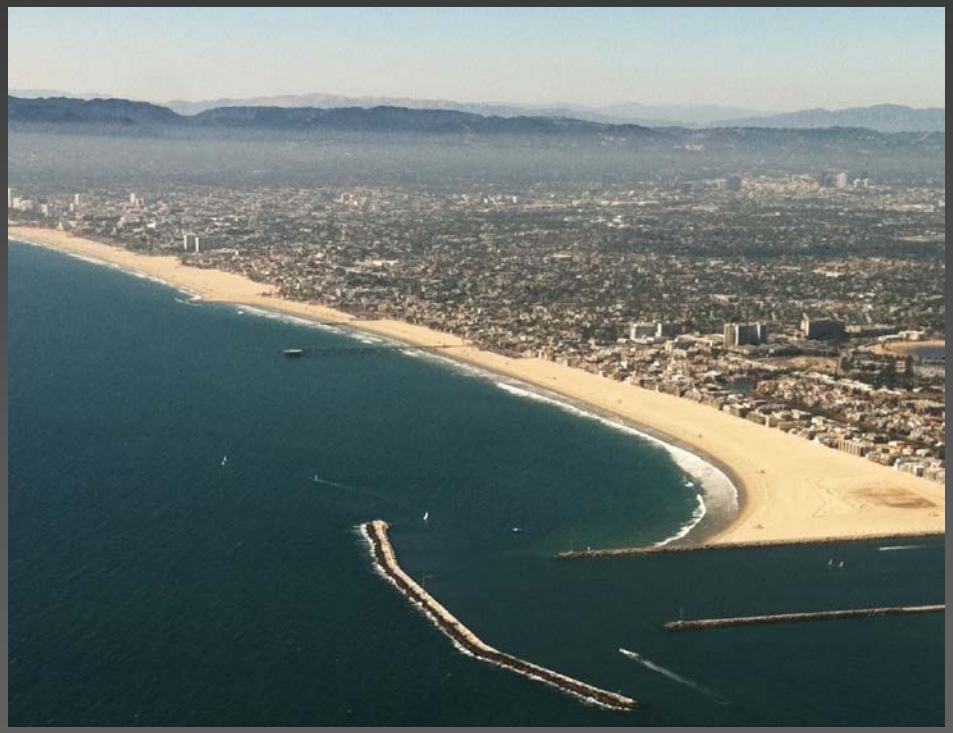
Sea Level Rise Adaptation Planning
A Case Study of Los Angeles, CA

Phyllis Grifman
Alyssa Newton
Juliette Finzi Hart

Sea Grant Program
University of Southern California



National Adaptation Forum
Denver, Colorado
April 2, 2013

USC Sea Grant - The Urban Ocean Program

Role of SG Programs

- Fund relevant research
- Outreach & Education
- Boundary Organization

Urban impacts on coastline

- Human Impacts
- Harmful Algal Blooms
- Water Quality
- Invasive Species
- Climate Change

CA Coastal Climate Change Adaptation Survey

- Focus on coastal counties and coastal concerns
- Goals
  - Understand needs
  - Understand barriers
  - Develop targeted trainings, workshops, and technical support

- First-of-its-kind longitudinal analysis in CA

CA Coastal Climate Change Adaptation Survey

16 CA Partners!

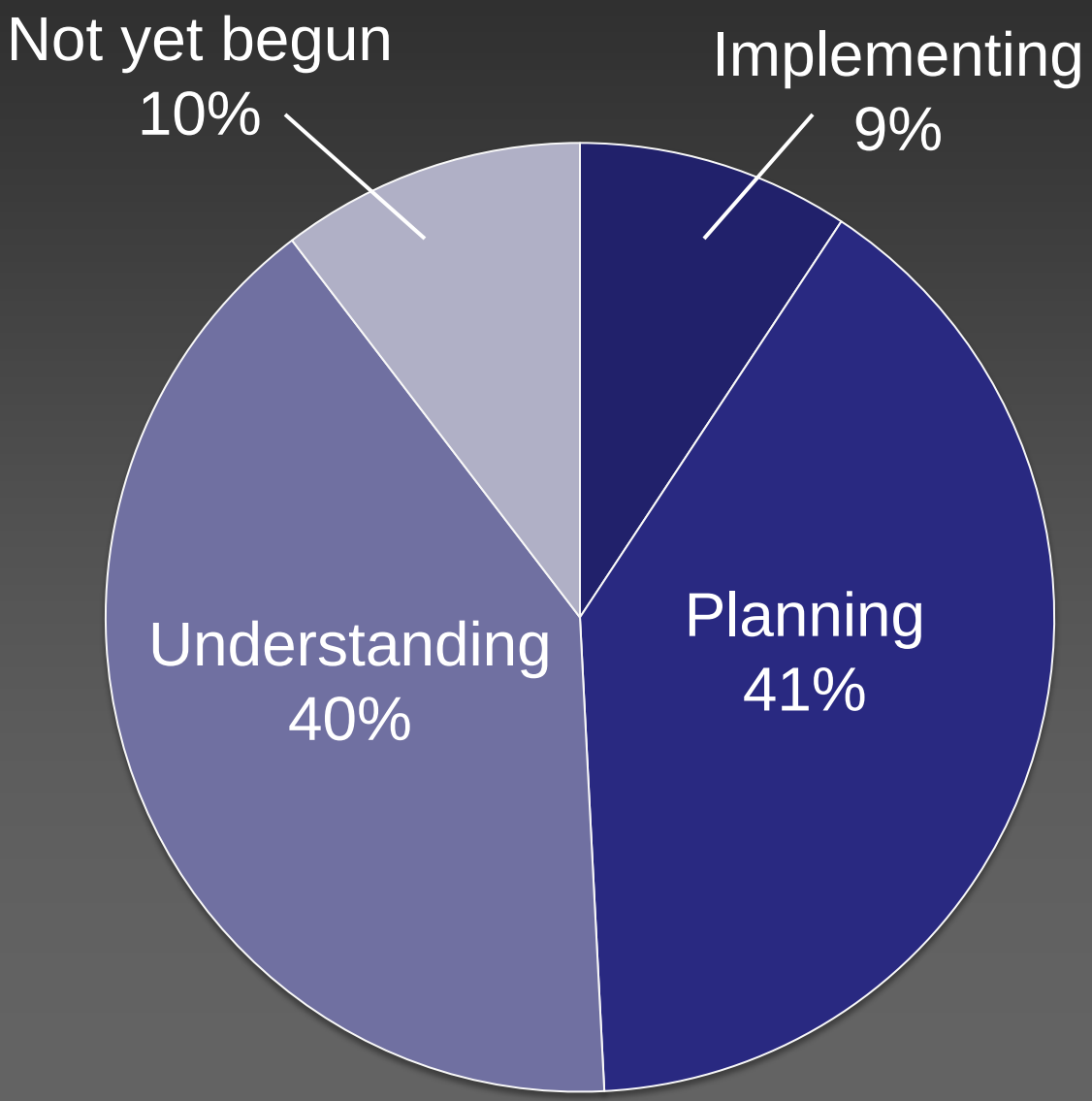
- Academic Partners
  - USC Sea Grant
  - CA Sea Grant
  - Center for Ocean Solutions, Stanford University
  - UC Berkeley
  - Susanne Moser Research & Consulting
  - Southern California Coastal Ocean Observing Network (SCCOOS)
  - California Nevada Applications Program (UCSD RISA)


