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Editorial: On combining approaches for studying socio-environmental dynamics over rural-urban ecosystems on Mediterranean shores

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Editorial on the Research Topic

[On combining approaches for studying socio-environmental dynamics over rural-urban ecosystems on Mediterranean shores](#)

“There is nothing more practical than a good theory.” Kurt Lewin.

Analyzing complex socio-ecosystems imply formalizing approaches that integrate a wide range of factors, both qualitative and quantitative, to understand the interactions that characterize these systems. These interdisciplinary approaches should formally harmonize numerous and diverse factors and explore in a non-deterministic way their relationships which, thanks to their versatility, can be applied to a wide range of situations.

The development of such approaches requires a meticulous selection of relevant qualitative and quantitative variables, enumerating, describing, evaluating, monitoring, and combining them to extract significant trends, dynamics and breaks, including those related to the behavior of the complex systems under consideration. Usually, biophysical dynamics are easier to apprehend and the magnitudes of errors can be explained and managed more easily, tending to give priority to environmental factors while working on ecological models. However, most ecosystems on the planet are now actually socio-ecosystems where human induces and drives emergent dynamics and this cannot be ignored. Using the metaphor of an arm, social factors can be seen as the nerve of human actions, while quantitative factors are the muscles, which determine the power and weight of each arm and the dynamics they can infuse.

The scientific community may acknowledge the importance of interdisciplinary approaches and the integration of anthropogenic factors, especially in environmental issues where humans are altogether the main actors and transformers, and sometimes solvers. For instance, numerous studies indicate that anthropological and by then anthropogenic factors such as power, reputation, family and inheritance rules (Tillion, 1966; Todd, 2011) can drastically affect the environment. It is however difficult to answer where and how to place sociological and anthropological questions and parameters, especially, and often, where they can only be described qualitatively. We know intuitively that they “drive” along with other more quantitative variables, but how to explicit it.

However, many pleas for such approaches regarding socio-ecological systems have been assessed and they are yet to be applied and generalized. Indeed, they do face a lot of constraints, both practical, formal, conceptual and even institutional obstacles even if the “Nobel” prize of economy of [Ostrom \(2009\)](#) has “sanctified their values, by highlighted the importance of considering both socio-economic and biophysical aspects in the study of complex systems. Worse, if concerning those located on the Mediterranean shores, they have to deal with an even greater complexity: those that are so ancient that it is difficult to separate human factors from environmental ones, both historically and practically. The Mediterranean shores are, with those of the dry rivers (Mesopotamia, Egypt, Indus), the oldest in the world to have been cultivated, colonized, transformed, governed and devastated.

As a result, we consider them to be among the most affected by future global and local changes: along with global warming that will affect rainfall and water availability, the demographic transitions to be achieved, the global expansions of urban daily lifestyles, rentals, industrializations and urbanizations will hit the current socio-ecosystems. These ones, historically structured in a radial city-hinterland scheme, are rapidly evolving and are unique in testing interdisciplinary approaches to their limits, where over- and underestimates can have enormous political and social repercussions. As a result, they may be considered as the ultimate challenges for interdisciplinary approaches to be proposed, settled, constructed, accepted and used, which explains why many prospective attempts fail to predict future trajectories.

Once we acknowledge the importance of these complex reconstitutions and the difficulty of attempting such interdisciplinary works, we should as a result tend to support methodological attempts for such proposals, within their environmental, institutional, social and economic contexts, Urban and rural Mediterranean shore systems, which have been shaped by millennia of human interaction with the environment. Four articles are included in this special issue, each dealing with the complexity of socio-ecological systems on southern Mediterranean countries and on building methods relating to the connections of cities with various vital components of the territory, with the aim of exploring and presenting existing approaches combining socio-economic elements, including qualitative ones, and agro-biophysical formalizations:

1. The article by [Hamrita et al.](#) deals with Mediterranean periurban agro-food systems, studying the specific case of periurban agricultural systems around the city of Sousse in Tunisia, threatened by urban pressure in a context of regulation declines and other environmental and social threats, of which climate change, food security and sustainable development are the most important. The authors used a specific Landscape Character Assessment methodology to assess both the threats and the assets of such a landscape, a mostly traditional olive groves predominating polyculture family-based farming model and a family system;
2. [Kassouk et al.](#) highlight the growing constraints of coastal cities in southern Mediterranean countries and, in their case, the city of Kelibia (Tunisia), which is expanding at the expense of the most productive farmland. The assessment and quantification of urban growth over land was carried

out using remote sensing analysis of Pleiades images and a comparison of different methods of analysis, resulting in a dramatic increase of urban areas over crops, but also over the sea and rivers, in just 4 years, which raises many questions about public awareness, law enforcement, scientific monitoring and by then environmental sustainability in the region;

3. Mines are the subject of [Saqalli et al.](#) who show the importance of the connections of such infrastructure to increasingly distant cities and centers of power. All of them have a significant environmental impact, especially since the French colonial expansions of industrial origin on the Mediterranean coasts, with abandoned mines and slag heaps still visible in those places. Comparing Mediterranean mountain mines and agrosilvopastoral sites in Morocco, France and Tunisia, the authors show how exploitation rights, investments and profits depended on the connection between the expanding military power of the 19th century, the economic decision-makers of the cities progressively further afield to the colonial capital of Paris, and the ability to avoid the consequences of abandoning the mining settlement, highlighting the influence of colonial history and political decisions on the distribution of mines and their environmental impacts in the Mediterranean region;
4. Finally, the last article compares the accumulated experience of different interdisciplinary research projects that attempt, and mostly fail, to jointly combine environmental and social issues related to rural, periurban, and urban environments within and between national environmental research communities in the southern Mediterranean, comparing different interdisciplinary research projects in Algeria, France, Lebanon, Morocco, and Tunisia in which they highlight the need to overcome structural social, institutional, economic and political challenges in order to achieve effective collaboration between researchers, from which funding cuttings and versatility, administrative and social hierarchy and lack of connection to stakeholders are prominent. While these projects may face difficulties, they also offer opportunities to develop sustainable metrics, methods and procedures to address socio-environmental challenges in the Mediterranean region.

The scope of this Research Topic was then to explore and present existing approaches combining socio-economic elements, even qualitative ones and agro-biophysical formalizations, dedicated to the evaluation of the various and fast-growing socio-environmental constraints on Mediterranean shores where urban and rural areas are environmentally intricate and stressed.

Author contributions

MSaq: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. MSae: Writing – review & editing, Writing – original draft, Visualization,

Validation. GM: Writing – review & editing, Writing – original draft. that could be construed as a potential conflict of interest.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships

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