Community Resilience

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The ability of social units (e.g., organizations, communities) to mitigate hazards, contain the effects of disasters when they occur, and carry out recovery activities in ways that minimize social disruption and mitigate the effects of future disasters.

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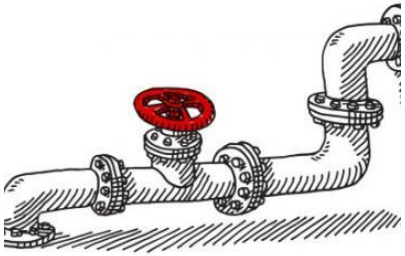
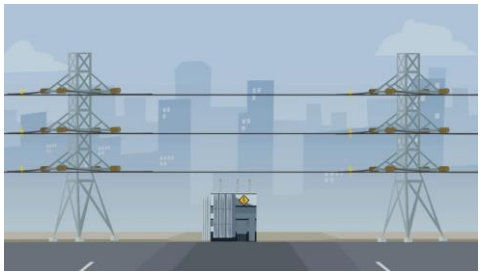
Essential infrastructure and organizations

Hospital



Water Network



Power Network

Local Emergency Management

Community Resilience

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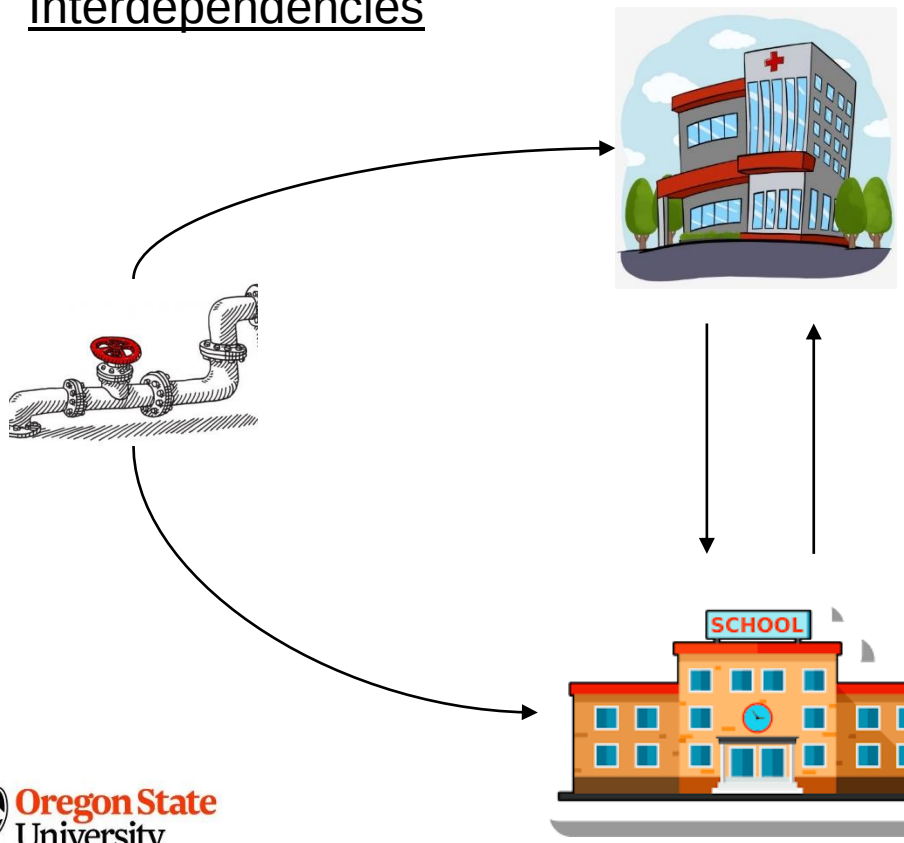
Interdependencies



Must be present to recover and provide opportunities

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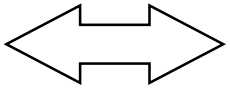
Expectations

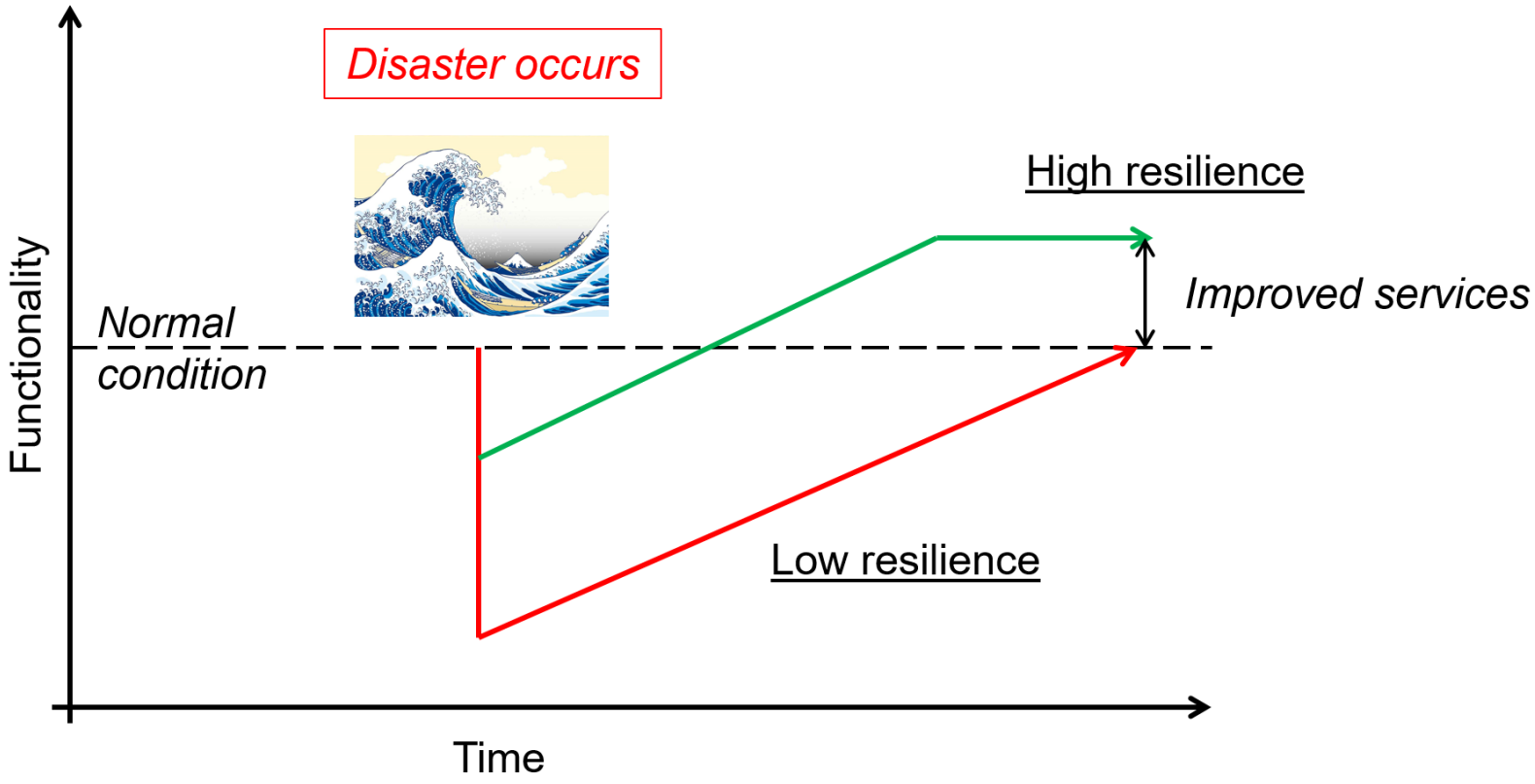
- What are the most important capabilities to a community?
- What are the community's expectations for recovery?
- What are the community's expectations for damage?



