



January 8, 2024

Modern Causal Inference Creating a Gestalt Switch in the Science of Forests and Floods

I.J. Good (a Bayesian statistician) once said “We are controlled by nature, but by discovering causes we can recover some of the control.” How do we gain control? One means is through an understanding of forest hydrology driven by causal inference. In this area, two modes of investigation are guiding research.

For over a century, the dominant framework operates at the tree, stand, hillslope, and minute headwater levels. Looking only at this micro-scale, which is both specific and focused on a circumscribed land space, renders a reductionist understanding which ignores the macro-scale power of much larger watersheds. This framework suggests that there are “natural laws” which occur in every instance; it is deterministic and restricted in ability to address the fluidity of the moment. In this faltering understanding, the significance of the effects of deforestation on the frequency of extremes (e.g., floods, droughts, and landslides) is not given a sober review.

The paradigm shift I am speaking to focuses on a holistic and probabilistic examination at the macro-scale, inclusive of watersheds and the wider landscapes, to unravel the embedded causal power. In academic circles, this is an examination recognizing the oppositional realities and investigative frameworks of the “deterministic” versus the “stochastic.” These two competing and incompatible frameworks differ greatly in their methods of evaluation and their ability to accurately depict cause-and-effect relations among deforestation, hydrology, and ultimately the very landscapes that surround us.

In light of increasing flood risk caused by climate change, I demonstrate how the causal stochastic framework can help policymakers worldwide develop robust forest and water management plans based on a defensible and clear understanding of floods.

Presenter

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C2E2 Spotlight is held monthly on Mondays from 12:00 pm to 1:00 pm. To attend in-person or virtually please contact pamela.lee@ubc.ca.