



1.

Mobility systems in a context of global warming and natural disasters: toward greater resilience?



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Discipline

Sciences humaines

Sciences sociales

Prospective

Mots clés

Mobilité

transition mobilitaire

environnement

Développement durable

résilient

résilience

Mode de transport

Tous modes de transport

Niveau

Thèse de doctorat

Visuel



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The World Meteorological Organization retired the names Igor and Juan in recognition of the storms' severity. Hurricane Igor, ranked the third wettest hurricane in Canadian history, was defined by precipitation. Measuring 1,500 kilometres in diameter, it was the largest recorded storm in the Atlantic Basin until Hurricane Sandy. Hurricane Juan was defined by strong winds and a massive storm surge. Weather buoys in Halifax Harbour, the province's capital city, snapped their moorings following 20 metre waves^[1].

In the face of profound mobility disruption, a lot worked well. In these coastal communities, there is a cultural instinct to batten down the hatches prior to storms. When the dominant transport system of roads and cars was destroyed, a surprisingly robust spectrum of alternative modes - and the necessary skills to operate them - materialized: ferries, buses, helicopters and more. Residents, one news article reported, "took ATVs, boats, hik[ed] through the woods to get to nearby communities to get insulin for one gentleman or to pick up some food or baby formula in another

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 *Power lines and trees entangled, blocking roads. St. John's, Newfoundland.
Photo: Colin Peddle.*

That said, getting back to normal means reinstating systems proven vulnerable. While infrastructural and societal upheaval provides a window of opportunity to navigate a mobilities transition, the collective reflex at such times is to return to the status quo. Roads and bridges washed out by Hurricane Igor were rebuilt. Power lines toppled by Hurricane Juan were replaced. In both provinces, when electricity was lost so too was the capacity to pump fuel. The impulse was to restore automobility – that is, fossil fueled vehicles and related infrastructure. Electrical and fuel systems remain intertwined. While understandable, this response is problematic as it avoids consideration of a transition to more environmentally-responsible and socially-just mobility systems.

One of the key differences that arose, however, was that Hurricane Igor was largely, though not exclusively, portrayed by Newfoundland media and policy makers as an isolated event (despite several recent floods in the past decade). By contrast, in Nova Scotia, Hurricane Juan was viewed as symptomatic of climate change and seen as one of many complex events, from invasive species to avian flu to plane crashes (notably all linked to mobilities) to impact the province. This may have contributed to more action on climate change and sustainable transport issues in Nova Scotia, than in Newfoundland, in the years following hurricane landfall.
 Through my doctoral research, I examined the links between climate change impacts and everyday mobilities, highlighting ecological considerations within the sphere of mobilities research. The anchoring idea for my project is that transport modes powered by fossil fuels contribute to climate change. In turn, climate change through severe weather events disrupts mobility. While linking specific weather events to climate change is tenuous, I examined Hurricanes Igor and Juan as examples of the conditions – high winds, intense precipitation and sea level rise – expected under a changing climate. Through qualitative comparative case studies, I explored how Hurricanes Igor and Juan highlight resilience and vulnerability in contemporary mobility systems.

Weather routing refers to the practice of continuously altering a ship's course to take maximum advantage of tidal, current and wind conditions so as to reduce the physical resistance and, by extension, cost of transport. As society navigates a changing climate, how can we trim our sails to reduce emissions that cause climate change and, at the same time, brace for the impacts of severe weather?

2/ If your thesis involves empirical research, what does this consist of?

 In addition to key similarities, namely record-breaking hurricanes making landfall in Atlantic Canada within a decade and the island/peninsular geography of both regions, Hurricanes Juan and Igor also offer important contrasts. Comparing the impacts from rural Newfoundland to urban Halifax illustrates the diversity and complexity of mobility systems. Further, the characteristics of the hurricanes, and their respective impacts on mobility, varied: Juan was defined by wind, Igor by rain.

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 One of hundreds of flooded roads. Newfoundland. Photo: Colin Peddle.

