Barriers to Adaptation

The Challenges of Managing Climate Risks and How Local Communities Can Overcome Them

Susanne C. Moser, Ph.D.
Susanne Moser Research & Consulting
Stanford University

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Road map

- Adaptation, Limits and Barriers – Some Definitions
- Phase I: Developing a Framework to Diagnose Barriers to Adaptation
- Phase II: Empirical Test of Framework
- Sample Findings
  - “10,000 foot chronology”
  - Barriers by stages in the process
  - Dominance of barriers
  - Avoiding barriers
  - Overcoming barriers
- Conclusions
Adaptation broadly defined

"Adaptation involves changes in natural and human systems (ranging from short-term coping to longer-term, deeper transformations) 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."

(Moser and Ekstrom 2010 PNAS)
Generic adaptation strategies to climate change and extreme events

- Reduce Exposure
- Reduce Vulnerability
  - Reduce Sensitivity
  - Increase Response Capacity
- Reduce the Threat Through Mitigation
- Improve Disaster Risk Management
- Enhance Local Resilience
  - Self-organize
  - Rebound
  - Learn & change
- Minimize, Share, Transfer the Remaining Risks; Compensate for losses

Source: IPCC (2011), SREX SPM
Adaptation options: Examples
“What is being done, put in place or changed”

- **Structural/Technical**
  - Hard and soft engineering solutions (seawalls, beach replenishment, reservoirs)
  - Moving infrastructure inland/higher
  - Irrigation
  - Ecosystem restoration

- **Planning & Policy Tools**
  - Setback regulations
  - Building codes
  - Land use policies
  - Public access regulations

- **Financial Mechanisms**
  - Insurance pools (risk sharing & transfer)
  - Restoration/redevelopment funds
  - Ecosystem service payments
  - Taxation

- **Informational & Behavioral Interventions**
  - Education
  - Disaster Preparedness
  - Decision support/climate services
  - Storm warning systems
  - Stakeholder engagement
Limits and barriers

- **Limits** – absolute thresholds
  beyond which existing activities, land uses, ecosystems, species, sustenance or other social benefits cannot be obtained or maintained, not even in a modified fashion.

- **Barriers** – obstacles that can be overcome
  with concerted effort, creative management, change of thinking, prioritization and any related shifts in resources, land uses, institutions, etc.
  - Result in inefficiency, ineffectiveness, missed opportunities, higher costs, sometimes desirable delays.
  - NOT normative, but descriptive
  - Barriers may appear to individuals participating in the adaptation process as *de facto* limits.

Source: Moser & Ekstrom 2010, PNAS
See also: Dow et al. 2013, Nature Climate Change
Some barrier “favorites”:
• Costs
• Lack of scientific information
• Technological feasibility
• “Politics”
• Institutional challenges
• Environmental side effects

Range of definitions
But non systematic, complete
Range of theoretical bases
(or none at all)

No clear guidance on how to overcome barriers
Architecture: Key structural elements

WHO encounters barriers?   Doing WHAT?   In WHAT context?

Context

Governance & larger human and biophysical environment

Actors

System of concern
Architecture: Key structural elements

Context
Governance & larger human and biophysical environment

Actors

System of concern
Understanding

- Detect problem
- Gather/Use info
- (Re)Define problem

Managing

- Evaluate
- Monitor option and environment
- Implement option

Planning

- Select option(s)
- Assess options
- Develop options

WHEN in the adaptation process does the barrier emerge or impede progress?
Diagnosing barriers to adaptation

Two fundamental questions:

- What can stop, delay, divert the process? (or: At every stage in the process, what must occur for the adaptation process to proceed?)

- What causes the impediments? (or: How do the actors, context [governance and otherwise], and the system of concern contribute to those impediments?)
Example: Problem detection

1. **Detect problem**
2. **Gather/Use of Info**
3. **Evaluate**
4. **(Re)Define problem**
5. **Develop options**
6. **Select option(s)**
7. **Assess options**
8. **Implement option**
9. **Monitor impact and environment**
Example: Problem detection

Barriers and diagnostic questions

What can stop, delay, divert the process?

Key Barriers in the Problem Detection and Initial Framing Phase

- Existence of a signal
- Detection (and perception) of a signal
- Threshold of concern (initial framing as problem)
- Threshold of response need and feasibility (initial framing of response)
**Example: Problem detection**

**Barriers and diagnostic questions**

How do the actors, context, and the system of concern contribute to those impediments?

