



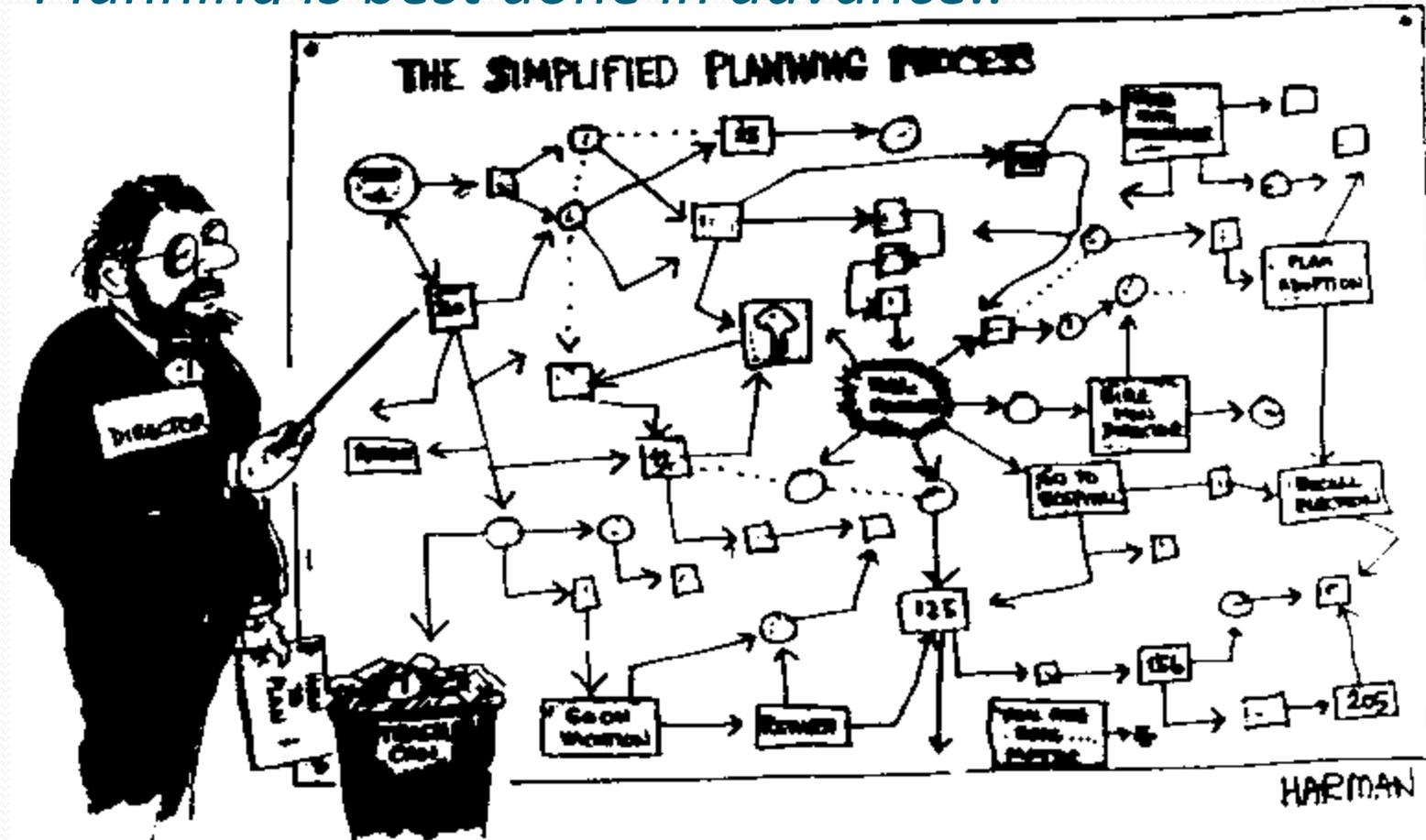
State, Regional, and Local Strategies for Resiliency: A Panel Discussion

**Bay Area Planning Directors Association
May 31, 2013**

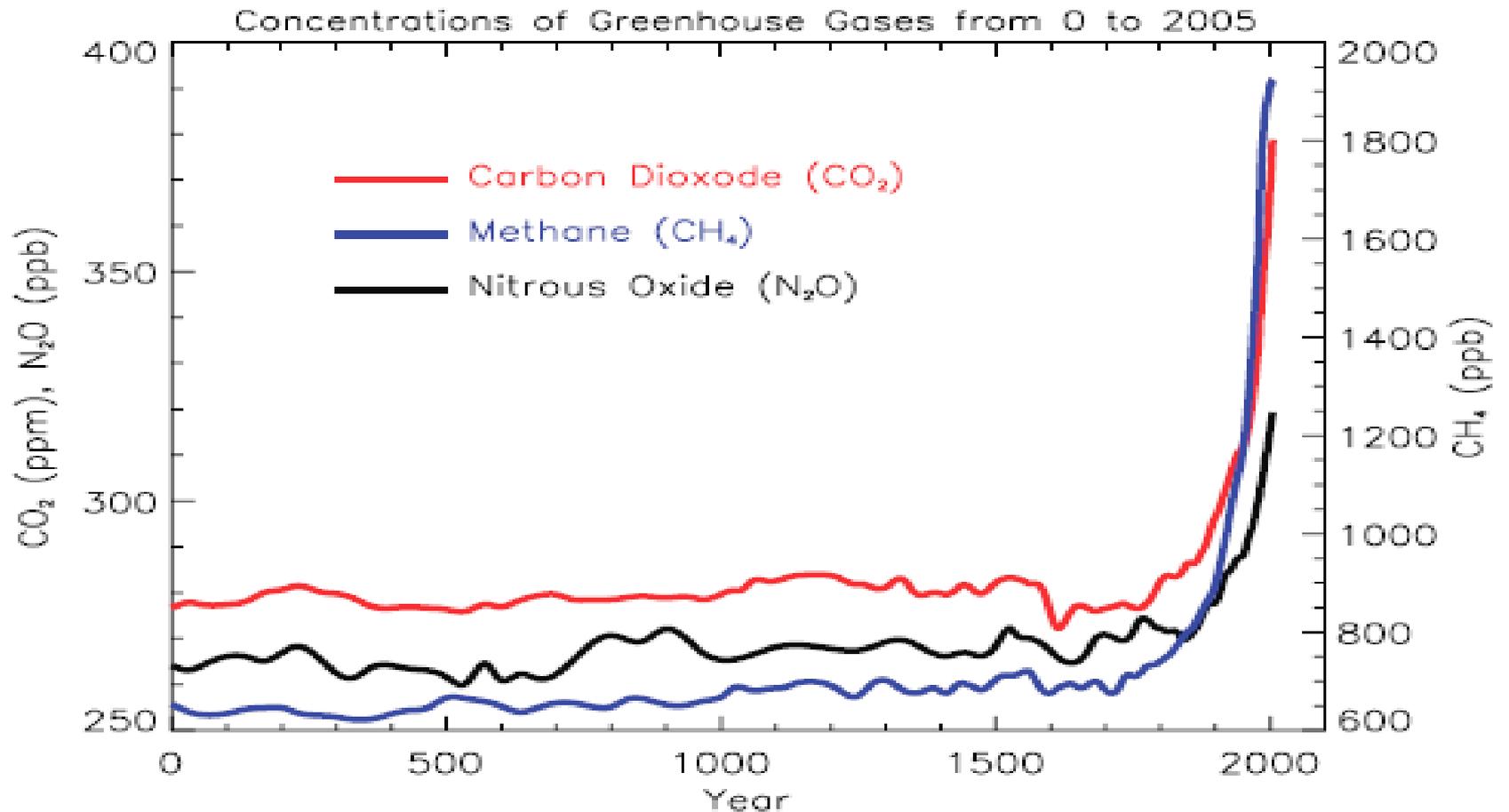
- Alex Hinds, *Moderator*, Sonoma State University
- Louise Bedsworth, Governor's Office of Planning and Research
- Timothy Burroughs, City of Berkeley
- Arrietta Chakos, Urban Resilience Strategies
- Wendy Goodfriend, Bay Conservation and Development Commission
- Laurie Johnson, San Francisco Planning and Urban Research Association and Laurie Johnson Consulting + Research

Why Care About Community Resilience?

“Planning is best done in advance..”



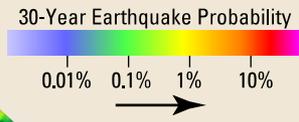
Oops - 400 ppm. Oh my!



CALIFORNIA AREA EARTHQUAKE PROBABILITY

More than 99%

probability in the next 30 years for one or more magnitude 6.7 or greater quake capable of causing extensive damage and loss of life. The map shows the distribution throughout the State of the likelihood of having a nearby earthquake rupture (within 3 or 4 miles).



