

## Conducting a social-ecological inventory in the Denali region of Alaska

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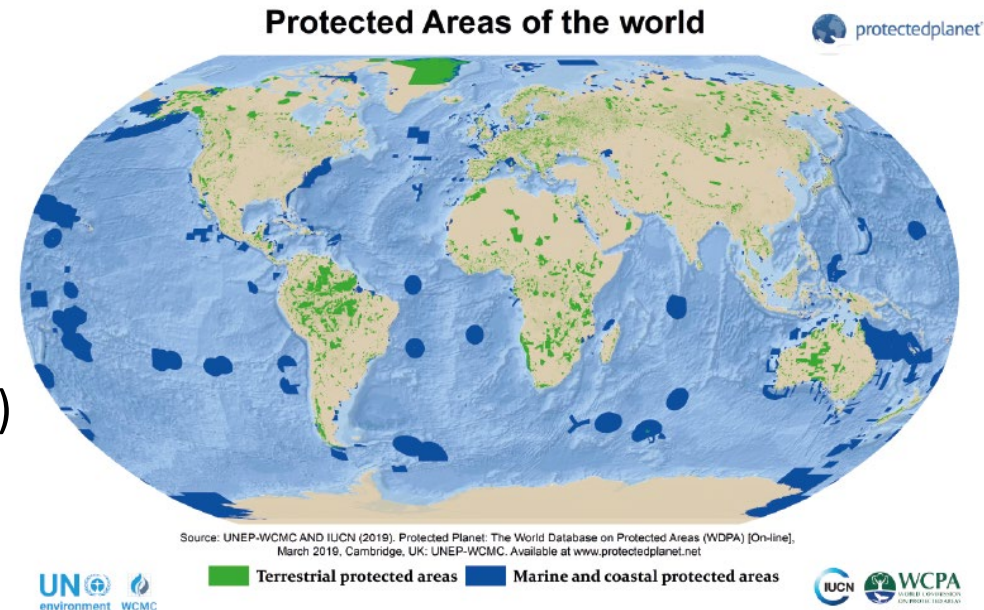


# Background



- Parks and protected areas harbor important ecological and cultural resources, but coverage alone is not enough to meet global conservation targets (IPBES, 2018)

- Common challenges for protected area networks:
  - Lacking common visions and support among local, regional, and national governments (Blondet et al., 2017)
  - Low stakeholder awareness of benefits and involvement in conservation initiatives (Ferranti et al., 2010)
  - Difficulties in balancing conservation goals with economic and social drivers (McCauley et al., 2008)
  - Problems regarding consensus-based decision-making





# Background



- Community engagement is crucially important for minimizing social conflict, sustaining ecosystems and economies, and enhancing well-being
- Multiple “best practices” have been identified
  - Early and consistent engagement throughout research process
  - Participatory rather than passive engagement to elucidate value plurality
- Economically developed nations are underrepresented in literature and there is no “one-size” fits all approach





# Social-ecological inventories



- Tool similar to stakeholder analysis, but extends traditional stakeholder assessments to incorporate diverse perspectives (Schultz et al., 2007)
- Emphasizes the coupled human-nature interactions to document key actors *and* their experiences in particular social-ecological system
  - Contextualizes social-ecological systems across stakeholder groups
  - Highlights social complexity not captured by traditional assessments
  - Elucidates local needs and capacity of communities
- Applications are nascent, creating an opportunity for methodological and conceptual enhancements





# Fuzzy cognitive mapping



- Cognitive map that depicts relations among elements of a “mental landscape”
- Explicit representation using semi-quantitative data to show how stakeholders characterize social-ecological conditions (Gray, 2014; Kosko, 1986)
- Assessment of how people characterize the system they live in rather than their role in environmental management

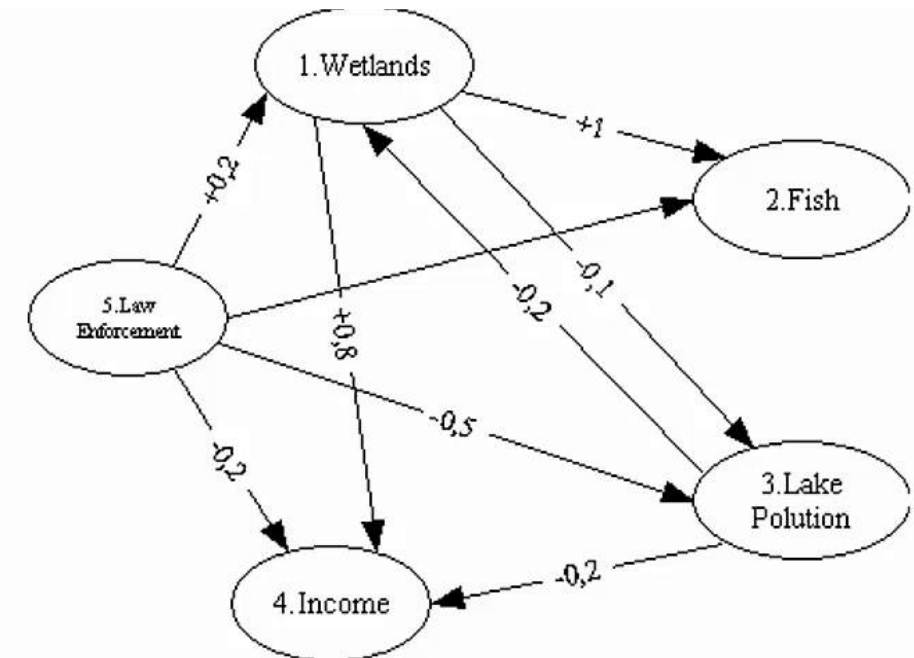


Ecological Modelling  
Volume 176, Issues 1–2, 15 August 2004, Pages 43–64



Ecological models based on people's knowledge:  
a multi-step fuzzy cognitive mapping approach

