Cascadia CoPes Hub

THE CASCADIA COASTLINES AND PEOPLES HAZARDS RESEARCH HUB

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COASTLINES AND PEOPLE

OSSPAC 9/13/2022: Introduction to the Cascadia CoPes Hub

Oregon State University

University of Washington

University of Oregon

Humboldt State University

The William D. Ruckelshaus Center

Sea Grant Oregon

Sea Grant Washington

Swinomish Indian Tribal Community

USGS science for a changing world

Arizona State University

Cascadia CoPes Hub Vision

Increase communities' coastal resilience to protect their lives, identities, and values through scientific advancements

Provide information for hazard assessments, mitigation, and adaptation measures—including planning, policy making, and engineering — **working in collaboration with coastal communities**.

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Testing 2 Hypotheses

1. Advancing coastal hazards science will transform communities understanding of the coastal risks they face

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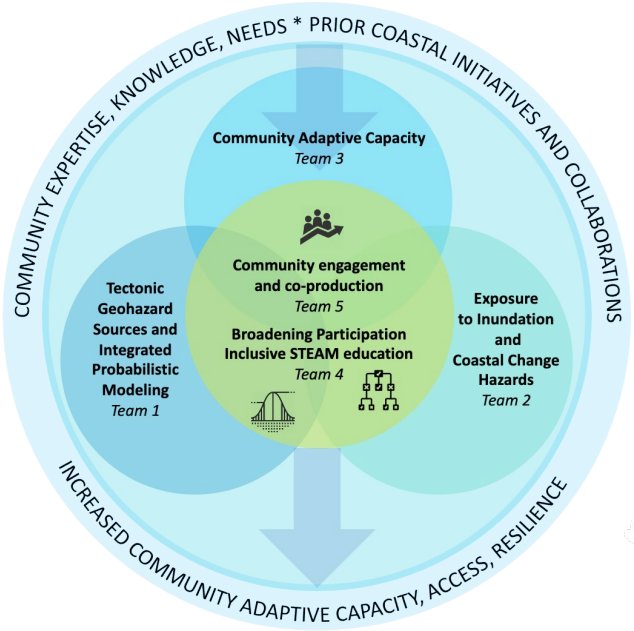
Testing 2 Hypotheses

1. Advancing coastal hazards science will transform communities understanding of the coastal risks they face

2. An inclusive co-produced approach to advancing hazard assessments and mitigation will increase coastal communities' ability to adapt and broaden participation in lowering disaster risk

Five interconnected teams are carrying out the work of the Cascadia CoPes Hub



Research Teams:

Team 1 - Tectonic Geohazard Sources and Integrated Probabilistic Modeling

Team 2 - Exposure to Inundation and Coastal Change Hazards

Team 3 - Community Adaptive Capacity

Integrative/ Cross-cutting teams:

Team 4 - Broadening Participation and Inclusive STEAM Education

Team 5 - Community Engagement and Co-Production of Coastal Hazards Knowledge

Cascadia Coastlines and Peoples Hazards Research Hub

Program Management and Administration

Administrative Core

Peter Ruggiero (PI)
Ann Bostrom (co-PI)
Alison Duvall (co-PI)
Dwaine Plaza (co-PI)
Harold Tobin (co-PI)
Nicole Errett
Lisa Gaines
Jenna Tilt

Project Manager: Alessandra Burgos

Senior Leadership Steering Committee

Administrative Core
Project Manager
Team Leads
Theme Leads
External Evaluators

External Evaluators

Julia Melkers
Eric Welch

Graduate Research Assistants (Advisor)

Lesley Michalegko (Welch)
June Mi Kang (Melkers)

External Advisory Committee

Rebecca Bendick
Ian Boxill
Gregory Guannel
Mike Harryman
Onora Lien
Diego Melgar
Tommy Moore
Emma Norman
Jan Newton
Kelin Wang

