Scale mismatches in social-ecological systems

They happen when the scale of an ecological process differs from the scale of the social organization linked to the decision-making processes. This can lead to disruptions in some function of the social-ecological systems, inefficiencies or loss of significant system components. Understanding the different types of disagreement, their causes and strategies for overcoming them is key in the management and care of social-ecological systems.

Photo: Hugo Inda

Scale is a way of organizing the understanding of the world and its interrelationships. The biogeophysical scale on which events occur must be differentiated from the scale considered as a unit of analysis.

The concept of scale transcends disciplinary boundaries. While in ecology and geography it usually refers to the spatial and temporal dimension, in sociology this concept includes ideas about representation and organization. The temporal and spatial dimensions determine the context of social-ecological interactions, which can be affected and also influence human beings.

Some of the problems arising from ecosystem management are due to mismatches between the scale of environmental governance and the dynamics of the ecosystem considered.

An example of temporal mismatch is the management of long living but slow-breeding species, such as oaks or elephants. These require consistent, long-term policies that are difficult to align with five or six-year electoral or administrative periods.

Key references

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At the other end is the need for providing a rapid response to unexpected events with potentially serious consequences in the short term, such as the introduction of invasive species into a given ecosystem.

Spatial mismatches are very common when administrative and political boundaries do not match with ecosystem processes and interactions between ecosystems. The emergence of integrated water resource management and the incorporation of the river basin as a unit of analysis in the care and management of inland water ecosystems was an example of overcoming this type of discrepancy in the late 1970s.

Deforestation in the Amazon can cause alterations in the climate system which may take a long time to become apparent and affect faraway territories. A significant portion of these temporal or spatial mismatches are not identified and therefore not understood.

For example, there will be a functional disagreement when a city grows and consequently the need for drinking water increases exceeding the ability of ecosystems to provide sufficient good quality water.

These multiple challenges require social learning at various levels, as well as the development of a flexible institutional structure, with the ability to be reorganized after disturbances and respond to changes in social-ecological systems. In this context, an adequate interaction between different government areas, at national, regional and global level, is key.

Additional suggested reading

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