Uygar Özdesmi , Stacy L. Özdesmi



Özdesmi & Özdesmi (2004)



# Research objectives



- This research is guided by two objectives to understand how local community members characterize the Denali region as a social-ecological system
  1. Characterize the social-ecological system defined by stakeholder groups to represent the current conditions of the Denali region
  2. Compare perceived patterns of social-ecological conditions in the Denali region among different stakeholder groups







# Study Context



- Denali National Park and Preserve

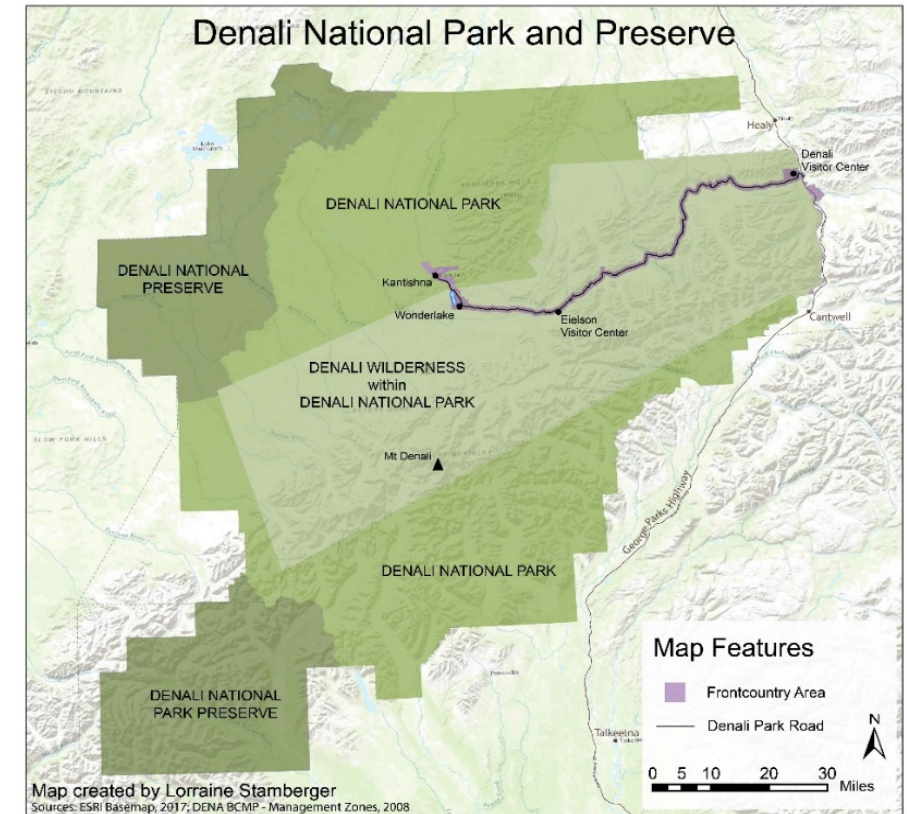
- Located in the Alaskan interior and home to highest peak in North America: Mt. Denali (20,310')
- Mixture of deciduous taiga forest, tundra, glaciers, snow, and bare rock at varying elevations
- Established wilderness within park boundaries



