

Adaptation, Agriculture, and Ranching in Montana



Laurie Yung

Department of Society and Conservation, University of Montana

Mitigation versus Adaptation

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- Adaptation: Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (IPCC, 2001).

Mitigation or Adaptation?



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- “[We] must adapt and improve resilience to minimize risk to people, natural places, and key infrastructure. Adaptation will require thoughtful, preventative actions and investments, and demand new approaches and preparation from nonprofit, private and government entities.”

- Interim Progress Report of the Interagency
Climate Change Adaptation Task Force, 3/16/10

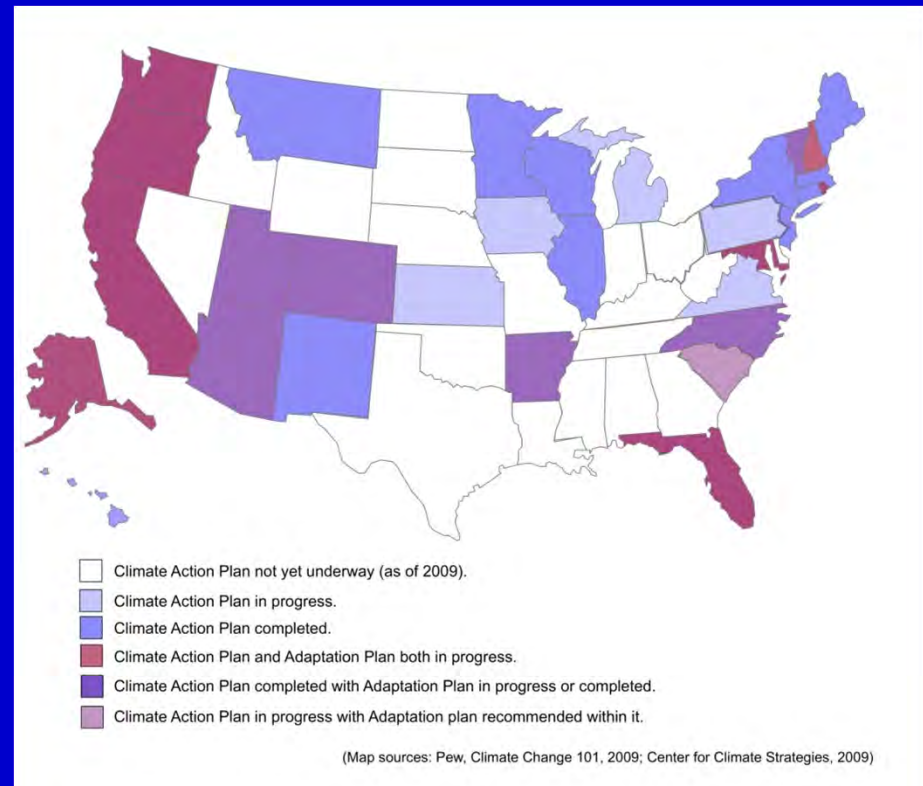
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 - Increased use of summer air conditioning
- Adaptation actions may influence GHGs
 - Restoring forest habitat for climate-sensitive species may reduce GHGs

Who Adapts?

- Nations, states, cities
- Farmers, businesses, individuals
- Agencies, NGOs



Examples of Adaptation Actions

- Measures to reduce the effects of urban heat islands
- Restrictions on building in the path of future sea level rise
- Changes to storm water treatment in anticipation of future floods
- Incentives to develop defensible space around structures in western forests
- Water conservation strategies for irrigators
- Planting drought tolerant trees and crops

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- Anticipatory – proactive actions that anticipate change (may be more effective and less costly)

Adaptation as Resilience

- Adaptation not just about mechanistic responses to specific impacts (e.g. build larger walls to hold back floods)
- Adaptation also involves building the ability of systems to “bounce back” or recover from a range of predicted and “surprise” impacts, building the potential to effectively adapt (e.g. restore riparian system to allow for higher flows)

- **Vulnerability** is the extent to which a system is susceptible to damage or harms from climate change.