 To research what responses emerge in terms of mobility systems impacted by hurricanes I designed a comparative case study. Given my concentration on issues of complexity and uncertainty related to mobility, climate change and severe weather events, I focused on collecting official and expert accounts. For both Hurricanes Juan and Igor, I compiled existing data in the form of media articles, legislative transcripts and policy documents, as well as collected material in the form of interviews with key informants such as transport managers, environmental managers and land use planners. I also organized conference sessions and volunteered for the Red Cross to round out my research experience.

I focused on heavily impacted regions within each province, drawing on provincial and to a lesser extent local and national responses. In combination, each method contributes to building a rich case study, with multiple methods increasing the validity of findings. My goal is not to provide a detailed chronological description of the events, but to illuminate and explore various facets of mobility experienced in these events.
 Guided by the following questions, I analyzed the resulting data set:

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- Accommodate, rather than exclude or confine, ecological dynamics (i.e. seasonal watercourse flooding, urban forest renewal) in mobilities planning.

5. Rebrand redundancy

- Foster organizational shifts towards viewing redundancy as wise, not wasteful.
- Create a culture of robust rather than lean supply chains, and of reliable delivery schedules rather than just-in time delivery practices, especially for critical infrastructures and services.
- Build redundancy (e.g. modal, fuel, technical, material, informational) into mobility networks at multiple scales from individual to infrastructural.

6. Think flex

- Incorporate flexibility (e.g. modes, fuels, routes, schedules, infrastructure) into mobility networks.
- Explore low-tech, local options to increase societal resilience and decrease reliance on far-reaching mobility networks (e.g. community food storage and sharing, skill development, decentralized and renewable electrical generation).
- Explore high-tech communication (e.g. Skype), printing (e.g. 3-D) and alternative vehicle (e.g. UAVs) technologies as a means to render mobility networks more flexible
 Primary considerations include questioning current mobility practices, lessening social-ecological friction, increasing societal resilience, maintaining or, ideally, increasing quality of life.

Preparing for disruptions due to severe weather and adapting to carbon-constrained mobility systems both provide an opportunity to put the needs of the most vulnerable people front and centre, and to re-organize mobility and energy use in a way that

reduces socially-constructed vulnerability. These six climate routing practices are intended to build upon and augment short-term solutions, facilitating a bigger picture transition to sustainable mobility.

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 Some roads were washed out entirely, others looked intact but were structurally compromised. More than 100 communities were isolated for up to ten days. Photo: Colin Peddle

 ### 4/ What questions have arisen from your research that could be addressed in the future?
 My research broaches questions at the intersection of understanding and acting that require further research:

1. Why is it difficult to understand and act on the interscalar connections between climate change and everyday mobilities?

- Fossil fueled-transport contributes to climate change, and, severe weather (exacerbated by climate change) disrupts transport. How can this circularity become a more central consideration in policy thinking?

2. Why is our instinct to reestablish mobility systems that, through their reliance on fossil fuels, exacerbate disruptive weather events that destroyed these systems in the first place?

- How can windows of opportunity like hurricanes be better leveraged to enact more systemic, transformational mobility shifts? Might mobility think tanks (as described above) offer insights, interventions and paths forward?

3. Can a conceptual tool like climate routing reframe our responses in a way that allows analytical and practical leverage needed to change course?

- As a society, we are attuned to thinking of how to minimize investments of money and time. Can we transfer this aptitude to a decarbonized mobility transition?

What comes into focus through the cases of Hurricanes Igor and Juan is robust capacity to return things to the way they were. Moving forward, communities need assistance understanding and enacting a transition to new ways of being.

<div class="logo logo-mobile"> *When roads are flooded and/or blocked, traditional emergency response may be restricted. St. John's Regional Fire Department, Newfoundland. Photo: Colin Peddle.*

Download the thesis

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<!-- Notes -->

[^1]: "5 years later, looking back at Hurricane Igor (Canadian Broadcast Corporation, 2015); "A look back at Hurricane Juan" (Global News)

Chapô

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