Photo credit: Juliette Hart

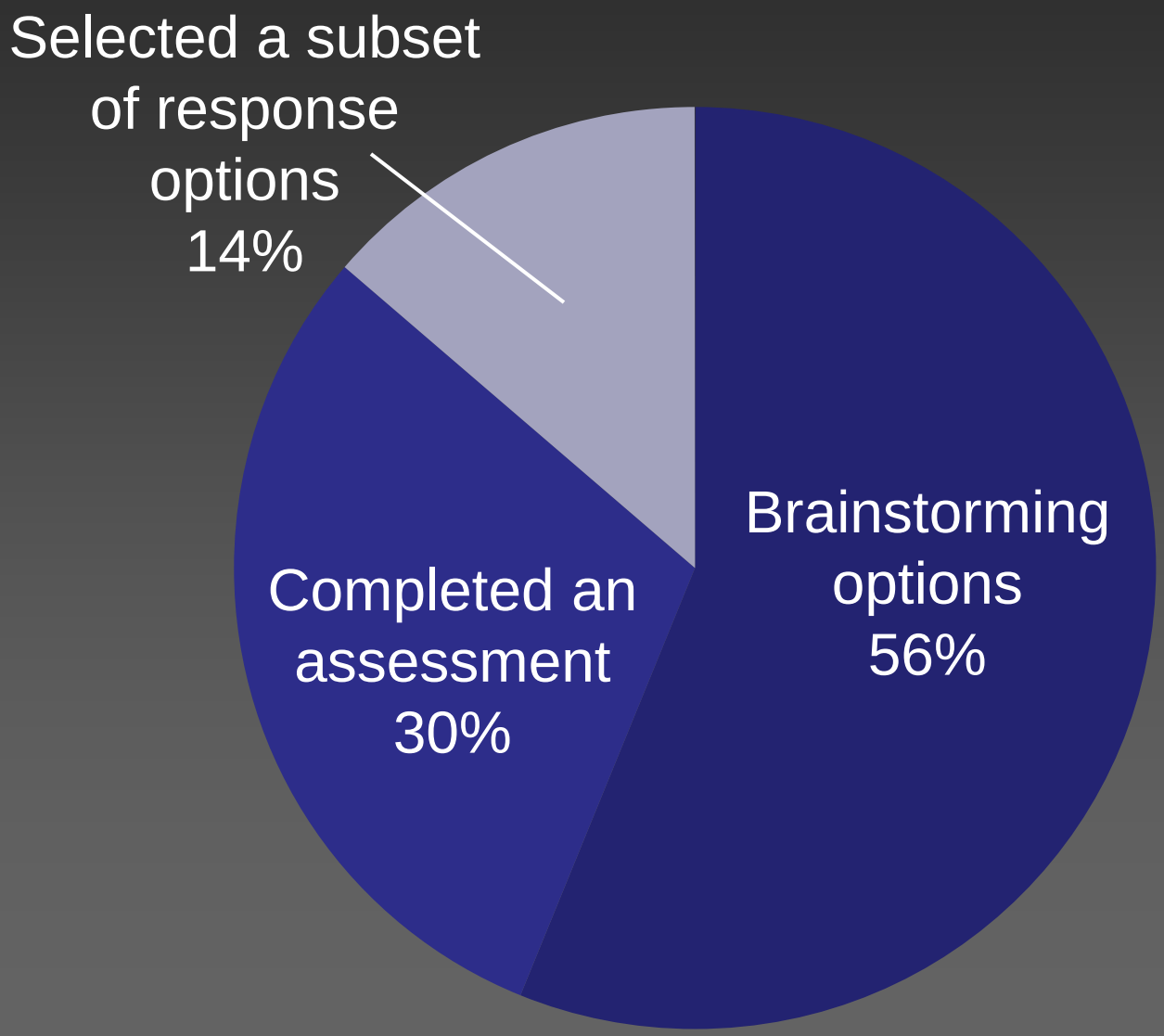
- State Level Partners
  - CA Coastal Commission
  - CA Coastal Conservancy
  - CA Ocean Protection Council
  - CA Ocean Science Trust
  - San Francisco Bay Conservation and Development Commission

- Federal Partners
  - NOAA Coastal Services Center
  - Tijuana River National Estuarine Research Reserve
  - San Francisco Bay National Estuarine Research Reserve
  - Gulf of Farollones Marine Sanctuary