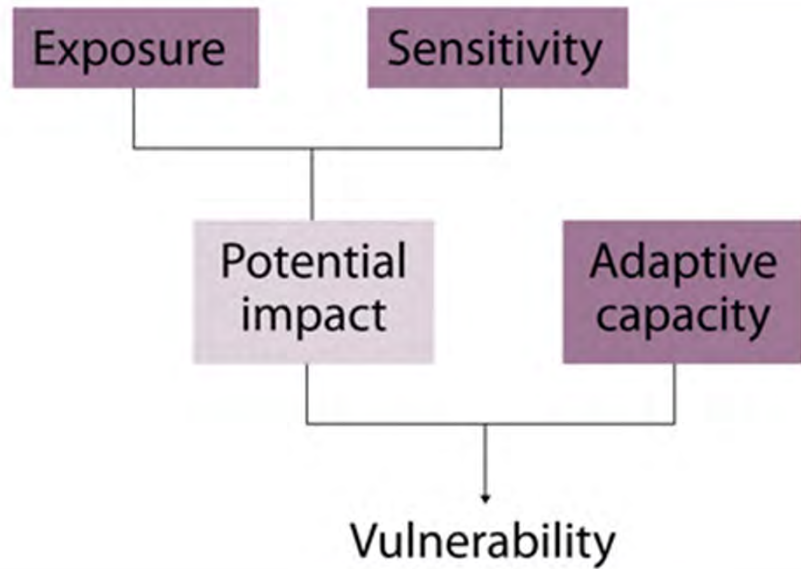


Who is most vulnerable?

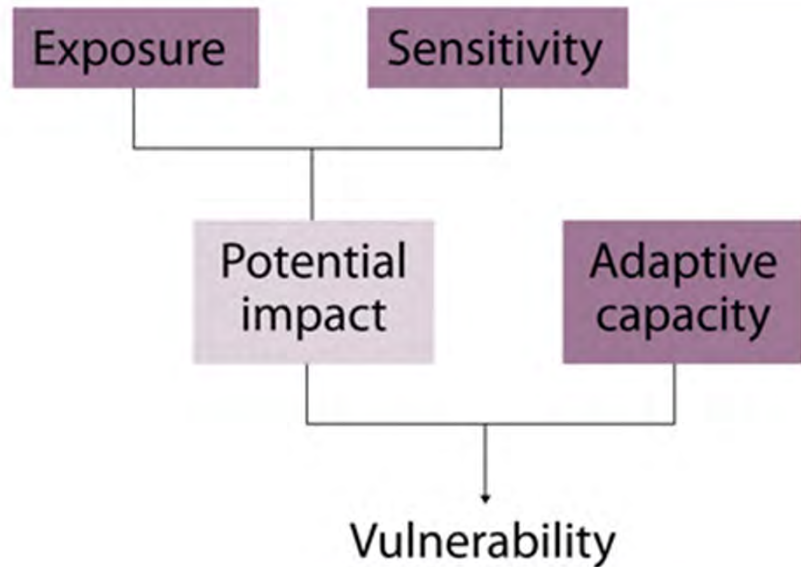
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- People/groups who have limited economic resources and/or are politically/socially **marginalized**.