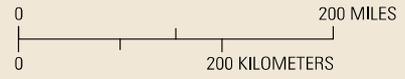
Boundary used in this study between northern and southern California

Regional 30-year earthquake probabilities

Magnitude	San Francisco region*	Los Angeles region
6.7	63%	67%

Magnitude	Northern California**	Southern California
6.7	93%	97%
7	68%	82%
7.5	15%	37%
8	2%	3%

*Probabilities from UCERF for the San Francisco region are nearly identical to the previous results from WGCEP 2003.
 **These probabilities do not include the Cascadia Subduction Zone



San Francisco Bay Region has a 63% probability of 1 or more M6.7 or greater earthquake in next 30 years

With 7 major fault zones, the entire region is subject to strong shaking

Community Resilience for Planners

Proactive Themes:

Identify critical issues

Assess threats and vulnerabilities

Address through existing planning processes

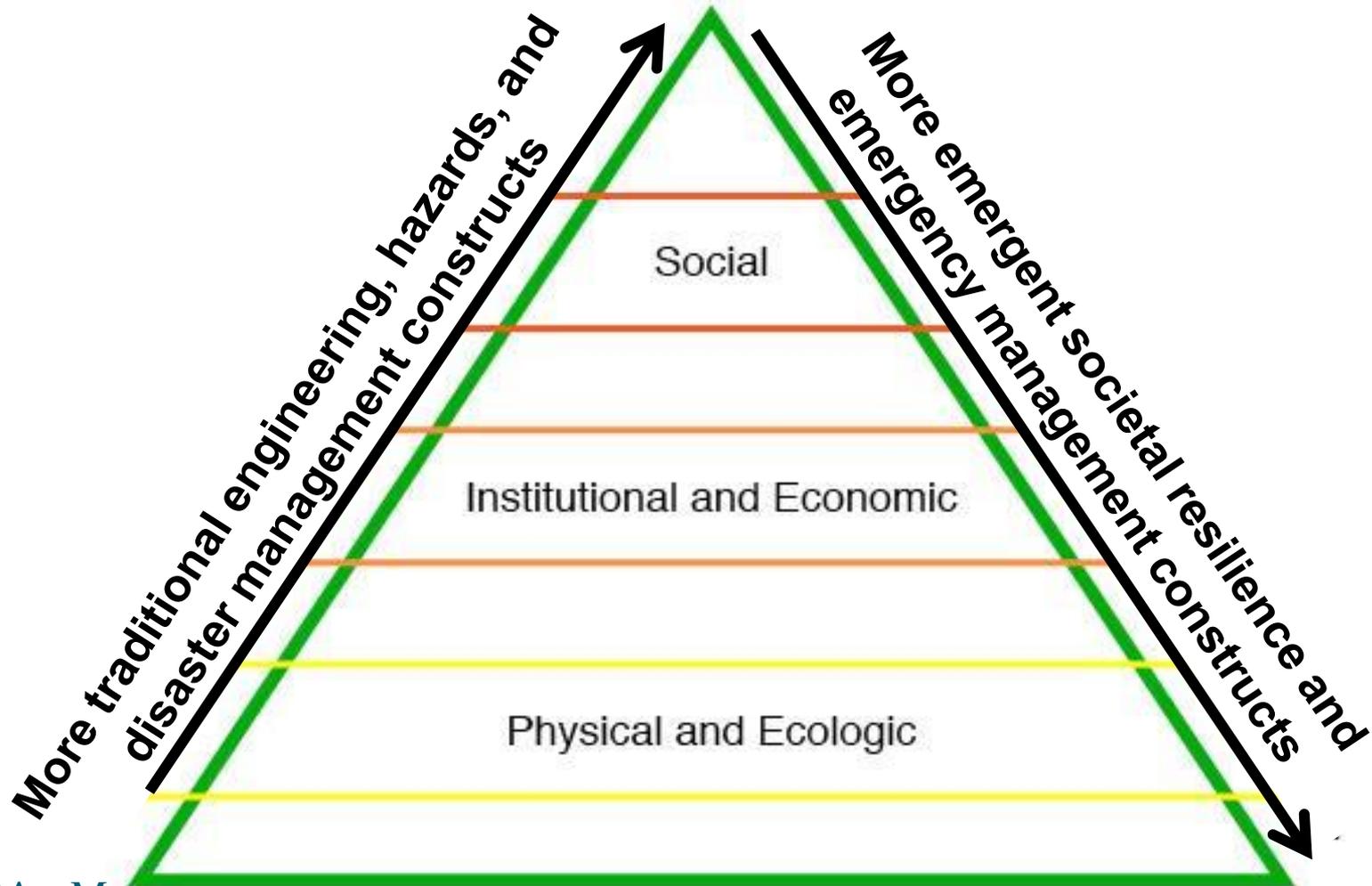
Integrate climate and earthquake resilience into our work





Question 1: How might we begin to think about defining a community resilience vision? What are the desired outcomes?

Risk, Resilience and Recovery Thinking Must Consider All Societal Dimensions



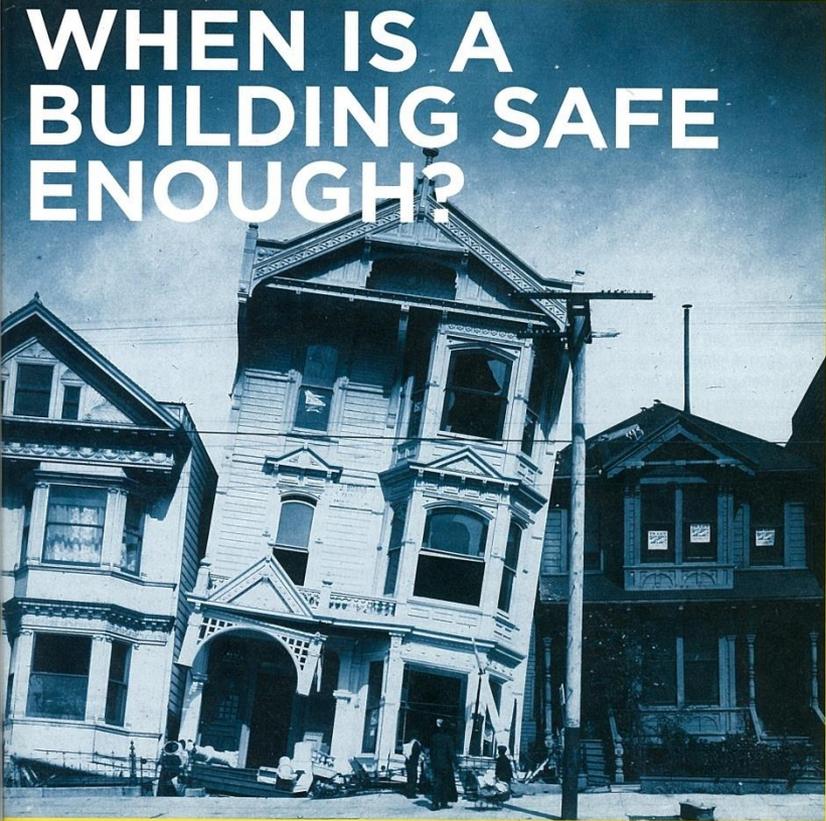


02.09

SPUR

Urbanist

Published monthly
by San Francisco
Planning & Urban
Research Association



WHEN IS A BUILDING SAFE ENOUGH?

The Resilient City
Part 1: Before the disaster

BAPDA - May 31, 2013

Before the Disaster

Defining what cities need from their seismic mitigation policies



What is seismic resilience?

Seismic resilience is the ability of the city to:

- **contain the effects** of earthquakes
- **carry out recovery** activities in ways that minimize social disruption
- **rebuild** in ways that mitigate the effects of future earthquakes



TARGET STATES OF RECOVERY FOR SAN FRANCISCO'S BUILDINGS AND INFRASTRUCTURE

INFRASTRUCTURE CLUSTER FACILITIES	Event occurs	Phase 1 Hours			Phase 2 Days		Phase 3 Months		
		4	24	72	30	60	4	36	36+
CRITICAL RESPONSE FACILITIES AND SUPPORT SYSTEMS									
Hospitals									×
Police and fire stations			×						
Emergency Operations Center									
Related utilities						×			
Roads and ports for emergency				×					
CalTrain for emergency traffic					×				
Airport for emergency traffic				×					
EMERGENCY HOUSING AND SUPPORT SYSTEMS									
95% residence shelter-in-place									×
Emergency responder housing				×					
Public shelters								×	
90% related utilities								×	
90% roads, port facilities and public transit								×	
90% Muni and BART capacity						×			
HOUSING AND NEIGHBORHOOD INFRASTRUCTURE									
Essential city service facilities								×	
Schools								×	
Medical provider offices									×
90% neighborhood retail services									×
95% of all utilities								×	
90% roads and highways						×			
90% transit						×			
90% railroads								×	
Airport for commercial traffic					×				
95% transit							×		
COMMUNITY RECOVERY									
All residences repaired, replaced or relocated									×
95% neighborhood retail businesses open								×	
50% offices and workplaces open									×
Non-emergency city service facilities								×	
All businesses open									×
100% utilities									×
100% roads and highways									×
100% travel									×

Source: SPUR analysis

TARGET STATES OF RECOVERY

Performance measure **Description of usability after expected event**

BUILDINGS **LIFELINES**

 **Category A:** Safe and operational

 **Category B:** 100% restored Safe and usable in 4 hours during repairs

 **Category C:** 100% restored Safe and usable in 4 months after moderate repairs

 **Expected current status**



SAN FRANCISCO
PLANNING + URBAN RESEARCH
ASSOCIATION

Adapting to Rising Tides



Communities and assets with low **vulnerability** are generally more resilient

Assets with higher sensitivity and low adaptive capacity are more susceptible to impacts, and therefore have an overall higher vulnerability.



