



# Ecosemiotics

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## Definition and Scope

Ecosemiotics is a subfield of semiotics that studies sign processes related to and responsible for ecological phenomena (Maran and Kull 2014, p. 41). Ecosemiotics holds the view (similarly to biosemiotics, the study of the theoretical principles and evolution of signs processes in nature) that sign processes (semiosis) and meaning making are present beyond human culture in the biological world everywhere, from simple single-celled organisms to complex ecosystems. Ecosemiotics can study signs in nature in their own right, such as how different species make sense of the habitats they share, or how members of different species understand each other. However, ecosemiotics also brings an important shift in the study of human culture, which is surrounded by and immersed in the sign activities of numerous other life forms. Ecosemiotics thus studies human culture in terms of its relation to ecosystems: how cultural processes and artifacts understand, represent, and affect other life forms and their semiosis, how the disconnection between culture and ecosystems occurs, and what semiotic possibilities exist for restoring the connection.

The history of the discipline of ecosemiotics dates back to the mid-1990s, when the concept was first proposed by the German semiotician Winfried Nöth (1998). Earlier roots of the discipline are biosemiotics, German romantic biology (especially the works of Jakob von Uexküll), theoretical ecology in Russia, and Yuri Lotman's cultural semiotics. In the late 1990s and early 2000s, the theoretical foundations and research focus of ecosemiotics were debated. This period is characterized by contrasting proposals about the research program—should ecosemiotics primarily study: (1) meaning relations (signification) between biological organisms and their inanimate environment (as developed by Nöth and Almo Farina); (2) semiotic interactions between human culture and nature (Kalevi Kull, Alf Hornborg, Alfred K. Siewers); (3) semiotic aspects of ecological relations in ecosystems (Søren N. Nielsen).

In the following decades a new generation of authors—Morten Tønnessen, Riin Magnus, Timo Maran, Kadri Tüür, among others—was active in building syntheses between these different points of view. In the new millennium, ecosemiotics has also been tested in various practical research situations and case studies: on urban vegetation (Magnus and Remm 2018), zoological gardens, folk medicine, ecotourism (Tønnessen 2020), invasive species, and so on. Today, it could be argued that the strength of ecosemiotics lies precisely in the critical study of the sign processes in diverse ecological processes, incorporating the semiosis in biological organisms and human cultural meaning-making in the same

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framework. Ecosemiotics has also gained transdisciplinary reach through collaboration and exchange with various disciplines: ecology (especially systems ecology and landscape ecology), cultural anthropology, ecolinguistics, and ecocriticism. In recent years, ecosemiotics has also become increasingly interested in global ecological crisis and environmental degradation while retaining its characteristically broad perspective (Maran 2020a; Tønnessen 2020).

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## Conceptual Toolbox

Ecosemiotic research can focus on the semiotic potency of the environment, the attribution of meaning by various biological organisms, the semiotic processes that regulate ecosystem functioning, cultural representations of nature, the semiotic aspects of environmental problems, and the interrelationships among these topics. In order to effectively address such a broad range of topics, ecosemiotics has developed a set of conceptual tools and research methodologies through the contributions and collaboration of many authors active in the field.

Ecosemiotics sees the environment as semiotic and meaningful in many ways. Material environment has the potential to become meaningful through patterns, structures, processes, and properties or affordances (Gibson 1986). Different species attribute meanings to the environment according to their biological needs and subjective perceptual worlds or *Umwelten* (Uexküll 2010). In doing so, they also create subjective, meaning-based spatial mappings of their environment (*ecofields*, according to Farina and Belgrano 2004). In ecosystems, different species communicate with each other and exchange information. Thereby, ecological relationships such as symbiosis, parasitism, and predation are accompanied by semiotic connections between meaningful forms, recognition, and behavior (*semiotic interactions*, Hoffmeyer 2008, p. 189). These connections form the informational or communication layer in ecosystems (*semiotype*, according to Nielsen 2007, p. 98), which plays an important role in ecosystem functioning, stability, and resilience. Interspecies communication may also establish