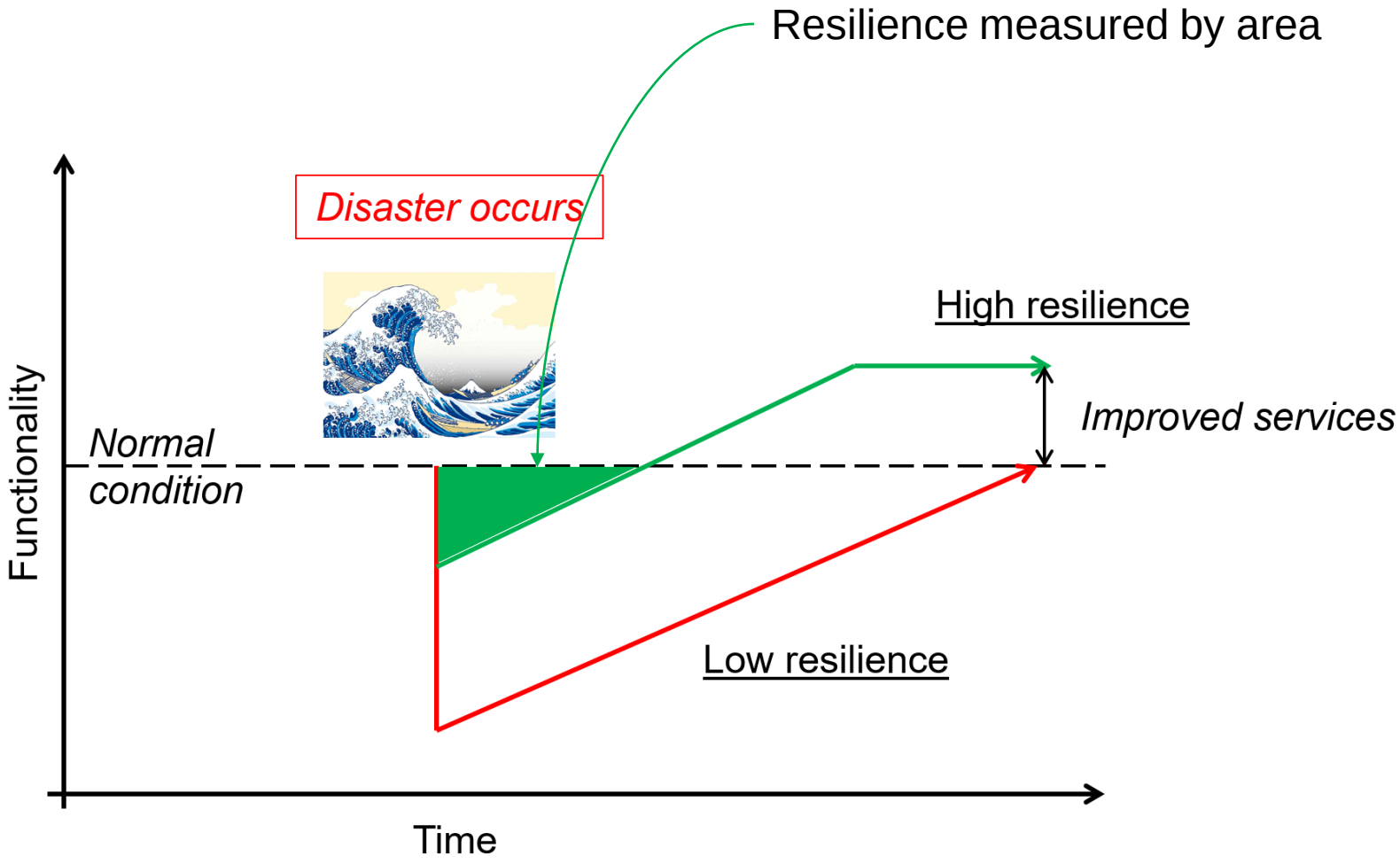
Reality

- How was the infrastructure designed in the community?
- How much damage is expected after a disaster?