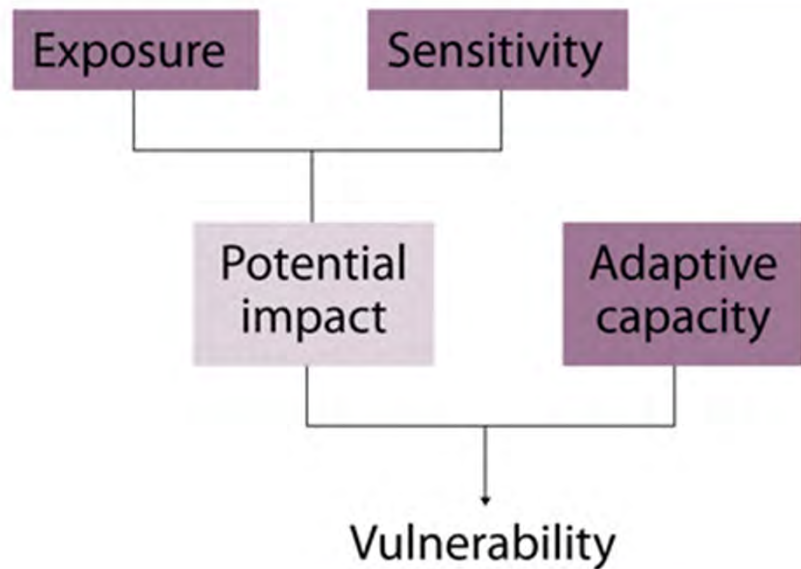


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Adaptive Capacity: The ability of a system to adjust and effectively respond to climate change impacts to reduce risk, moderate potential damages, to take advantage of opportunities, or to cope with the consequences (to learn/innovate).

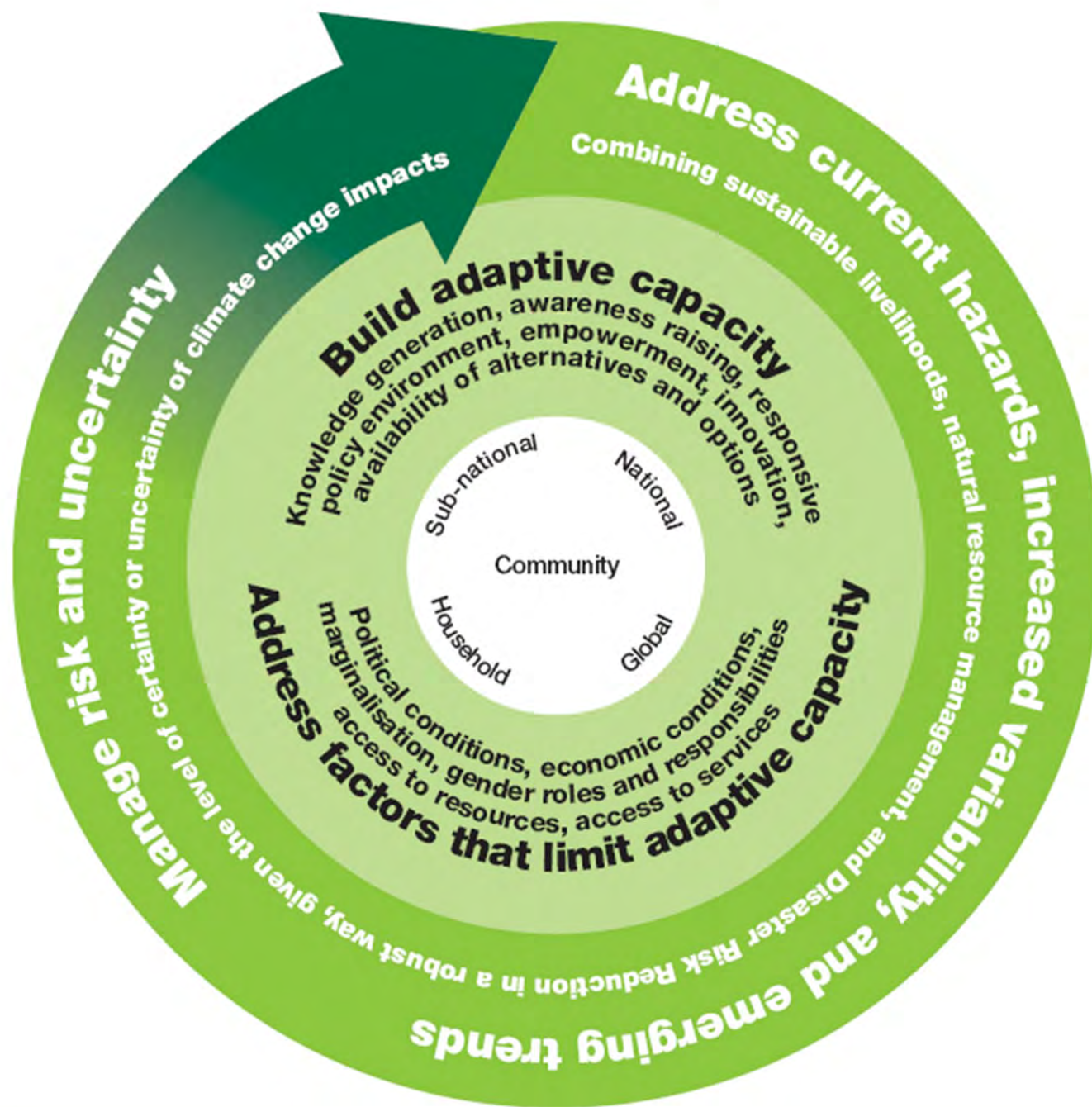
Table 2. Key Factors for Adaptive Capacity¹⁹

