



Rising Seas: Preparing for Climate Change

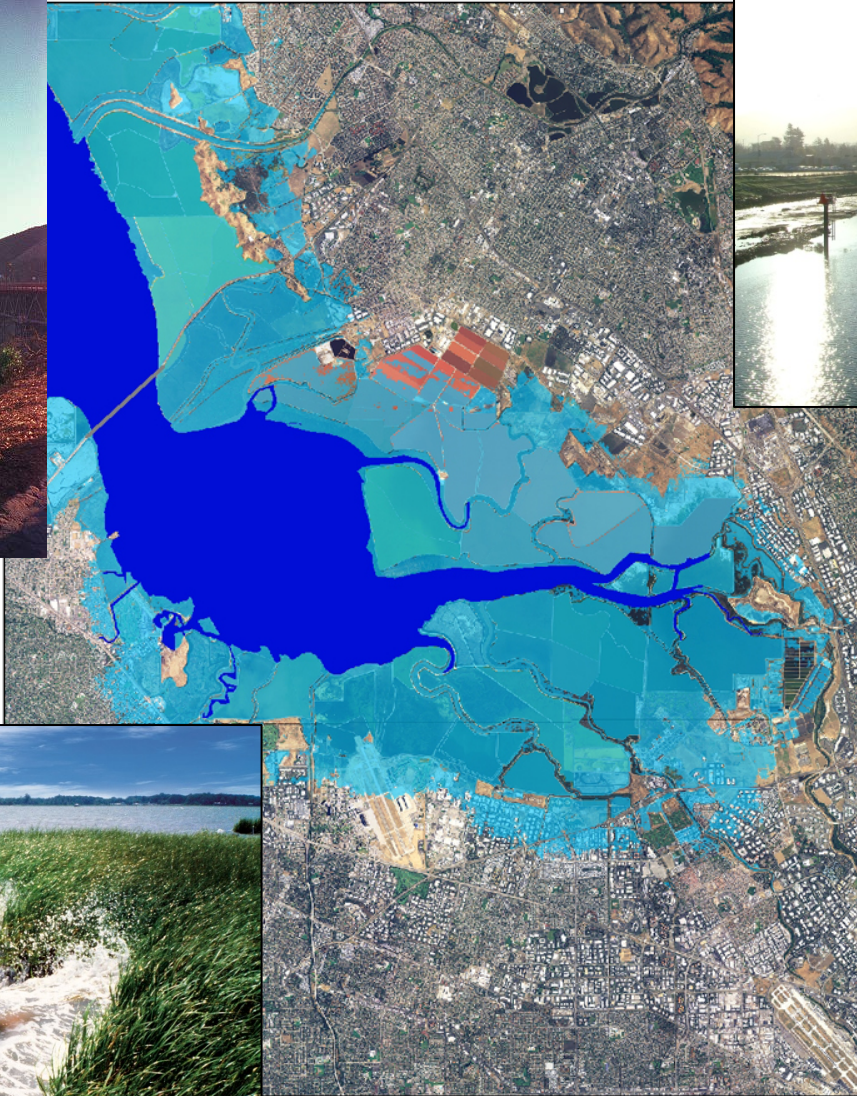
The Need for Adaptation in the Bay Area



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San Francisco Bay Scenarios for Sea Level Rise South Bay