Community Advisory Council

Corina Allen
Bridgette Blakesley
Beatriz Botello-Salgado
Tiffany Brown
Adam Canter
Pat Corcoran
Clancy De Smet
Maximilian Dixon
Gus Gates
Eliza Ghitis
Kevin Goodrich
Mike Harryman
Jennifer Kalt
Meade Krosby
David Lewis
Larissa Pfleeger
Charlie Plybon
Meg Reed
Ryan Sealy

Team 5: Community engagement and co-production of coastal hazards knowledge

Leads:

Nicole Errett
Jamie Donatuto
Amanda Murphy
Phyllis Shulman

Participating Members:

Coastal Community Leads
Collaboratory Representatives
All Hub investigators

Postdoctoral Community Liaisons (Advisor):

Natasha Fox (Tilt)
Cassandra Jean (Errett)
Rajasree Radhamma (Bolte/ Ruggiero)

Team 4: Broadening participation, inclusive STEAM education

Leads:

Dwaine Plaza
José Meléndez
Lisa Gaines
Dan Abramson

Graduate Research Assistants (Advisor):

TBD

Participating Members:

Coastal Community Leads
All Hub investigators

CHARTER Fellows:

Grace Backen
Hazel Curley O'Malley
Ximena Nava Diaz
David Nieto Wenzell
Irene Pablo Lora
Nina Sanchez
Kaitlynn Spino
Helena Thompson
John Williams Jr.
Timothy Withrow

Team 1: Tectonic geohazard sources and integrated probabilistic modeling

Research Leads:

Alison Duvall
Harold Tobin
Erin Wirth
Dan Cox
Marc Eberhard

Coastal Community Lead: Carrie Garrison-Laney

Investigators:

Loyce Adams
Andre Barbosa
Jeffrey Berman
Juliet Crider
Art Frankel
Carrie Garrison-Laney
Joan Gomberg
Frank Gonzalez
alex grant
Randy LeVeque
Joseph Louis
Guillaume Mauger
Ian Miller
Michael Motley
David Schmidt
Haizhong Wang
Joe Wartman
Janet Watt
Yong Wei

Postdoctoral Researchers (Advisor):

Mehrshad Amini (Cox/ Barbosa)
Audrey Dunham (Wirth)
Ian Stone (Wirth)

Graduate Research Assistants (Advisor):

Addie Lederman (Berman/Eberhard)
Erich Herzig (Duvall)
Madeline Lucas (Tobin)
Paul Morgan (Duvall)
Dylan Sanderson (Cox)

Team 2: Exposure to inundation and coastal change hazards

Research Leads:

Alex Horner-Devine
Peter Ruggiero

Coastal Community Lead: Ian Miller

Investigators:

John Bolte
Dan Cox
Steven Dundas
Joan Gomber
Sally Hacker
Terrie Klinger
Guillaume Mauger
Andrea Ogston
Meagan Wengrove

Postdoctoral Researchers (Advisor):

Rajasree Radhamma (Bolte/ Ruggiero)

Graduate Research Assistants (Advisor):

Meredith Leung (Ruggiero)
Sarah Vollero (Ogston)

Team 3: Community Adaptive Capacity

Research Leads:

Jenna Tilt
Nicole Errett
Dan Abramson

Coastal Community Lead: Felicia Olmeta Schult

Investigators:

John Bolte
Ann Bostrom
Jamie Donatuto
Steve Dundas
Joseph Louis
Michael Howard
Jennifer Marlow
José Meléndez
Laurie Richmond
Peter Ruggiero
Ana Spalding
Jamie Vickery
Haizhong Wang

Postdoctoral Researchers (Advisor):

Natasha Fox (Tilt)
Cassandra Jean (Errett)
Rajasree Radhamma (Bolte/Ruggiero)

Graduate Research Assistants (Advisor):

Joshua Blockstein (Tilt)
Cameron George (Meléndez)
Meg Hamele (Errett)
Nayre Herrera (Marlow)
Matias Korfmacher (Errett)
Isabel Nerenberg (Errett)
Trisha Patterson (Tilt/ Plaza)
Alyssa Suarez (Marlow)
Jordan Totty (Meléndez)

Theme 1: Spatial and temporal scaling and cross-scale interactions — **Lead:** Dan Abramson

