

Evaluation of the ecological integrity and ecosystem health of three benthic networks influenced by coastal upwelling in the northern Chile

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The ecological health of ecosystems relates to the maintenance or restoration of optimal system function when confronted with a disturbance. A healthy ecosystem is a prerequisite for ecological sustainability. Ecological integrity has been defined as an emergent property of ecosystems that is greatest when all the components of a system that should be there based on the energy signature received by the ecosystem are there, and ecosystem health as the state in which all of the processes operating within the complete system of components are functioning at the optimum efficiency for maximum empower. Other scientists have suggested evaluating ecological health through changes in the energy, empower, and transformity of different biotic and abiotic elements of ecosystems. The coastal area of northern Chile is characterized by waters rich in nutrients and of low oxygen concentration derived from coastal upwelling; and, in recent years, health assessments of the benthic systems in Mejillones, Antofagasta and Tongoy Bays have been made using systemic analysis of networks and information. However, the perspective of Energy Systems Theory and Emergy Analysis have not been used to assess the health status of benthic ecosystems. Following this approach, we evaluated the changes in the structure, organization and functional capacity of local systems caused by fishing and industrial activities. Benthic ecosystem responses to perturbation were evaluated in terms of changes in available energy flows, empower, and transformity in the network of three benthic ecological systems (Mejillones, Antofagasta and Tongoy Bays). In addition, the resilience of commercially important resources in response to disturbances (i.e., increased fishing and industrial activities) was assessed by means of energy analysis and simulation models of the health of these benthic ecosystems.

Poster.