Factors	Examples
Economic resources	Wealth of individuals and localities.
Technology	Localized climate and impact modeling to predict climate change and variability; efficient irrigation systems to reduce water demand.
Information/awareness	Species, sector, and geographic-based climate research; population education and awareness programs.
Skills/human resources	Training and skill development in sectors and populations; knowledge-sharing tools and support.
Natural resources	Abundant levels of varied and resilient natural resources that can recover from climate change impacts; healthy and inter-connected ecosystems that support migration patterns, species development and sustainability.
Infrastructure	Systems that provide sufficient protection and enable efficient response (e.g., wireless communication, health systems, air-conditioned shelter).
Institutional support/governance	Governmental and non-governmental policies and resources to support climate change adaptation measures locally and nationally.

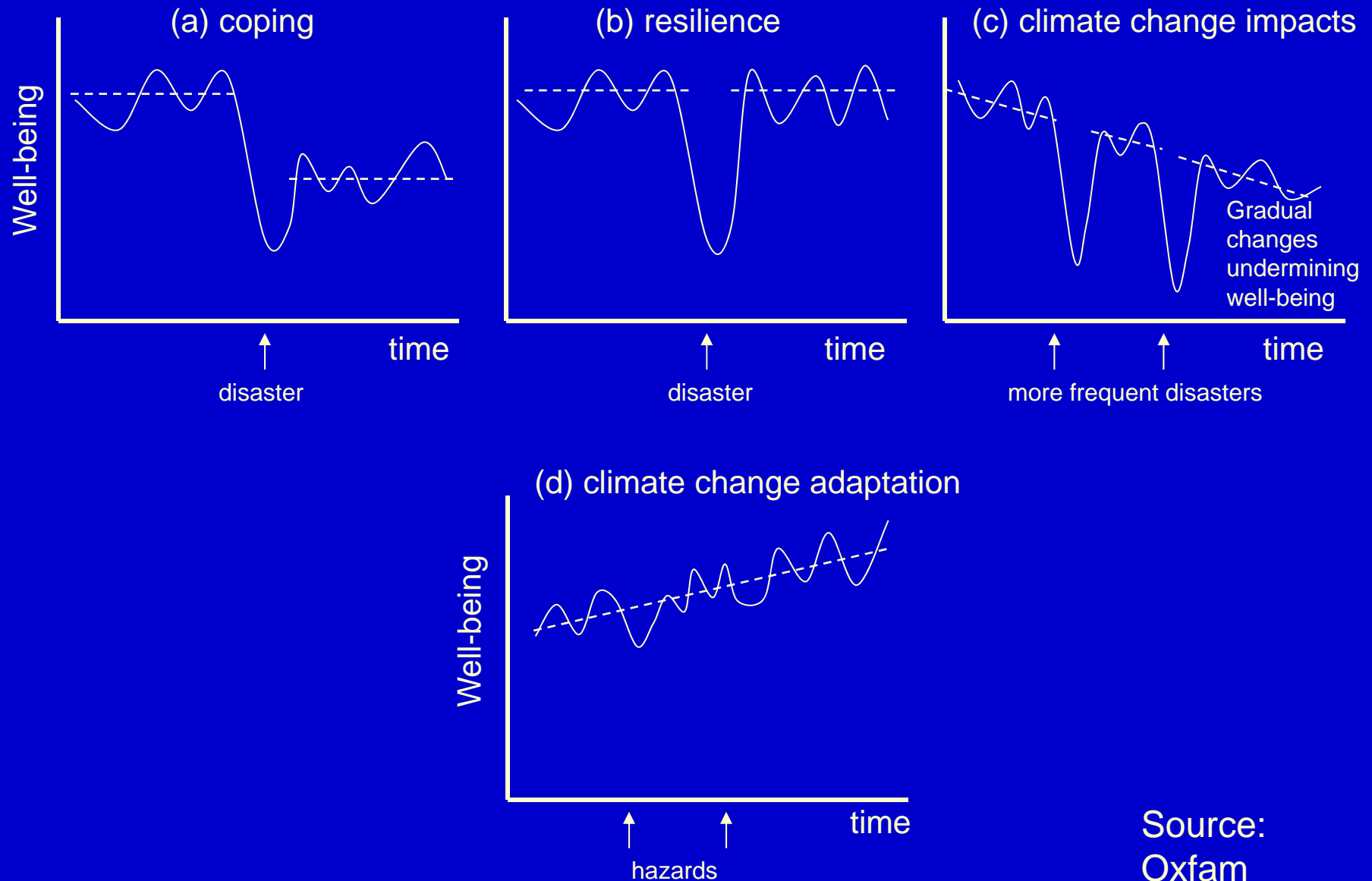
How to Build Adaptive Capacity

- Training and education
- New institutions and partnerships
- Make relevant information and resources available
- Reduce vulnerabilities
- Identify and address barriers (e.g. financial, institutional, social/cultural, technological, informational)

Oxfam's approach to CCA



Coping, resilience and adaptation



Source:
Oxfam

Ranching and Drought Adaptation in Montana



Agriculture and Climate Change

- Agriculture is climate-sensitive.
- Farmers and ranchers are expected to be impacted by drought.
- Montana is experiencing lower late summer stream flow (which means less water for irrigators) and lower soil moisture (which means less productive rangelands)
