Social Impacts of Climate Change in San Luis Obispo

Introduction to
Vulnerability-Adaptation Analysis

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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)
## Vulnerable Populations & Communities

<table>
<thead>
<tr>
<th>Climatic Threat</th>
<th>Population at Risk</th>
<th>Components of Vulnerability of Greatest Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floods</td>
<td>Floodplain residents (esp. elderly, handicapped, ill)</td>
<td>Exposure</td>
</tr>
<tr>
<td></td>
<td>- inland (creaks, rivers, dams)</td>
<td>Response capacity</td>
</tr>
<tr>
<td></td>
<td>- coastal</td>
<td>Response Capacity</td>
</tr>
<tr>
<td></td>
<td>Institutionalized populations</td>
<td>Response Capacity</td>
</tr>
<tr>
<td></td>
<td>Socially excluded and economically marginalized groups</td>
<td>Response Capacity</td>
</tr>
<tr>
<td>Heat + air pollution (fire, ozone, PM)</td>
<td>Infants</td>
<td>Sensitivity</td>
</tr>
<tr>
<td>Heat</td>
<td>Inland areas</td>
<td>Exposure</td>
</tr>
<tr>
<td></td>
<td>Outdoor workers</td>
<td>Response Capacity</td>
</tr>
<tr>
<td></td>
<td>Elderly</td>
<td>Sensitivity</td>
</tr>
</tbody>
</table>
Vulnerabilities to Floods, Erosion

Vulnerability to Extreme Heat
Vulnerabilities to Wildfire

Emergency Response Time and Facility Map

Social Vulnerability – Integrated View

SLO County Tracts
Social Vulnerability
Low
Green
Medium
Yellow
High
Red
Social Vulnerability – Integrated View

Vulnerable Economic Sectors

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

- Extreme Weather Events
  - breaching protective habitats
- Sea-Level Rise
  - altered salinity
  - altered freshwater flows
- Rainfall
  - inundation of transitional habitats
- Water Temperature
  - maintenance of physical environment
- Acidification
  - Extent of Habitat & Integrity of Ecosystems
  - Access of Animals & Predators to Habitats
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

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Thank you for what you do!

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.

Paul Hawken, 2009
Thank you!

Summary reports are available at:
http://www.lgc.org/adaptation/slo/

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