Exposure

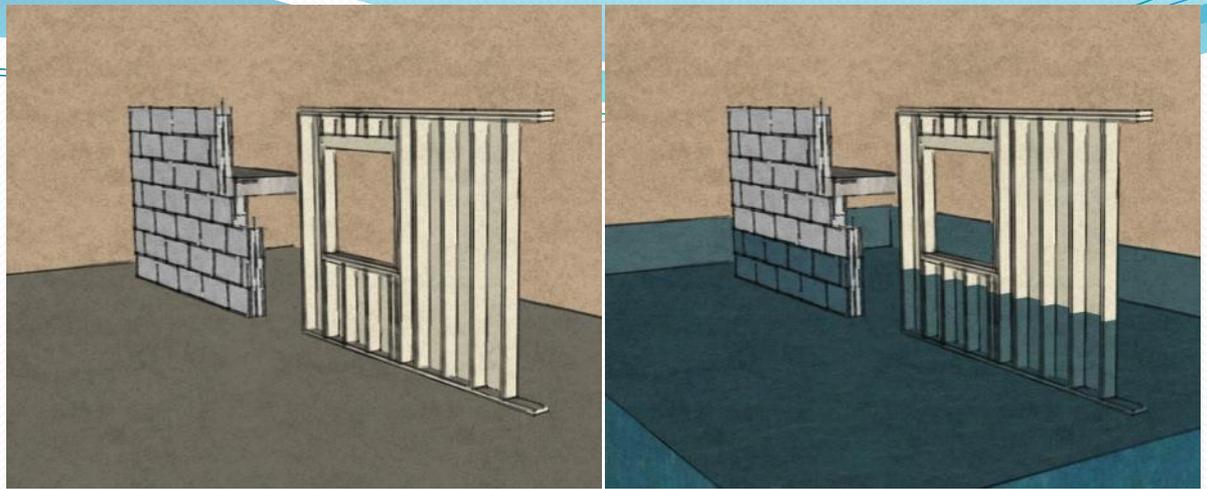
The extent to which an asset experiences a specific climate impact, e.g., frequent flooding, permanent inundation, elevated groundwater levels or salinity.



Sensitivity

The degree to which an asset is adversely impaired by a climate impact.

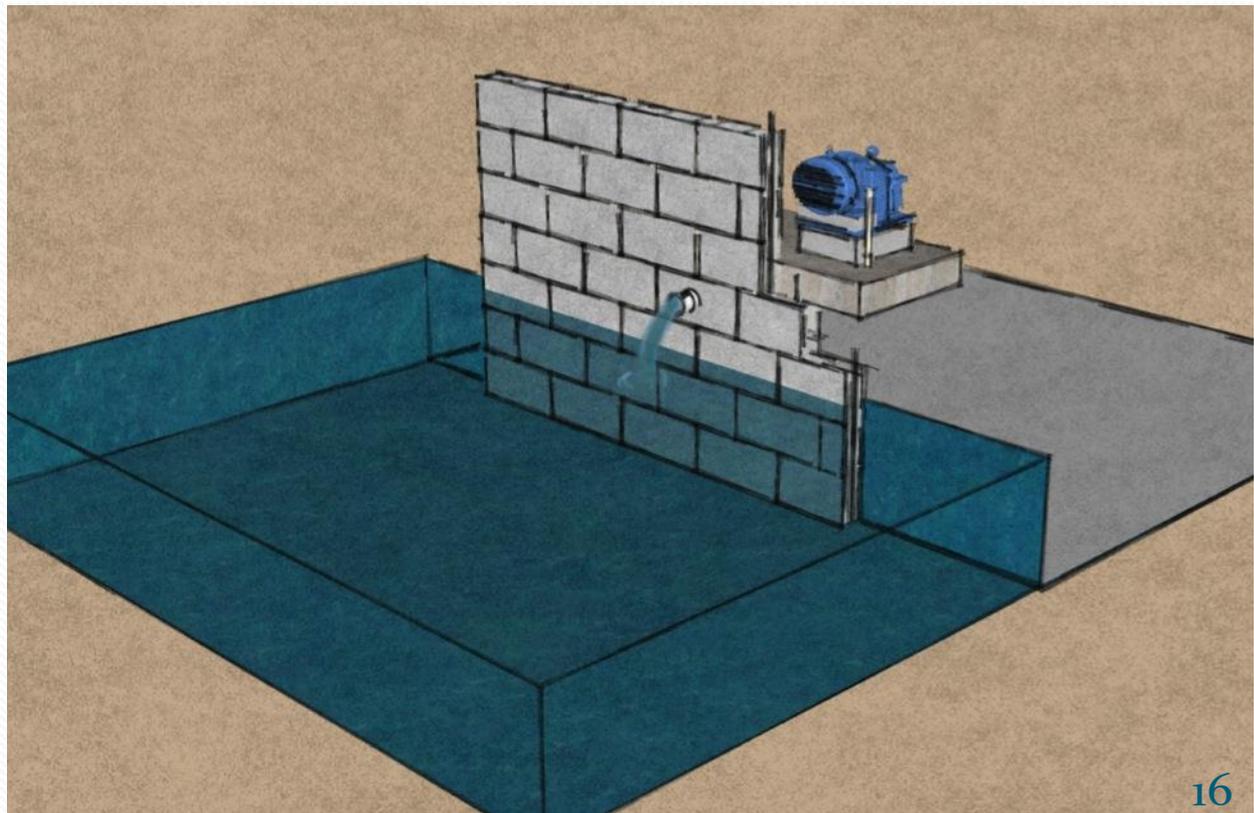
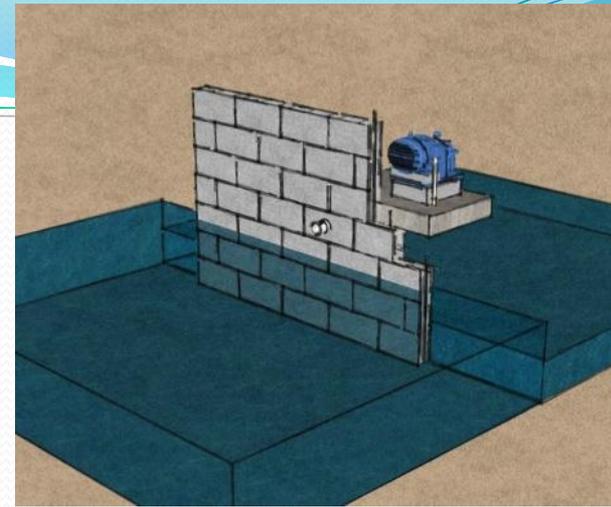
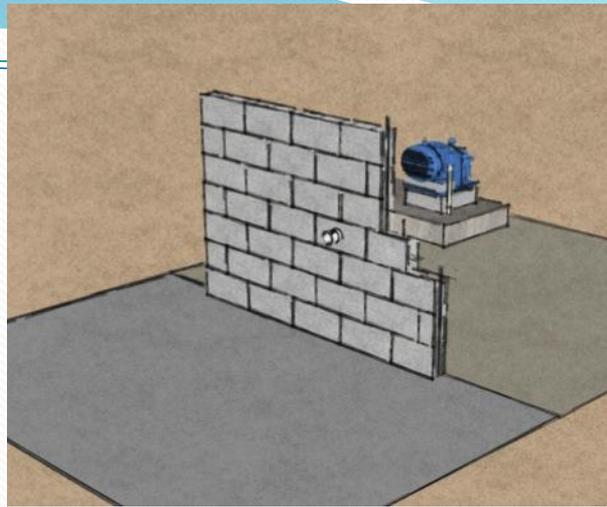
In this example two walls of different material withstand the impact of a flood very differently.