Theme 2: Science and risk communication, decision support — **Lead:** Ann Bostrom

Theme 3: Probabilistic modeling and simulation — **Lead:** Jeffrey Berman

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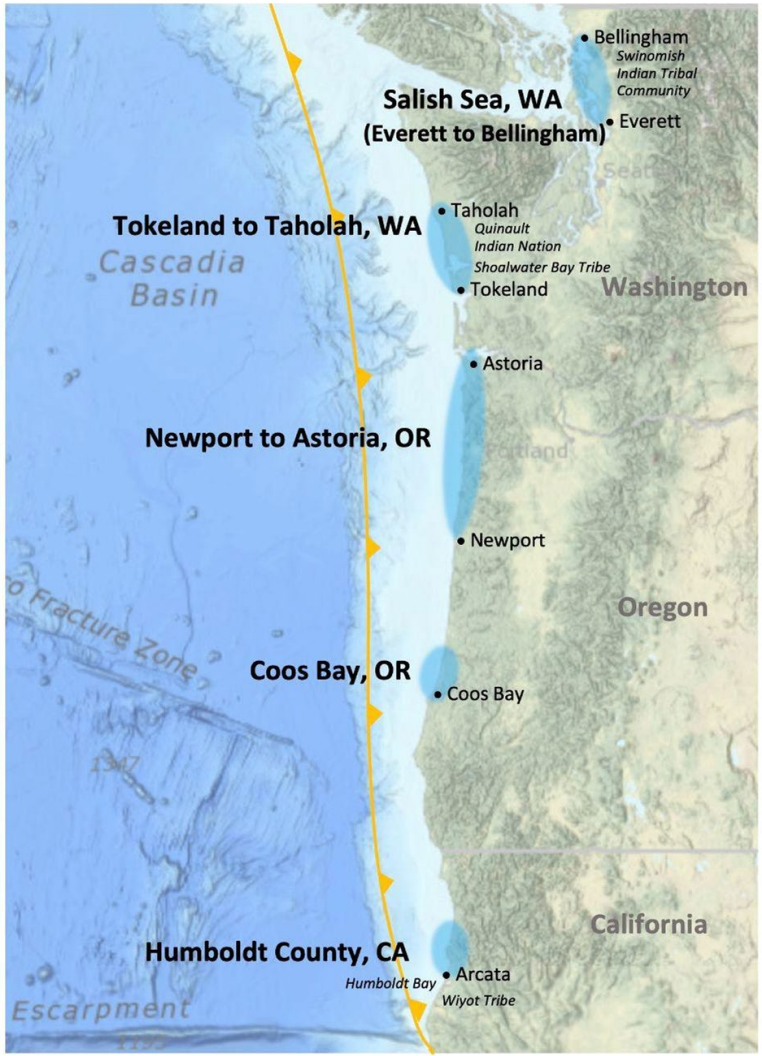
Hub Collaboratories

Collaboratories have tractable scales of geography for in-depth, **equity-focused**, **community engaged**, and **convergent research**. They are **diverse** with regard to **geography, geology, ecology**, and various community metrics. These are locations that have engaged or will soon engage with Hub scientists.



Community Engagement and co-production of coastal hazards science

- Engage coastal communities, especially underrepresented communities and populations, in identifying research priorities that integrate community values and protect valued assets
- Bridge Hub research with communities to enhance their adaptive capacities and sustainability
- Build upon and leverage past and current coastal initiatives to integrate the expressed needs and interests of communities with Hub research
- Build the networks of self-involved community members, while expanding the number of potential future participants in ongoing co-production processes

Community Engagement and co-production of coastal hazards science

Cascadia Community-Engaged Research Clearinghouse

CCERC

A PATHWAY FOR COMMUNITIES AND PRACTITIONERS TO CONNECT TO THE CASCADIA COPES HUB

4 MECHANISMS TO SUPPORT COMMUNITY NEEDS:

- Post Doctoral Coastal Community Liaisons
- Co-Production Studios + Labs
- Hub Researcher Expertise, Networks, & Resources
- Coastal Community Leads

HOW IT WORKS:

STEP 1 INVITE COMMUNITY LEADERS AND PRACTITIONERS TO SUBMIT COLLABORATION OR SUPPORT REQUESTS

STEP 2 REGULARLY REVIEW REQUESTS TO DETERMINE RIGHT HUB MECHANISM FOR SUPPORT

- Hub Coastal Community Lead, Liaison or Project Manager
- Co-Production Studios / Labs
- Hub Research Leadership Team Pilot Project

STEP 3 CONNECT COMMUNITIES WITH APPROPRIATE HUB RESEARCHERS

STEP 4 PROVIDE AD-HOC TECHNICAL SUPPORT FOR COMMUNITY-ENGAGED RESEARCH DESIGN OR IMPLEMENTATION

Broadening participation, inclusive Science, Technology, Engineering, Arts and Mathematics (STEAM) education

Cascadia CHARTER Undergraduate Fellowship Program

Coastal Hazards and Resilience Training, Education, and Research

Enhance university sophomore-junior experiences in research, outreach & engagement for underrepresented and minority undergraduate students

Cascadia TEACH Project

Training, Education, and Research in Coastal Hazards

Create new university K-12 community science research experiences

Cascadia CoPes GRT

Graduate Research Traineeship

Convergent science training of graduate students and postdocs

CHARTER Fellows Bootcamp

8-10 July 2022

Cascadia CoPes Hub
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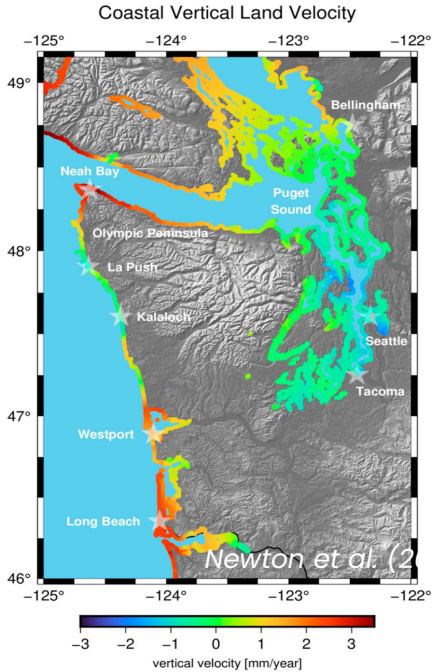
Oregon State University · University of Washington · University of Oregon · Cal Poly Humboldt · Arizona State University · Sea Grant Washington · Sea Grant Oregon · Swinomish Indian Tribal Community · William D. Ruckelshaus Center · USGS science for a changing world