 San Francisco Bay
 1 m sea level rise



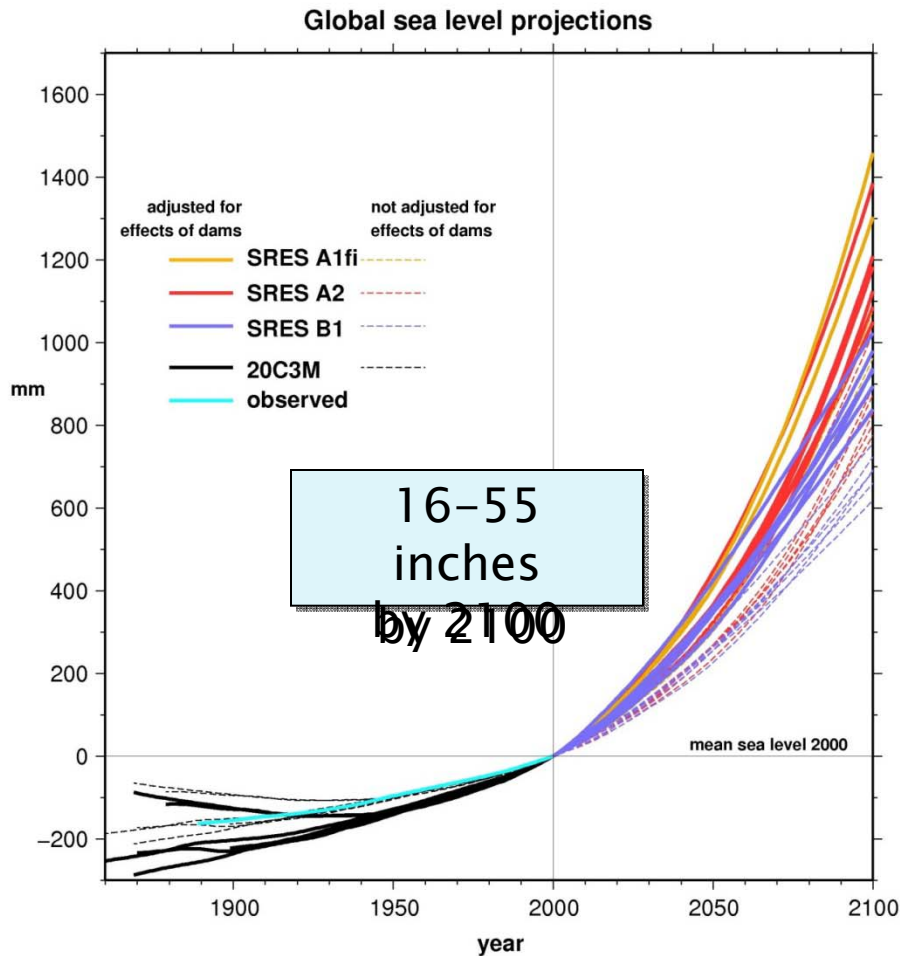
Map is based on USGS 2m DSM and National Agriculture Imagery Program data. Map is illustrative and depicts a potential inundation scenario in 2100. Limitations in the geospatial data available may effect accuracy. Map should not be used for planning purposes.

Ice Breaker



- ▶ To minimize impacts of climate change – how much attention should we put on mitigation, How much on adaptation
 - in the next 10 years?
 - In the next 50 years?
- ▶ What impacts of sea-level rise are you most worried about in your community?
- ▶ What do you feel will be the hardest impact of sea-level rise to reduce/limit/manage?
 - Why?

