

Social Impacts of Climate Change in San Luis Obispo

Introduction to Vulnerability-Adaptation Analysis

Susanne C. Moser, Ph.D.

Susanne Moser Research & Consulting

Julie A. Ekstrom, Ph.D.

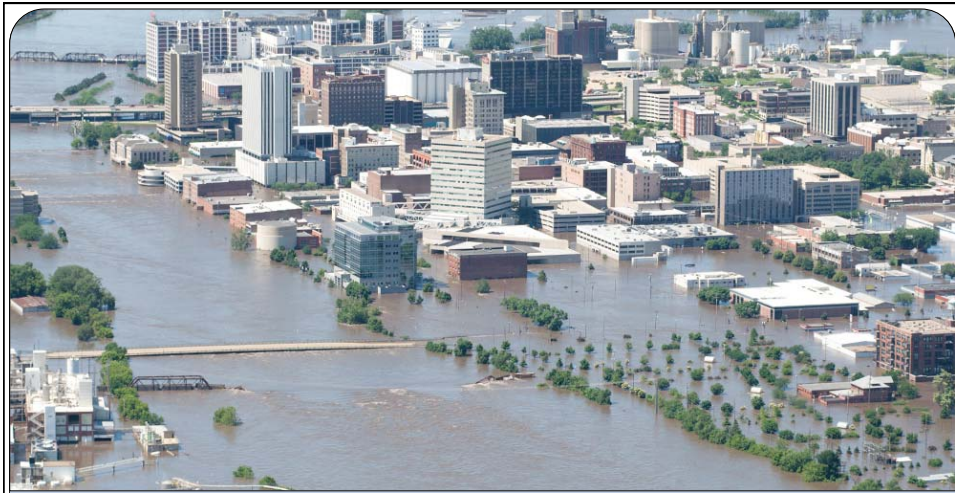
Lawrence Berkeley National Laboratory

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Overview and Goals



- **Overview: What is Vulnerability & Adaptation?**
- **Selected Findings from SLO Report**
 - Vulnerable Populations and Communities
 - Vulnerable Economic Sectors and Activities
 - Vulnerable Services and Infrastructure
- **Deepening Understanding Through Further Exploration**
 - Preview of the Day's Discussions



What is Vulnerability & Adaptation?

Managing Climate Risks

- **We need two complementary approaches**
 - **MITIGATION** – limiting the severity of climate change by reducing the cause (emissions)
 - **ADAPTATION** – maximizing the potential benefits from change and minimizing the severity of negative impacts by
 - reducing the chance and severity of experiencing climate threat
 - increasing the ability to make necessary changes, and to respond, bounce back, and recover after experiencing extreme events

Actually, We Have 3 Choices

“We basically have three choices: mitigation, adaptation, and suffering. We’re going to do some of each. The question is what the mix is going to be. The more mitigation we do, the less adaptation will be required and the less suffering there will be.”



John Holdren

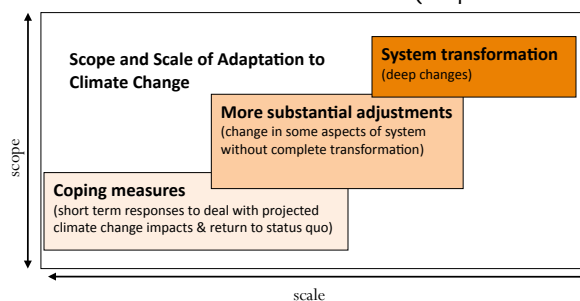
Past President of the American Association for the Advancement of Science; Harvard University, Science Advisor to the President

(cited in *The New York Times*, 01-30-07)

Adaptation – What’s Involved?

“Adaptation involves changes in natural and human systems in response to actual and expected impacts of climate change, and concurrent and interacting non-climatic changes, which may moderate harm or exploit beneficial opportunities.”

