

Università di Brescia

RESEARCH SEMINAR

ITAGREEN MRIO: Towards a Multiscale Ecological Macroeconomic Model

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Room A6, Santa Chiara Building

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Abstract:

This study presents ITAGREEN-MRIO, a novel Multi-Spatial Integrated Assessment Model (MS-IAM) developed to explore the socio-economic impacts of climate change in Italy within the context of sustainability transitions. Rooted in Ecological Macroeconomics, the model is built on a modular system dynamics framework and extended to capture spatial heterogeneity across five macro-regions. Its design enables the analysis of complex socio-economic and ecological dynamics under alternative techno-climatic scenarios, with particular attention to the propagation of regional shocks and their aggregation at the national scale. The main methodological contribution lies in the explicit incorporation of a multi-regional input–output structure, region-specific household consumption, and spatially heterogeneous climate damage impacts. This configuration provides a detailed representation of how climate-induced productivity shocks affect intermediate goods flows, household demand, and value added across regions and sectors. The results show that neglecting regional heterogeneity leads to a systematic underestimation of long-run aggregate losses, as climate shocks propagate unevenly through interregional production networks and are amplified by regions with strong manufacturing centrality. The analysis further highlights the interaction between endogenous technological change and climate damages. While innovation supports output growth, it does not fully offset productivity losses and may amplify resource pressures through increased intermediate input requirements. Overall, ITAGREEN-MRIO provides a spatially explicit framework capable of capturing the intertwined economic, technological, and ecological dimensions of climate impacts, offering a robust tool for regionally informed policy design.