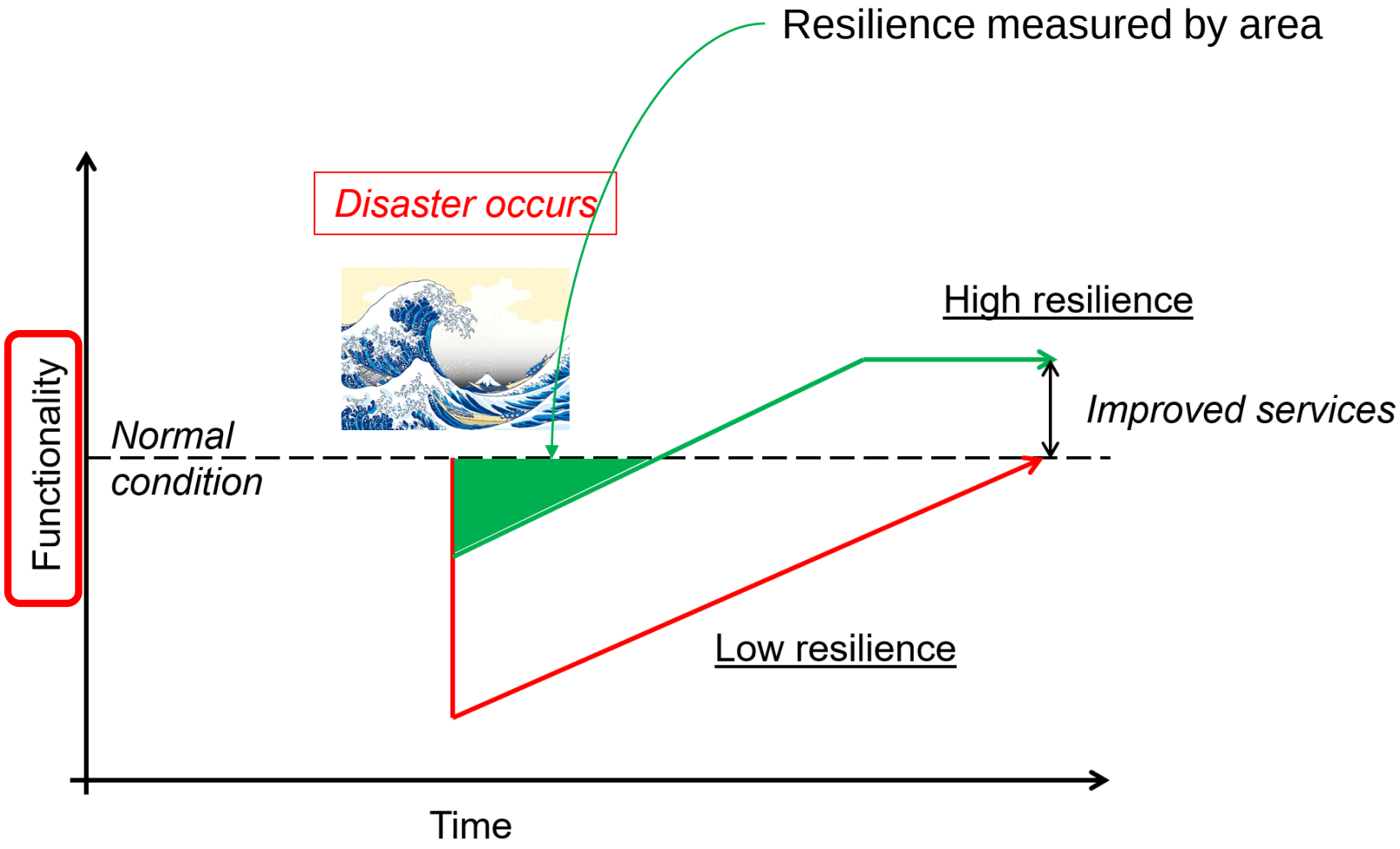
Quantifying Resilience



Quantifying Resilience



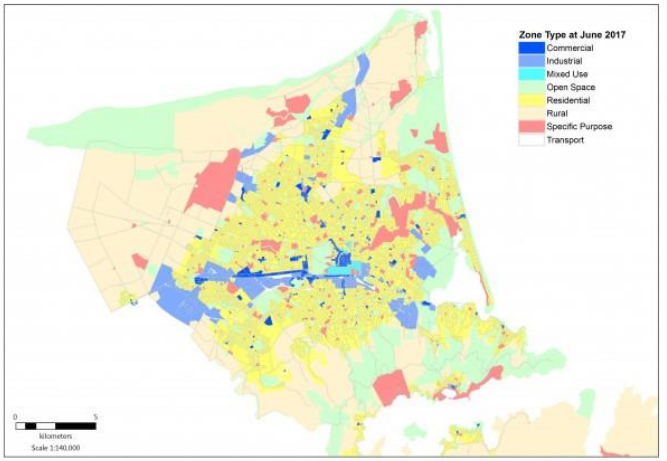
Quantifying Resilience



How do we address resilience with civil infrastructure?

Design buildings and communities to withstand potential forces/demands from hazard

Use urban planning/zoning to restrict building in high-risk areas



Examples:
Christchurch, NZ
Nashville, TN
Boulder, CO

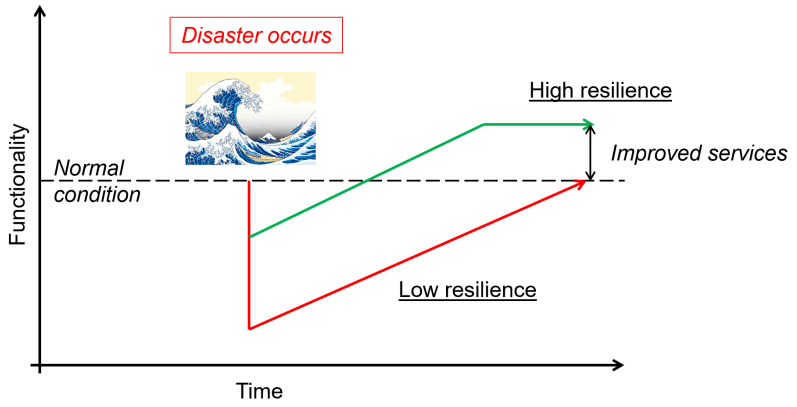
How do we address resilience with civil infrastructure?

Design buildings and communities to withstand potential forces/demands from hazard

Performance objectives in building codes

Performance-based earthquake engineering allows for Immediate Occupancy or Functional Recovery performance objectives.

- Shelter in-place
- Business continuity
- Limited damage
- Lifelines that are necessary to ensure shelter in-place and business continuity are functional



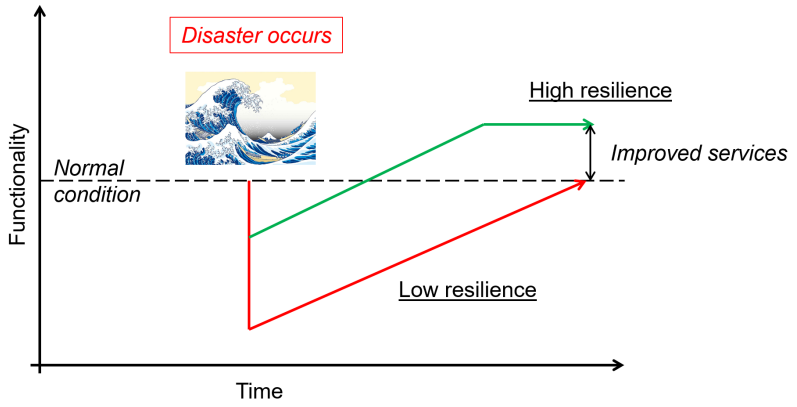
How do we address resilience with civil infrastructure?