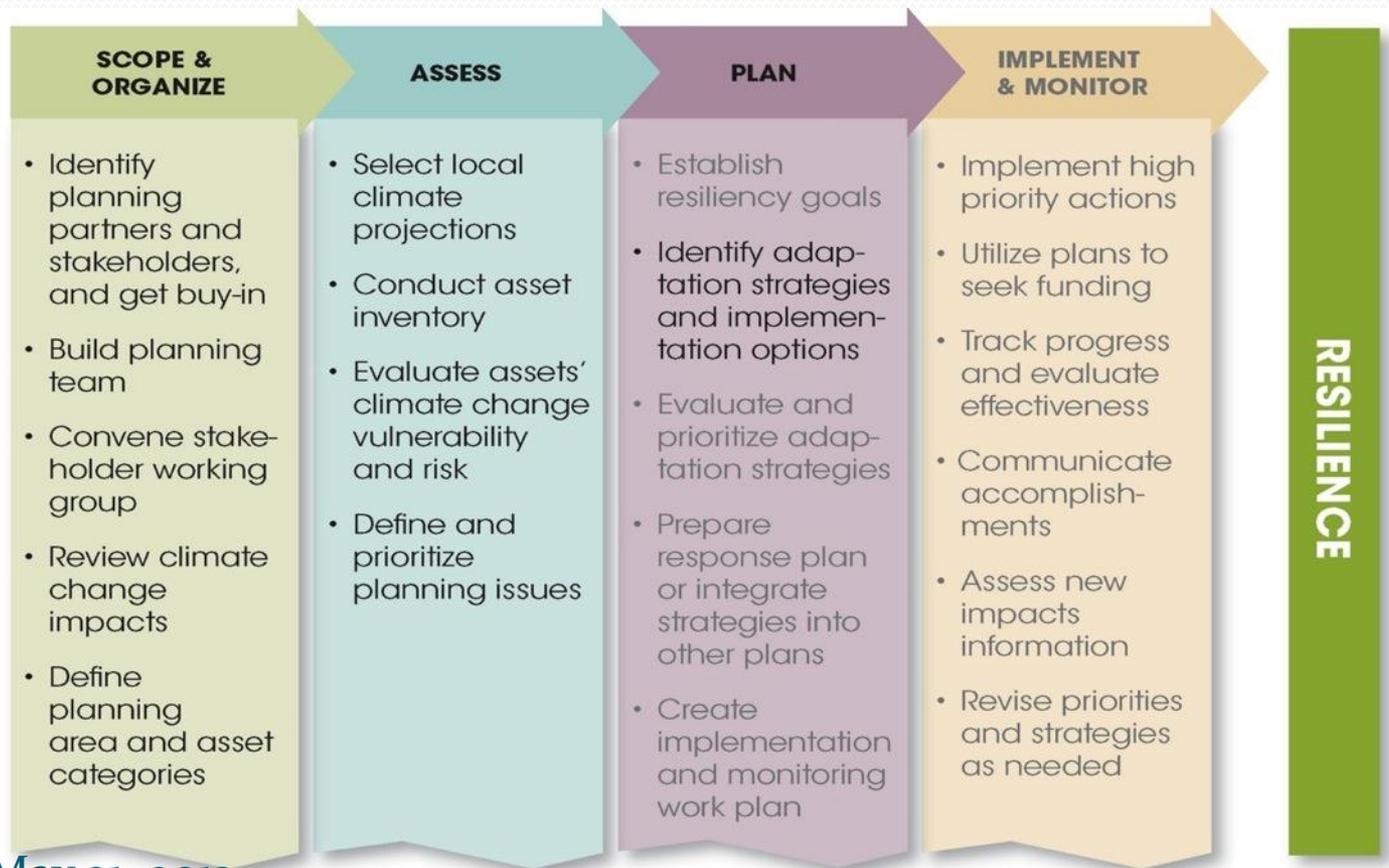
Adaptive Capacity

The ability of an asset to accommodate or adjust to a climate impact and maintain its primary functions.

In this example a structure equipped with a pump can maintain functionality despite an increase in water levels.



Adapting to Rising Tides





Seize opportunities to include
resilience planning in your
communities' planning
documents



*Question 2: How do we translate
resilience thinking into land use
planning policy and practice?*



“The ability to indentify opportunities and innovate new processes requires that every internal stakeholder understand sustainability and practice it.”

-Network for Business Sustainability report

Inter-departmental Sustainability Working Group

Tasked with improving Berkeley's environmental sustainability performance.

- Advise on existing/planned projects/programs
- Develop staff training on sustainability
- Include sustainability section on council reports
- Incorporate sustainability into dept. work plans
- Adopt sustainability performance metrics

Adapting to Rising Tides

Strategic Planning and Implementation to Develop Resilience

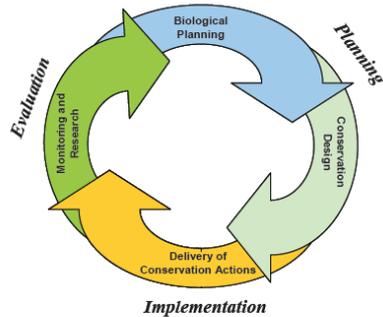
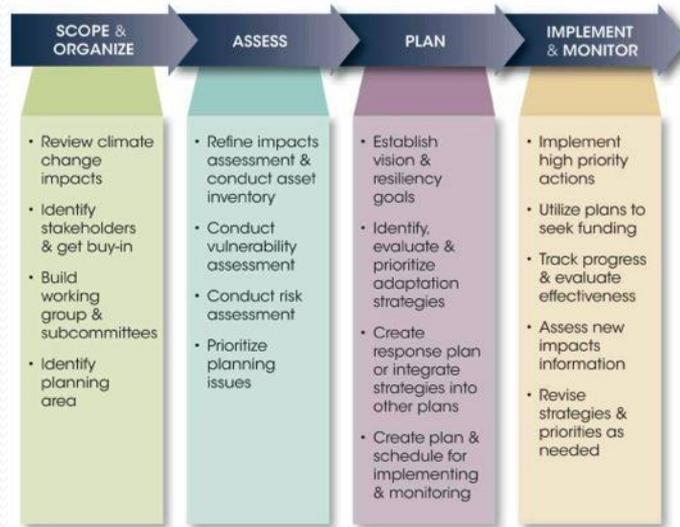
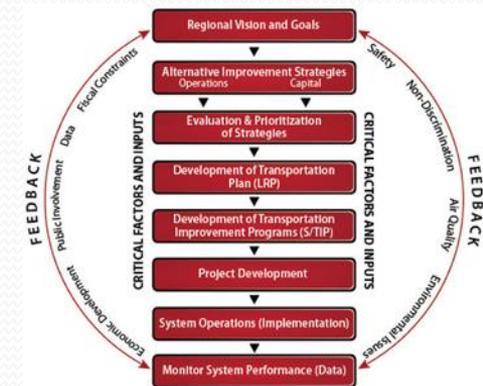
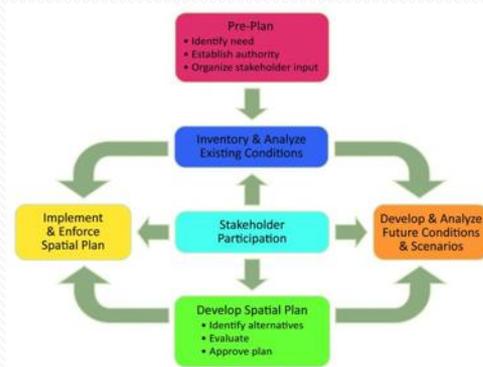
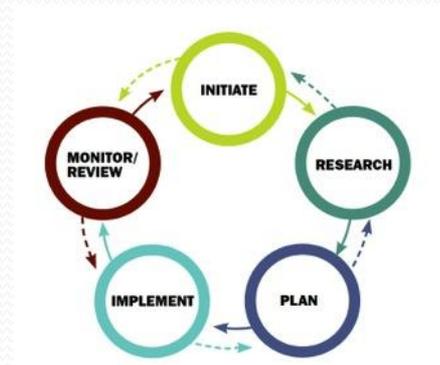


Figure 1. The Elements of Strategic Habitat Conservation.



RESILIENCE



Adapting to Rising Tides



Scope & Organize

- Set Resilience Goals
- Select Climate Change Impacts
- Choose Project Area
- Identify Sectors, Services, Asset
- Invite Stakeholders



Assess

- Existing Conditions and Stressors
- Vulnerability and Risks
- Define and Organize Key Issues



Plan

- Review/Refine Resilience Goals
- Develop Adaptation Response
- Select and Apply Evaluation Criteria

Adapting to Rising Tides

Multi-Scale Vulnerability Assessment

Regional to Local Scale

Appropriate for certain vulnerabilities and risks, e.g., systemic, information or policy issues

Neighborhood Scale

Appropriate for cross-cutting vulnerabilities that require understanding relationships among assets that can affect function

Asset-Specific Scale

Appropriate for asset owners and managers in addressing specific vulnerabilities within their control

Adapting to Rising Tides

- ART local scale responses highlight key issues in the project area
- Adequate for certain vulnerabilities – systemic issues or policy development
- Demonstrates at the local scale some strategies are too general
- Serves as a starting point for specific strategies



On Solid Ground

How Good Land Use Planning Can Prepare the Bay Area for a Strong Disaster Recovery



Emphasis on Local Government (Pre- and Post-Disaster)

- I. Planning Process
- II. Multiple Hazards
- III. Regulatory Issues
- IV. Financing
- V. Information

Different Recovery Strategies for Different Types of Disaster Events

Geographic Scale	Low Impact Event	High Impact Event
Site	Likely to rebuild according to existing plans and codes	Replan, if damage extends across many sites or has substantial hazards
Neighborhood	Likely to rebuild according to current plans and codes	Replan, if damage extends across many sites or has substantial hazards
City	<p>Likely to replan a few areas based on damage, substantial hazards, economic factors, potential for making improvements.</p> <p>May upgrade local infrastructure.</p> <p>Lower likelihood of replanning than high impact event</p>	<p>Likely to replan various areas based on damage, substantial hazards, economic factors, potential for making improvements.</p> <p>May upgrade local infrastructure.</p> <p>Greater likelihood of replanning than under low impact event</p>

Source: Adopted from Ken Topping, draft *Planning for Post-Disaster Recovery Guidebook* - Next Generation, American Planning Association, currently under development

BAPDA - May 31, 2013



Planning Strategies for Multi-hazard Areas

Developed Areas	Un-developed Areas	Under-developed Areas
<p>Strategies for rebuilding more resiliently post-disaster</p> <ul style="list-style-type: none">• Widen roads in Oakland hills following a fire• Buyout property when >50% damaged	<p>Rely on planning toolkit and strengthen it (CEQA, safety element, multi-hazard analysis of areas where you might want to reduce development potential)</p> <ul style="list-style-type: none">• Wetlands (liquefaction, flood and sea level rise)	<p>Focus on incentives, redevelopment efforts, and ensuring caution around the equity issues</p>



Question 3: What existing information and tools should local planners check out?