View of Mt. Denali from inside the park



Taiga forests in low elevations of the park



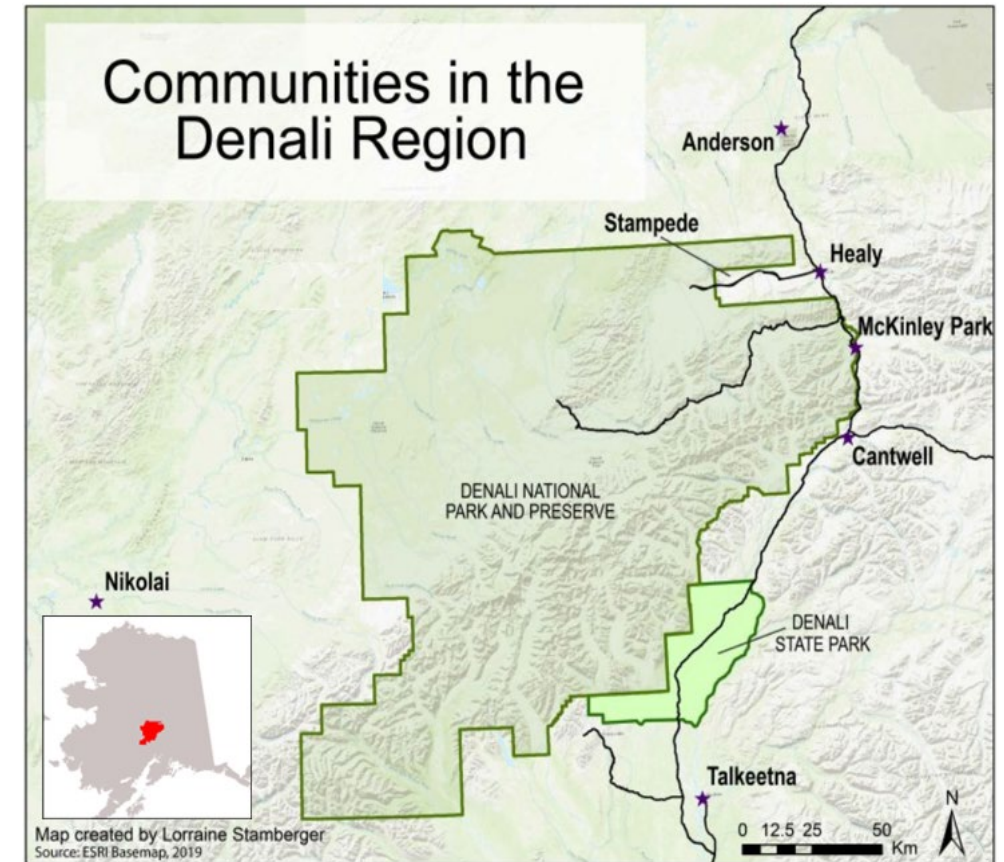




# Study context



- Seven communities representing a diversity of priorities and interests (N = 3,038)
  - Conservation/environmental management
  - Education
  - Traditional ways of life
  - Energy industry (coal, oil, and gas)
  - Tourism
  - Subsistence use
- Several federal, state, and private land at play
  - Federal land (NPS and BLM)
  - State land (Alaska DNR)
  - AHTNA Inc.
  - Usibelli Coal Mine
  - Privately owned land by residents



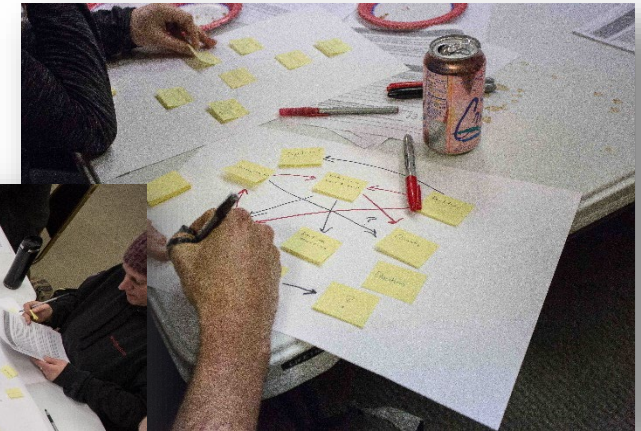




# Methods: Data collection



- Focus groups
  - Four (out of seven) focus groups held in different communities to understand the diversity of knowledge, experiences, and perceptions (Morgan and Kreuger, 1998)
  - Individual fuzzy cognitive mapping exercises (n = 25) and group-based discussions
- Semi-structured interviews
  - In-person interviews lasted ~60-90 minutes (n = 4)
  - Included individual fuzzy cognitive mapping exercise



*Fuzzy cognitive mapping exercises during focus groups in Cantwell and McKinley Village*



- Individual maps were digitized, cleaned, and added to adjacency matrices for further analysis
- Individual maps were aggregated by stakeholder group by averaging groups of individual matrices accordingly
- Graph indices were calculated to attain measures of centrality and density
- Components of each matrix were categorized
  - **Transmitters** – variables which have “forcing functions” or relative influence or effect on system function, but are not affected by other variables (Eden et al., 1992)
  - **Receivers** – variables that have receiving functions, but do have no effect on other variables (Eden et al., 1992)
  - **Ordinary** – variables who have mixture of transmitting and receiving functions (Eden et al., 1992)





# Results



- Completed individual maps = 25
  - Interviews (n = 4)
  - Focus groups (n = 21)
- Six stakeholder groups represented
- Sixty unique variables identified in individual maps