https://cascadiacopeshub.org/

cascadia.copes@oregonstate.edu

Tectonic Geohazard Sources and Integrated Probabilistic Modeling

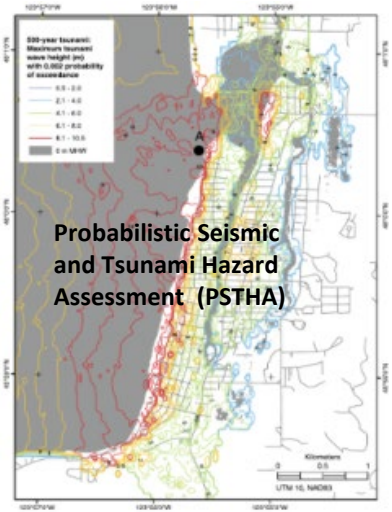


Goal 1: Identifying Tectonic Hazards & Recurrence Rates

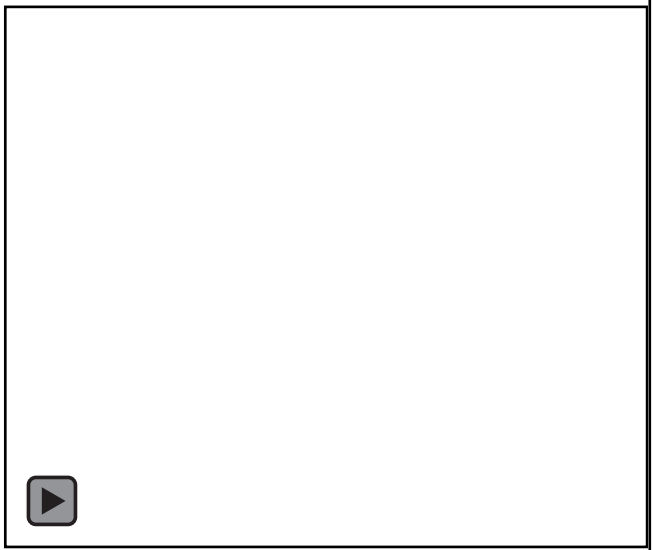
- Identifying onshore and offshore faults
- New landslide mapping and dating
- Landscape modeling and geomorphic assessments
- Updated estimates of vertical land movement
- New geologic observations & dating
- Recurrence interval estimations

Goal 2: Scenario Simulations

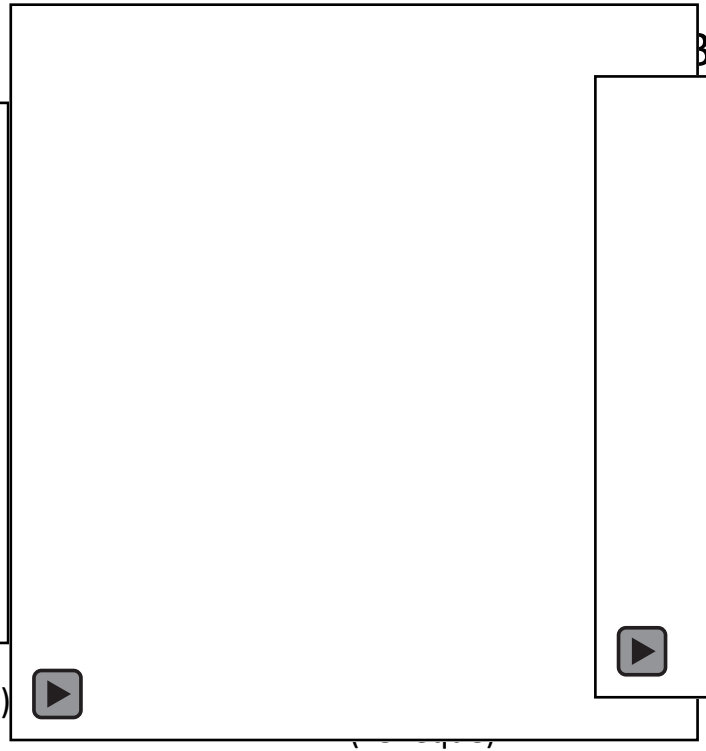
- Coupled earthquake-landslide-tsunami simulations
- Multi-Hazard Impacts of Shaking and Inundation on Coastal Infrastructure
- Tsunami Debris Forecasting and Vulnerability Assessment



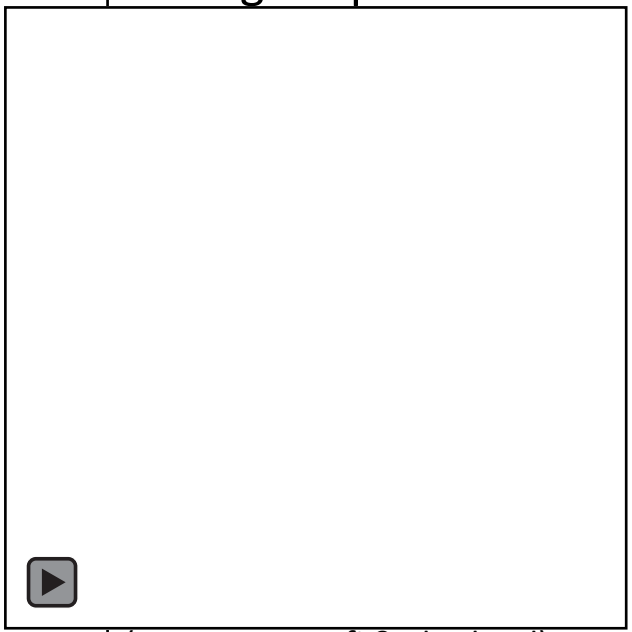
Integrated State-of-the-Art Simulations



(Wirth, Frankel & Marafi)



uilding Response



(Berman, Marafi & Eberhard)