Adapting to Rising Tides

ART Project
www.adaptingtorisingtides.org



Welcome!

Adapting to Rising Tides — the ART Project — is a collaborative planning effort to help San Francisco Bay Area communities adapt to rising sea levels. Led by the San Francisco Bay Conservation and Development Commission and the National Oceanic and Atmospheric Administration Coastal Services Center, the ART Project has engaged local, regional, state and federal agencies and organizations, as well as non-profit and private associations. Together, they are working towards the project goal of increasing the Bay Area's preparedness and resilience to sea level rise and storm events while protecting critical ecosystem and community services.

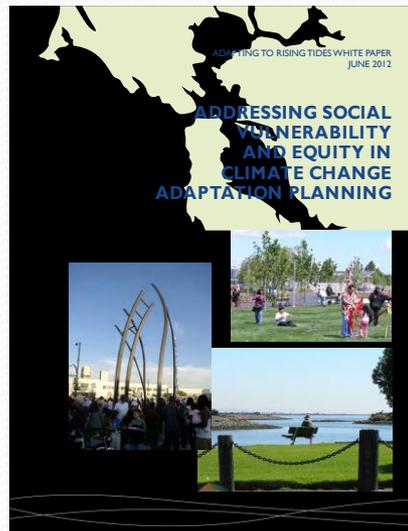
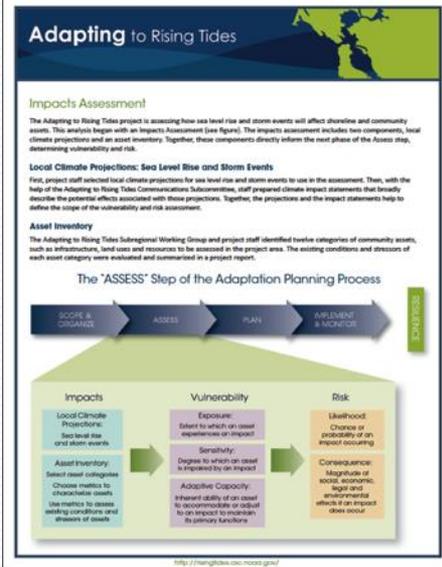
Click on the image on the right to learn more about specific aspects of the ART Project



Adapting to Rising Tides: Metrics Evaluation Worksheet

Asset Category: Contaminated Lands	Subregion				Is metric relevant? (checked)	Is data available? (checked)	If yes, source?	If yes, type?
	San Francisco	San Mateo	San Diego	San Geronimo				
Physical/biological								
High wildlife value/biodiversity								
Presence of state or federally listed species								
Risk of contaminants of concern to the ecosystem								
Topographic elevation of site (feet to grade)								
Management								
Site ownership, e.g., public or private								
Number of entities with jurisdiction over the site								
Consistency of regulations for site use, reuse or clean up								
Potential for rehabilitation or remediation of contaminants, e.g., in situ								
Presence of sediments, containment or treatment systems								
Presence of monitoring systems, ongoing, recurring								
Status of existing plans, e.g., master plan, long-term plan, etc.								
Public health and safety								
Risk of contaminants of concern to public health								
Proximity of the site to critical freshwater aquifers								
Proximity of site to sensitive receptors, e.g., schools, elderly housing, hospitals								
Site serves as a park, public access or recreation								
Site provides food, shelter or serves as an important multi-use								
Community and economic value								
Redevelopment potential of the site								
Status of site remediation								
Response to natural stresses								
Historic exposure, loss and response to flooding								
Service susceptibility of site								
Site is located within current 100-year floodplain								

Example Asset Types: Brownfields, Gas Stations (landfill), Landfill (open and closed), Superfund sites



Adapting to Rising Tides Survey

1. Background Questions

Thank you for taking the time to complete the Adapting to Rising Tides (ART) Vulnerability & Risk Assessment Survey. The purpose of this survey is to get your best professional judgments of how sea level rise and storm event impacts will affect the services, facilities and systems that you plan for, operate and/or manage. The survey has 4 sections.

BACKGROUND information about your area of expertise, and the service, facility or system that you wish to address in the survey.

VULNERABILITY ASSESSMENT consisting of 3 parts - exposure, sensitivity, and adaptive capacity. The exposure part does not have questions, rather it has information about exposure that will help guide your answers about impacts. Questions about sensitivity and adaptive capacity are a combination of multiple choice and essay/short-answer.

RISK ASSESSMENT consisting of questions about the consequence, or magnitude of effect, on social, economic, environmental and governance systems.

EQUITY section with questions about equity issues in the ART subregion that relate to sea level rise and storm event impacts.

To assist you in completing the survey, ART staff posted supplement information at (insert URL).

- Materials include:
 - Draft Existing Conditions and Stressors Report for the Assets in the ART Subregion
 - Sea Level Rise and Storm Event Exposure Maps for the ART Subregion
 - Background information about the shoreline analysis and exposure maps
 - Project climate impact statements
 - A PDF version of this survey for printing.

Your responses to the following survey are confidential. BCDC and ART project partners will not directly quote any of your information without your explicit consent.

1. What is your name?
- *2. What agency or organization do you work for?
- *3. What department, section or unit do you work for within your agency or organization?
4. What is your job title?

Adapting to Rising Tides

Digital Coast

www.csc.noaa.gov/digitalcoast/



Home About Data

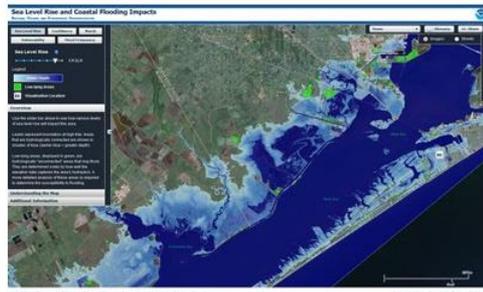
Sea Level Rise and Coastal Flooding Impacts Viewer

[NOAA Coastal Services Center](#)

Overview In Action Support Get It Now

OVERVIEW

Being able to visualize potential impacts from sea level rise is a powerful teaching and planning tool, and the Sea Level Rise Viewer brings this capability to coastal communities. A slider bar is used to show how various levels of sea level rise will impact coastal communities. Additional coastal counties will be added in the near future. Maps are not available for Alaska due to elevation data accuracy and vertical datum transformation gaps.



Launch Now

Acknowledgments

The NOAA Coastal Services Center would like to acknowledge those organizations that provided direct content used in this tool or feedback, ideas, and reviews over the course of the tool's development. Specifically the Center would like to acknowledge the [following groups](#).

View First Time Tips Video

Tools for Coastal Climate Adaptation Planning

connect.natureserve.org/toolkit/ebm-tool-network/climate-adaptation-planning-tools

A screenshot of the NatureServe website. The page features a navigation menu with options like Home, About Us, Projects, Visit Local Programs, Get Data, Products & Services, Publications, and Support Us. The main content area is titled "EBM Tools Network - Tools for Coastal Climate Adaptation Planning" and includes an "About the Guide" section. The "About the Guide" section explains the purpose of the tools and provides information on how to use them. There is also a "Related Info" section with links to downloads and a webinar recording. The footer contains links for Support Us, Contact Us, Feedback, Site Map, Credits, Privacy Policy, and América Latina y el Caribe.

State Resources

Guidance

CALIFORNIA ADAPTATION PLANNING GUIDE



PLA
ADA
COMI

STATE OF CALIFORNIA General Plan Guidelines

2003



GOVERNOR'S OFFICE OF PLANNING AND RESEARCH

Tools

California Emergency Management Agency | Hazard Mitigation Portal

MyHazards

Helping reduce your risks from natural disasters

Funding

American Planning Association Resources (www.planning.org)

Hazard Mitigation: Integrating Best Practices into Planning



APA Planning Advisory Service, Report
Number 560

BAPDA - May 31, 2013

The screenshot shows the American Planning Association website. At the top, there is a navigation menu with links for 'About APA', 'Membership', 'Events', 'Education', 'Outreach', 'Resources', and 'Jobs & Practice'. Below the menu is the APA logo and the tagline 'Making Great Communities Happen'. A search bar is located on the right side. The main content area features a large image of a construction site with the word 'REBUILDING' overlaid in large white letters. Below the image is the title 'Planning for Post-Disaster Recovery: Next Generation' in green. A list of bullet points describes various disaster events and their impacts. To the right of the list is a 'Recovery News' section with a 'Read more' link and a 'Model Pre-Event Recovery Ordinance' section with a brief description.