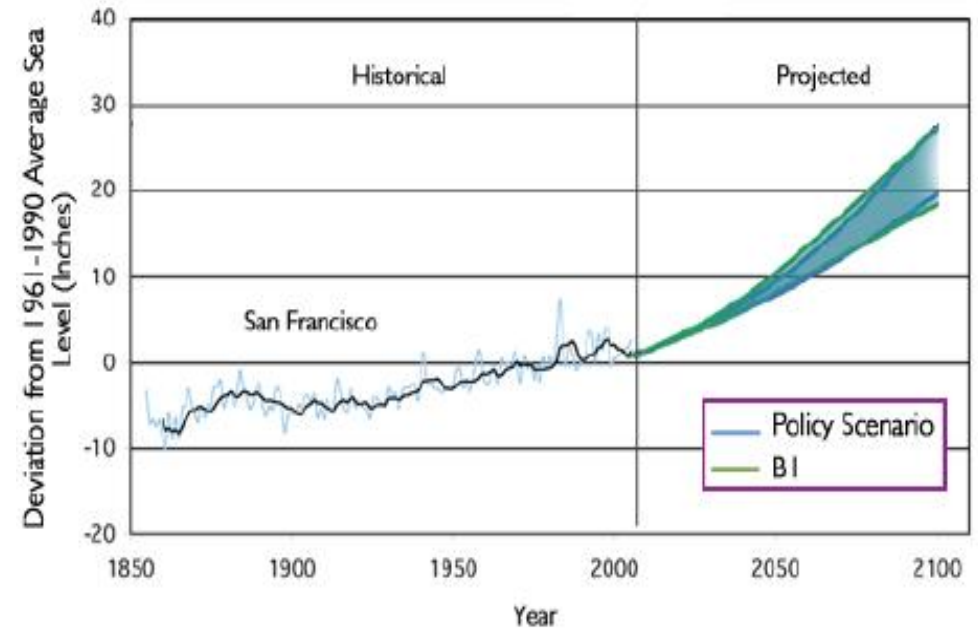
Sea-Level Rise Projections



CNRM CM3 GFDL CM2.1 MIROC3.2 (med)
MPI ECHAM5 NCAR CCSM3 NCAR PCM1

after Rahmstorf (2007) Science VOL 315 pp 368-370
Chao et al. (2008) Scienceexpress 13 March 2008 10.1126/science.1154580

Global Sea Level Deviation Above 1961-1990 Average



B1 = SRES (lowest) emissions scenario (IPCC)

Policy scenario = 80% emissions reductions from developed nations below 2000 by 2050; fair contributions from developing countries

Our Ability to Cope Must Keep Up with Changes in Climate

▶ Climate Variability and Change

- Climate varies to some extent naturally across seasons, years, decades (e.g., more/fewer storms, dry/wet years, El Niño)

1. Climate does not change...
2. Climate becomes more extreme...
3. Climate becomes radically different...

Trouble!

Trouble!

Trouble!

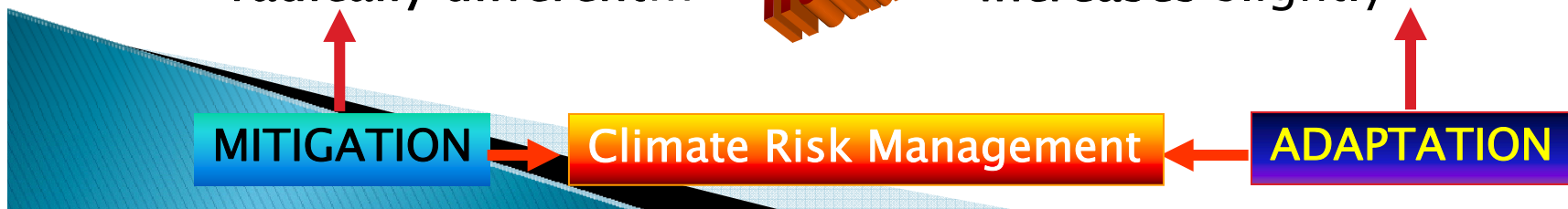
▶ Society's Coping Capacity

- Society copes through financial, institutional, technological, social mechanisms (e.g., insurance, water rights, snowmaking, air conditioning, sharing)

- ... but coping capacity declines

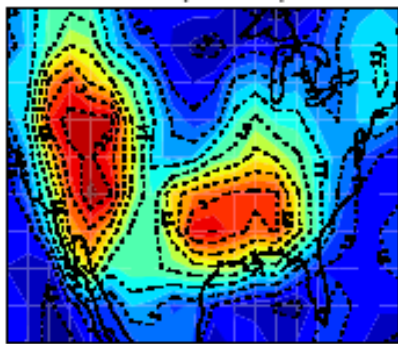
... and coping capacity stays the same as it is now

- ... even if coping capacity increases slightly

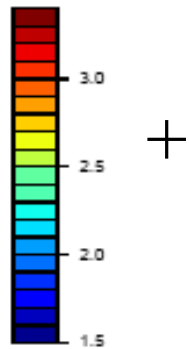


Vulnerability & Adaptation

- ▶ Vulnerability =
Exposure + Sensitivity + Response capacity
(coping and adapting)



Source: Tebaldi et al (2006)



Source: AP



- ▶ Adaptive Capacity

- **Economic Resources** (availability, distribution)
- **Technology** (existence, access)
- **Information and Skills** (availability, training)
- **Infrastructure** (availability, functionality)
- **Institutions** (stability, structure, access)
- **Equity** (distribution, access, conflict)
- **Social capital** (education, networks, trust, etc.)