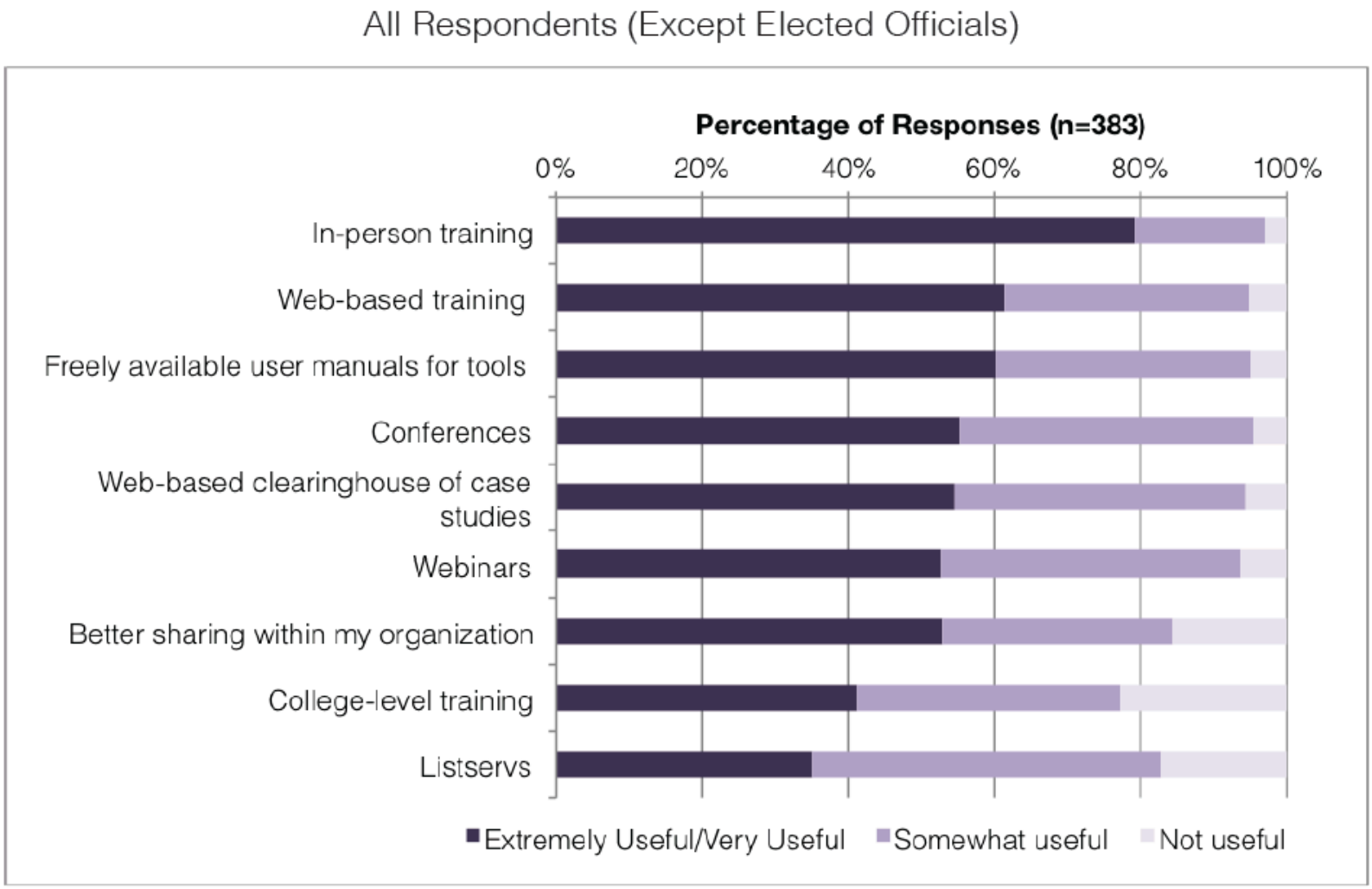
Where are Coastal Communities in the Adaptation Process?



