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Author: Almo Farina

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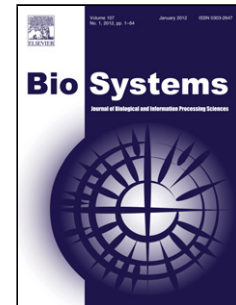
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Ecoacoustic Codes and Ecological Complexity

Almo Farina

Department of Pure and Applied Sciences

Urbino University

Urbino, Italy

Abstract

Multi-layer communication and sensing network assures the exchange of relevant information between animals and their umwelten, imparting complexity to the ecological systems.

Individual soniferous species, the acoustic community, and soundscape are the three main operational levels that comprise this multi-layer network. Acoustic adaptation and acoustic niche are two more important mechanisms that regulate the acoustic performances at the first level while the acoustic community model explains the complexity of the interspecific acoustic network at the second level. Acoustic habitat and ecoacoustic events are two of the most relevant mechanisms that operate at the third level.

The exchange of ecoacoustic information on each of these levels is assured by ecoacoustic codes. At the level of individual soniferous species, a dyadic intraspecific exchange of information is established between an emitter and a receiver. Ecoacoustic codes discriminate, identify, and label specific signals that pertain to the theme, variation, motif repetition, and intensity of signals.

At the acoustic community level, a voluntarily or involuntarily communication is established between networks of interspecific emitters and receivers. Ecoacoustic codes at this level transmit information (e.g., recognition of predators, location of food sources, availability and location of refuges) between one species and the acoustically interacting community and impart cohesion to interspecific assemblages.

At the soundscape level, acoustic information is transferred from a mosaic of geophonies, biophonies, and technophonies to different species that discriminate meaningful ecoacoustic events and their temporal dynamics during habitat selection processes. Ecoacoustic codes at this level operate on a limited set of signals from the environmental acoustic dynamic that are heterogeneous in time and space, and these codes are interpreted differently according to the species during habitat selection and the completion of phenological cycles.

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