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# Editorial: Integrating physical and social sciences towards the sustainable development goals

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## KEYWORDS

disaster and climate risk reduction, complex network, sdg, wildfires and management scenarios, floods, epidemiology

## Editorial on the Research Topic

### Integrating physical and social sciences towards the sustainable development goals

Social physics provides a theoretical framework for comprehending collective social phenomena that arise from interactions between individuals, groups, and governments. The pressing Research Topic of safeguarding natural resources for future generations and investigating the impact of climate change are particularly important within this field. These challenges are especially pertinent to the study of Social Physics.

In the Research Topic/special issue “*Integrating Physical and Social Sciences towards the Sustainable Development Goals*”, we, Santos et al. the Research Topic Coordinator, invited multidisciplinary teams to submit papers addressing the Sustainable Development Goals on both physical and social perspectives, especially in integrating them.

In “*Sustainability assessment of Cerrado and Caatinga biomes in Brazil: A proposal for collaborative index construction in the context of the 2030 Agenda and the Water-Energy-Food Nexus*”, Arcoverde et al. develop a quantitative-collaborative methodology for constructing indicators and indexes for the sustainability of two Brazilian biomes: Cerrado and Caatinga. They found that in areas of better average nexus performance, there is also greater inequality between nexus dimensions—penalizing the Nexus overall index.

In “*Renewable sources to promote wellbeing in poor regions of Brazil*”, Nascimento Filho et al. analyze the features of the energy matrix suitable and match optimal points for the implementation of micro-electric power plants for generation, distribution, and storage from renewable energy sources, for the municipalities in the State of Bahia. The paper discusses the SDGs, among which are affordable and clean energy (SDG7), sustainable cities and communities (SDG11), and action against climate change (SDG13). They develop a model to map the potential of micro- and mini-energy generation in the grid.

In “*Network analysis of spreading of dengue, Zika, and chikungunya in the state of Bahia based on notified, confirmed, and discarded cases*”, Santos et al. build functional networks from epidemiological time series, considering Brazilian data of Dengue, Zika, and Chikungunya as a case study. They compare the networks formed with confirmed and discarded cases and verify the cross-relationship of the networks’ metrics. Their finding

corroborates that Dengue and Zika diseases are caused by closely related flaviviruses, different from Chikungunya, which comes from a togavirus.

In “*Fire exposure index as a tool for guiding prevention and management*”, Freitas et al. analyze environmental and land management data to construct a Fire Exposure Index (FEI) and identify the pressure exerted on two Brazilian Sustainable Use Reserves. The index has four dimensions: fire, landscape, climate, and territorial management. The additional format of communicating the results of this research to society and decision-makers is conceived as a dashboard.

In “*Vulnerability analysis in Complex Networks under a Flood Risk Reduction point of view*”, Santos et al. present a formulation for a vulnerability index based on the efficiencies of the system of networks, applied to a case study in Santa Catarina (Brazil). It aims to locate the most vulnerable links in a transportation network and assess whether these links are susceptible to hazards and disruptions. The paper discusses the 2030 Agenda for Sustainable Development related to Infrastructures, Intelligent Cities, and Climate, particularly SDGs 9, 11, and 13. They produce a map considering the index and areas susceptible to urban floods and landslides, using the (geo) graph approach.

In “*Perturbation analysis of the rank-size rule for municipalities squeezed in a prefecture: Effects of the archipelagoes, rapidly increasing rural depopulation, ethnic minority issues, and future sea-level rise due to global warming*”, Hayata performs a perturbation analysis of the rank-size rule for municipalities squeezed in Japanese prefectures. He focuses on the effects of the archipelagoes, municipal consolidations, and coastal inundations due to future sea-level rise and observes the emergence of a self-organized process. The results for the mainland and territorial islands suggest that historical interactions over a long period become a key factor in enhancing the statistical rule.

Finally, in this call, the acceptance rate was approximately 55%, and it took 70 days between submission and acceptance, on average.

There were approximately 50 authors, 53% men and 47% women from six countries.

We thank the Associated Editor, Prof. Gaogao Dong (Jiangsu University, China), for his support in one of the papers.

Also, we want to thank the reviewers for their detailed and agile work. Reviewers were from different countries: Argentina, Brazil, China, the United Kingdom, and the United States. We also want to thank Alex Perkins, Arthur Valencio, Derick Quintino, Hugo Saba, Kazuya Hayata, Lucia Calderon Pacheco, Marcus Fernandes Da Silva, Meiry S. Sakamoto, Sabrina Camargo, Thais Michele Rosan, Vander Freitas, Yasuko Kawahata.

## Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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