shared sign conventions or *ecological codes* (such as alarm calls in birds or odors with shared meanings) that further contribute to ecosystem integration. Species inhabiting the same area may form stable communities (*consortia*, cf. Kull 2010) through semiotic bonds. Taken together, the many meaningful relationships among biological organisms and with the material world create a tense semiotic web of appearances, rhythms, colors, patterns, and movements that can be called the *semiotic ground* (Kohn 2013, p. 57–58). The semiotic ground is predominantly presymbolic, consisting of signs based on similarities (icons) and associations (indexes, traces). Human cultures have historically been rooted in this semiotic ground, e.g. through tacit and non-verbal knowledge, imitation, deixis, and folklore—a connection that today is becoming increasingly fragile and unstable.

Ecosemiotics also studies cultural texts, artifacts, symbols, and habits that in various ways represent or influence semiotic processes in nature. To cover the full complexity and potential of nature-culture relations, it is essential to consider these relations as diverse and multidimensional. In addition to the representational relationship, nature experiences can also inspire cultural creativity, be it mimetic and imitative, or have a complementary relationship (cultural texts and the environment intertwine or support each other). Several authors have critically observed that human symbolic conventions and sign systems can become too closed and abstract, in which case they become detached from environmental semiosis. In particular, highly symbolic monetary and economic systems (Hornborg 2001) and abstract semiotic models of nature (Kull's [1998] *third nature*) tend to dissolve or override the semiotic dynamics of ecosystems. As Kull critically acknowledges, replacing the richness of natural environments with material structures that embody human symbolic forms seems to be an inevitable outcome of human semiosis. This process can damage the semiotic activities of other species and their meaningful habitats, as described by Ivar Puura (2013, p. 152) under the concept of *semicide* or by Ronald Posner (2000) as *semiotic pollution*.

At the same time, cultural representations and environmental semiosis are not necessarily in

conflict—cultural texts can also function as mediators or guides to the natural world. Texts about nature can draw readers' attention to natural semiosis, carry the voices of nonhuman animals, express knowledge about sustainable practices, and reshape existing ecological practices. A supporting cultural strategy is *biotranslation* or *Umwelt translation* (Kull and Torop 2003), where representing nonhuman animals in culture begins with careful consideration of the role of meanings and expressions in the animal's *Umwelt*. Sometimes environmental agency becomes known to humans when it abruptly crosses the boundary of symbolic systems and enters cultural space. David Low (2008) has suggested calling such disturbances environmental *dissent* and analyzing them as necessary systemic corrections to runaway human symbolic systems. Today's severe climate events, massive wildfires, and zoonotic disease outbreaks point to the rise of such non-human or material semiotic agencies. Dissent analysis is particularly useful for understanding the temporal dynamics between cultural discourse and environmental agency. To study semiotic processes related to resilience and damage of nature-cultural systems, ecosemiotics has used *ecosemiosphere* as an umbrella concept to cover semiotic processes at different scales and complexities (Siewers 2011; Maran 2021). Ecosemiosphere encompasses different species, bodies, codes, niches, and viewpoints, and is thus inherently heterogeneous, rich in boundaries and asymmetries. Such a conceptualization makes the ecosemiosphere open to creative cultural practices (e.g. research, creation, co-creation) that can be used to bridge humans and other species in adapting to environmental change. The concepts introduced in this section form a complex conceptual toolbox that allows ecosemiotics to model and critically analyze many different semiotic processes in nature-culture systems.