(adapted from IPCC 2001, 2007)



Vulnerability-Adaptation Assessment

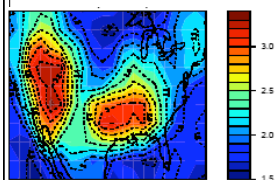
- **The (old) top-down paradigm:**
Tell me how climate will change – and I tell you how vulnerable we are and how we’re going to adapt...
- **The (old) bottom-up paradigm:**
Tell me about our existing troubles (a.k.a. vulnerabilities) – and I tell you what we have to do...
- **The (new) integrated approach:**
Give me both (climate and on-the-ground vulnerabilities, let’s assess barriers to adaptation, and we’ll develop more effective, no-regrets adaptation strategies



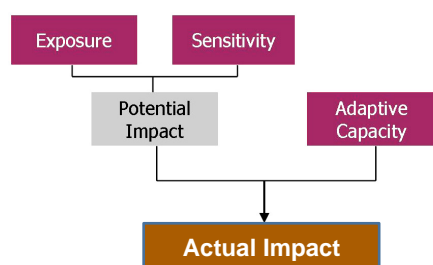
Vulnerability of People & Things We Care About

Actual Impacts = climate change + on-the-ground vulnerabilities

Vulnerability
[susceptibility to harm/change]
... depends on:
E – Exposure
S – Sensitivity
RC – Response Capacity
(ability to cope & adapt)



Source: Tebaldi et al (2006)