Awareness—Analysis—Action: The AAA of Adaptation

▶ Awareness

- Do you know how climate change could impact your community, local businesses, specific populations?

▶ Analysis

- Can you identify and assess the risks from climate change to your services, operations?

▶ Action

- Do your current policies, strategies, codes, and plans include provisions for the impacts of climate change?
 - Reducing vulnerabilities
 - Improving your response capacity (incl. learning, adapting to new information, changing stresses)
 - Removing barriers to action

From Adaptive Capacity to Adaptation Actions Or: Where the Rubber Meets the Road...



Awareness

- Attitudes to GW
- Level of concern
- Knowledge of climate change, impacts, and solutions



Analytic Capacity

- Identification of risks
- Assess of threats to services, operations
- Use of information
- Information processing tools



Action

- Current policies, strategies, plans, regulations
- Development of long-term projects, plans
- Emergency plans
- Actions taken/not taken
- Briefing of elected officials public

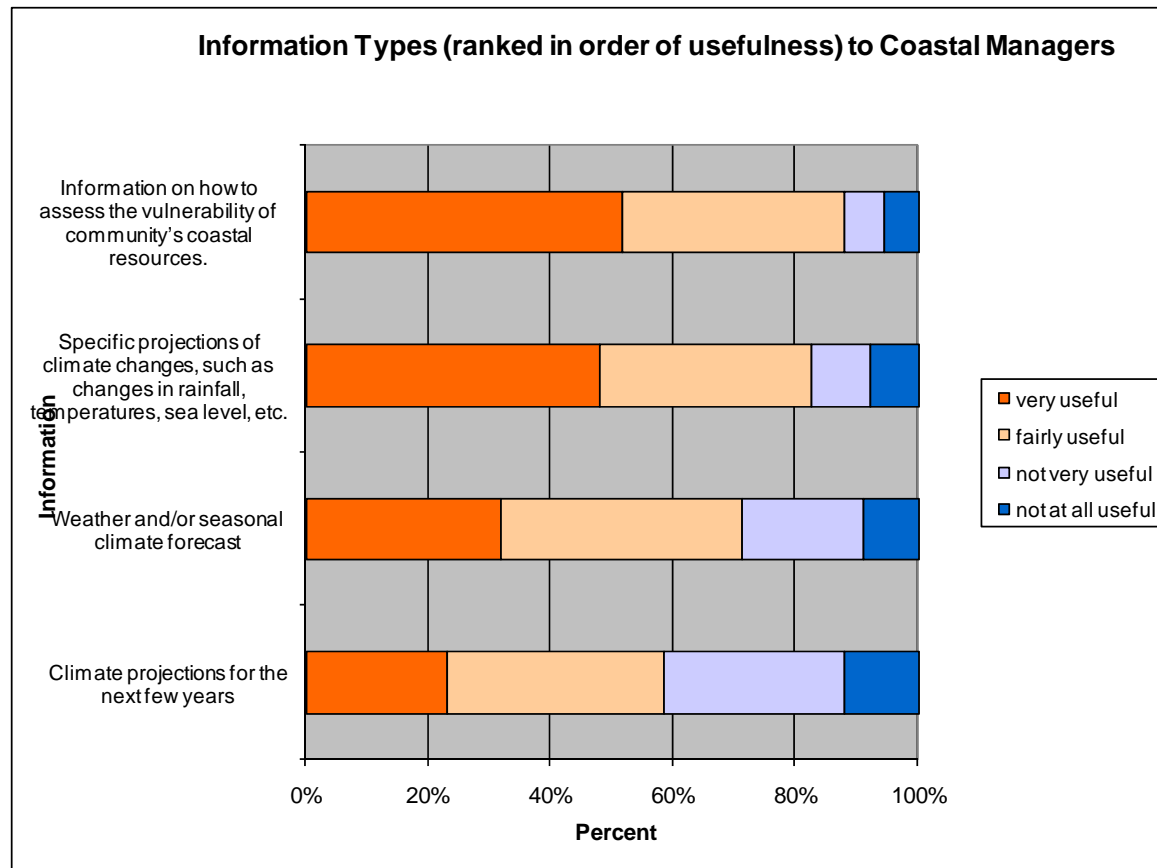
Key Findings

- ▶ Reducing emissions (mitigation) is no longer enough. Preparing for and dealing with the consequences of climate change (adaptation) is also necessary.
- ▶ Much of that adaptation will take place through existing management institutions and structures (e.g., federal, state, local cooperation).
- ▶ At this time, state and local coastal managers in CA are highly aware, moderately informed, but almost entirely unprepared to deal with the impacts of climate change.
- ▶ State legislative action (e.g., mandates, appropriations) and state agency leadership would support and motivate local efforts to assess vulnerabilities, prioritize adaptation needs, and begin implementing adaptation strategies.



Source: Cyber Strategy Inc.