Design buildings and communities to withstand potential forces/demands from hazard

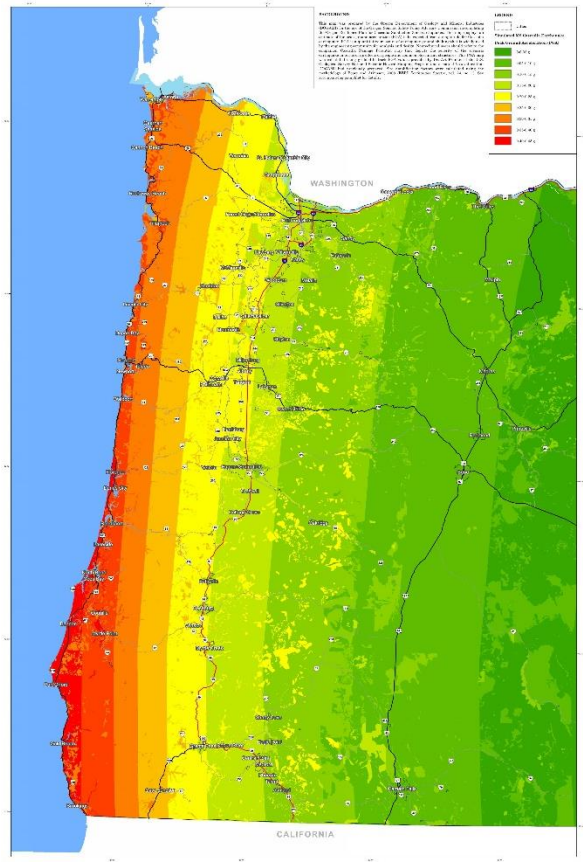
Performance objectives in building codes

Performance-based earthquake engineering allows for Immediate Occupancy or Functional Recovery performance objectives.

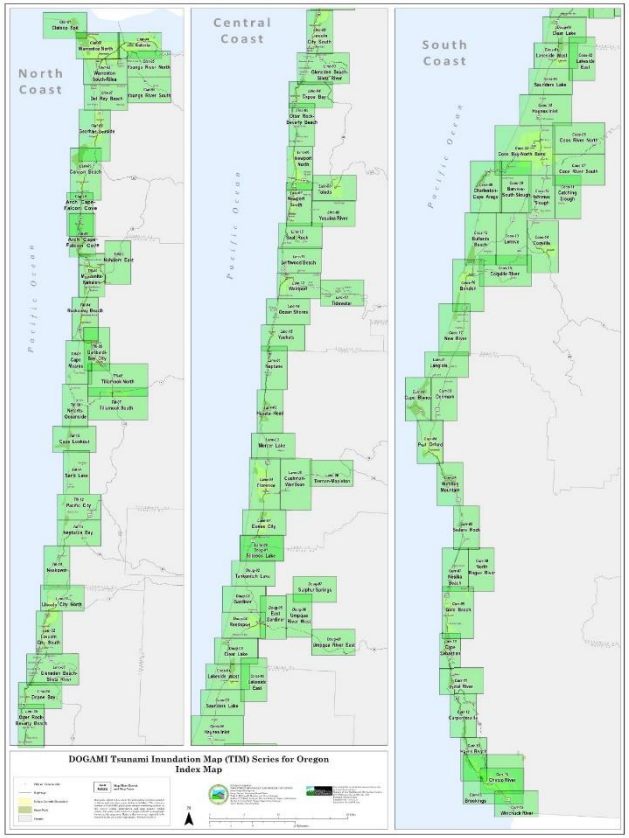
Design building stiffness such that lifelines and non-structural components are not severely damaged.



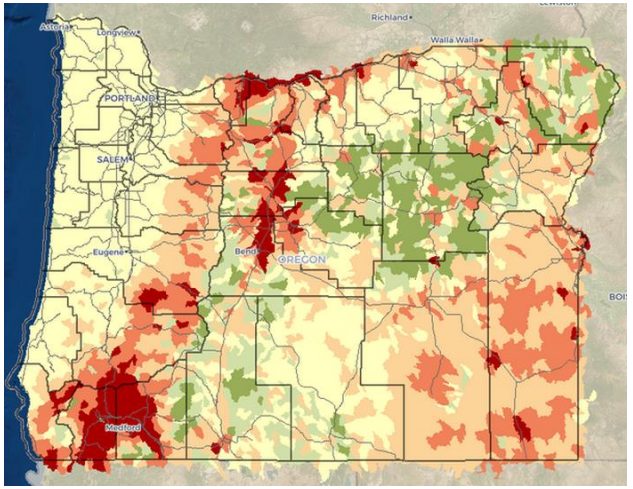
Hazards in Oregon



Earthquake



Tsunami



Wildfire

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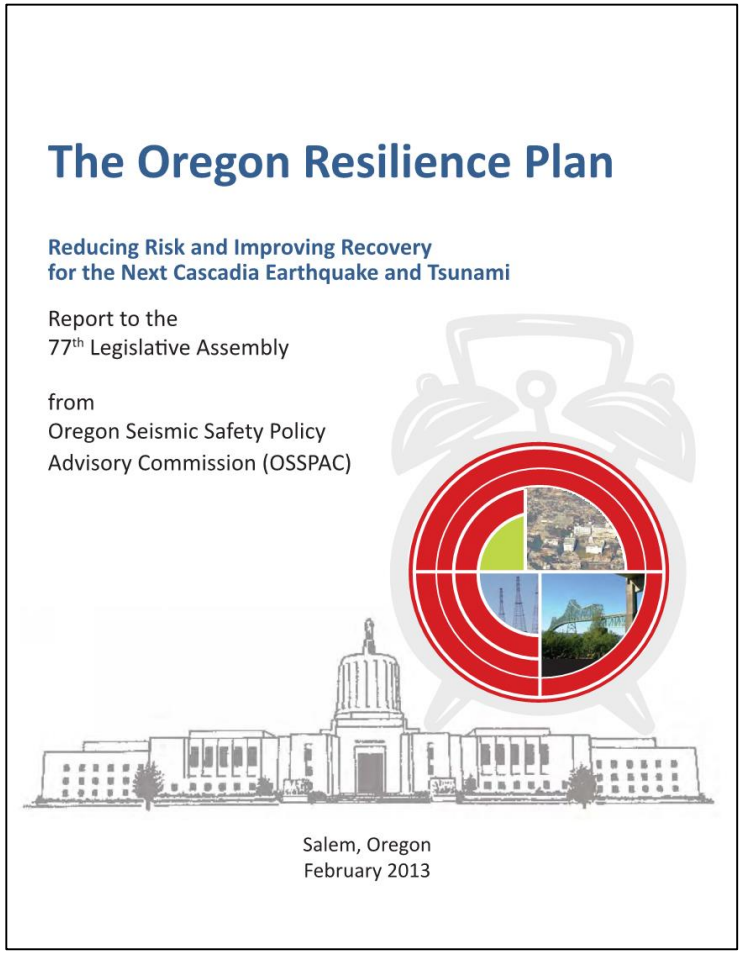
Community Resilience Motivation