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Actors</th>
<th>Governance &amp; Context</th>
<th>System of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Understanding</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Existence of a signal</td>
<td>- Does the actor receive the signal?</td>
<td>- Does the governance system somehow prevent sending out a signal?</td>
<td>- Does a signal exist and what does it mean?</td>
</tr>
<tr>
<td>ii. Detection (perception) of a signal</td>
<td>- Does the actor detect, perceive or recognize the signal?</td>
<td>- How is the signal delivered and by whom?</td>
<td>- What is the nature of the signal?</td>
</tr>
<tr>
<td>iii. Threshold of concern (initial framing as problem)</td>
<td>- How does the actor interpret the signal?</td>
<td>- Does the governance system fail to transmit a signal or prevent it from reaching individuals?</td>
<td>- How is or can the signal be identified, seen or experienced?</td>
</tr>
<tr>
<td>iv. Threshold of response need and feasibility (initial framing of response)</td>
<td>- Does the actor perceive a need to respond and perceive a response to be feasible in principle?</td>
<td>- Do leaders, norms, or institutions dismiss the issue as a problem?</td>
<td>- Is the issue/problem novel or familiar?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Do laws, policies and social norms support or prevent taking a problem seriously and responding to it?</td>
<td>- Are there logical actors to take on the detected problem?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Is there an already agreed upon way of dealing with the detected problem or not?</td>
</tr>
</tbody>
</table>
# Intervention points: Overcoming barriers

- Where does the barrier originate?
- Where could one intervene to overcome the barrier?

<table>
<thead>
<tr>
<th>Spatial/Jurisdictional</th>
<th>Temporal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximate</td>
<td>Contemporary</td>
</tr>
<tr>
<td></td>
<td>Legacy</td>
</tr>
<tr>
<td>Remote</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>C</td>
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<tr>
<td></td>
<td>B</td>
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<td>D</td>
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</tbody>
</table>

The more remote in space and time the barrier is from the actor’s sphere of influence, the less opportunity does s/he have to intervene and overcome the barrier.
The “Barrier Rose”: Stage-Specific Barriers

Lit review: Ekstrom, Moser, and Torn (2011), Sacramento: CEC.
Project Phase II: Empirical study

- Test the usefulness and transferability of the diagnostic framework by:
  - Identifying all relevant barriers to adaptation to SLR and related coastal hazards in real-life case studies
  - Identifying ways to overcome barriers

Study report/published papers available at: http://www.susannemoser.com
Choice of case studies

- **Variables**
  - Exposure to local risks from climate change and sea-level rise
  - Social vulnerability index

- **Criteria**
  - Adaptation process underway (stages)
  - Inclusion of cities, counties, and regional governance entity
  - Willingness to participate
Local case studies

Counts of SF Bay Area (regional case)

Case Study Boundary: San Francisco Bay Area
Research approach & methods

• Preliminary research to inform case study selection
  • review and synthesis of climate change risks
  • social vulnerability assessment
  • information gathering on local adaptation efforts

• Comparative case study design
  • 4 local communities, plus regional process
  • 43 key informant interviews
  • document review
  • (participatory) observation of public meetings and workshops

• Statewide coastal adaptation needs assessment

<table>
<thead>
<tr>
<th>Case study</th>
<th>Full interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Hayward</td>
<td>7</td>
</tr>
<tr>
<td>Marin County</td>
<td>6</td>
</tr>
<tr>
<td>City/County of San Francisco</td>
<td>10</td>
</tr>
<tr>
<td>Santa Clara County</td>
<td>6</td>
</tr>
<tr>
<td>JPC and Region</td>
<td>13</td>
</tr>
<tr>
<td>State</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>43</td>
</tr>
</tbody>
</table>
Data analysis

- Adaptation Process Mapping
  - Chronology (by periods)
  - Decision-making (by stages)

- Barrier Analysis

- Comparison and Synthesis

- Statistical Analysis of Relevant Survey Elements
### Case studies: Mapping the adaptation process

#### PerIODS

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</thead>
<tbody>
<tr>
<td>2006</td>
<td>Lone Voice</td>
<td>Initial SLR Assessment</td>
<td>Coalition Building</td>
<td>Deepening Understanding</td>
<td>Pilot Project</td>
</tr>
<tr>
<td>2009-10</td>
<td>Lack of receptivity</td>
<td>Availability of information</td>
<td>Staff time</td>
<td>Resources for analysis</td>
<td>Funding for study</td>
</tr>
<tr>
<td>2010</td>
<td>Lack of concern</td>
<td>Limited resources</td>
<td>Funding</td>
<td>Too much/too little info</td>
<td>Legality &amp; procedural feasibility</td>
</tr>
<tr>
<td>2011-ongoing</td>
<td>Lack of interest</td>
<td>Perceived option feasibility</td>
<td>Analytic capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No local signal</td>
<td>Jurisdictional constraints</td>
<td>Resources to support process</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Polit. will, buy-in</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Local ownership</td>
</tr>
</tbody>
</table>

#### Key Barriers

- Lack of receptivity
- Availability of information
- Staff time
- Resources for analysis
- Funding
- Too much/too little info
- Legality & procedural feasibility
- Perceived option feasibility
- Analytic capacity
- Jurisdictional constraints
- Resources to support process
- Polit. will, buy-in
- Local ownership

**Source:** Moser & Ekstrom (2012)
Barriers by period/phase/stage

Periods:
- Period 1: Understanding
  - Availability of information
  - Resources for more extensive/detailed vulnerability assessment