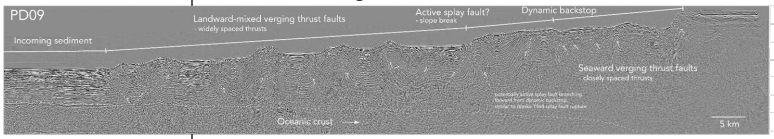
Mapping and characterizing active faults using seismic images (Team 1)

Project Goals:

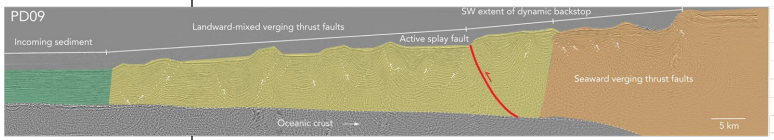
- Use geophysical data to map and characterize active faults that might slip in future Cascadia Subduction Zone megathrust earthquakes (mainly in the offshore region of Cascadia)
- Use mapped faults as inputs for earthquake and tsunami simulations

Highlights:

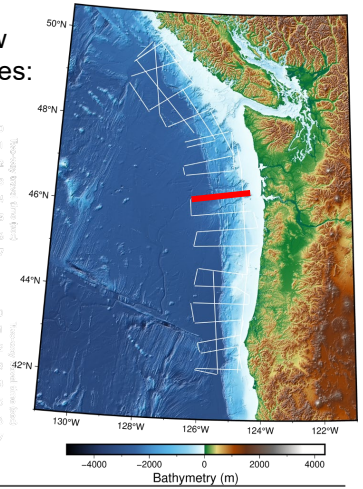
Raw offshore subsurface image:



Structural interpretation of active faults:



Map of new seismic images:



Barriers:

- There are 100's of different faults in the offshore region and we do not know which faults are more likely to slip in future Cascadia earthquakes and tsunamis.

Methods to overcome barriers:

- Apply structural geology methods to determine which faults are most active
- Narrow down the faults we include in simulations to three main types: buried rupture, splay fault, and trench-breaking

Achievements/ Next Steps:

- We are analyzing both existing seismic images and bathymetric mapping, as well as over 50 new seismic images of the offshore collected during the allied CAscadia Seismic Imaging Experiment 2021 (CASIE21)
- UW graduate student Madeleine Lucas presented structural analysis of active faults identified in the new CASIE21 seismic images at two major conferences: AGU 2021 and SSA 2022

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Community Islanding

Dylan R. Sanderson, Daniel Cox,
Andre R. Barbosa, John Bolte

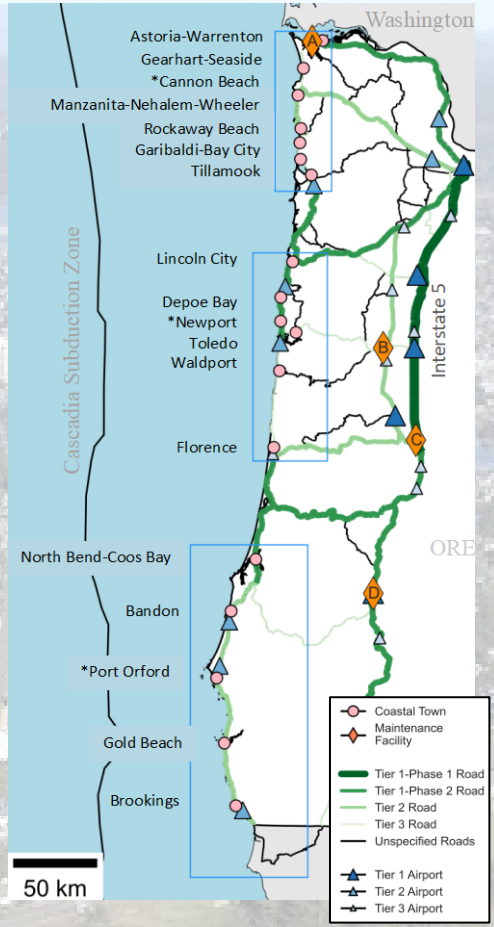
"How connected are people *within* a community and how connected are they to the *region* after a CSZ event?"