1977	National Earthquake Hazards Reduction Program (NEHRP) Earthquake Hazards Reduction Act of 1977
2009	SPUR (San Francisco Bay Area Planning and Urban Research Association) Report on *The Resilient City*
2012	Resilient Washington State
2013	Oregon Resilience Plan
2013	Rockefeller Foundation's 100 Resilient Cities
2015	NIST Community Resilience Center of Excellence
2018	Rockefeller Foundation's 100 Resilient Cities Ends
2019	NIST Community Resilience Center of Excellence – renews for round 2

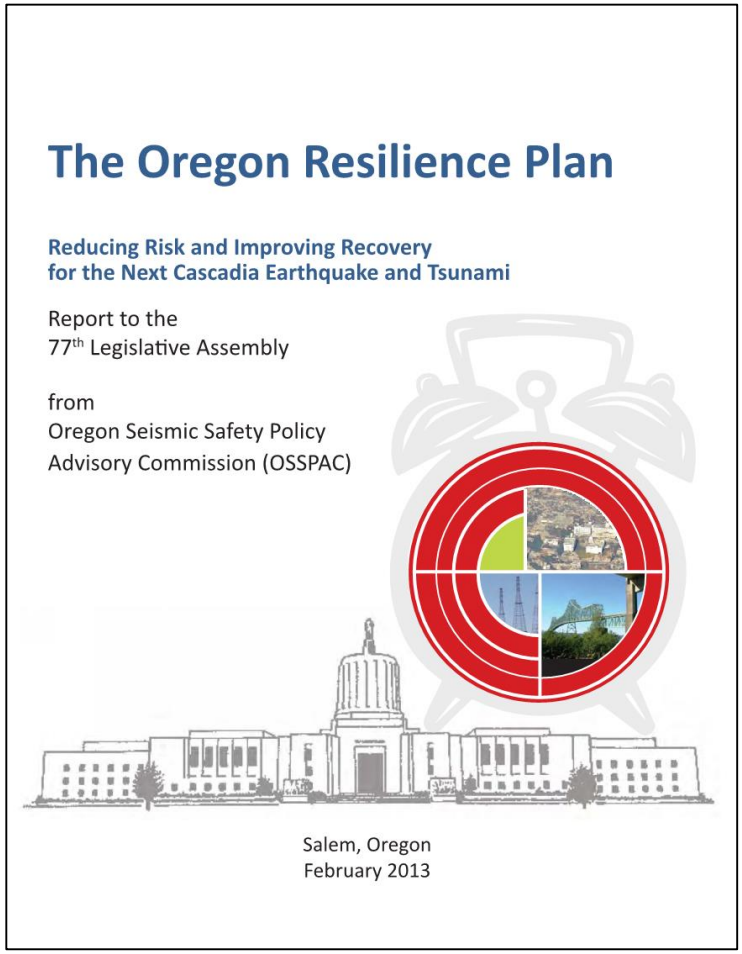
Community Resilience in Oregon



Evaluation of current conditions:

- Business continuity
- Coastal communities
- Critical & essential facilities
- Transportation
- Energy
- Information and communications
- Water & wastewater

Community Resilience in Oregon



Evaluation of current conditions:

- Business continuity
- Coastal communities
- Critical & essential facilities
- Transportation
- Energy
- Information and communications
- Water & wastewater

Identification of

- **Potential for damage**
- **Lack of recovery potential**
- **Areas of improvement**

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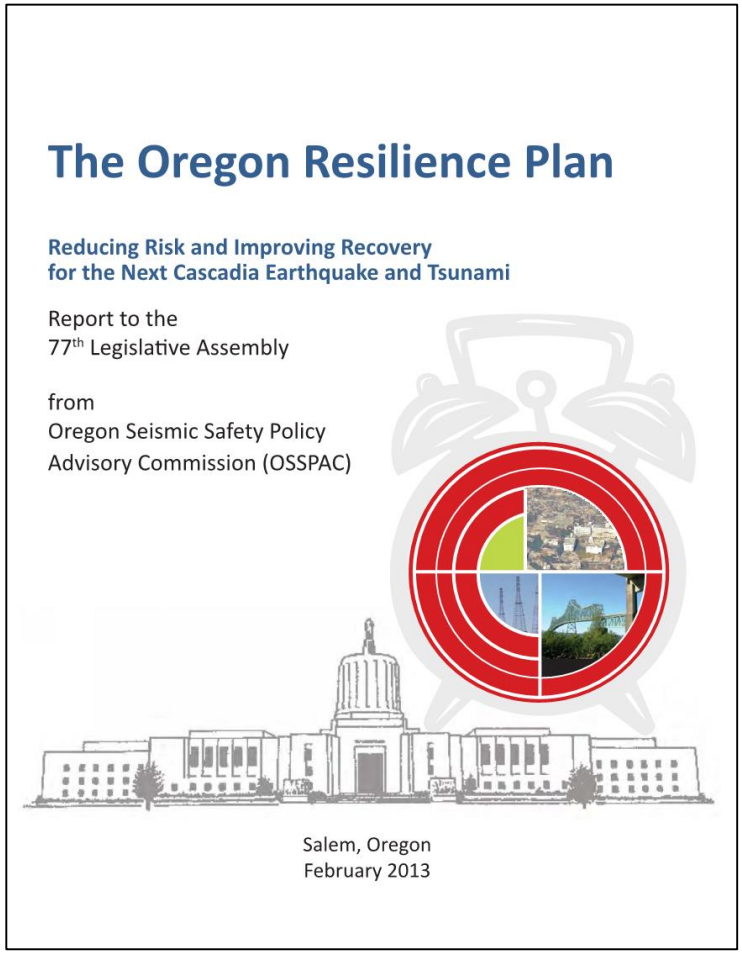
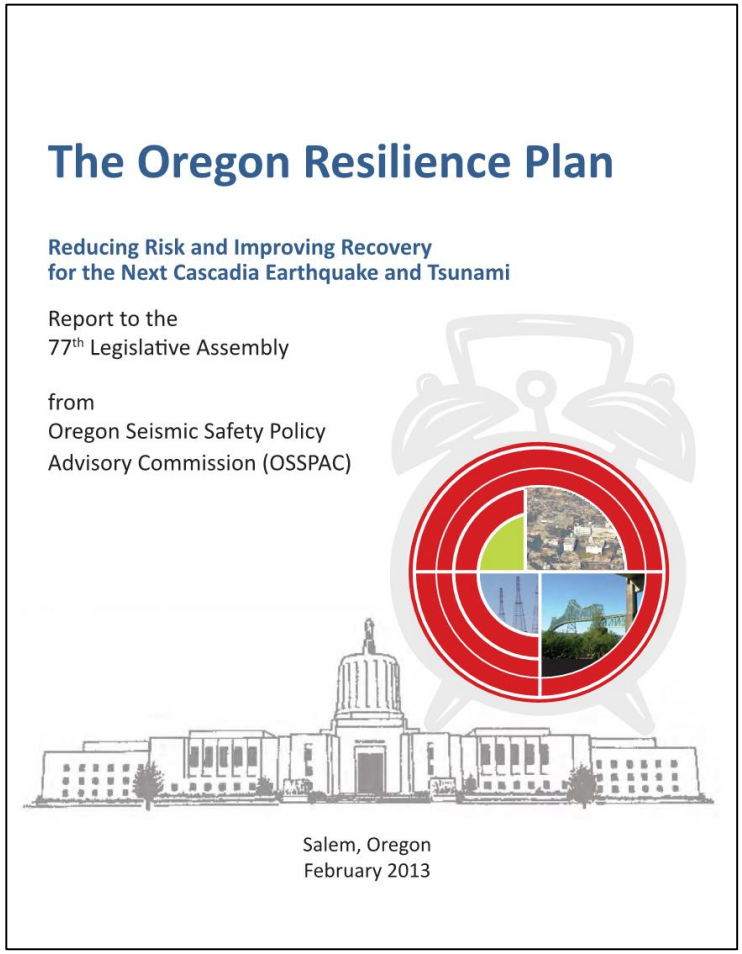
Community Resilience in Oregon – *Progress Update (2018)*