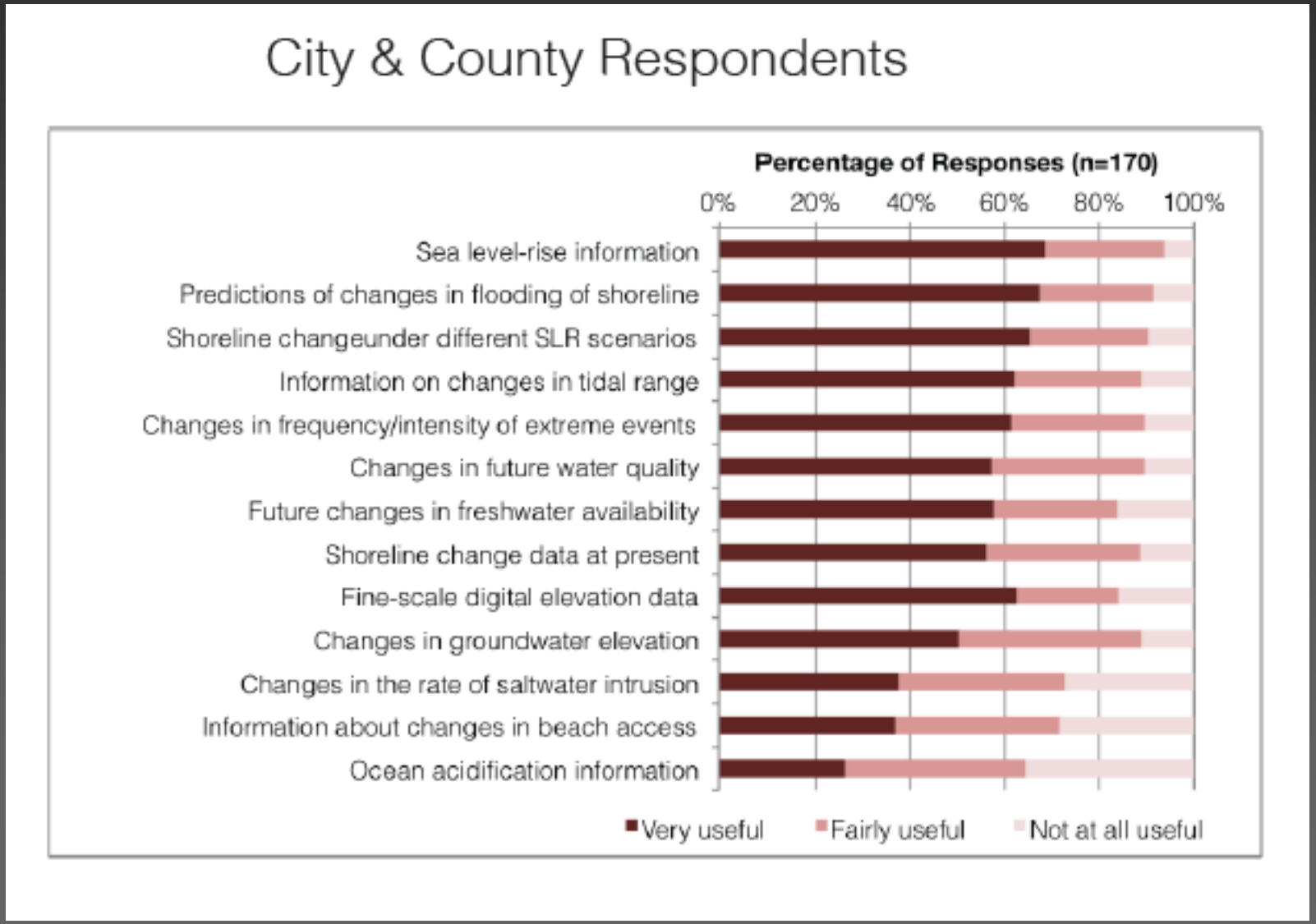
Of those who are in the planning stage…



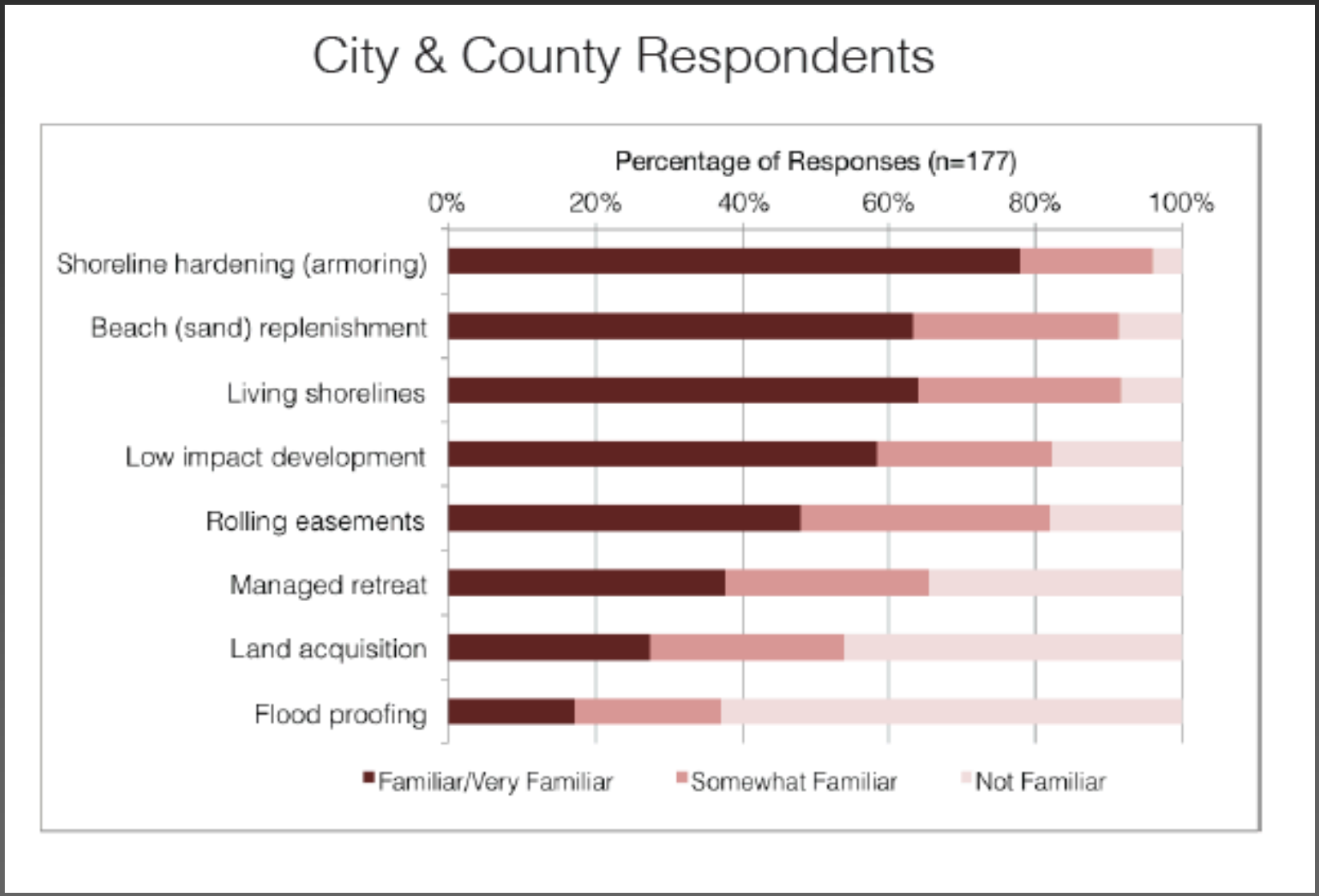
Preferred mechanisms for building capacity



