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Editorial

Dynamic Landscape Connectivity Special Issue Editorial

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Until fairly recently, the majority of landscape connectivity analyses have considered connectivity as a static landscape feature, despite the widespread recognition that landscapes and the abiotic and biotic processes that influence them are dynamic. With the advent of new analytical techniques and the increasing availability of time-series data to characterize landscape dynamics, more connectivity analyses are addressing dynamics in landscapes that can arise from changes in environmental conditions, the planning environment, and social-ecological systems. Inspired by a symposium at the 2019 annual meeting of The Wildlife Society focused on dynamic connectivity, this Special Issue of Land calls attention to the importance of landscape dynamics for characterizing, planning for, and maintaining connectivity. The Special Issue reviews the state of dynamic connectivity science [1] and presents current applications of dynamic connectivity in landscapes around the world.

The articles in the Issue focus on innovative analyses to assess structural and functional connectivity, including an overview of the current state of dynamic connectivity and empirical applications that can inform adaptive planning for connectivity from both landscape and species perspectives. The contributions to this Issue evaluate the influence of spatial and temporal dynamics on connectivity in response to seasonal [2], interannual, or decadal climate changes [3,4] as well as changes in conservation and development status [5]. One article focuses on the application of recent advances in Circuitscape modeling that can be used to adopt dynamic approaches for assessing connectivity in support of adaptive planning for connectivity over time [6]. The Issue also explores collaborative partnerships between scientists and stakeholders to develop, interpret, and enact effective dynamic connectivity plans, and, most importantly, develop implementation priorities and strategies [7].

Whether in support of the conservation of tigers in Southeast Asia [8], creating sustainable landscapes to support multiple species in chaparral of Southern California [3,5], seasonal changes in connectivity for bears in Massachusetts [2], watershed connectivity in the Upper Yellow River, China [9], establishing a landscape connectivity network in Northern California [4,7], or using social-ecological networks to support connectivity in urban landscapes [10], the innovative research from the contributing authors in the Special Issue highlights how landscape dynamics are essential to understand connectivity. These articles all emphasize how a failure to translate dynamics in connectivity science to planning efforts can impede our ability to effectively protect connected landscapes now and under future conditions.

One important intersection in connectivity science that the articles in the Special Issue explore is the integration of climate change within the connectivity framework, whether at seasonal, interannual or decadal scales. The integration of climate projections into connectivity assessments demonstrates how dynamic connectivity models can increase

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understanding of temporal changes in connectivity across space and time and support climate-wise connectivity planning.

Another critical theme of the Special Issue was the need for collaborative partnerships to develop, interpret and enact effective connectivity plans. Collaborations between ecologists and computer scientists led to the development of the Circuitscape tool, widely used in connectivity assessments, and have continued to support the evolution of this tool to meet user needs to address dynamic problems in connectivity science [6]. Collaborative partnerships between scientists and stakeholders were recognized as essential to shape objectives of connectivity planning, provide and contextualize data to be used in the analyses, inform and improve analytical methods, and, most importantly, develop implementation priorities and strategies [7]. This collaborative approach is central to operationalize and prioritize connectivity in landscapes that are experiencing climate, land-use and other change.

What the articles in this Special Issue demonstrate clearly is the need to account for connectivity dynamics and specifically, the importance of including dynamism in connectivity models and assessments. Although there are unique challenges that accompany the adoption of dynamic connectivity assessments for conservation management and planning in the context of traditional conservation prioritization approaches, what this body of research evidences is that with the increased availability of temporal and spatial climate and species movement data, computational capacity, and an expanding number of empirical examples in the literature, incorporating dynamic processes into connectivity models is an intrinsic component of connectivity and integral to the future of connectivity science.

Conflicts of Interest: The authors declare no conflict of interest.

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