Business continuity (completed)

- ✓ SB 311 (2017) authorizes cities and counties to adopt an ordinance or resolution providing tax exemption to commercial, industrial and multi-family buildings built before Jan. 1, 1993,
- ✓ Oregon Resilience Buildings 1 & 2 in SB 5506 (2017) are the start of a long-term planning effort within the Capital Mall area (Salem),
- ✓ Department of Education administers a grant program, Seismic Rehabilitation Grants Program for public educational facilities.

Community Resilience in Oregon – *Progress Update (2018)*



Critical and Essential Buildings (completed)

- ✓ Establishment of a State Resilience Office
- ✓ Seismic Rehabilitation Grant Program funds retrofits of emergency operations centers and fire and police stations,
- ✓ Survey of Portland URM buildings,

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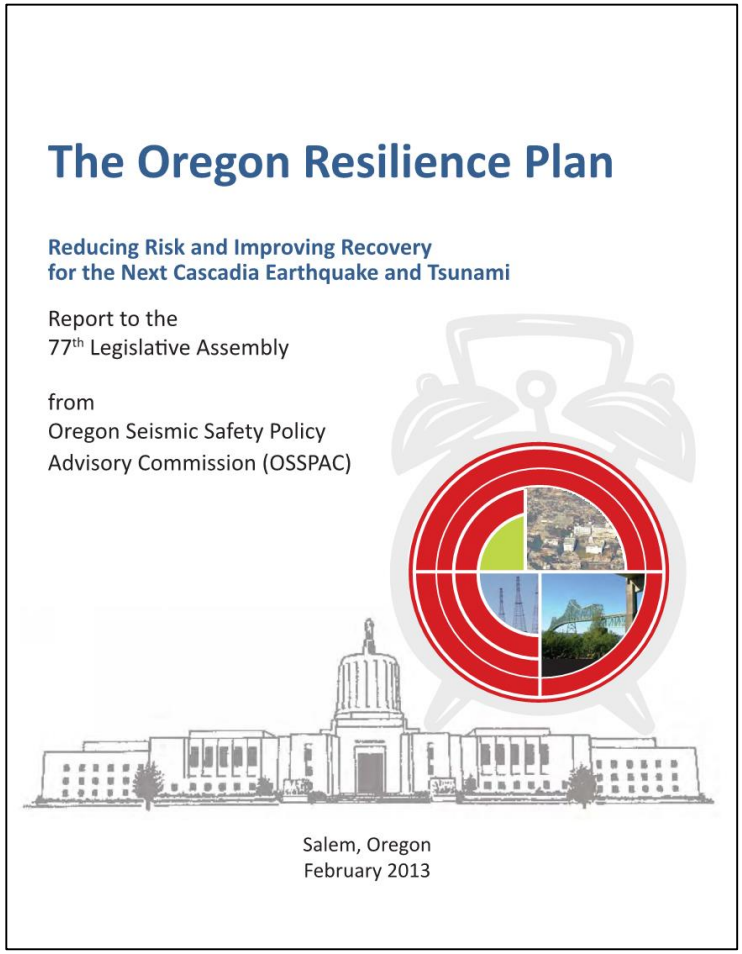

Coastal Communities

- ✓ Provide information about Cascadia earthquakes and tsunami in all hotels, motels, and short-term rentals;
- ✓ Create tsunami evacuation modeling for each coastal community as a base level to estimate the likely fatality level;
- ✓ Improve tsunami evacuation measures by further developing existing evacuation routes, creating new evacuation routes, bettering education and signage about evacuation routes, and creating vertical evacuation structures or buildings.