APA
American Planning Association
Making Great Communities Happen

About APA | Membership | Events | Education | Outreach | Resources | Jobs & Practice

Search

Post-Disaster Recovery

- Recovery News
- Symposium
- Project Rationale
- Bibliography
- Literature & Resources
- Case Studies
- Model Recovery Ordinance

REBUILDING

Planning for Post-Disaster Recovery: Next Generation

- A late-season Hurricane Sandy slams into the New Jersey shore, colliding with a winter storm to produce high-tide storm surges in Manhattan and Atlantic City, a blizzard in West Virginia, and massive power outages and evacuations throughout the Northeast (October 2012).
- An earthquake, followed by a tsunami, followed by a nuclear emergency, in northern Japan, with a death toll that continues to rise (March 2011).
- An earthquake in Christchurch, New Zealand, that follows another tremor five months earlier (February 2011).
- An earthquake and tsunami in Chile (March 2010).
- An earthquake in Port-au-Prince, Haiti, that kills more than 200,000 people (February 2010).
- Hurricane Ike devastates Galveston, Texas, and nearby areas (September 2008).

What becomes of these communities and regions afterwards? How long does it take to rebuild? Is there anything communities can do to speed the process, to reduce the losses, to become more resilient?

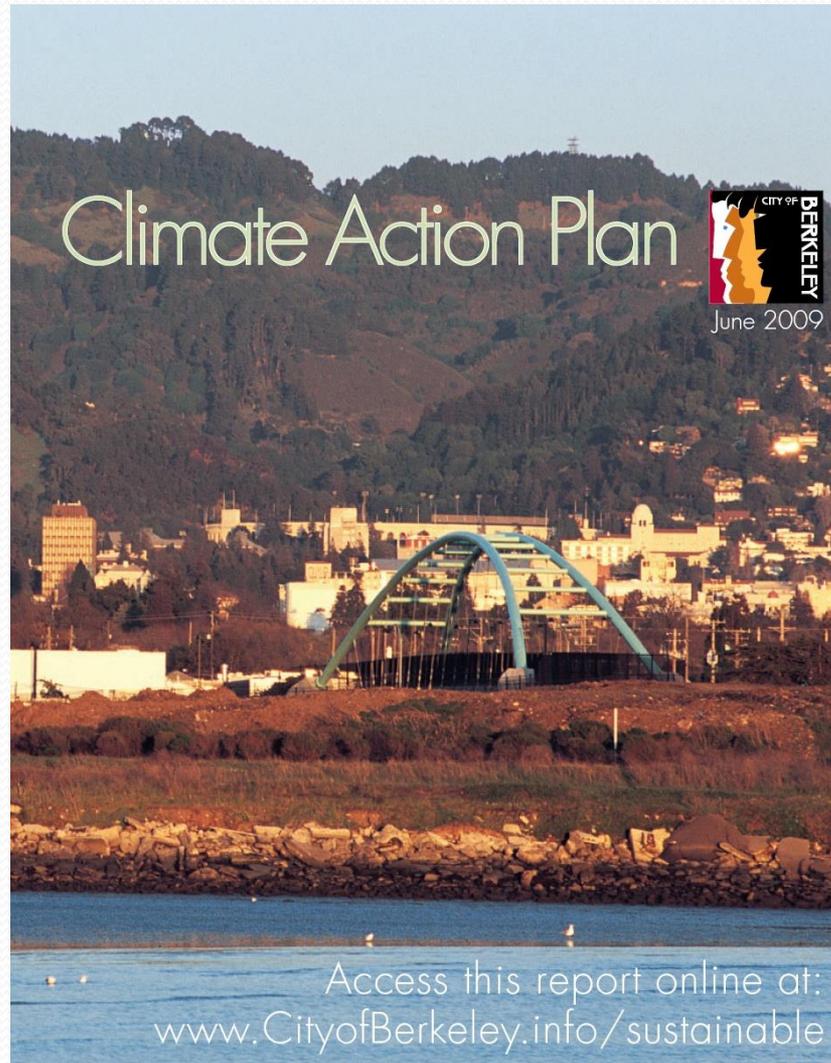
Recovery News

Recovery News is a multimedia blog providing news, ideas, and perspectives on community planning for post-disaster recovery.

[Read more](#)

Model Pre-Event Recovery Ordinance

Under this project, APA has prepared an annotated model pre-event recovery ordinance designed to assist communities in preparing before a hazardous event for better managing the process.



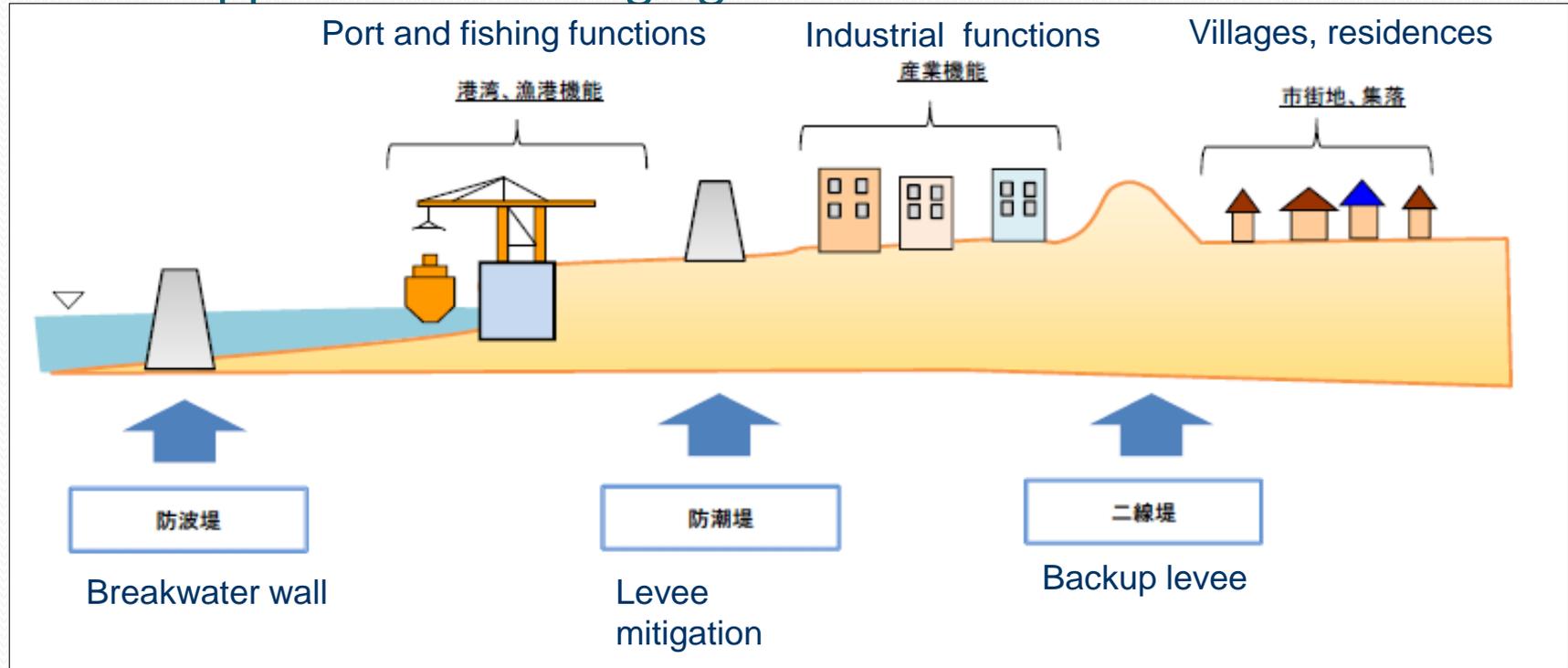


Question 4: What are some examples of resilience in action?

Tohoku Region, Japan, March 2011 (earthquake, tsunami, nuclear incident)



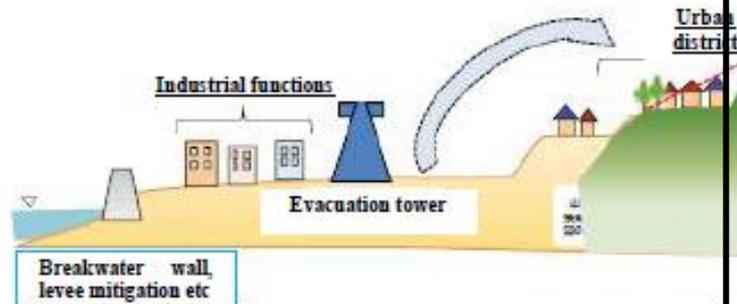
Introduced Concept of “Disaster Reduction” and 2-level Approach to Managing Future Tsunami Risk