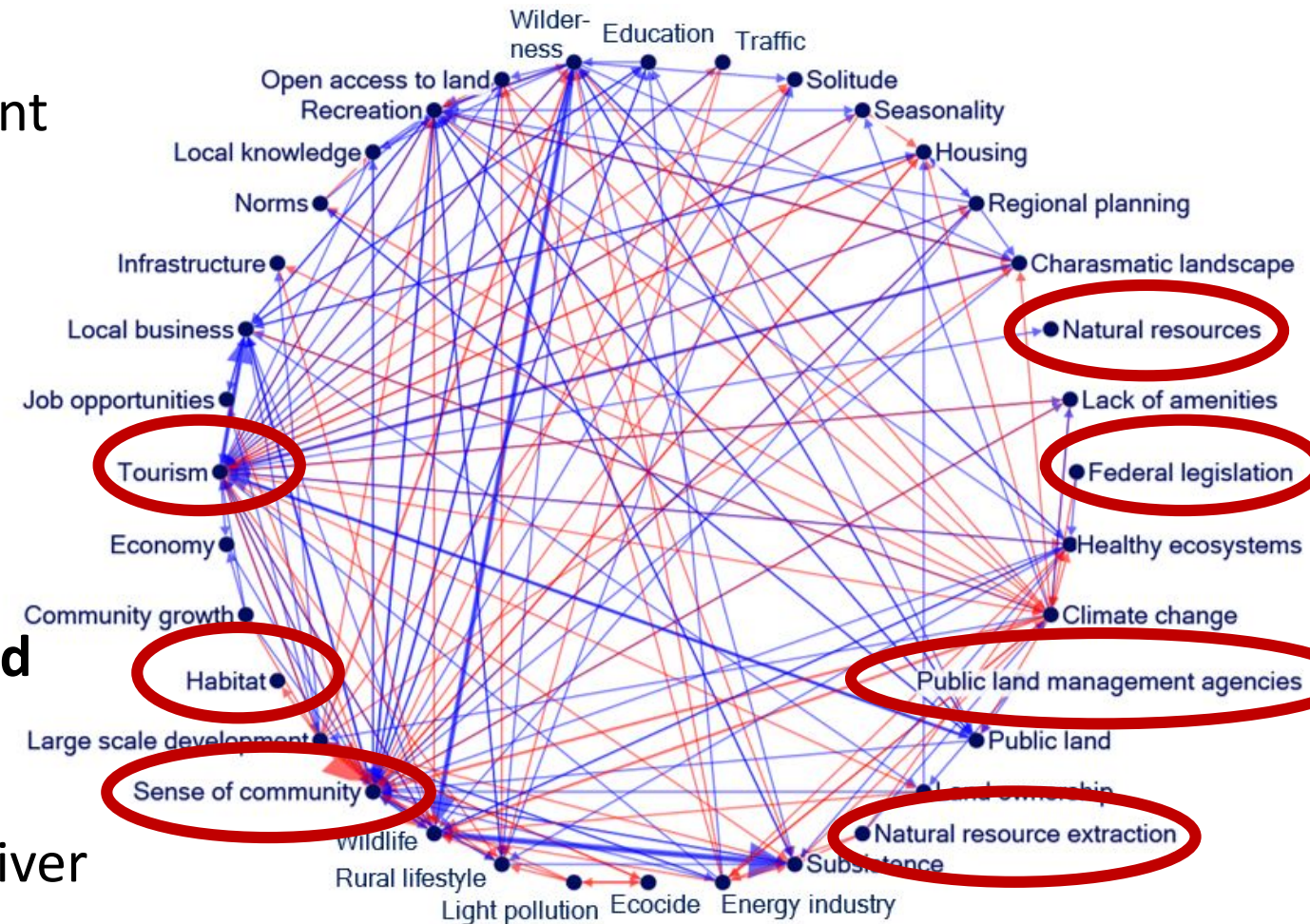
Stakeholder group	Description	Maps (N)	# of variables identified
Education	Those who primarily identify with education through their occupation and/or social roles	1	11
Environmental Management	Those who primarily identify with environmental management through their occupation and/or social roles	10	36
Indigenous groups	Those who are Native alaskan as indicated by federal designation	1	8
Local business	Those who primarily identify as local business owners or operators	3	22
Longtime residents	Those who primarily identify as a community member that has lived within the region for most or all of their lives	5	36
Tourism Industry	Those who primarily identify with industrial tourism or the energy industry through their occupation	5	28
Total		25	141



# Results: Environmental Management



- Multiple variables and connections identified in environmental management sub-group (n = 10)
  - 36 variables, 196 connections
- Centrality
  - **Sense of community** was highest in-degree centrality(0.95) and **tourism** was highest out-degree centrality (1.42)
- **Natural resource extraction, public land management agencies, and federal legislation** are transmitter variables
- **Habitat** and **natural resources** are receiver variables



