A Systematic Approach to Building-Scale Geohazard Risk Assessments in Oregon
1. Hitch your wagon to the natural hazard mitigation planning process; it’s already there.

2. Geohazard maps are now precise enough to make building-scale damage estimates with the right tools.

3. This isn’t site-specific analysis. Don’t oversell it.

4. Doing this kind of work? Looking for advice? Reach out to DOGAMI.
ELEMENTS OF A GEOHAZARD RISK ASSESSMENT

Geologic Hazards

Risk

People & Property

Credit: Figure modified from Wood 2011
MORE PRECISE FLOOD HAZARD MAPPING

USGS topo sheet

Credit: FEMA/USGS

Contour interval = 40 feet

Lidar

Structure Foundation Elevation = ~74'

Base Flood Elevation = ~69'

Contour interval = 2 feet
MORE PRECISE LANDSLIDE HAZARD MAPPING
City of Seaside, Oregon

$5 billion in building assets in Clatsop County, Oregon

Building Occupancy Type
- Residential
- Commercial/Industrial
- Public/Non-Profit
- Agricultural/Utility
Blue buildings are home to permanent residents.

Population is prorated to buildings from census blocks based on square footage.

Clatsop County’s total population is 37,000.

City of Seaside, Oregon

Credit: DOGAMI
BUILDING VULNERABILITY IS NOT UNIFORM

City of Seaside, Oregon

Seismic building codes
- No code
- Minimal standards
- Medium standards
- Highest standards

Credit: DOGAMI

GSA Cordilleran Section Annual Meeting
Portland, Oregon - May 17, 2019
BUILDING VULNERABILITY IS NOT UNIFORM

The majority of buildings in the county were built before seismic building codes

Oregon Department of Geology and Mineral Industries

Portland, Oregon - May 17, 2019

GSA Cordilleran Section Annual Meeting
ELEMENTS OF A GEOHAZARD RISK ASSESSMENT

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People & Property

Credit: Figure modified from Wood 2011
Clatsop County tsunami exposure: medium scenario, Cascadia Subduction Zone M9.0

Buildings exposed: **8,810**

Value of exposed buildings: **$1.7 billion or 34%**

Potentially displaced population: **11,300 or 31%**
Clatsop County M9.0
CSZ earthquake damage
*areas outside tsunami zone**

Red-tagged buildings: **5,000**
Yellow-tagged buildings: **1,300**
Estimated building damage: **$1.2 billion or 25%**
Potentially displaced population: **7,000 or 19%**

Shaking and ground failure damage is only part of the story in Clatsop County.

Total Building Value Loss Ratio from M 9.0 Earthquake

- **Loss Ratio from CSZ M9.0 Earthquake**
- **0%**
- **25%**
- **50%**

- **Clatsop County (rural)**
- **Arch Cape**
- **Svensen-Knappa**
- **Westport**
- **Astoria**
- **Cannon Beach**
- **Gearhart**
- **Seaside**
- **Warrenton**

*Unincorporated

Credit: DOGAMI
RISK IN TERMS OF COMBINED HAZARDS

Earthquake and Tsunami Building Damage

- Loss Ratio from M9.0 Earthquake
- Exposure to Tsunami Inundation (Medium)

Clatsop County (rural)*
Arch Cape*
Svensen-Knappa*
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Assumes that tsunami exposure is 100% damage

New tsunami damage models will refine this assumption
Seismic design alternatives analysis helps communities weigh costs and benefits.

Damage results are reliable only in aggregate; these are not site-specific studies.
DOGAMI has pegged its mapping and risk assessment priorities to the 5-year natural hazard mitigation planning process.

State, tribal, and local governments must develop a hazard mitigation plan as a condition for receiving FEMA disaster assistance grants.
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