

Territorial ecology: economic dynamics of territories through socioecological interactions, application to a French mountain village

Summary (105 words)

Borrowing ecological principles and concepts, territorial ecology proposes to analyze the territorial (regional) dynamics and trajectories by describing the circulation of material and energy flows between human societies and the biosphere. This presentation focuses on the generation of physical, economic, social and cultural wealth through socio-ecological interactions. In order to analyze the way wealth is engendered at a local scale, a methodology has been developed and applied to Aussois, an alpine village in Savoie (France). Material and energy flow analysis combined to an analysis of the local actors' system questions the territorial capability (ability to achieve territorial development) and resilience (ability to adapt to change).

Extended abstract (760 words)

Territorial ecology studies socio-ecological interactions, taking place within a geographical area (Barles, 2010). Borrowing ecological principles and concepts, it proposes to analyze the territorial (regional) dynamics and trajectories by focusing on the circulation of material and energy flows between human societies and the biosphere (Buclet and Barles, 2013). Socioecological metabolism aims at understanding the inputs, outputs and stocks embedding the territorial system. Through socio-ecological metabolism, territorial ecology highlights interaction and retroaction processes occurring among human activities, as well as between human activities and their biogeochemical environment. This presentation focuses on the generation of physical, economic, social and cultural wealth through socio-ecological interactions. Wealth is considered as a given and a construct (Kébir and Crévoisier, 2004): as a given, wealth depends on the biogeochemical resources of the environment. As a construct, it relies on the capacity of human societies to extract and transform these resources and convert them as a potential for their development. Given resources become wealth when human societies reveal and shape their potentiality, their utility and their value (Gumuchian and Pecqueur, 2007). Territorial ecology thus focuses on ecosystem services, land use, landscapes and resource management, among others.

In order to analyze the generation of territorial wealth through socio-ecological interactions, a methodology has been developed and applied to Aussois, an alpine village in Savoie (France). Adopting a systemic approach, territorial wealth generation subsystems are defined on the basis of human time use that appears to be a determining dimension of socio-ecological interactions. It corresponds to the structure of activities and employment that are crucial factors influencing land use types and intensity, transformation of land cover and impacts on the environment (Ohl *et al.*, 2007). In Aussois, four wealth generation subsystems have thus been identified: agricultural subsystem, hydroelectric subsystem, touristic subsystem, but also residential subsystem (people living in Aussois without working here: commuters, retired, out of work...). Each wealth generation subsystem is analyzed from a socio-ecological perspective, focusing on resource units, resource system, users (or actors) and governance system (Ostrom, 2009). Resources in terms of material and energy flows, incomes as well as tangible and intangible

heritage are accounted and assessed in view of their positive or negative effects on the territorial wealth generation. Retroactive effects are also considered. The system of local actors is observed in terms of physical, organizational and institutional proximity of stakeholders. Actors' interactions are characterized through individual rationale for action in terms of power, legitimacy and interest (Brullot, 2009; Brullot *et al.*, 2014). The mapping of actors' interactions allows, *in fine*, to understand the individual and collective capability (Sen, 1999; Rauschmeyer, Omann, Frühmann, 2011, Solava, 2006).

Results of this territorial ecology analysis enhance the understanding of the generation of physical, economic, social and cultural wealth in view of socio-ecological interactions, in a given geographical area. For instance, in Aussois, it enables to understand the dynamics and evolution of the agricultural subsystem's wealth generation. Mainly based on extensive forms of stock farming such as the breeding of dairy cattle for Beaufort cheese production, it appears as a structuring component of the territorial wealth generation. If, until the mid XXth century, the agricultural subsystem appeared as a relatively closed system (mainly depending on local resources and maintained through numerous retroactions), since 1950, the multiplication of outdoor interactions led the agricultural subsystem to a greater dependency, questioning its capacity to maintain its capability and resilience. The progressive organization of local stakeholders in a process of certification is thus analyzed as a collective process for the sustainability of high mountain agriculture.

However, these subsystems deliver a partial view of the territorial system as a whole. Being densely embedded, interconnected and interdependent, they need to be articulated within a territorial system of wealth generation. In analogy with biological ecosystems, territorial subsystems demonstrate several types of interactions or symbioses, which effects can be positive and / or negative. We borrow the concepts of mutualism, commensalism and parasitism to describe the symbiosis between the different subsystems designing the territorial system. This intertwining of subsystems offers a systemic vision of the territorial capability, understood as the ability of local stakeholders to find and seize material and immaterial resources to develop their territory. In interaction with their environment, local societies maintain and develop each subsystem taken independently as well as territorial system as a whole, by creating wealth interactions in which these components fit together. Territorial ecology intent providing a systemic view of wealth generation in which the territorial wealth is seen as wealth produced both from natural resources available in the environment and resources built by individual and collective learning of human societies.

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