Usefulness of physical information for assessing risks



Familiarity with coastal adaptation options



City of LA Climate Initiatives

AdaptLA follows other initiatives by City of Los Angeles

- GreenLA – reduce GHG by 35% below 1990 level by 2030

- Climate LA

UCLA Climate research

- Downscaled models for climate heat, water supply, health, soil moisture

AdaptLA: Overview

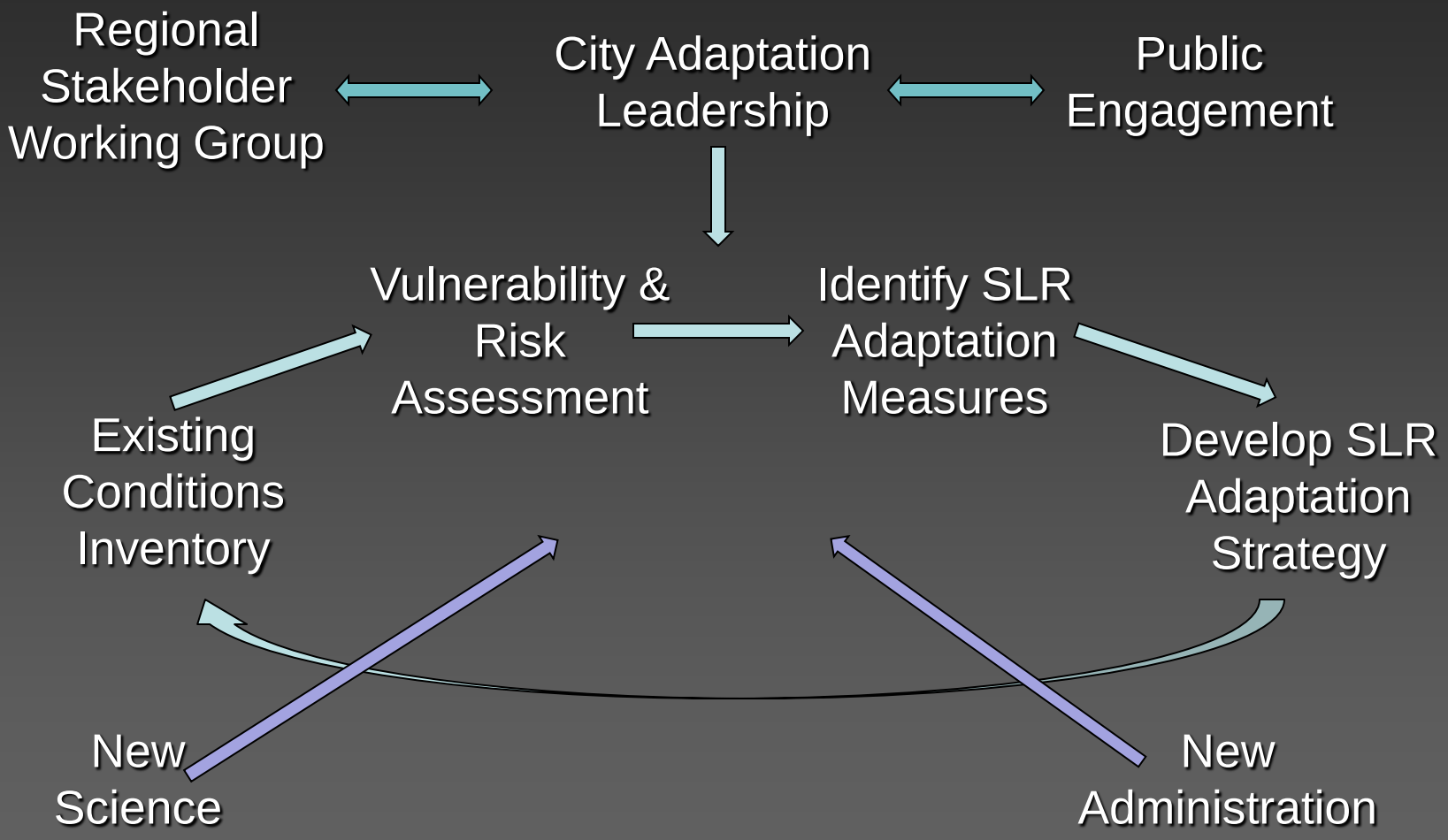
Comprehensive planning process

- City-led
- Science-based
- Participatory and stakeholder-supported

- Process drawn from many sources & firsthand experience
  - San Diego Bay SLR Planning (ICLEI)
  - San Francisco Bay SLR Planning (ICLEI, CSC, survey partners)

- Start with Sea Level Rise

“Adaptive” adaptation planning



Leadership Teams

- Adaptation Planning Team
  - City of LA
  - USC Sea Grant
  - LARC Los Angeles Regional Collaborative for Climate Action and Sustainability
  - ICLEI – Local Governments for Sustainability

- City Adaptation Leadership
  - Department of Water & Power
  - Port of Los Angeles
  - Bureau of Sanitation
  - Emergency Management Services
  - Planning
  - Parks and Recreation

Science Team

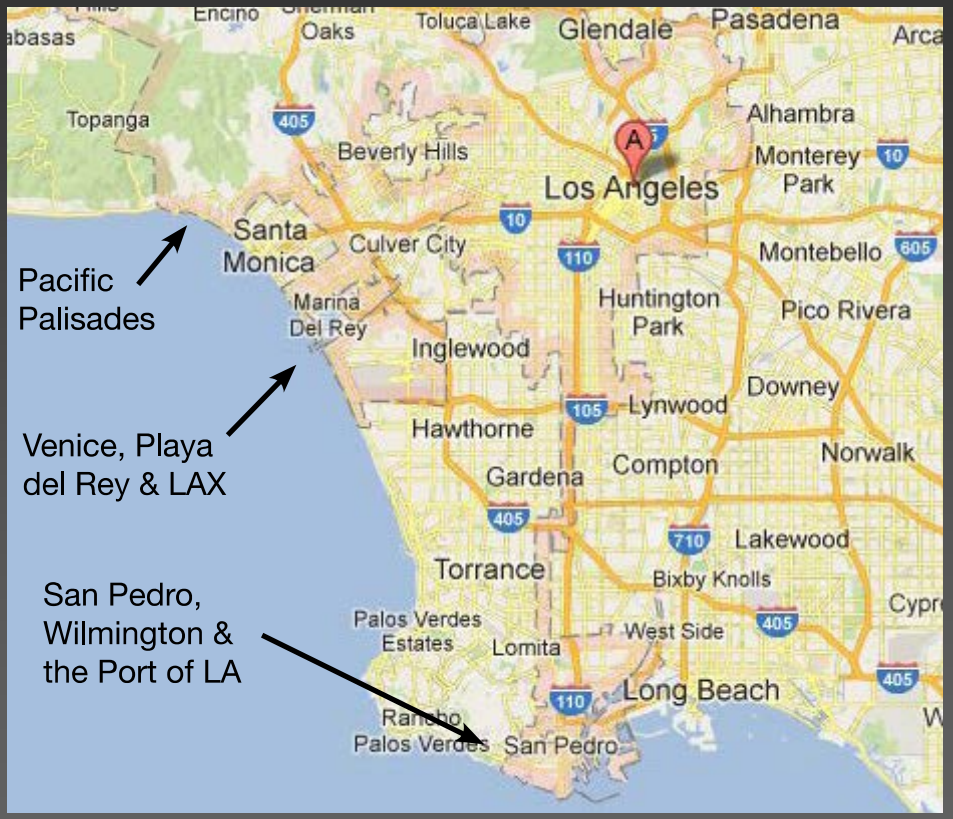
- Dr. Reinhard Flick, Scripps Institution of Oceanography / TerraCosta Consulting
- Dr. Julia Ekstrom & Dr. Susanne Moser, Susanne Moser Research & Consulting
- Dr. Dan Wei & Dr. Sam Chatterjee, USC Price School of Public Policy
- Dr. Patrick Barnard, USGS
- Lesley Ewing, CA Coastal Commission
- Brian Holland & Monica Gilchrist, ICLEI

Participatory Process

- Regional Stakeholder Working Group
  - Local business, industry experts, LA County representatives, public utilities, NGOs, COGs, SCAG
- Public engagement through public fora

SLR Vulnerability Study for the City of LA
Geographic Scope

- City of LA boundaries
- Coastal Regions
  - Pacific Palisades
  - Venice, Playa del Rey & LAX
  - San Pedro, Wilmington & the Port of LA