Analytic Capacity: Information Needs

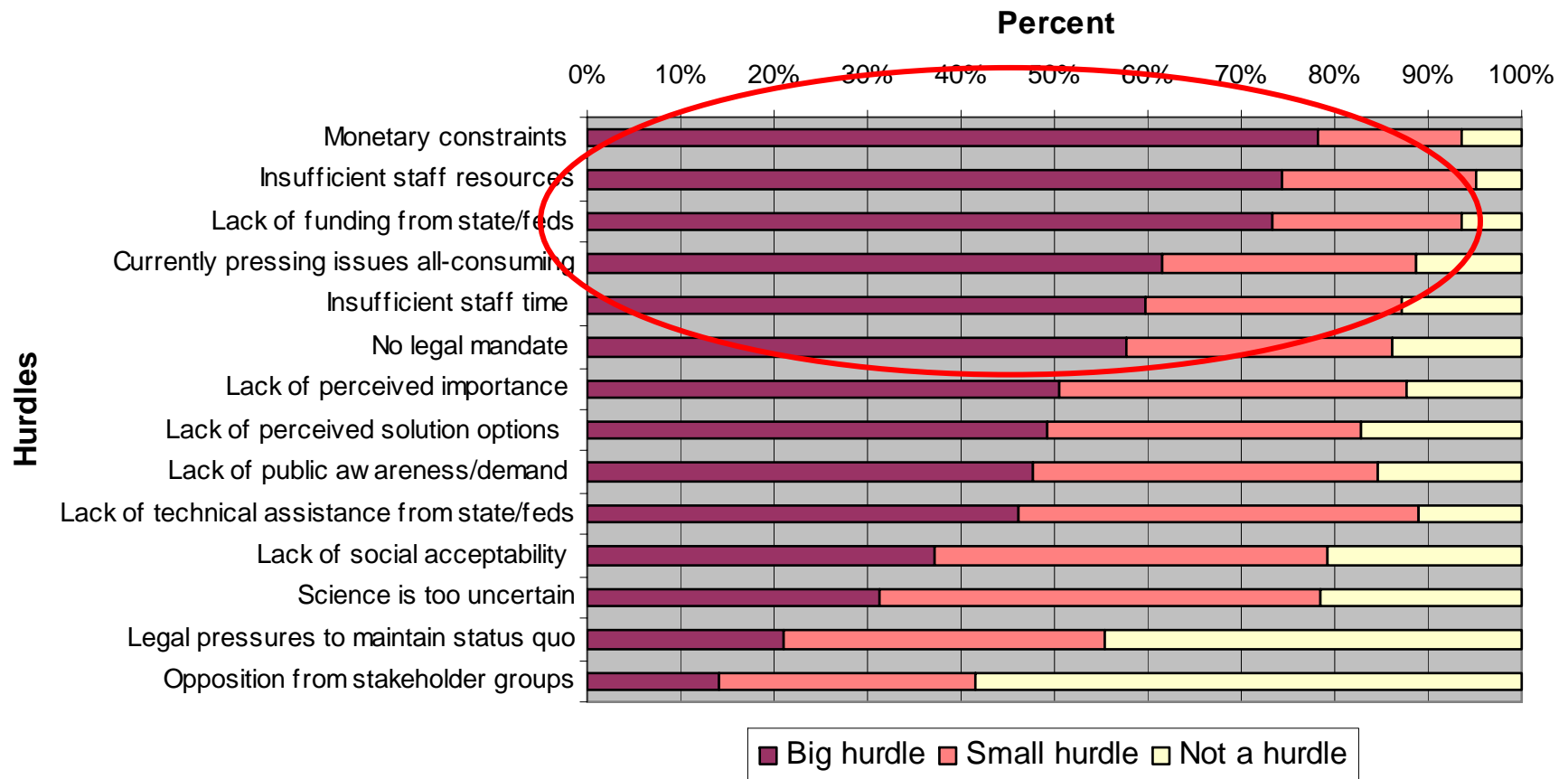


Desirable opportunities to learn more

	hands-on training	user manuals	conferences	better college edu.	web clearing-house	dedicated listserves	in-house sharing
very useful	47.5%	46.2%	40.7%	44.1%	47.5%	33.3%	30.8%
extremely useful	23.7%	12.8%	13.6%	9.3%	18.6%	14.5%	10.3%
Total	71.2%	59.0%	54.3%	53.4%	66.1%	47.8%	40.1%

Action Barriers

Perceived Hurdles to Local Action on Global Warming Impacts



Sources: Moser & Tribbia (2006/7), Tribbia & Moser (2008)

Other Challenges Experienced at the Local Level

- ▶ The absence and quality of leadership
- ▶ Departmental divisions, lack of coordination, collaboration, communication
- ▶ Lack of actionable science – scale, platforms, relevance
- ▶ Lack of downscaled climate change information and climate services
- ▶ Lack of collaboration with local universities and experts; consulting of variable quality
- ▶ Isolation from networks for exchange of knowledge and experiences
- ▶ Budget constraints and competing priorities
- Perceived and real competition between mitigation and adaptation
- Lack of support enabling local adaptation actions through higher levels of government – funding, regulation, technical assistance, policy guidance, scenarios
- Regulatory and cross-jurisdictional conflicts; state and federal rules and regulations at cross-purposes with local efforts can delay or hinder efforts (perverse subsidies, incentives that place people/assets at risk)
- Lack of (re)training of local professionals

Meeting the Challenges