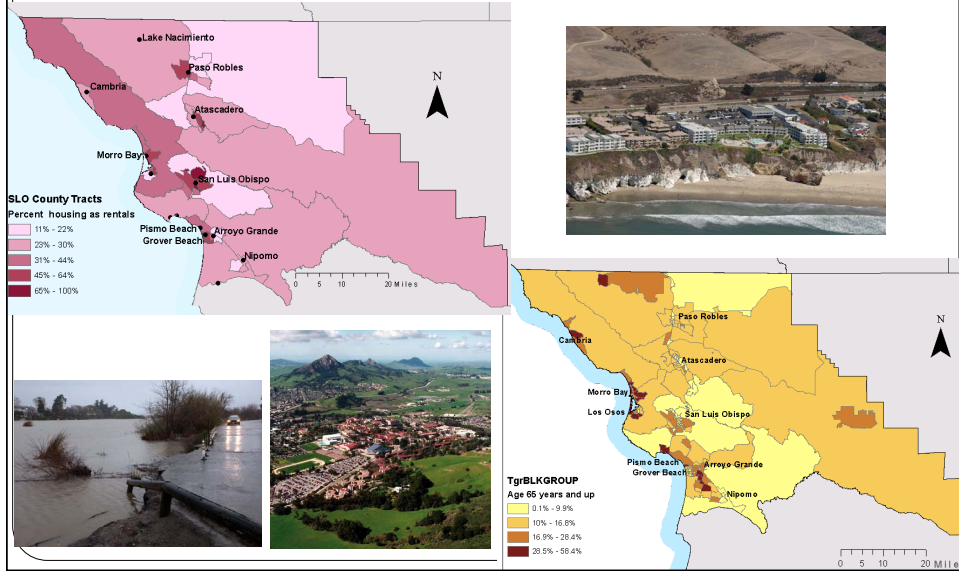
Source: Wikimedia Commons



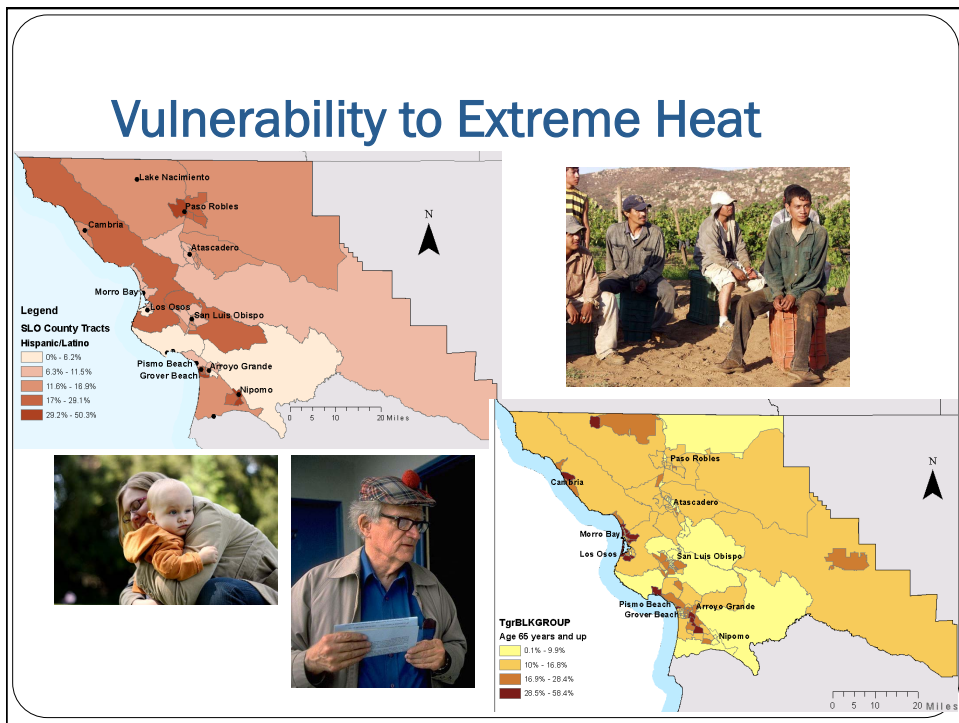
Vulnerable Populations & Communities

| Climatic Threat | Population at Risk | Components of Vulnerability of Greatest Concern |
|--|---|---|
| Floods | Floodplain residents (esp. elderly, handicapped, ill) - inland (creeks, rivers, dams) - coastal | Exposure Response capacity |
| | Institutionalized populations | Response Capacity |
| | Socially excluded and economically marginalized groups | Response Capacity |
| Heat + air pollution (fire, ozone, PM) | Infants | Sensitivity |
| Heat | Inland areas Outdoor workers | Exposure Response Capacity |
| | Elderly | Sensitivity |