Review of Coastal and Shorelines Assets

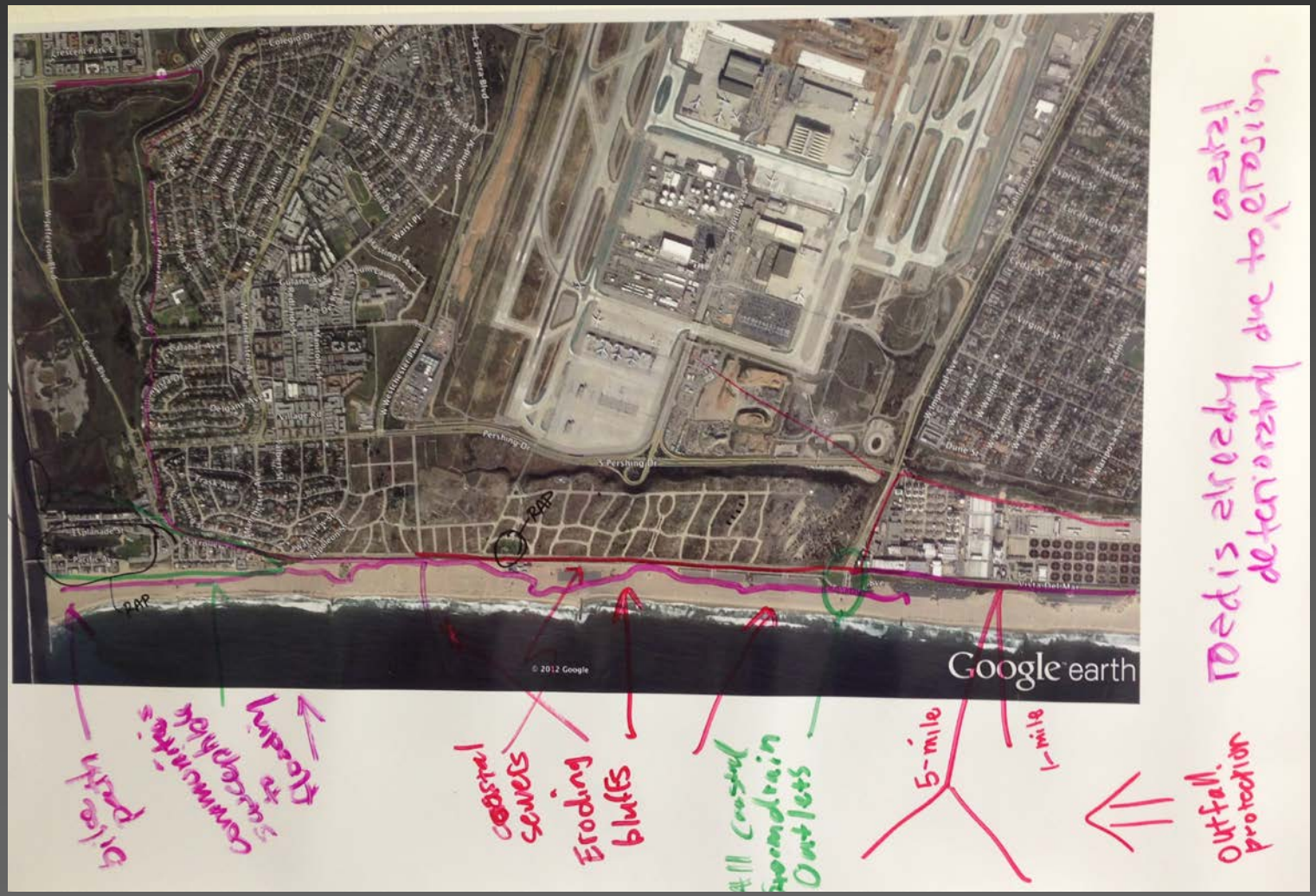
- Pacific Palisades Region
  - PCH – not much room for retreat
  - Geotechnical / coastal engineering solutions
- Venice/Playa del Rey/LAX Region
  - “Bay Watch” beaches
  - Gradual retreat of beaches ongoing
  - Continued sand nourishment
- San Pedro/Harbor Region
  - SLR impacts to cliffs
  - Cliff retreat monitoring

Existing Conditions and Current Vulnerabilities

- Start with what we know

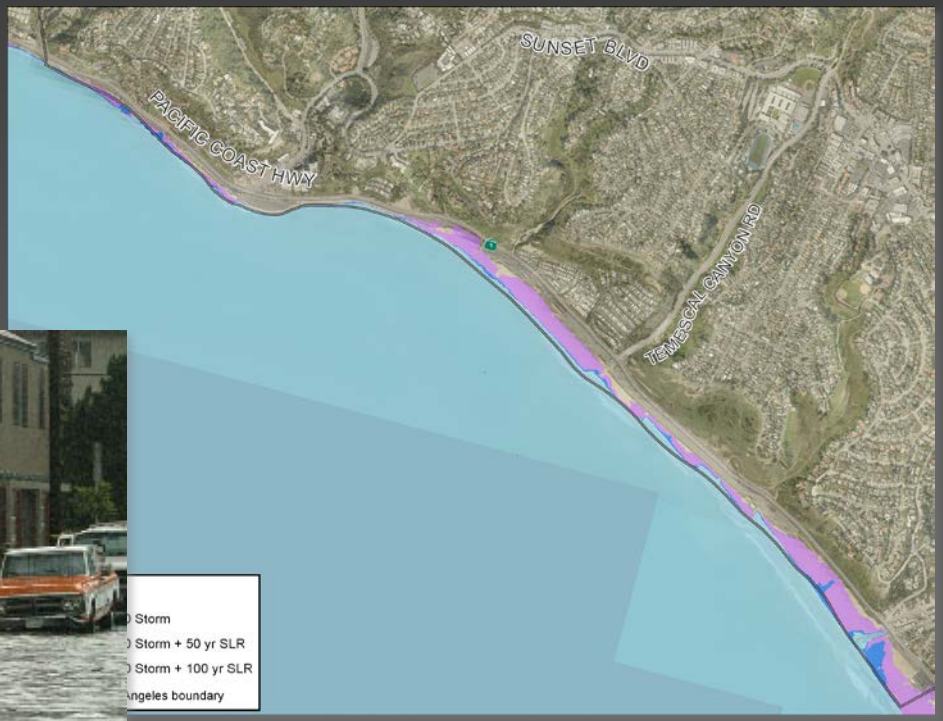
- Current Observed Vulnerabilities
  - Identified all coastal assets
  - Known vulnerabilities from high tides and storms