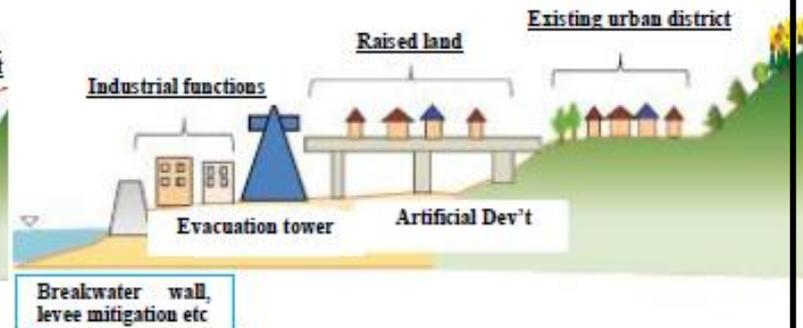
Japan National Reconstruction Design Council's Concept for Tsunami-Resilient Communities

(Reconstruction Design Council in Response to the Great East Japan Earthquake, June 2011; translation by K. Iuchi)

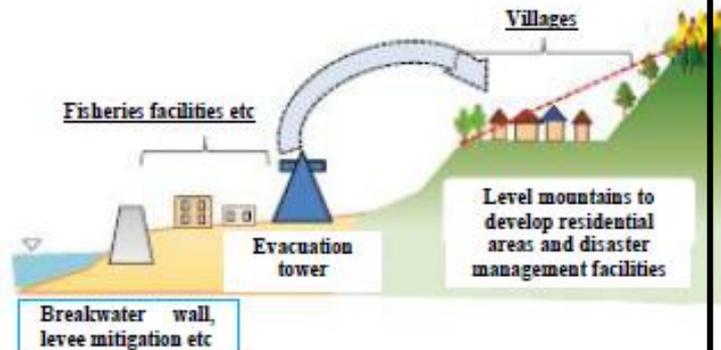
Type 1



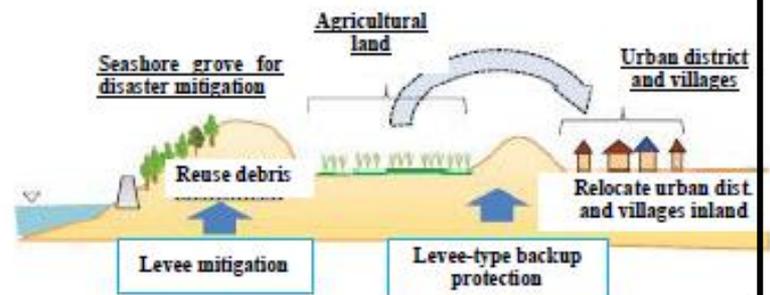
Type 2



Type 3



Type 4



Japan National Reconstruction Design Council's Concept for Tsunami-Resilient Communities

(Reconstruction Design Council in Response to the Great East Japan Earthquake, June 2011; translation by K. Iuchi)

Rikuzen Takada City

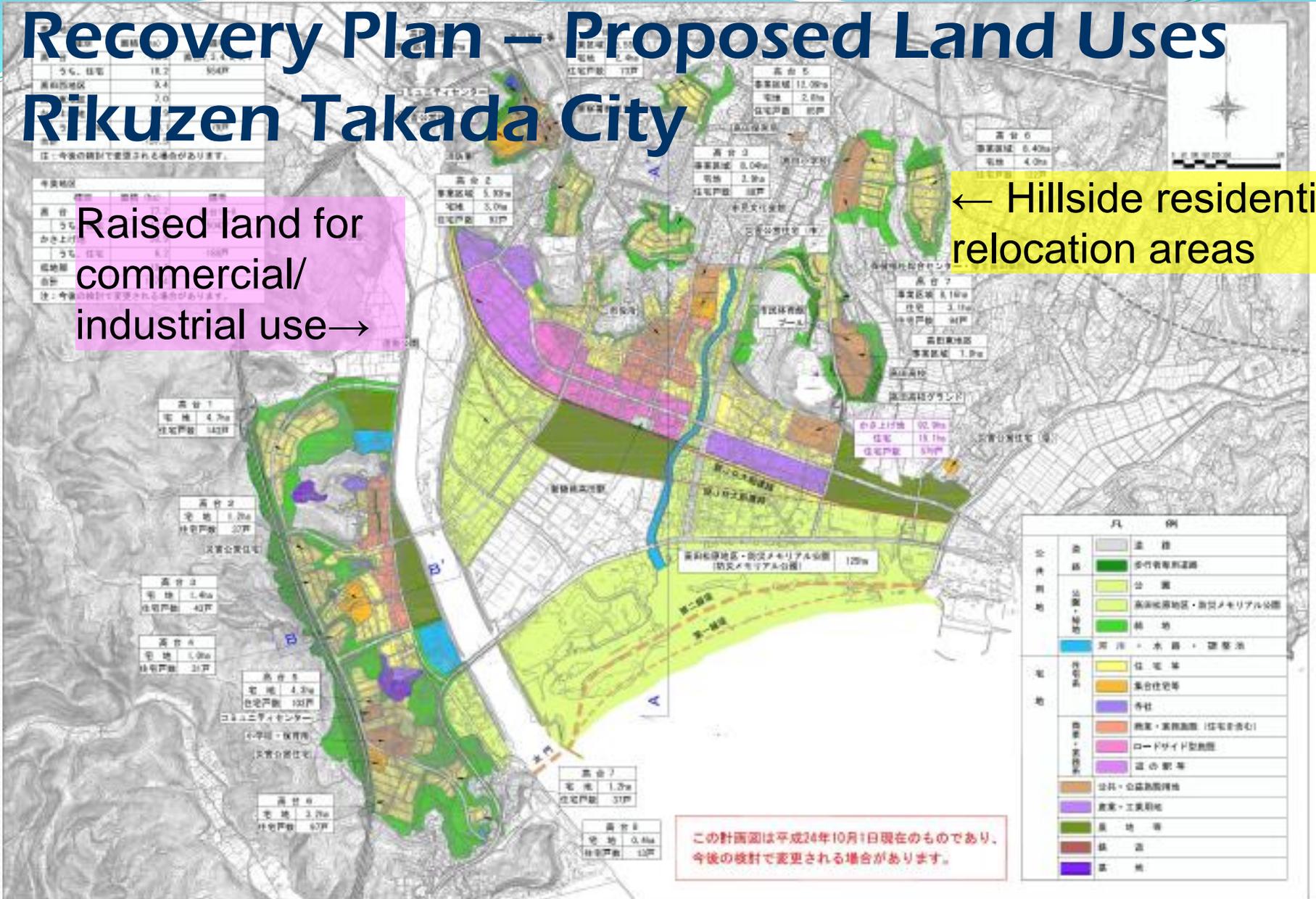


(Source: H. Koura, Osaka University)

Recovery Plan – Proposed Land Uses Rikuzen Takada City

Raised land for commercial/ industrial use →

← Hillside residential relocation areas



An aerial photograph of New Orleans, Louisiana, showing the city's skyline in the background and a vast area of flooding in the foreground. The flooded area is filled with debris, including trees, buildings, and other structures, indicating the aftermath of a major disaster. The Mississippi River is visible in the middle ground, and the city's infrastructure is partially submerged.

Hurricane Katrina, New Orleans (hurricane winds, storm surge, river flooding, subsidence)

Photo credit: msnbc.msn.com, August 31, 2005

New Orleans' Recovery Assessment

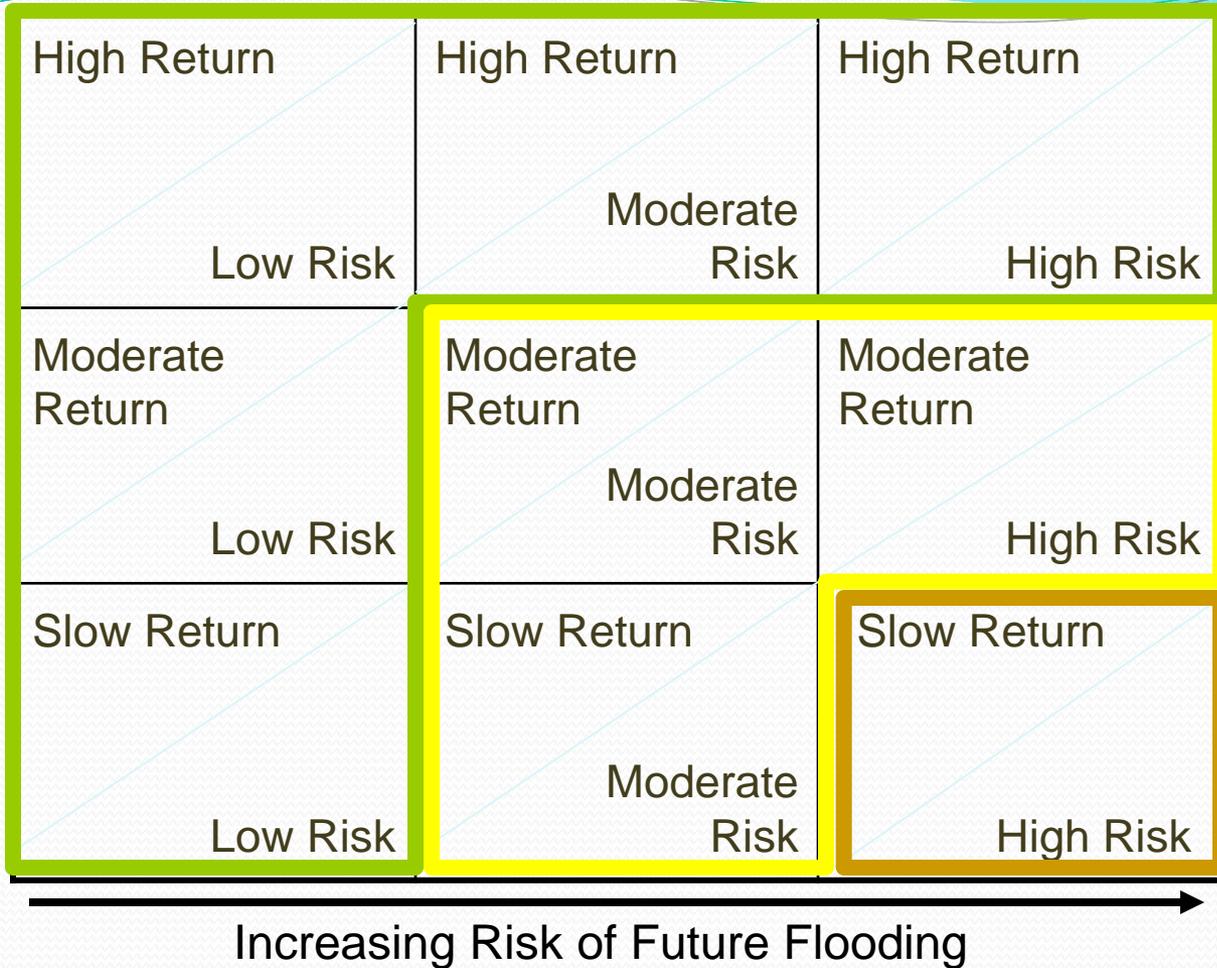
(Phase 1 of the Unified Recovery Plan process, 1-year after Hurricane Katrina)