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## Research Methods and Applications

In several areas, ecosemiotics has developed more detailed research methods, goals, and applications. A fundamental concern of the discipline is

to identify the meaning-making processes of other species and to make them perceptible for human cultural processes. Here, ecosemiotics can make use of *Umwelt* analysis (Uexküll 2010) as a systematic description of animal subjective worlds based on animal perception, physiology, behavior, and ecology. *Umwelt* analysis has been elaborated in various ways, such as describing interrelationships between the *Umwelten* of two or more species, between the *Umwelt* and the material environment, or mapping temporal and developmental changes in *Umwelten*. A systematic description of the landscape from the perspective of an animal is provided by ecofield analysis, which distinguishes *patches* with different meanings (such as nesting ecofield, foraging ecofield, guarding ecofield, etc., Farina and Belgrano 2004). Ecofields depend on the physical forms and structures of the landscape as well as on the perception and life functions of the respective species. The concept makes it possible to describe points of contact and conflicts between species, as well as their problems in recognizing environmental resources relevant to them (common in anthropogenic and rapidly changing environments). Farina has also combined methods of sound ecology (matrix recordings) with ecofield analysis to map the meaning structures of landscapes. Another elaboration is ecological repertoire analysis, which uses observational techniques to identify central motifs or themes of meaning based on observations in multispecies environments (Maran 2020b). Elaborations of *Umwelt* analysis have found practical application in issues of species conservation and extinction, management of invasive species, and human-animal conflicts.

Deciphering the meanings of properties in material environments (Gibson's affordances or meaning potentials) can help cities and other anthropogenic habitats to become more inclusive and sustainable. In a similar vein, Farina (2018) analyzes small rural farms as "rural sanctuaries," with the emphasis on affordances that humans provide to other species. The semiotic analysis of affordances (as in *Umwelt-based place analysis*, Maran et al. 2024) allows for the detection of potentials and properties of the shared environment in multispecies communities.

Existing positive affordances as well as barriers and lack of resources, are revealed from a multispecies perspective, including their aesthetic and creative potential. Other practical methods for making non-human interests and needs visible include *Umwelt*-based sensory exercises and storytelling. Such studies also allow for the creation of new affordances (such as nesting sites, passages, hiding places, wintering structures, drinking slots) through collaboration between researchers, designers, and local communities. The artifacts created are supportive of nonhumans while also creating a positive sense of place for human stakeholders (Herrmann-Pillath et al. 2023). The focus is on incorporating the voices of nonhuman species into human decision-making to create new habitats for nonhumans while supporting better connectivity and coherence in nature-culture systems.

Another prominent application of ecosemiotics lies in the analysis, critique, and promotion of cultural texts (literature, artworks, cultural symbols) with attention to their role in environmental crises, the representation of nature, and change towards more sustainable cultural habits and futures. Works of nature writing can be seen here as models of human relationships with the environment, both in terms of its history, present, and possible future. Specifically, the analysis may focus on questions such as: (1) what literary devices cultural texts use to represent nonhuman semiosis, communication, interests, and values; (2) how deep textual structures decode existing oppositions between humans and nature (e.g., through the use of extended metaphors, embodiment, immersion, etc.); (3) what narrative and rhetorical tools are used to problematize our current use of the environment and propose viable alternatives.

In addition to studying existing texts, ecosemiotics approaches culture as an everyday creative practice. Here, cultural creativity is seen as a method to become more attentive to non-humans and to change our existing human-centered habits. By working with artists and writers, ecosemiotics can combine principles of research creation, ecological knowledge, and semiotic modeling to propose literary and artistic works that carry more authentic and diverse meaningful connections to the nonhuman world. Finding artistic means to express nonhuman

*Umwelten*, using photography to discover urban multispecies aesthetics, or writing citizen letters from the perspective of other species to express their needs and values are some such exploratory and experimental applications.

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## Conclusion

What makes ecosemiotics unique among other environmental humanities disciplines is its ability to work with diverse forms of human and non-human meaning within a single analytical framework. All living organisms and ecosystems are regarded here as essentially meaning-based and meaningful. Such a stance allows ecosemiotics to observe meaning processes in different ecological settings and to document the loss of significance (or depth of meaning) as a result of the global environmental crisis. A robust set of conceptual and methodological tools makes ecosemiotics a practice-oriented discipline that is fit to alleviate emerging problems in our damaged nature-cultural systems.

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