Existing Conditions and Current Vulnerabilities Playa del Rey to Dockweiler Beach and Hyperion Treatment Plant Map



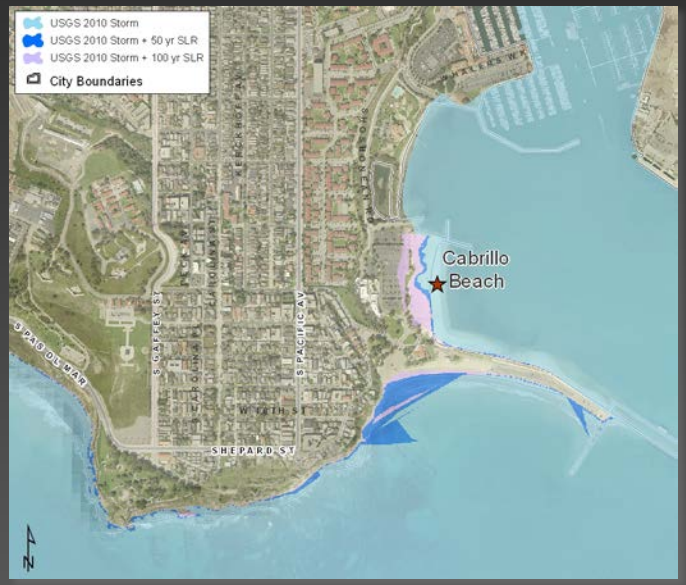
Vulnerability Assessments – Determine SLR Exposure

- USGS – Dr. Patrick Barnard (CoSMoS 1.0)
  - Hindcast Jan 2010 Storm
  - Jan 2010 + 0.5 m (~50 yrs)
  - Jan 2010 + 1.4m (~100 yrs)



Physical Vulnerability Assessment

- Led by Brian Holland, ICLEI – Local Governments for Sustainability, USA
- Examined all city assets
  - From wastewater treatment plants to open spaces to POLA
- Survey to identify assets sensitivity, adaptive capacity, and consequences
- Follow-up conversations



Physical Vulnerability Assessment – Major Findings

- Roads and water systems (wastewater, stormwater, potable water) vulnerable
- Museum and cultural centers highly vulnerable
- Parks and open space less vulnerable – can be restored
- Port and energy facilities – low vulnerability

Social Vulnerability Assessment

- Led by Dr. Julie Ekstrom and Dr. Susanne Moser

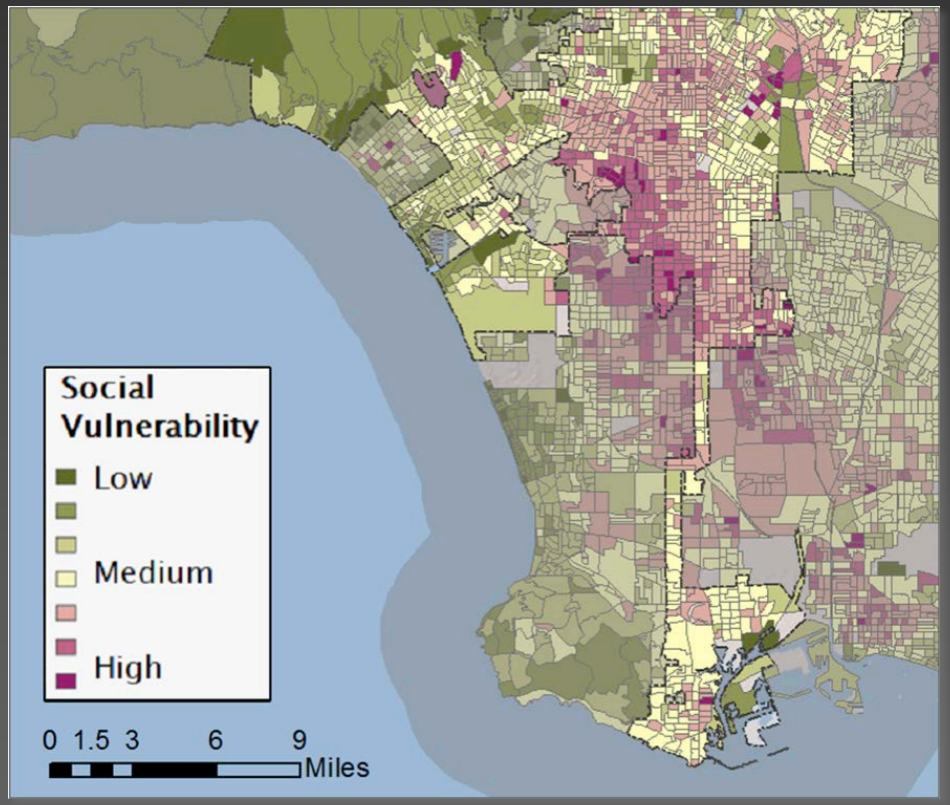
- Examined suite of census data
  - Income
  - Poverty
  - Education
  - Race
  - Age
  - Housing type/age
  - Physical/mental illnesses & disabilities

- Social Vulnerability Index analysis (Cutter et al. 2003)
  - Index of 32 different population characteristics

Social Vulnerability Assessment – Major Findings

Census data analysis

- Venice, low-lying San Pedro and Wilmington highest vulnerability
  - Lower per capita income & education, linguistic isolation, larger proportion of renters



Social Vulnerability Assessment – Major Findings

Beginning Strategies for Adaptation

- Document vulnerable populations – helps first responders
- **Communications** need to include alternative outreach efforts/information materials
  - Other languages (especially Spanish)
  - Don't require literacy or computer access

Economic Vulnerability Assessment

- Led by Dr. Dan Wei and Dr. Sam Chatterjee
- Examined property losses
  - HAZUS MH 2.1 (FEMA)
- Direct/indirect business interruption losses
  - Input – Output Model

Economic Vulnerability Assessment – Major Findings

	10-yr storm today	10-yr + 0.5 m SLR	10-yr + 1.4 m SLR
Output Losses	$3.4 million	$5.8 million	$9.1 million
Income Losses	$2.3 million	$3.8 million	$5.9 million

- **Tripling of economic losses with 1.4 m SLR**
- **Minimal business interruption losses**
  - **(because primary building loss is residential)**

