Current State of Knowledge and Research on Human Dimensions of Climate Change and Potential Effects on Behaviors Associated with the Use and Management of Forests

> Dr. Sandra De Urioste-Stone School of Forest Resources University of Maine







Overview

- Why study <u>human</u>
 <u>dimensions</u> of climate change?
- What <u>factors</u> help us explain behaviors and decisions?
- What type of <u>research</u> are we conducting in Maine?
- What are the <u>implications</u> for future research and planning?



Why Study Human Dimensions of Climate Change (CC)?

Multiple disciplines that help us understand human-CC interactions...

- Role humans play...
 - Contribute to CC
- Factors that drive behaviors and decision making processes...
 - Reduce footprint (mitigate)
 - Avoidance (prepare)
 - Response (adapt)





Current Knowledge



• <u>Climate change risk perceptions</u>: "individual's belief that a potential climate change impact

may represent a <u>threat</u> (to person, community, industry, country, world)" (Huebner 2012: 943)

• Multiple factors drive risk perceptions

Current Knowledge

- CC risk perceptions influence behaviors
 - Stakeholder decisions to adopt adaptation and mitigation actions (Hambira & Manwa 2013)
 - ➢ Higher risk perceptions associated with higher intention to change future decisions (De Urioste-Stone et al. 2016)
- Perceived <u>efficacy and control</u> play a role in decision making processes



Future Implications

- Different people perceive and respond to risk differently
 - How to effectively predict **<u>risk and behavior</u>**?
 - How is <u>information shared</u> with and is <u>understood</u> by potential users?
 - How can information be <u>communicated</u> so it is used to inform <u>decision making</u>?
- Some areas and industries are more vulnerable than others to climate change effects
 - How do we measure <u>vulnerability and adaptive</u> <u>capacity</u> more effectively?
 - How do we effectively integrate <u>social and</u> <u>biophysical</u> data and metrics?





Future Implications— Winter Tourism

Substitution-coping behavior

- <u>Visitors</u> (if conditions for recreational activities are perceived to be unsuitable):
 - Spatial substitution → destination
 - Temporal substitution \rightarrow trip delay; season
 - Activity substitution \rightarrow other recreation experiences
 - Strategic substitution \rightarrow alternative gear
 - Informational coping

(McCreary et al. 2019; Steiger et al. 2017)

- <u>Businesses</u> (if conditions to provide services are perceived to be unsuitable):
 - Technological adaptation
 - New products
 - New market segments



Contents lists available at ScienceDirect

Global Environmental Change

journal homepage: www.elsevier.com/locate/gloonvcha

Projected climate change impacts on skiing and snowmobiling: A case study of the United States

Cameron Wobus^a, Eric E. Small^b, Heather Hosterman^a, David Mills^{a,*}, Justin Stein^a, Matthew Rissing^a, Russell Jones^a, Michael Duckworth^a, Ronald Hall^a, Michael Kolian^c, Jared Creason^c, Jeremy Martinich^c

^a Abt Associates, 1881 Ninth Street, Suite 201, Boulder, CO, USA
 ^b University of Colorado Boulder, Geological Sciences, Boulder, CO, USA
 ^c U.S. Environmental Protection Agency, Climate Charge Division, Washington, DC, USA

Study: In Vermont, snowmobile riders feel negative effects of climate change



A new study takes stock of the effects of climate change on snowmobiling, a large recreational industry in Vermont. (Photo: Bear Cieri)

Resilience of Maine Nature-based Tourism Destinations to Climate Change

WHY?

• 31.3 million visitors in summer 2018→ 60% nature-based (MOT, 2018)

WHO?

• Tourism businesses and visitors

HOW?

- Multiple case study in Western Maine, Camden, Mount Desert Island, Machias
- Mixed methods: semi-structured interviews, survey research, participatory workshops

WHAT ARE WE LEARNING?

- More information on local effects of CC (De Urioste-Stone et al. 2015; Horne et al. in review)
- Gender and age influence risk perceptions (De Urioste-Stone et al. 2015; Horne et al. in review)
- Pro-environmental behavior→ mitigation strategies (Horne et al. 2018)
- Different substitution strategies used depending on market segment
- Health & wellbeing more likely to drive behaviors (De Urioste-Stone et al. 2016; Horne et al. in review)





Mitigating Socio-ecological Determinants of Tick-borne Disease Risk

WHY?

• Climate impacts on tick prevalence and TBD (i.e., Lyme disease transmission)

HOW?

- Biophysical research (drag sampling, mammal trapping, climate modeling)
- Social science research : semi-structured interviews, surveys, observations

WHAT ARE WE LEARNING?

- 98% know what ticks are and that deer ticks cause diseases
- Most common <u>preventative behaviors</u>: Tick-checks and use of insect repellent
- Concern with negative impacts to <u>outdoor recreation</u> economy and <u>cultural practices</u>

Recently awarded grant to expand our study to other conservation systems







Research Outcomes

- Integrate models of social and biophysical data to determine risk and inform decision making
- Refine models for engaging diverse stakeholders to better understand risk perceptions and promote collaboration
- Strategic planning processes that increase preparedness and ability to cope with change
 - Plan for <u>vulnerabilities</u>
 - Foresee and take advantage of opportunities → create new economic development pathways



Current Knowledge Gap

- How to integrate <u>rural economic development</u> problems with climate change decision making?
- How to more effectively **predict** behaviors and decision making?
- What are causes of *inaction*?
 - What are barriers and facilitators to prepare and adapt?
 - What limits climate change related decision-making?



Recommendations

- Refine science communication tools and engagement processes
- Enhance landscape-scale analysis and recognition of cross-scale interactions
- Compare learnings across industries and regions
- Develop more integrated socio-ecological research models



Summary

- Predicting behaviors in response to climate change is complex
- Multiple factors drive perceptions of risk
- Risk perceptions influence behaviors, but less precise under uncertainty
- Consider risk and opportunities in future planning





Acknowledgements

- Graduate students
 - Current: Lydia Horne, Brooke Hafford MacDonald, Alyssa Soucy
 - Former: Matthew Scaccia, Emily Wilkins
- Undergraduate students
 - Current: Nataniel Burke, MacKenzie Conant, Asha DiMatteo-LePape, Nicholas Ferrauolo, Hope Kohtala
 - Former: Ashley Cooper, Jacob Foster, Dimitrje Howee-Poteet
- <u>Collaborators</u>
 - Acadia National Park, Bethel Chamber of Commerce, Cooperative Forestry Research Unit, Maine Woods Consortium, National Park Service, Maine Medical Center Research Institute, Schoodic Institute





Funding sources









Question/Comments

Center for Research on Sustainable Forests

5755 Nutting Hall, Room 263

Orono, ME 04469-5755

Tel: 207.581.3794

Fax: 207.581.2833

crsf@maine.edu

https://crsf.umaine.edu/forest-climate-change-initiative/