Environmental Management Stakeholder Map

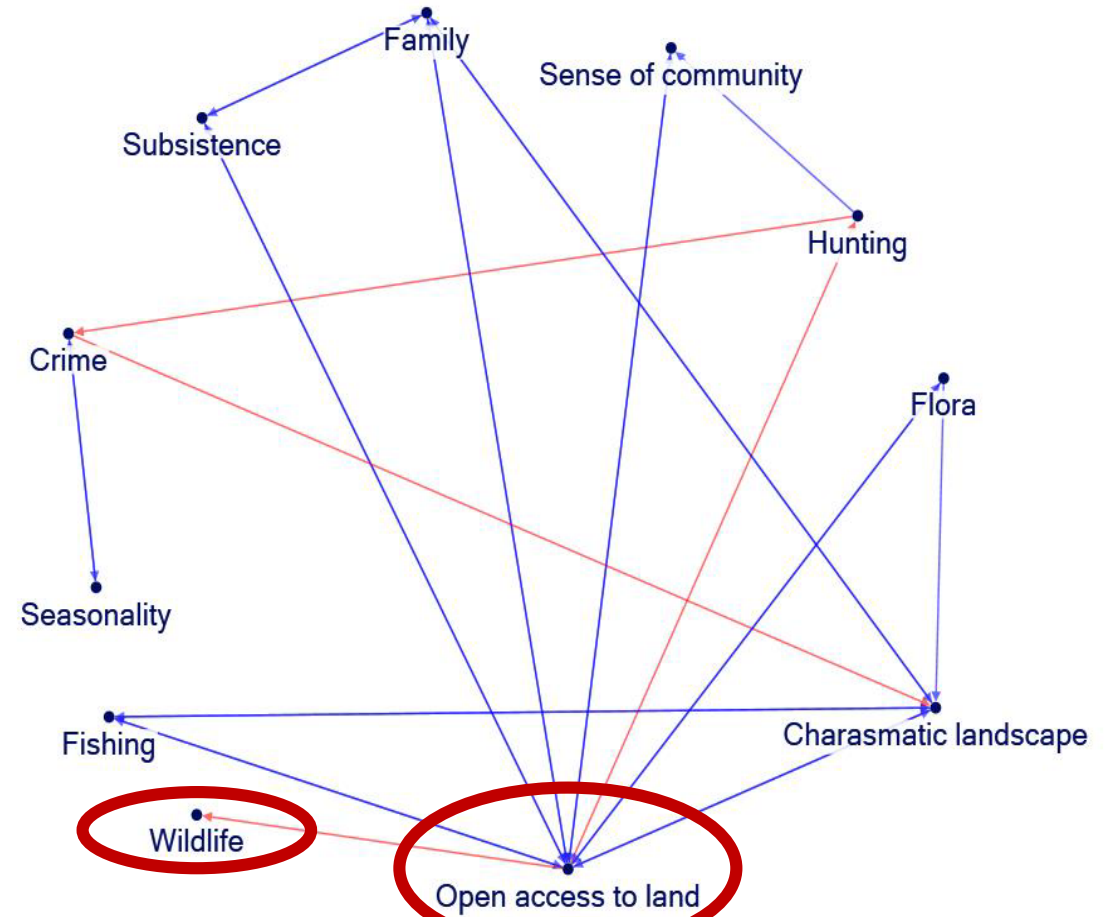




## Results: Education



- Multiple variables and connections identified in education subgroup ( $n = 1$ )
  - 11 variables, 26 connections
- Centrality
  - **Open access to land** was highest in-degree (3.5) and out-degree centrality (5)
- **Wildlife** is a **receiver** variable
- No **transmitter** variables



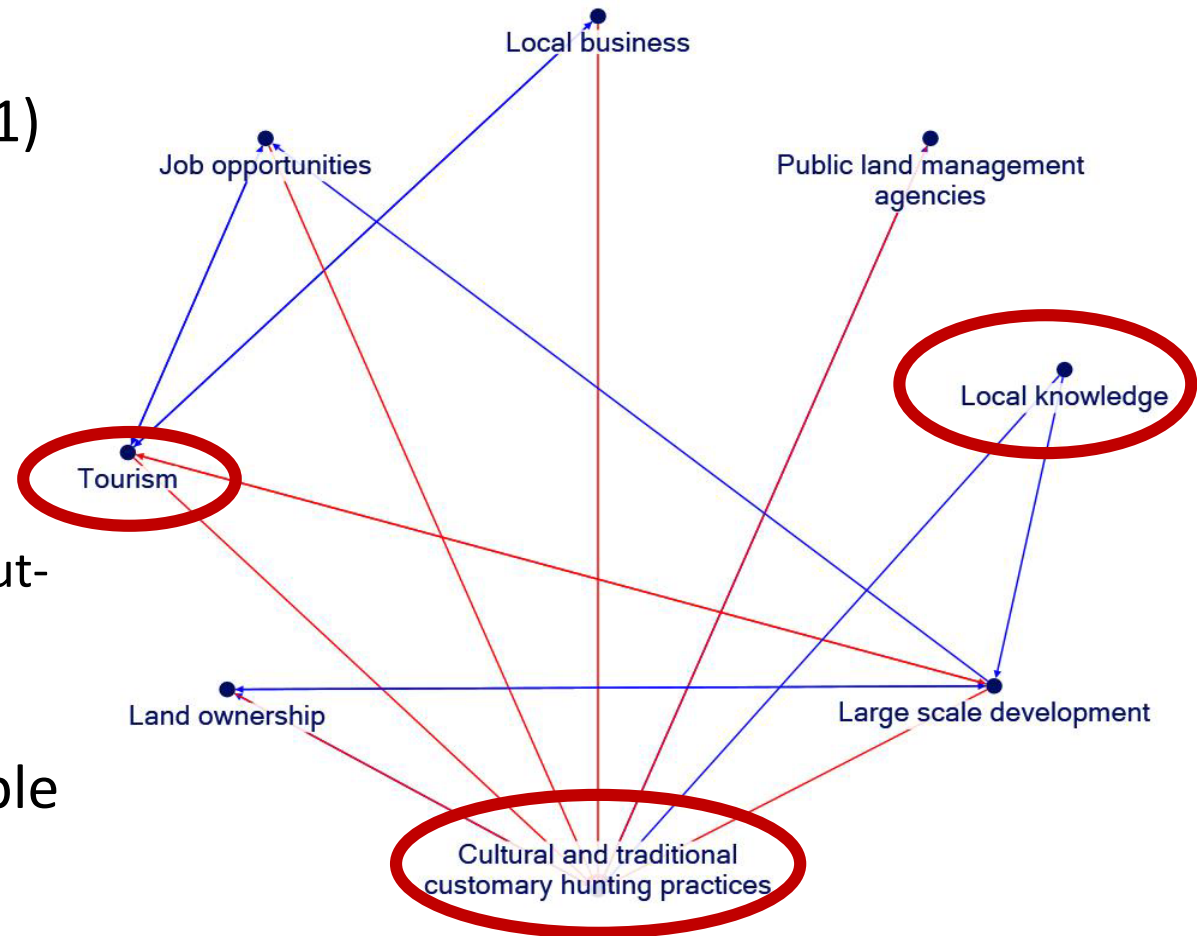
## Education Stakeholder Map



# Results: Indigenous



- Multiple variables and connections identified in Indigenous subgroup (n = 1)
  - 8 variables, 19 connections
- Centrality
  - **Cultural and traditional customary hunting practices** was highest in-degree centrality (4.75) and **tourism** was highest out-degree centrality (1.75)
- **Local knowledge** was transmitter variable
- No receiver variables