Guidance for Moving Forward

- Matrix of potential adaptation strategies – Lesley Ewing

General Techniques	Technique Details	Spatial Scale	Temporal Scale (Implement/ Effective)	Adaptive Capacity	Responsible Party	Costs	Comments
Land Acquisition	Fee Simple Acquisition	One or more lots	Short/ Long-term	Yes	Government, Non-Governmental Organization, Homeowner Association, Geologic Hazard Abatement District	High	Provides greatest control over land use and hazard response. Land can be purchased from willing sellers or by governments using eminent domain.
	Conservation Easements	One or more lots	Short/ Long-term – lessen with time	Yes	Government, Non-Governmental Organization, Homeowner Association, Geologic Hazard Abatement District	Low to Moderate	Provides less control than fee simple acquisition. Can be part of a permit action. Land can be purchased from willing sellers.
	Transfer Development Credit	Jurisdiction, Region	Moderate/ Long-term	Yes	Government, Geologic Hazard Abatement District	Low to Moderate	Provides fee simple acquisition of high hazard lots. Takes time to set up TDC Program and develop criteria for hazardous lot acquisitions. Costs to administer are low. Acquisition costs paid by developers. Cost of coastal land may make program infeasible.

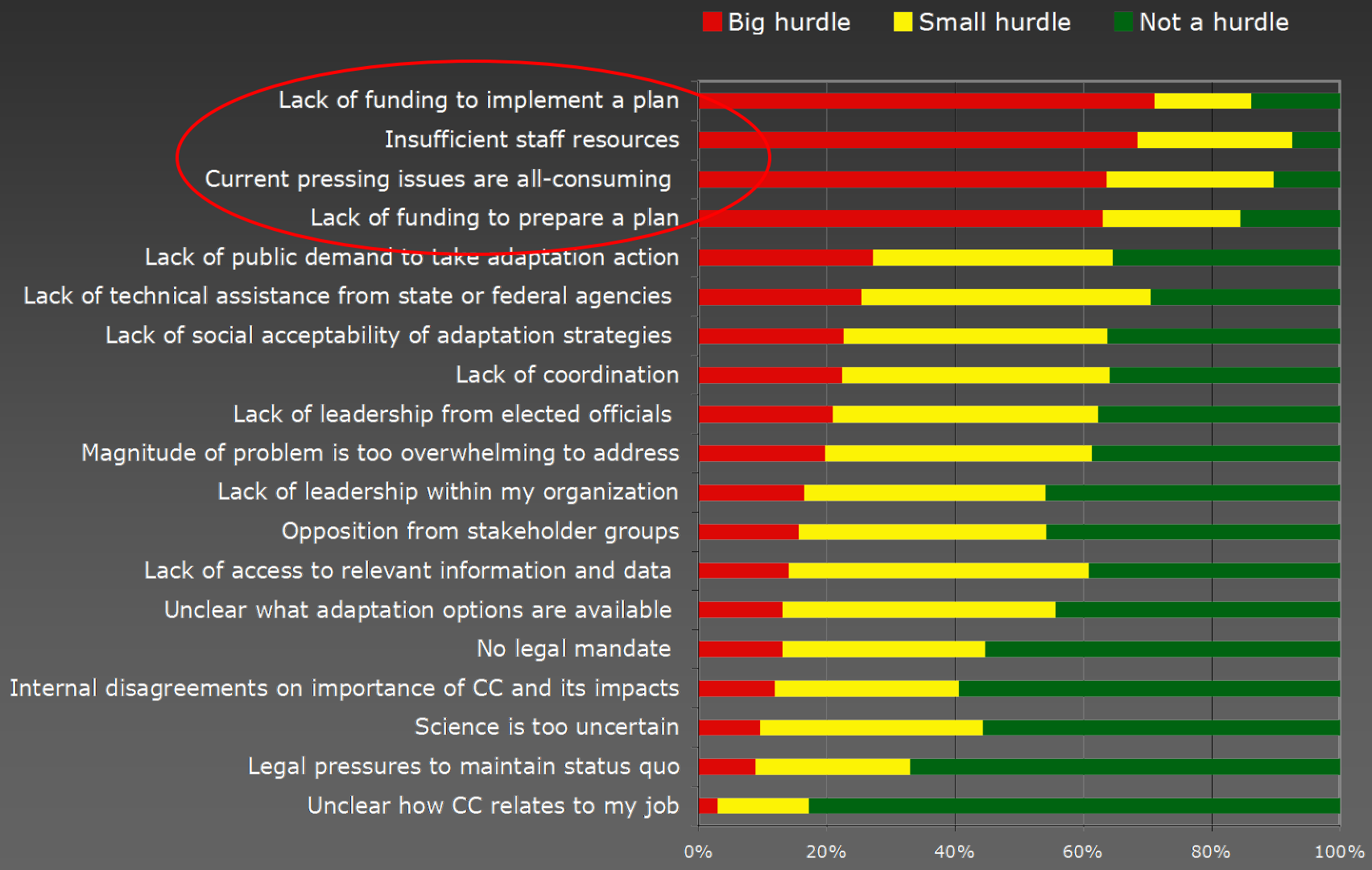
Guidance for Moving Forward

- Invest in a strong foundation for climate adaptation
- Define clear adaptation goals
- Develop clear prioritization and selection criteria for choosing among possible adaptation strategies
- Continue “adaptive adaptation planning” approach
- Expand partnerships in developing adaptation options

Actions the City Can Take Now to Prepare for SLR

- Storm watch and notification
- Semi-annual beach width monitoring
- Annual monitoring of cliff retreat
- Use of historical profiles and existing wave data for predictions
- Coordination with local, regional, state and federal agencies

Barriers to planning



Challenges to anticipate

- Funding
- Staff resources
- Competing priorities

Lessons Learned

- Flexibility built into process
- Communication needs to be well planned
- Patience!

What's Next?

- LARC – LA Regional Collaborative for Climate Action and Sustainability
  - Use AdaptLA process for greater LA region
- Update/refine USGS COSMOS model
  - Possible State of CA funding
  - USC SG outreach
- Public Outreach and K-12 education
- Coordination with local, regional, state and federal agencies

Thank you!

Phyllis Grifman
Associate Director 213-740-1963
grifman@usc.edu

Alyssa Newton
Regional Research & Planning Specialist
213-740-8602
agnewton@usc.edu