- Ranches in Montana are typically multi-generational family business

Drought Conditions (Local Biophysical Impacts)

- “Last year was the worst grass year that I had seen since I’ve been ranching.”
- “We’ve had springs that dried up that were never dry in my memory.”
- “this year’s different, and in the past 10 years [it’s] gotten worse.”



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(Local Socioeconomic Impacts)

- Lower incomes and increased debt
- Social and psychological stress
- Existing vulnerabilities
 - Existing debt
 - Fluctuating commodity prices
 - High costs of inputs
 - drought was believed to “break you in just one fell swoop...totally knock you right off the wall.”

Short-Term Coping

- Hauling water to cows
- Buying hay
- Overgrazing
- Leasing more grazing land
- Reducing herd size/selling cattle
- Selling land/portions of the ranch



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- Will these strategies work in the long run?



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 - Build small dams, install pivots, dig deeper wells, line irrigation ditches, and put in solar water pumps
- Purchase additional land

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Optimism about the Future may Reduce Anticipatory Adaptation

- Ranchers saw drought as part of a natural cycle and argued that wetter years would return
- Ranchers felt they had little control over drought and little ability to adapt



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- Low regrets strategies
 - Effective adaptation actions that involve minimal cost or risk (e.g. wildlife connectivity)

Reduce Vulnerability, Build Adaptive Capacity