- ▶ Adaptation rising on federal agenda
 - Budget allocations through existing programs
 - New policies and federal funds
- ▶ State Climate Adaptation Strategy...
 - ... to be implemented through existing programs, policy changes, budget appropriations, guidance, technical assistance
- ▶ Improving scientific basis
- ▶ Growing awareness among NGOs, public
- ▶ Local leadership and engagement
- ▶ Networking, exchange of ideas, learning
- ▶ Trainings of local officials like this

Thank you!



I Want You for
Climate Change

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Links to State Policy Priorities

- ▶ **Executive Order S-3-05 (June 1, 2005)**
 - “report on mitigation and adaptation plans to combat these impacts” [of CC]
- ▶ **AB32 California Global Warming Solutions Act**
- ▶ **CA Ocean Protection Council’s Strategic Plan**
 - Priority Area: Physical Processes and Habitat Structure
 - **Objective 1:** Restore and maintain valuable ocean and coastal habitats
 - **Objective 2:** Support implementation of regional sediment management throughout California
 - **Objective 3:** Support state efforts to detect the impacts of climate change and to develop strategies to respond to them
 - Priority Area: Education and Outreach
 - **Objective 1:** Increase public awareness of ocean and coastal issues and encourage individual stewardship
- ▶ **West Coast Governors’ Initiative on Ocean Health**
- ▶ **Executive Order S-13-08 (November 14, 2008)**
 - Directing state agencies to plan for sea-level rise and other climate change impacts
- ▶ **CAS** – public review soon, draft expected in June 2009