- Period 2: Planning
  - Perceived option feasibility
  - Sphere of responsibility/jurisdiction over options
  - Resources
  - Availability of data

- Period 3: MANAGING
  - Implement option(s)

- Period 4a: Planning

- Period 5: UNDERSTANDING
  - Evaluate

Actions:
- Detect signal
- Gather/use info
- Redefine problem
- Develop options
- Assess options
- Select option(s)
- Monitor option, env

Source: Moser & Ekstrom (2012)
Overall frequency of adaptation barriers encountered

Overall Frequency of Barriers Encountered
(Types of Barriers per Case Study)

Source: Moser & Ekstrom (2012)
Sources & origins of barriers

Sources of Adaptation Barriers (based on averages in each case)

- System: 10%
- Governance/context: 55%
- Actor: 36%

Summary of the Origins of Barriers (all combined)

<table>
<thead>
<tr>
<th>spatial/jurisdictional</th>
<th>temporal</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>contemporary</td>
</tr>
<tr>
<td>proximate</td>
<td>A - 31%</td>
</tr>
<tr>
<td>remote</td>
<td>B - 12%</td>
</tr>
</tbody>
</table>

Source: Moser & Ekstrom (2012)
What helps avoid barriers?

Aids and Advantages
(Normalized, per Case)

Types of Aids and Advantages

- HASPA
- Marin County
- San Francisco
- Santa Clara County
- Region

Source: Moser & Ekstrom (2012)
Strategies used to overcome barriers

Strategies Used to Overcome Barriers
(normalized, per case study)

- Data gathering and monitoring
- Research
- Self-education and learning
- Information sharing
- Creating awareness among staff, public, stakeholders
- Communication
- Networking/informal relationship building
- Cooperation, formalized partnerships
- Political maneuvering
- Lobbying
- Taking lead, assuming leadership
- Waiting for leadership
- Prioritizing
- Staffing changes
- Funding, fundraising, financing
- Policy & management changes

Source: Moser & Ekstrom (2012)
Governance: The Art of Overcoming Barriers

Institutional issues
- Laws, regulations, rules
- Procedures
  - Agency culture (transparency, accountability)
  - Stakeholder engagement (quality and degree)
  - Interagency collaboration
- Effective implementation (expertise, efficiency, leverage at point of Intervention, trust, social capital)

Political calculus
- Timing
- Power/influence
- Political support

Leadership
- Presence
- Quality
- Style

Knowledge
- Availability, access, quality, integration, human capital

Governance

Costs
- Planning
- Implementation
- Monitoring
- Evaluation

Social acceptability
- Deeply held cultural values
- Social justice
- Costs
- Impacts on ownership, rights, entitlements
Conclusions: Diagnostic framework

Produced richer picture of barriers than literature
Served well to identify barriers and deepen understanding of barriers and adaptation process
Some barriers line up well with Phases and Stages of the decision cycle, others span multiple ones
Source of barriers or temporal/jurisdictional origin sometimes difficult to identify

Need to add:
• Aids and advantages
• Measures of importance, difficulty to overcome barriers

Future possibilities:
• Move toward a simplified tool
• Move from diagnostic/descriptive tool toward a predictive tool
Thank you!

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- Julie A. Ekstrom, Ph.D. (case study research)
- California Energy Commission (PIER Program) for funding of SF Bay case studies
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- Participating coastal organizations and survey respondents

Contact:

- Susanne C. Moser, Ph.D.
  Web: [www.susannemoser.com](http://www.susannemoser.com)
  Email: promundi@susannemoser.com
Additional slides (survey results)

Rising to the Challenge

Results of the 2011 California Coastal Adaptation Needs Assessment

By Juliette A. Finzi Hart, Phyllis M. Grifman, Susanne C. Moser, Adina Abeles, Monique R. Myers, Susan C. Schlosser, Julia A. Ekstrom
Snapshot of California’s coastal communities

Where are California Coastal Communities in the Adaptation Process? (Status: Fall 2011)

- Not yet begun: 10%
- Understanding: 40%
- Planning: 41%
- Implementing: 9%

Source: Hart, Moser et al. (in preparation)
What got communities started?

Source: Moser & Ekstrom (2012); Hart et al. (2012)
Barriers to Adaptation as Perceived by Local Coastal Professionals in California

- Lack of funding for implementation
- Insufficient staff to analyze information
- Current pressing issues all-consuming
- Lack of funding for planning
- Lack of public demand
- Lack of technical assistance
- Lack of coordination
- Lack of social acceptability
- Lack of leadership (elected)
- Magnitude of problem overwhelming
- Lack of leadership (organization)
- Opposition from stakeholders
- Lack of access to relevant information
- Internal disagreements on importance
- Unclear on available options
- No legal mandate
- Legal pressures to maintain status quo
- Science is too uncertain
- Unclear how climate change relates to job

Percent

Type of Barrier:
- Big Hurdle
- Small Hurdle
- Not a Hurdle