- Population
- Flood Protection
- Funding
- Housing
- Education
- Infrastructure
- Public Safety
- Healthcare
- Transportation
- Economic Development
- Public Facilities
- Historic Preservation
- Culture

**Citywide
Recovery
Assessment**

District-level Assessments
(Source: UNOP 2007)

Increasing Rate of Population
Return



- Policy Area A – Less flood risk and/or higher repopulation rates
- Policy Area B – Moderate flood risk and/or moderate repopulation rates
- Policy Area C – Highest flood risk and slowest repopulation rates

	Policy Area C	Policy Area B	Policy Area A
0 - 2 yrs	<ul style="list-style-type: none"> ■ Stabilize neighborhoods and help rebuild together safely ■ Use modular or temporary facilities to provide full coverage 	<ul style="list-style-type: none"> ■ Help returning residents and businesses with elevation ■ Repair major infrastructure ■ Use modular or temporary facilities to provide full coverage 	<ul style="list-style-type: none"> ■ Ensure residents can fund individual flood protection ■ Accommodate additional residents and businesses ■ Repair major infrastructure ■ Restore permanent facilities
2 - 5 yrs	<ul style="list-style-type: none"> ■ Continue neighborhood stabilization ■ Invest in permanent infrastructure ■ Re-vision public services and amenities 	<ul style="list-style-type: none"> ■ Help slow-recovery neighborhoods rebuild together ■ Improve infrastructure scalable to population and resettlement ■ Re-vision public services and amenities 	<ul style="list-style-type: none"> ■ Improve infrastructure to spur revitalization and accommodate additional population ■ Initiate re-visioning of public services and amenities
> 5 yrs	<ul style="list-style-type: none"> ■ Complete reconstruction and revision of services and amenities 	<ul style="list-style-type: none"> ■ Complete reconstruction and revision of services and amenities 	<ul style="list-style-type: none"> ■ Complete reconstruction and re-vision of public services and amenities

ART Next Steps

- Initiate Focus Area adaptation planning at the Hayward Regional Shoreline
- Continue working with Regional Shoreline Parks
- BCDC+ABAG joint multi-hazard planning project at the Oakland International Airport and Bay Farm Island Focus Area



OAK / Bay Farm Island Focus Area

- Demonstrate the benefits of integrated, multi-hazard shoreline resilience planning
- Identify synergies and conflicts between earthquake risk mitigation and sea level rise adaptation planning
- Examine secondary vulnerabilities and consequences caused by dependencies among asset in the focus area, and dependencies to assets outside of the focus area



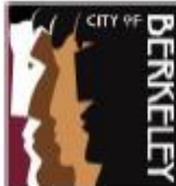
guide

to Conserving Water through Rainwater Harvesting & Graywater Reuse for Outdoor Use

BERKELEY'S

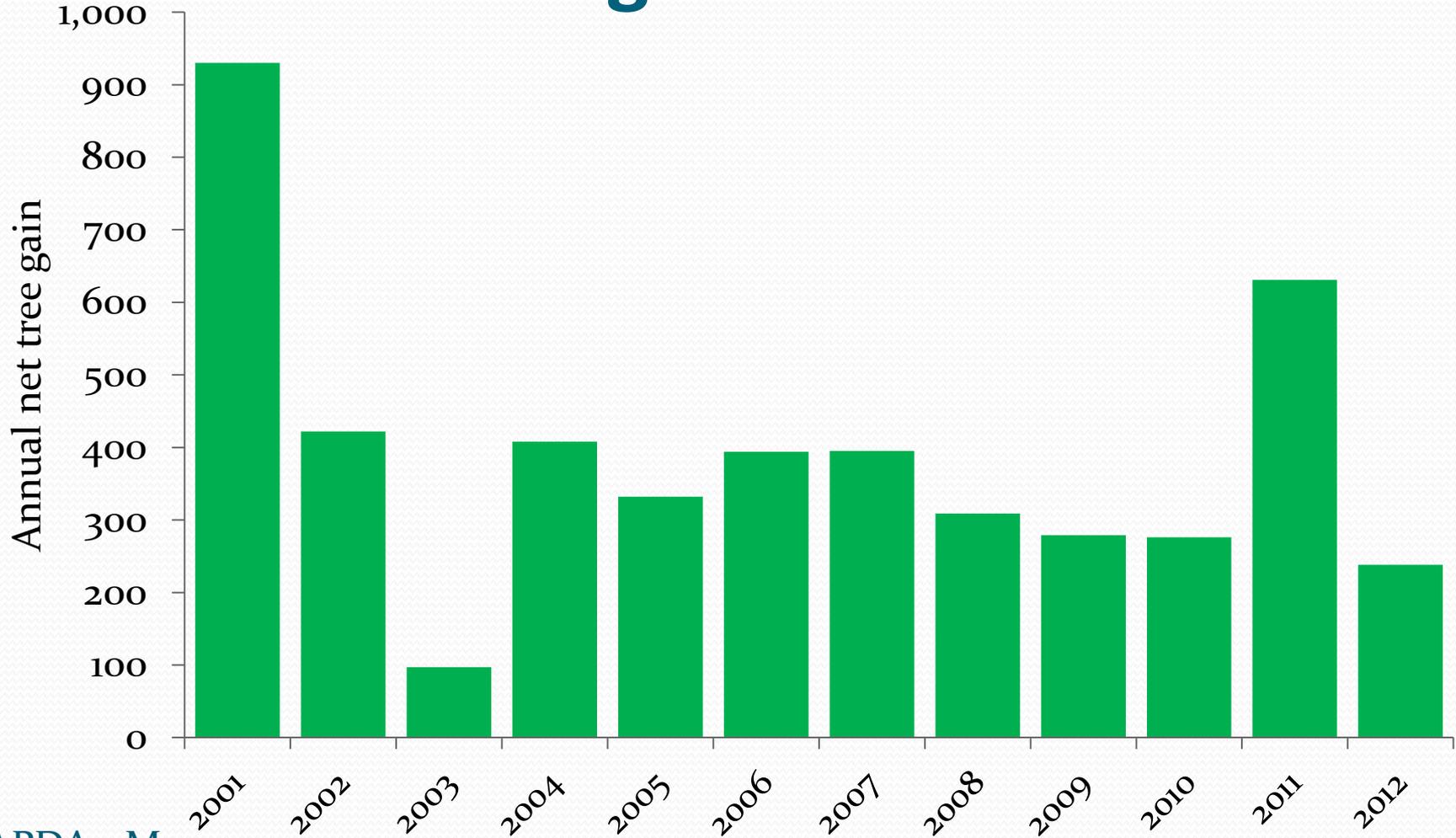
BEST
BUILDERS

A
GUIDE
TO
SUSTAINABLE
BUILDING



www.cityofberkeley.info/sustainable

Performance metric: Annual net tree gain



Alex Hinds

Center for Sustainable
Communities,
Department of Environmental
Studies and Planning
Sonoma State University
(805) 704-7510
alexhinds47@gmail.com

Wendy Goodfriend

San Francisco Bay Conservation
and Development Commission
(415) 352-3646
wendyg@bcdcc.ca.gov

Laurie Johnson

Laurie Johnson Consulting and
Research
(415) 614-1438
laurie@lauriejohnsonconsulting.com

Timothy Burroughs

Office of Energy & Sustainable
Development
City of Berkeley
(510) 981-7437
tburroughs@ci.berkeley.ca.us
www.cityofberkeley.info/sustainable