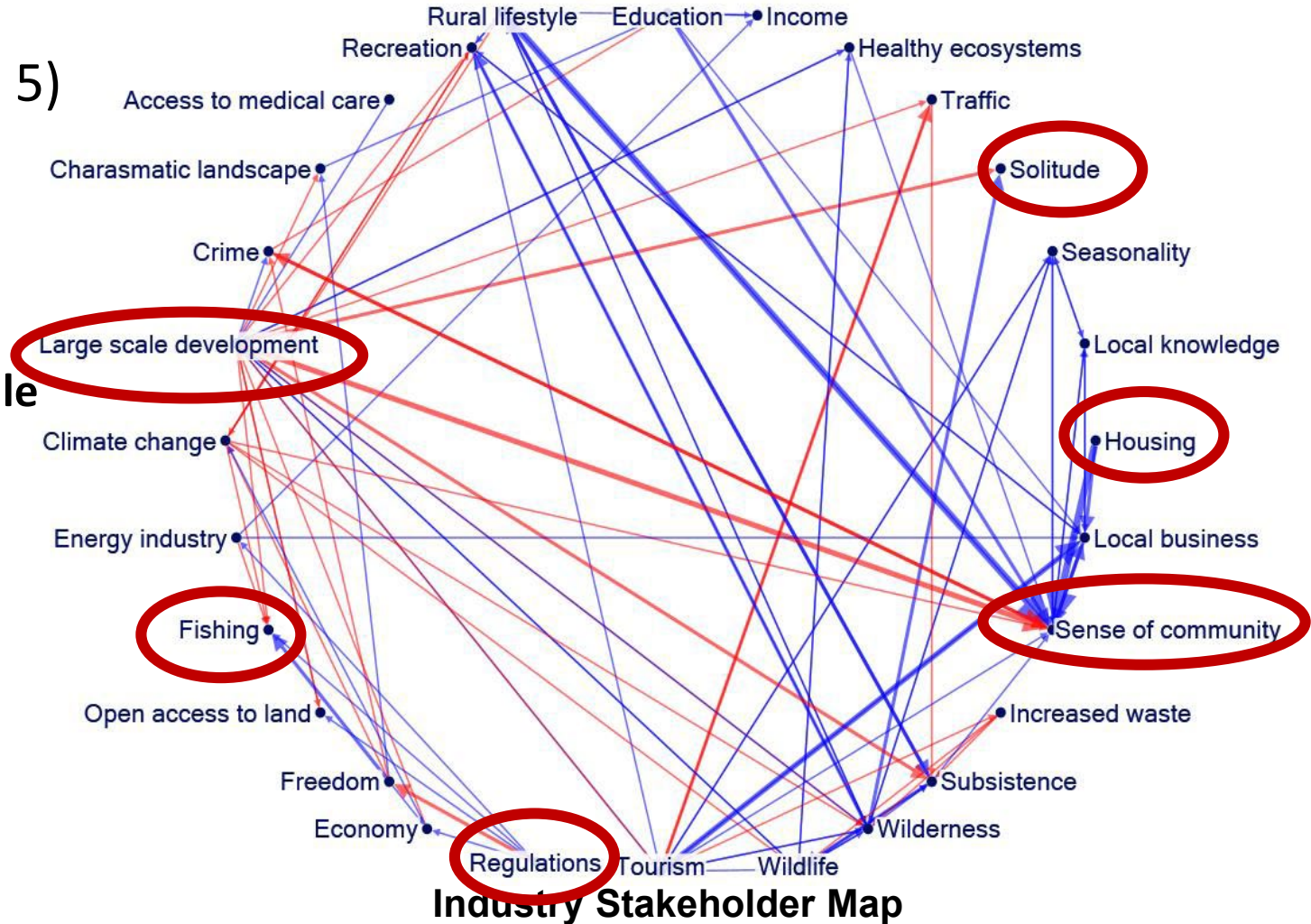
Indigenous Stakeholder Map



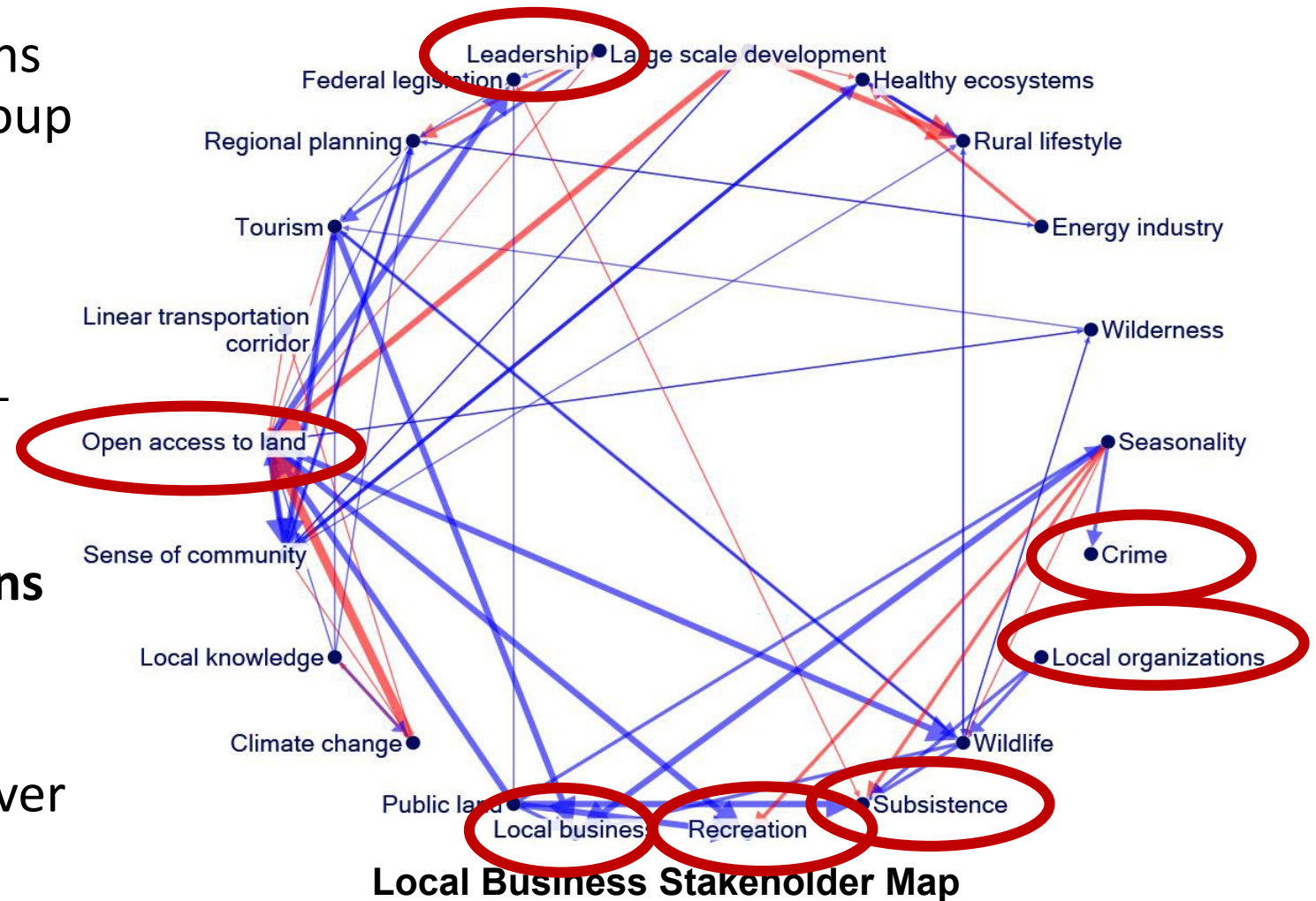
- Multiple variables and connections identified in Industry subgroup (n = 5)
  - 36 variables, 81 connections

- Centrality

- Sense of community** was highest in-degree centrality (1.50) and **large scale development** was highest out-degree centrality (1.30)
- Regulations** and **housing** were transmitter variables
- Solitude** and **fishing** were receiver variables



- Multiple variables and connections identified in local business subgroup (n = 3)
  - 22 variables, 65 connections
- Centrality
  - **Open access to land** was highest in-degree centrality (1.50) and out-degree centrality (1.08)
- **Leadership** and **local organizations** were transmitter variables
- **Subsistence, local business, recreation, and crime** were receiver variables