Vulnerabilities to Floods, Erosion

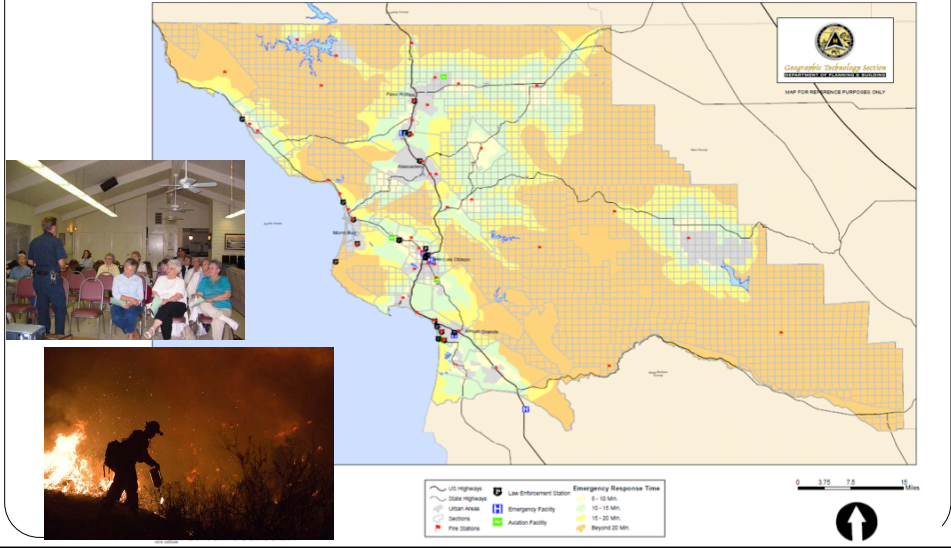


Vulnerability to Extreme Heat

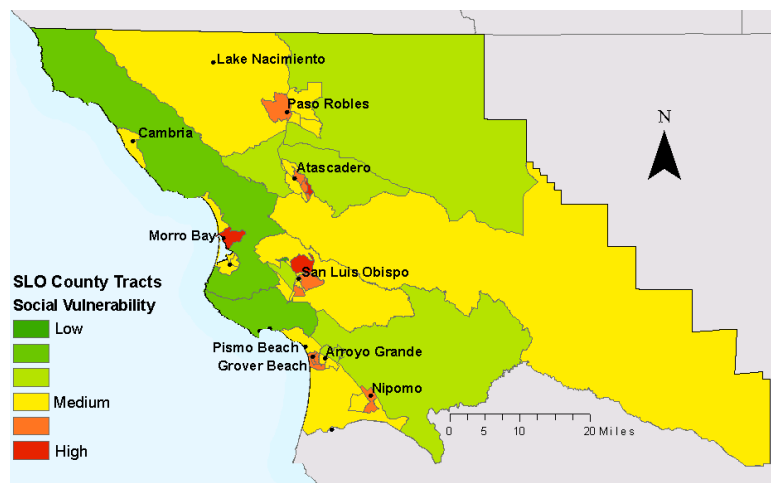


Vulnerabilities to Wildfire

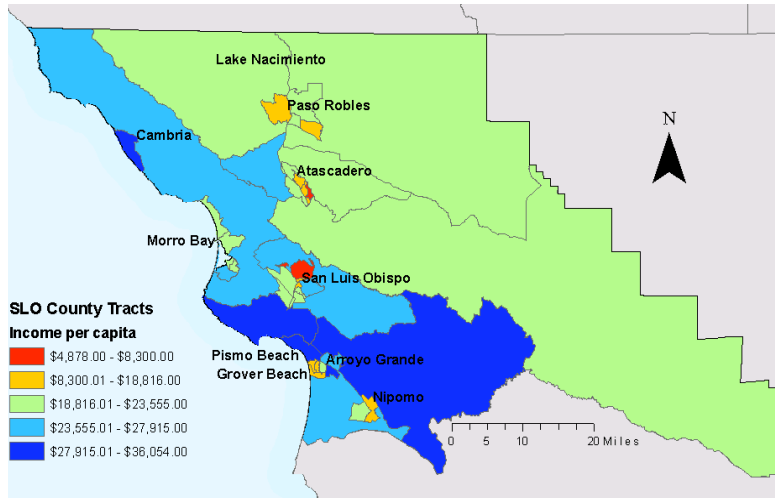
Emergency Response Time and Facility Map



Social Vulnerability – Integrated View



Social Vulnerability – Integrated View



Vulnerable Economic Sectors

| Economic Sector | Employment (% of total) |
|---|-------------------------|
| Educational services, and health care and social assistance | 21% |
| Arts, entertainment, and recreation, and accommodation, and food services | 13% |
| Retail trade | 12% |
| Wholesale, information, and other services | 11% |
| Construction | 9% |
| Professional, scientific, and management, and administrative and waste management services | 9% |
| Public administration | 7% |
| Manufacturing | 6% |
| Finance and insurance, real estate, rental and leasing | 6% |
| Transportation and warehousing, and utilities | 4% |
| Primary industries (agriculture, forestry, fishing, hunting and mining) (an estimated 4,388 people are employed in agriculture) | 3% |

Employment in Service Sector



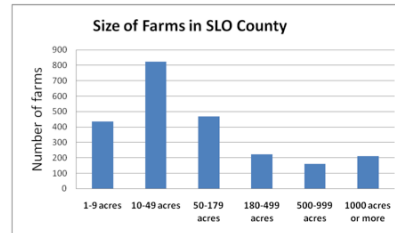
Employment in Agriculture



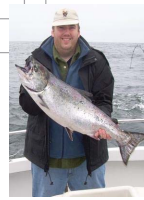
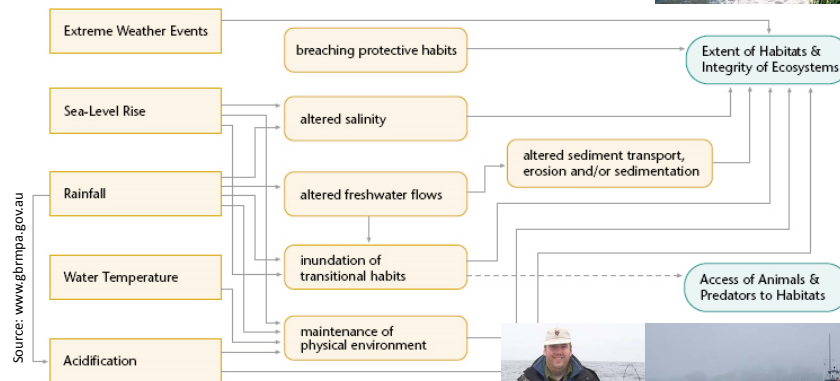
Vulnerabilities in Agriculture

Factors Influencing Farmer's Response Capacity

- Location
- Types and diversity of crops and cattle
- Current farming practices
- Access to water resources, wells, and water rights
- Financial resources
- Diversity of income sources
- Access to flood and drought insurance
- Participation in farming cooperatives
- Access to and use of climate-related information
- Market-, policy-related, or legal constraints on farming



Vulnerabilities in Fisheries



Vulnerabilities in Tourism

- Travel spending (2007): \$1.21 billion
- Tourism accounts for >16,500 jobs (2001 to 2007), many low-wage service jobs
- Local government budgets depend heavily on tourism-related taxes
- Tourism depends heavily on safe transportation infrastructure, weather and the health of natural resources
 - Beaches
 - Wetlands, sport fishing opportunities
 - Hiking, scenic drives
- Perception of safety, attractiveness of destinations and their supporting infrastructure likely as important as direct impacts

