Resilience and Interdisciplinary research

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Abstract

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In its 20 years anniversary, Nature Science Society – Dialogue association (NSS-D, France) balance some advances on interdisciplinary research, and what stay to be explored. They think common definitions are now well accepted: a-disciplinarity, mono-, pluri-, inter-, trans-disciplinarity and " Indisciplines " . Different kinds of dialogues and relations between disciplines have been experimented, in interdisciplinary teams and projects (mainly published in NSS review and Indisciplines collection), from field studies and stories of how interdisciplinary research has been managed, said by the same protagonists, to theoretical research with the contribution of philosophy of science and epistemology. There are several ways to practice interdisciplinarity; it is time to valorize the abundant empirical case studies to think more theoretically, a necessary path to transmit our experience and teach interdisciplinarity to the young generations.

The recognition of human and natural processes, as not separate but integrated into socio-ecological systems, has driven a need for greater interdisciplinary research. IIS researcher from the Netherlands explores the origin and development of interdisciplinarity and focus on the different ways knowledge is integrated in interdisciplinary exchange. They propose a model for interdisciplinary research on socio-ecological change, tested with students, as a step-by-step approach: problem definition, identification of relevant disciplines and integration of disciplinary insights. Integrating knowledge is the challenge of socio-ecological systems transformation.

Philosophers from Lund University (Suède) discuss the potential of the resilience concept for bridging and/or unifying disciplines in both ecological and social systems. How is the concept of resilience supposed to bridge or to unify disciplines, from a philosophy of science perspective? Many different underlying structures may give rise to a resilient behavior. The project of conceptual unification, clarifying its meaning and predicaments, does not imply a methodologically coherent empirical project. Studying resilience in the field needs a range of different methods, tools, and techniques. Methodological unification depends ultimately on the constitution of the studied systems and not only on the success of the project of conceptual unification. French researchers from NSS-D propose to use the resilience concept...
as a dynamic concept, post trending to equilibrium and precursor of viability, "the capacity of society to change the system’s state variables when current trajectories become untenable”.

More than integration, hybridization or fusion of knowledge, French researchers propose dialogue between societies and natures as the key-point in socio-ecological systems. To facilitate this dialogue, they experiment the role of information sciences (statistic, computer science and mathematics), representing in a simplify way, with a logic or computer language, the different knowledge of each discipline invited, and combining them. This may be another way to explore what kind of interaction is involved in interdisciplinary research.

Colleagues from several South African institutions propose a transdisciplinary approach to research because it provides a mechanism for addressing social-ecological complexity, fragmentation of knowledge, acknowledging local contexts and incorporating multi-stakeholder perspectives and values (with researchers, managers, planners, policy makers and stakeholders). Social learning and co-production of knowledge are more productive and interactive than following an "implementation manual”. They use a set of principles as heuristics, arranged along three questions: (a) who to learn with, (b) what to learn about, (c) how to learn. Transdisciplinary learning may require skilled facilitation and the use of knowledge intermediaries, while systems transformations may depend on how well we can design and maintain inclusive learning processes.

All of these proposals are clearly involved in how to improve interdisciplinary research on socio-ecological systems by a resilience conceptual approach. They call for a better link between methodological, experimental and theoretical interdisciplinary framework to be able to transform institutions and societies.

**Keywords:** Interdisciplinary, Modeling, Socio, Ecological Systems, Learning, Local Knowledge, Transformation