Highlights:

- Differences in *local* and *regional* connectivity due to highway damage and repair
- Focus on 18 coastal communities spanning entire Oregon Coast
- Redistribution of repair resources from valley to coast can benefit some coastal communities

Next steps:

- Public outreach through press release and public appearances
- Next stakeholder engagement: Oregon State of the Coast (Newport, 10/5/22)
- Future study incorporating community-identified assets (w/ Jenna Tilt)

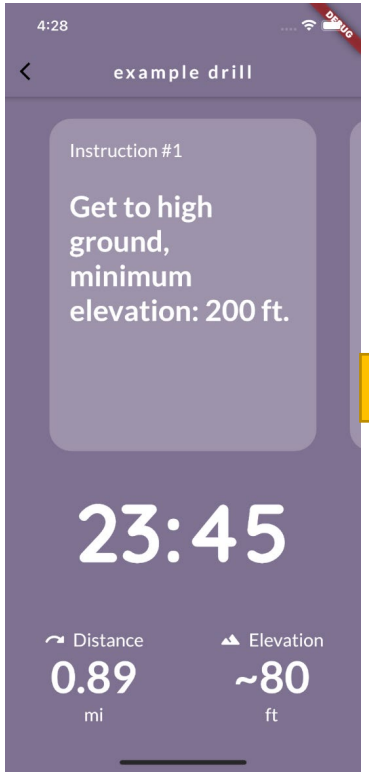


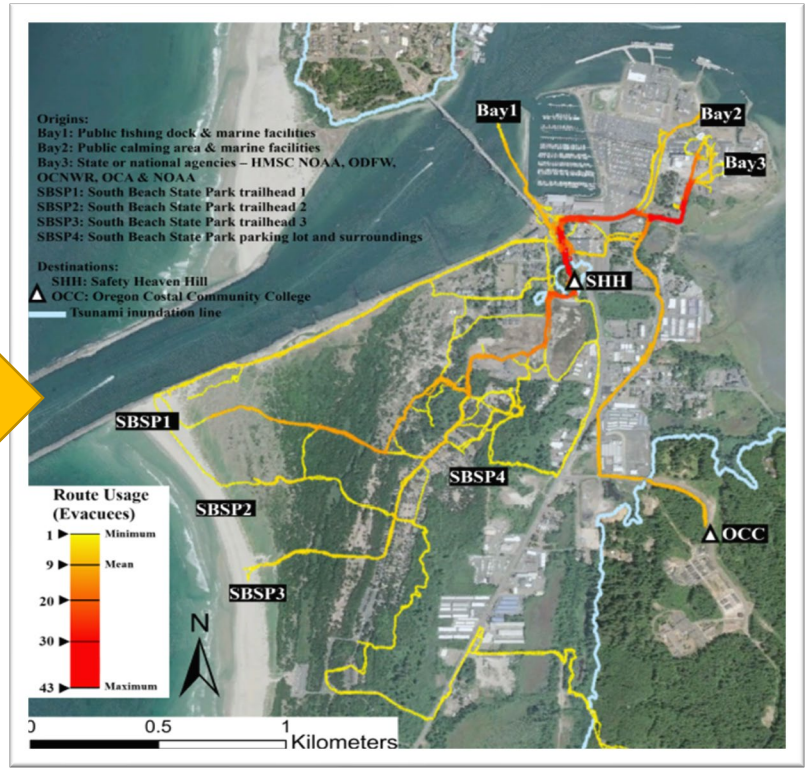
POC: Daniel Cox (dan.cox@oregonstate.edu)

Reference: Sanderson D, DT Cox, A Barbosa, J Bolte "Modeling regional and local resilience of infrastructure networks following disruptions from natural hazard," *Journal of Infrastructure Systems*, doi.org/10.1061/(ASCE)IS.1943-555X.0000694.