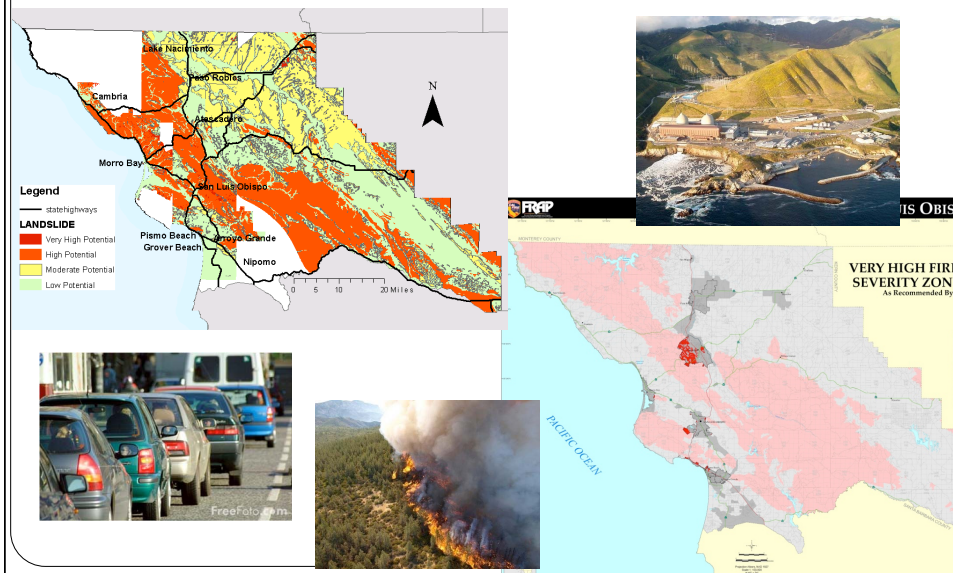


Vulnerable Services: Water

- **Climate change threats**
 - Water supply reduction
 - Saltwater intrusion in coastal areas
 - Water quality changes
 - Flooding and runoff
- **Concurrent stressors**
 - Growing demand due to growth, climate changes
 - Already overpumping
 - Infrastructure
 - Groundwater pumping, banking, desalinization is energy-intensive, costly
 - High water cost
 - Septic systems, wastewater treatment facilities



Vulnerable Services: Emergency Response



Preview of Days' Discussions

Deepening Our Understanding

Morning

What concerns you most?

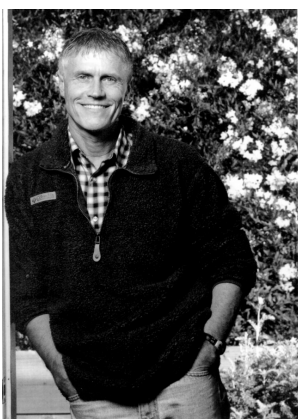
- 1-Which climate threat?
- 2-Affecting what or whom?
(Potentially affected population, sectors, type of development etc.)
- 3-Why?
 - Exposure – what is the degree to which the who/what will experience the threat?
 - Sensitivity – how severely would the who/what be impacted if it experienced this threat?
 - Capacity – how well is the who/what able to deal with this threat, able to adapt to this threat?

Afternoon

What can we do about it?

- 1-Identify strategies and actions (and who would implement them) to maximize opportunities and minimize negative impacts
- 2-Identify *existing* resources and programs and *additional* resources needed to manage risks
- 3-Identify synergies and potential conflicts across sectors
- 4-Prioritize identified adaptation strategies and actions

Thank you for what you do!



Paul Hawken, 2009

When asked if I am pessimistic or optimistic about the future, my answer is always the same:
If you look at the science about what is happening on earth and aren't pessimistic, you don't understand data.
But if you meet the people who are working to restore this earth and [their communities], and you aren't optimistic, you haven't got a pulse.

Thank you!

Summary reports are available at:

<http://www.lgc.org/adaptation/slo/>

Our Contacts:

Susanne Moser, Ph.D.

Susanne Moser Research & Consulting
Santa Cruz, CA 95060

Email: promundi@susannemoser.com



Julie Ekstrom, Ph.D.

Berkeley, CA

Email: jaekstrom@gmail.com

