

## Ecological Networks: From Structural Analysis to Synchronization

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**Abstract :** Ecological systems are exposed and are influenced by various natural and anthropogenic disturbances. They produce various effects and states seeking response symmetry to a state of global phase coherence or stability and balance of their food webs. This research project addresses the development of a computational methodology for modeling plankton food webs. The use of algorithms to establish connections, the generation of representative fuzzy multigraphs and application of technical analysis of complex networks provide a set of tools for defining, analyzing and evaluating community structure of coastal aquatic ecosystems, beyond the estimate of possible external impacts to the networks. Thus, this study aims to develop computational systems and data models to assess how these ecological networks are structurally and functionally organized, to analyze the types and degree of compartmentalization and synchronization between oscillatory and interconnected elements network and the influence of disturbances on the overall pattern of rhythmicity of the system.

**Keywords :** ecological networks, plankton food webs, fuzzy multigraphs, dynamic of networks

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