



Séminaire conjoint / Joint Seminar CIRRELT - Département GOL de HEC Montréal

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SPATIAL OPTIMIZATION MODELS AND ALGORITHMS FOR CONSERVATION PLANNING

Abstract: Biodiversity is rapidly declining due to habitat loss, landscape degradation, environmental change, and human activities, making the protection of natural areas essential for maintaining ecological balance. This talk presents mathematical programming formulations for the design of nature reserves and ecological corridors, using mixed-integer programming to induce key spatial properties in conserved areas such as connectivity, compactness, and continuity. We develop and implement solution approaches based on branch-and-cut, valid inequalities, warm starts, spatial decomposition, and local search, and evaluate their performance on both real-world and synthetic landscapes. The results demonstrate substantial reductions in solution time relative to baseline MIP formulations. The talk concludes with an overview of ongoing work on ecological corridor design models that integrate spatial structure with species population dynamics.

Biography: Jorge A. Sefair is an Associate Professor in the Department of Industrial and Systems Engineering at the University of Florida, where he also serves as Associate Chair for Graduate Studies and Associate Director of the Center for Applied Optimization. His research focuses on network optimization, multistage optimization, and integer programming, with particular emphasis on applications of operations research in environmental planning, public policy, and service systems. His work is highly interdisciplinary, with publications coauthored with scholars in civil engineering, public health, ecology, biology, and economics. His research has appeared in leading journals, including INFORMS Journal on Computing, European Journal of Operational Research, Annals of Operations Research, IISE Transactions, Networks, Naval Research Logistics, and Omega, among others. His work has been supported by the National Science Foundation, the Office of Naval Research, the Department of Homeland Security, and other federal and private organizations. Dr. Sefair is also the recipient of an NSF CAREER Award in Operations Engineering (2021).

JEUDI / THURSDAY
30 AVRIL / APRIL 30TH
10h30 – 12h00

HEC Montréal
Édifice Côte-Sainte-Catherine
Salle Associations étudiantes
(1^{er} étage – section verte)

Responsable / Organizer:
Jorge Mendoza