Adaptive capacity

Refers to the capacity of a system to modify its response or functioning (operation mode) in the face of external changes or changes in its internal dynamics. Adaptive capacity implies a diverse set of attributes linked to learning capacities, innovation, anticipation, and the interaction of different knowledge systems.

Foto: Hugo Inda

Social-ecological systems are dynamic and subjected to constant changes, as a consequence of shocks and perturbations or changes in their internal dynamics.

The adaptive capacity of ecological systems is related to the variety of species (including genetic diversity) and functional diversity. The latter is related to the roles or functions of the organisms within the structure and functioning of the ecosystems they are part of. Having all fundamental roles available is key, as well as securing an adequate redundancy, which means that different species can adopt the same role or function.
In social systems, individuals, institutions and the networks of actors and agents are the ones who can learn and accumulate knowledge and experience, allowing flexibility during problem-solving thus keeping a balance among the different stakeholders.

We live in the Anthropocene, an era in which ecosystems are affected in a myriad ways by human activities which depend, at the same time, on the services they provide. In an interconnected world, multiple changes happen simultaneously as they interact and frequently result in unknown consequences. In such context of constant change and uncertainty, adaptive capacity plays a key role.

Key References

Biggs, R., Schlüter, M., Schoon, M.L., eds. (2015). Principles for building resilience. Sustaining ecosystem services in social-ecological systems. Cambridge: Cambridge University Press.

Chapin III, F.S., Carpenter, S.R., Kofinas, G. P., Folke, C., Abel, N., Clark, W.C., Olsson, P., Stafford Smith, D.M., Walker, B.H., Young, O.R., Berkes, F., Biggs, R., Grove, J.M., Naylor, R.L., Pinkerton, E., Steffen, W., Swanson F.J. (2010). Ecosystem stewardship: sustainability strategies for a rapidly changing planet. Trends in Ecology and Evolution, 25, 241-249.

In social-ecological systems, decision-making processes include a considerable level of uncertainty which determine the processes of learning by doing. The capacity for learning and memory are fundamental to improve our knowledge, the early detection of failures and errors, and the promotion of processes of continuous adjustment and improvement.

Consequently, it is important to identify the critical elements that are required when trying to maintain the adaptive capacity of a social-ecological system:

• learning to live with change and uncertainty;

• nurturing diversity for resilience;

• combining different types of knowledge for learning; and

• creating opportunities for self-organization towards social-ecological sustainability.

Additional suggested readings

Gunderson, L.H., and Holling, C.S., eds. (2002). Panarchy. Washington, D.C.: Island Press.

Mazzeo N., Zurbriggen, C., Trimble, M., Bianchi, P., Gadino, I., Steffen, M. (2017). Sostenibilidad ambiental del Uruguay: aportes desde el pensamiento resiliente. Bella Vista (Uruguay): South American Institute for Resilience and Sustainability Studies (SARAS).