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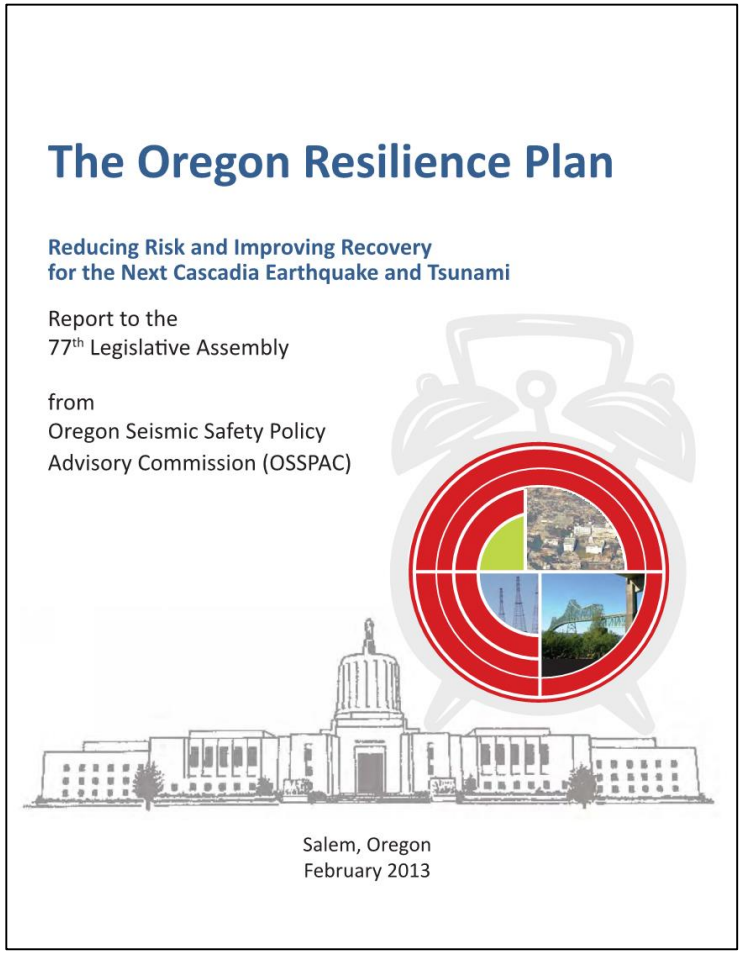
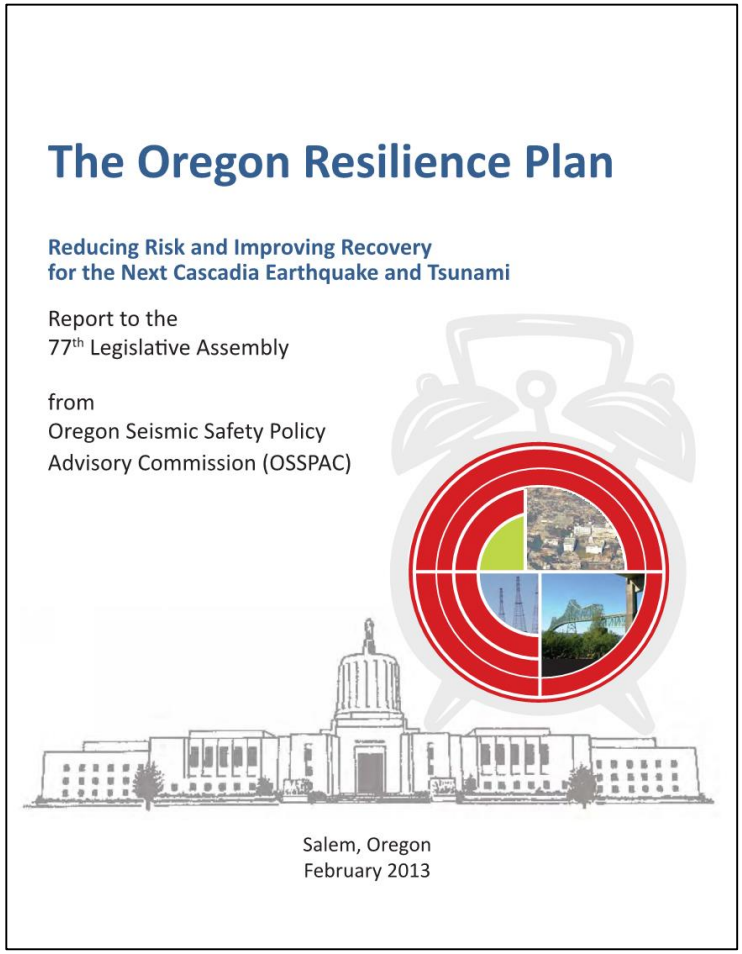
Community Resilience in Oregon – *Progress Update (2018)*



Coastal Communities

- ✓ Develop plans to provide shelter, water, and food for residents and visitors;
- ✓ Ensure that critical transportation links to the valley and along the coast survive the earthquake so that coastal communities are not cut off from relief and recovery efforts;
- ✓ Use tsunami-resistant buildings as vertical evacuation structures to ensure the safety of people in the inundation zone where other options are limited, and use tsunami-resistant infrastructure for critical transportation, port facilities, and utilities.

Community Resilience in Oregon – *Progress Update (2018)*



Coastal Communities

- ✓ Make all government buildings, schools, and essential facilities located within tsunami zones more resilient

Oregon Looks To Shake Up Development Rules In Tsunami Zones

Critics blast Oregon repeal of tsunami-zone building ban

Oregon Legislature repeals ban on building in tsunami zone

House Bill 3309: overturns 25-year old law prohibiting new schools, hospitals, jails, and police and fire stations from being built in the state's tsunami inundation zone

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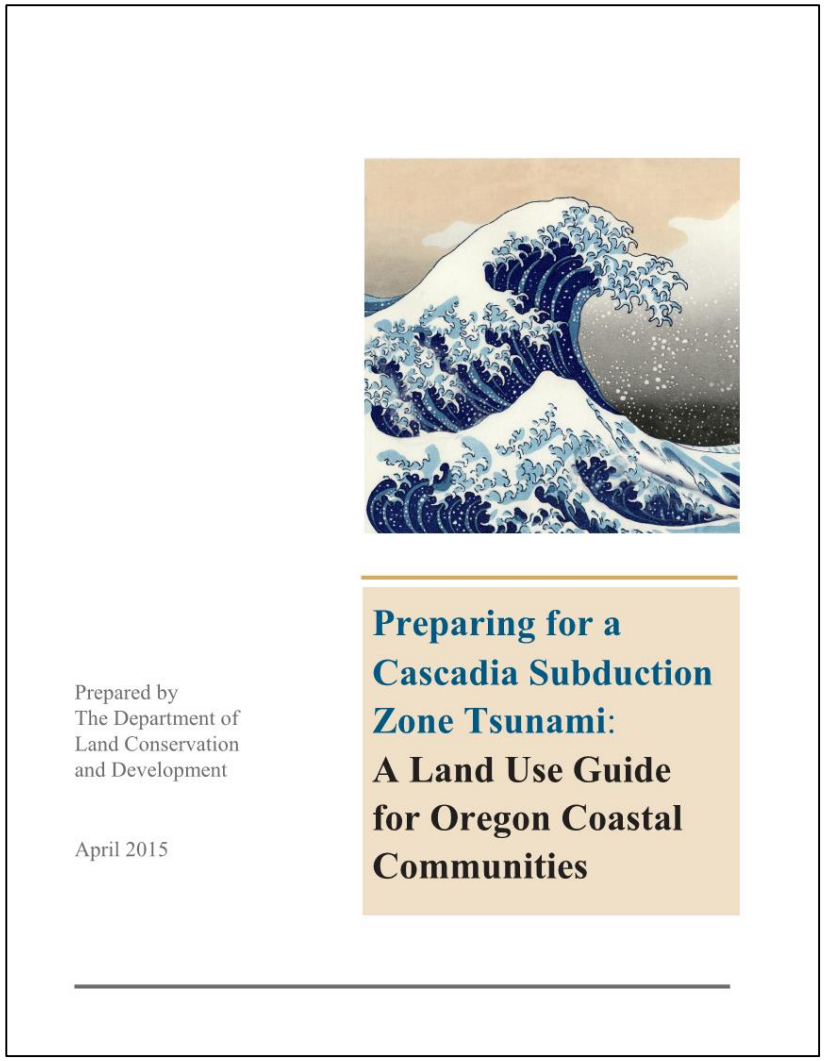
Community Resilience in Oregon – *Examples of implementation*



Communities that have implemented:

- ✓ Coos County
- ✓ City of Florence
- ✓ City of North Bend
- ✓ City of Reedsport

