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Ecosystems

January 2003, Volume 6, Issue 1, pp 0087-0098

Mobile Link Organisms and Ecosystem Functioning: Implications for Ecosystem Resilience and Management

Abstract

Current natural resource management seldom takes the ecosystem functions performed by organisms that move between systems into consideration. Organisms that actively move in the landscape and connect habitats in space and time are here termed “mobile links.” They are essential components in the dynamics of ecosystem development and ecosystem resilience (that is, buffer capacity and opportunity for reorganization) that provide ecological memory (that is, sources for reorganization after disturbance). We investigated the effects of such mobile links on ecosystem functions in aquatic as well as terrestrial environments. We identify three main functional categories: resource, genetic, and process linkers and suggest that the diversity within functional groups of mobile links is a central component of ecosystem resilience. As the planet becomes increasingly dominated by humans, the magnitude, frequency, timing, spatial extent, rate, and quality of such organism-mediated linkages are being altered. We argue that global environmental change can lead to (a) the decline of essential links in functional groups providing pollination, seed dispersal, and pest control; (b) the linking of previously disconnected areas, for example, the spread of vector-borne diseases and invasive species; and (c) the potential for existing links to become carriers of toxic substances, such as persistent organic compounds. We conclude that knowledge of interspatial exchange via mobile links needs to be incorporated into management and policy-making decisions in order to maintain ecosystem resilience and hence secure the capacity of ecosystems to supply the goods and services essential to society.

Received 23 April 2001; accepted 17 June 2002.



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Title

Mobile Link Organisms and Ecosystem Functioning: Implications for Ecosystem Resilience and Management

Journal

Ecosystems

Volume 6, Issue 1 , pp 0087-0098

Cover Date

2003-01-01

DOI

10.1007/s10021-002-0150-4

Print ISSN

1432-9840

Publisher

Springer-Verlag

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Keywords

- Key words: mobile links; ecosystem functioning; global environmental change; ecosystem services; ecological memory; biodiversity; functional groups; resilience; management; invasive species.

Industry Sectors

- Energy, Utilities & Environment

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