Senior Capstone: Evacuation Drill App Development

Haizhong Wang



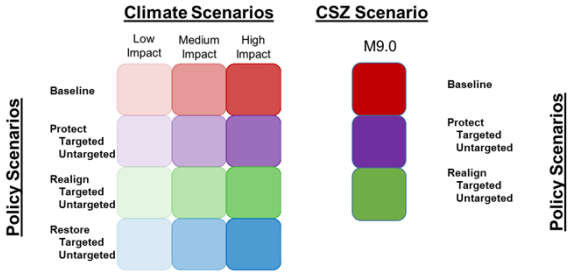


Community Adaptive Capacity

Increase adaptive capacity of coastal communities to prepare, respond, and recover from chronic and acute hazards by:

- Integrating multiple worldviews and knowledge systems into disaster risk assessment
- Identifying approaches that fortify communities who will likely be isolated following disaster events, while strengthening community equity and livability
- Building capacity of local governance systems to create more equitable adaptation strategies and policies
- Developing support tools to evaluate local adaptation strategies and support the appropriate decisions

Family Community walk with LISTOS, Newport, Oregon Photo Credit: Katie Stanton



Envisioning Alternative Coastal Futures

Exposure to Inundation and Coastal Change Hazards

Goal 1: Quantifying risk from extreme coastal water levels

- Communities lack information to plan for increased flood and erosion risk
- Conduct integrated, probabilistic studies in climate and hydrodynamics, to quantify exposure to coastal hazards under present and future conditions

Goal 2: Quantify evolution of coastal morphology and coastal ecological response

- Predict erosion/accretion and subsequent habitat change in muddy embayments, on sandy shorelines, and in mixed sediment environments
- Describe likely impacts on resources threatened with habitat loss
- Evaluate role of changes in sand supply, wave environments, and marine nutrients

Goal 3: Evaluate natural and nature-based features for climate change adaptation

- Determine a NNBF approach for a system and if its is appropriate for selected vulnerable areas.
- Investigate how NNBF can be combined in ways that promote synergies and reduce tradeoffs among ecosystem services valued by communities

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Major accomplishments in first 12+ months

1. **HIRING** – Project Manager (Ali Burgos); ~20 graduate students and postdocs (combined)
2. **FELLOWSHIP**– On boarded 10 CHARTER Fellows and completion of summer 2022 Bootcamp!
3. **PILOT PROJECTS** – Underway - opportunity for community-engaged pilot projects and emergent research activities; Six pilot proposals have been awarded including:
   a. **'Rapid response to a large-scale tsunami advisory: Better understanding if, how, and why Cascadia coastal communities receive warnings and change behaviors'**
   b. **'Collecting critical infrastructure inventories in the Tokeland to Toholah Collaboratory'**
   c. **'Enhance community disaster preparedness and resiliency through physical and virtual drills'**
   d. **'Inclusive community-based STEAM identity-building in coastal hazards research: Pilot activities for Cascadia TEACH with the Ocosta School District, WA**
4. **ENGAGEMENT** – Successful engagements e.g.,
   a. Congressional briefing to house Ocean caucus
   b. Presentation to Yachats, OR
5. **ADVISORY BOARDS** –
   a. External Advisory Committee (EAC) convened, meetings April 19th and June 22nd ,2022.
   b. Community Advisory Council (CAC) first meeting June 15th, 2022.
6. **SEMINARS** – Sustained, well attended seminar series, in partnership with Cascadia Coastal Hazards CoPe Research Coordination Network.
7. **ANNUAL MEETING** – First annual meeting held, with community panel, Diversity, Equity, and Inclusion (DEI) training, tribal engagement training, science talks, poster session, etc.
8. **RESEARCH**– Lots of exciting research is currently underway!

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Thanks!

Peter Ruggiero

Co-Director and Principal Investigator,
Cascadia Coastlines and Peoples Hazards Research Hub
Professor, College of Earth, Ocean, and Atmospheric Sciences

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