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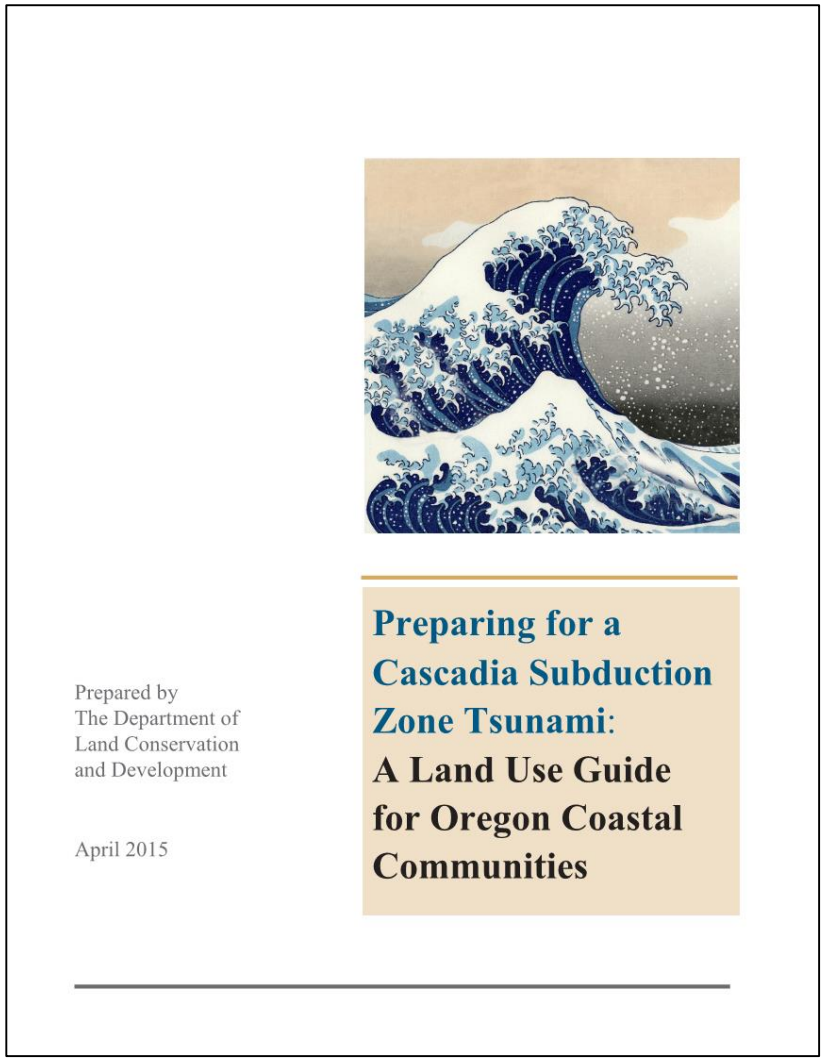
Community Resilience in Oregon – *Examples of implementation*



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Policies implemented:

- ✓ Incorporated tsunami hazard overlay zones into land-use planning
- ✓ Limit development of critical facilities within tsunami inundation zones
- ✓ Encourage stronger building techniques
- ✓ Offer flexible options to people who want to make development designs more tsunamic resilient
- ✓ Improvement plans for tsunami evacuation facilities

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Community Resilience in Oregon – ***Examples of implementation***

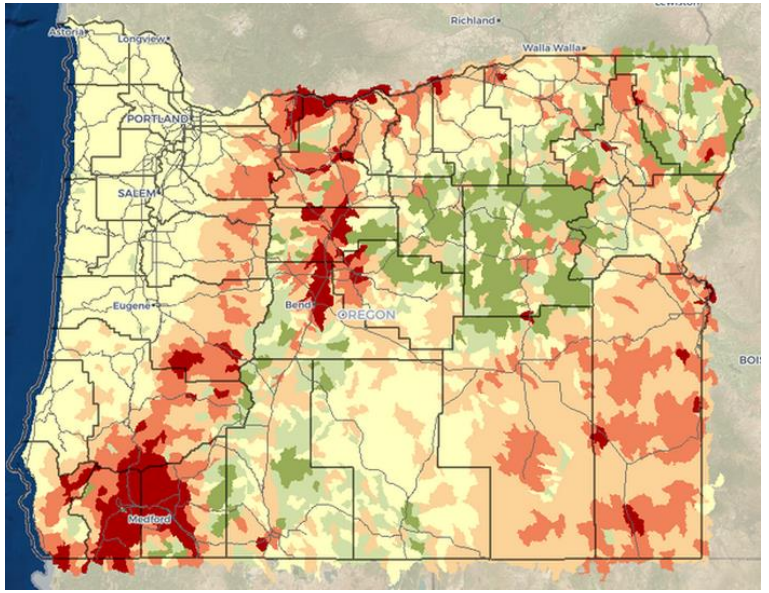
January 30, 2019

- Governor Kate Brown signed an executive order creating the ***Governor's Council on Wildfire Mitigation***

Oregon Building Codes Division adopted an amendment to the Oregon Residential Specialty Code.

Community Planning Assistance for Wildfire (CPAW) worked with ***Bend, Sisters, Ashland, and Wasco County*** to adopt of the WUI code for structures.

Ashland Forest Resiliency Stewardship Project (AFR)



Research at Hinsdale Laboratory

- Fundamental mechanics and conditional probabilities for prediction of hurricane surge and wave loads on elevated coastal structures (**Oregon State University**)
- Nonlinear long wave amplification in the shadow zone of offshore islands (**Texas A&M**)
- Probabilistic assessment of tsunami forces on coastal structures (**University of Washington**)
- Numerical and probabilistic modeling of aboveground storage tanks subjected to multi-hazard storm events (**Rice University**)
- Telescopic structural flood walls (**Smart Walls Construction LLC**)
- Non-linear long wave amplification in the shadow zone of offshore islands (**University of Southern California**)
- Advancing multi-hazard assessment and risk-based design to promote offshore wind energy technology (**Northeastern University**)
- Transient Rip Current Dynamics: Laboratory measurements and modeling of surf zone vorticity (**University of Washington**)
- Runups of unusual size: Predicting unexpectedly large swash events (**Oregon State University**)
- Physical modeling of submarine volcanic eruption generated tsunamis (**Georgia Tech**)
- Wave, surge, and tsunami overland hazard, loading and structural response for developed shorelines (**University of Notre Dame, University of Southern California, and Oregon State University**)
- Physics of dune erosion during extreme wave and storm-surge events (**Oregon State University, University of Delaware, and Texas A&M**)
- Vertical evacuation structures subjected to sequential earthquake and tsunami loadings (**University of Washington**)

Research at Hinsdale Laboratory

Oregon State University