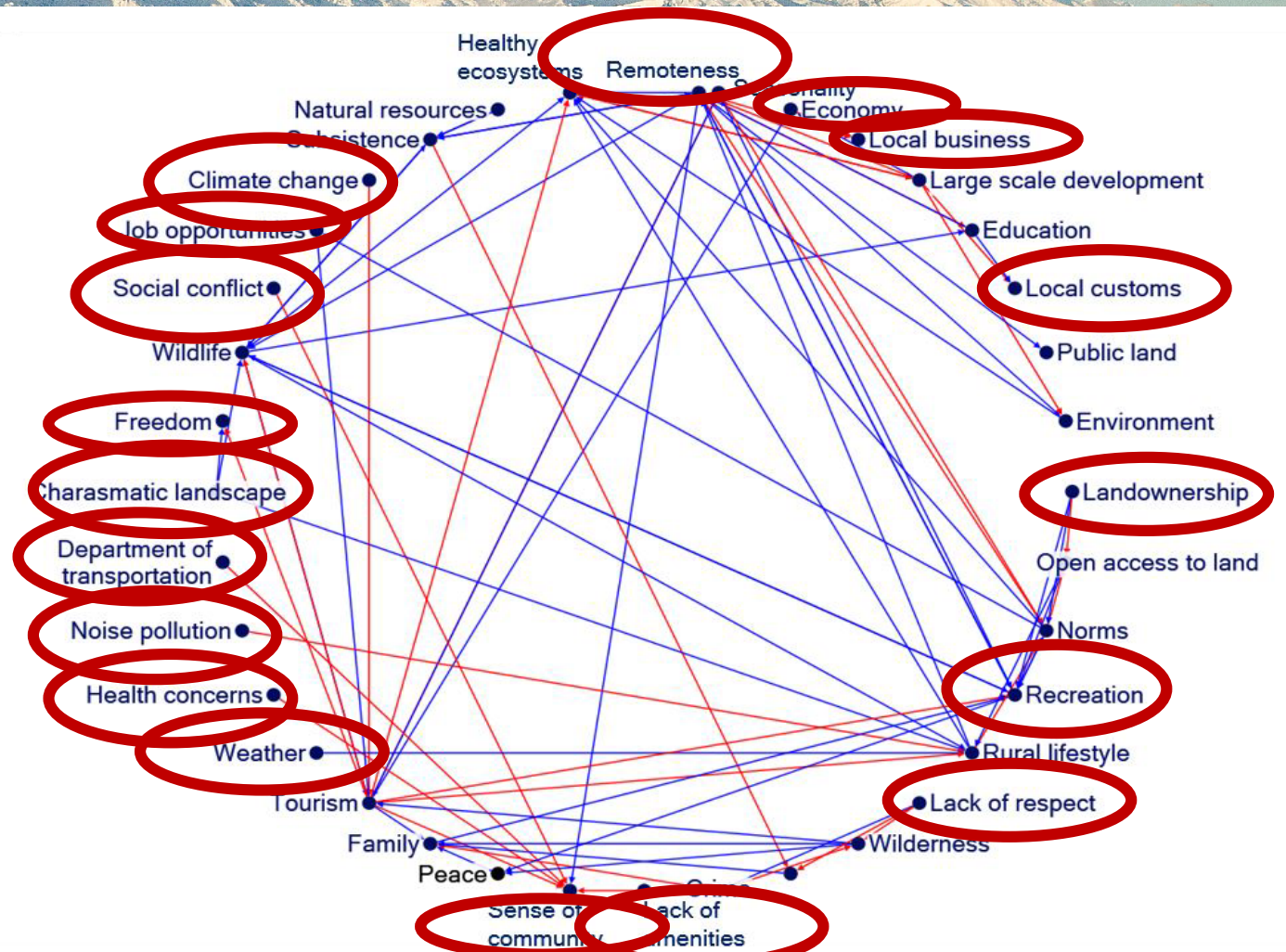




# Results: Longtime resident



- Multiple variables and connections were identified in longtime resident subgroup (n = 5)
  - 36 variables, 81 connections
- Centrality
  - **Recreation** was highest in-degree centrality (0.95) and **remoteness** was highest out-degree centrality (1.35)
- Ten **transmitter** variables
- Six **receiver** variables



Longtime Resident Stakeholder Map



# Discussion



- Several shared social-ecological features (e.g., **wildlife, subsistence, healthy ecosystems, and sense of community**) that characterize the region across interest groups
- Distinct interest groups emphasized features in line with their interests as most significant in terms of function
- However, in terms of most central to characterizing the system, **open access to land, tourism, recreation, and sense of community** emerged across groups



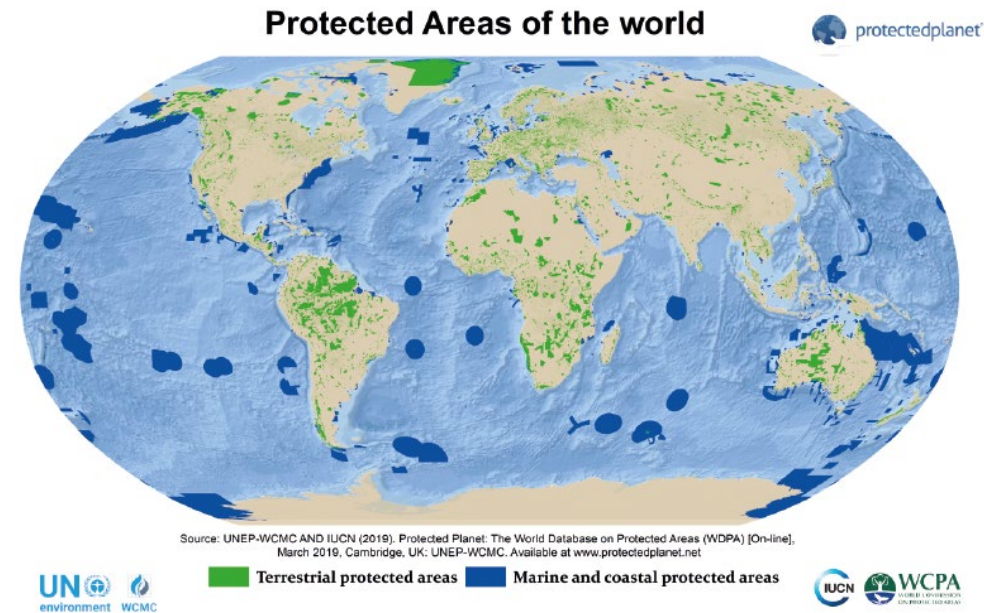




# Implications



- This research provides a means to include community stakeholders in protected area research in line with common guidelines
- Results can be used to navigate various interests and open up dialogue about **shared, common visions for the future** (Blondet et al., 2017; IPBES, 2018)
- Highlights the importance of utilizing creative methods to understand best approaches for protected area community engagement in a given context



- Future research will conduct scenario analysis on maps to better understand how increasing drivers of change will impact the perceived social-ecological system
- Next steps are to continue collecting data through mapping exercises to yield a more representative sample of groups in the region





## Collaborators

Dr. William Stewart  
Dr. Rose Keller  
Ben Leitschuh  
Julianna Rogowski



VAN RIPER RESEARCH GROUP  
*Valuing **nature**. Changing **behavior**.*



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