

Envisioning Coastal Resilience through Alternative Futures Modeling:

A Graduate Student Perspective

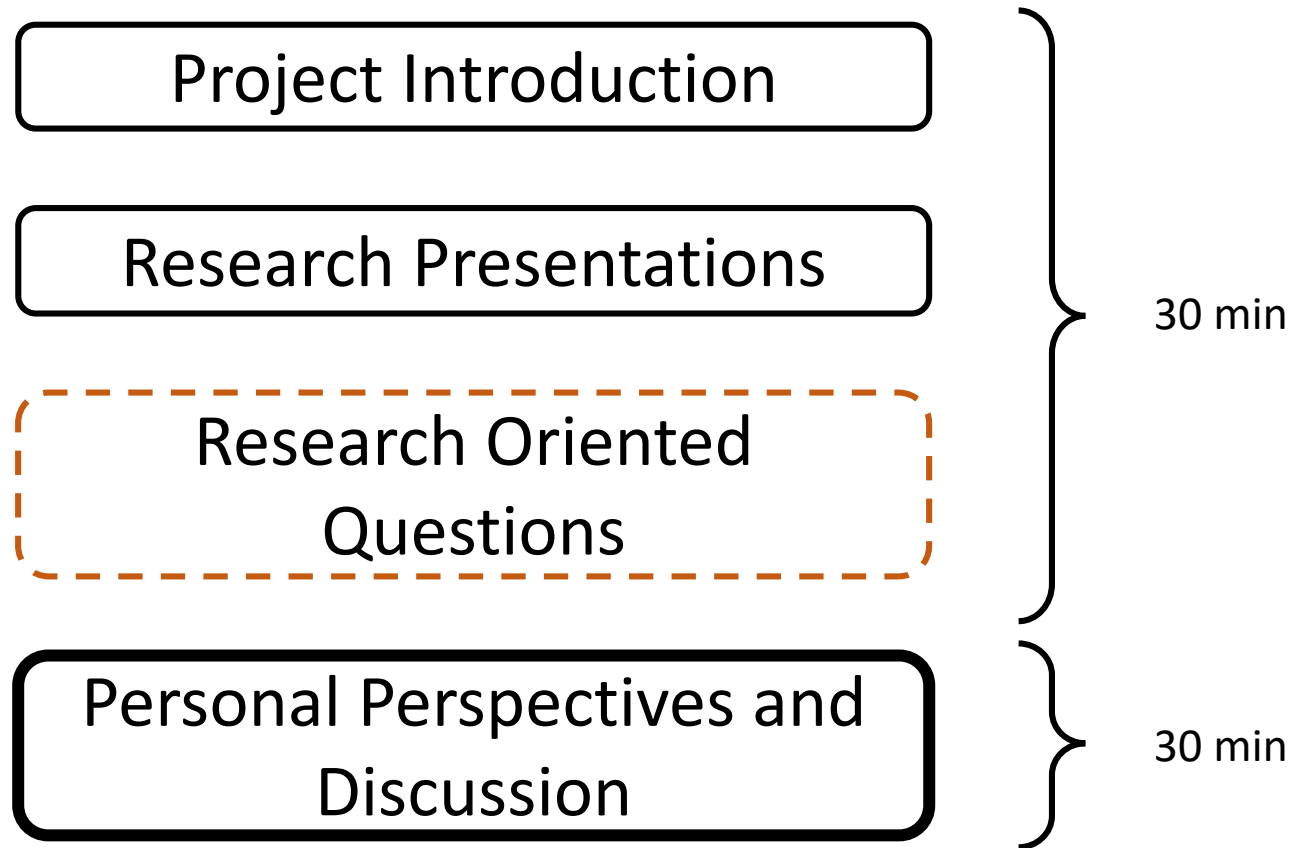
Amila Hadziomerspahic, Meredith Leung, Dylan Sanderson, Katie Stanton



Oregon State
University



Session Format



Session Goals



The value of interdisciplinary research

to the community for applied problems
to the scientists (particularly grad students) for future collaborations



Interdisciplinary problems provide unique opportunities

for researcher's growth
for the development of a holistic perspective when problem solving.



By gaining this perspective we enable our work to be directly applied

for the benefit of community members, students, scientists, managers and all stakeholders.

The Problem

Feedbacks between human actions and natural systems are hard to anticipate, especially when we try to simultaneously:

- preserve community values and ensure equitable solutions
- prepare for two distinct coastal hazards with limited resources

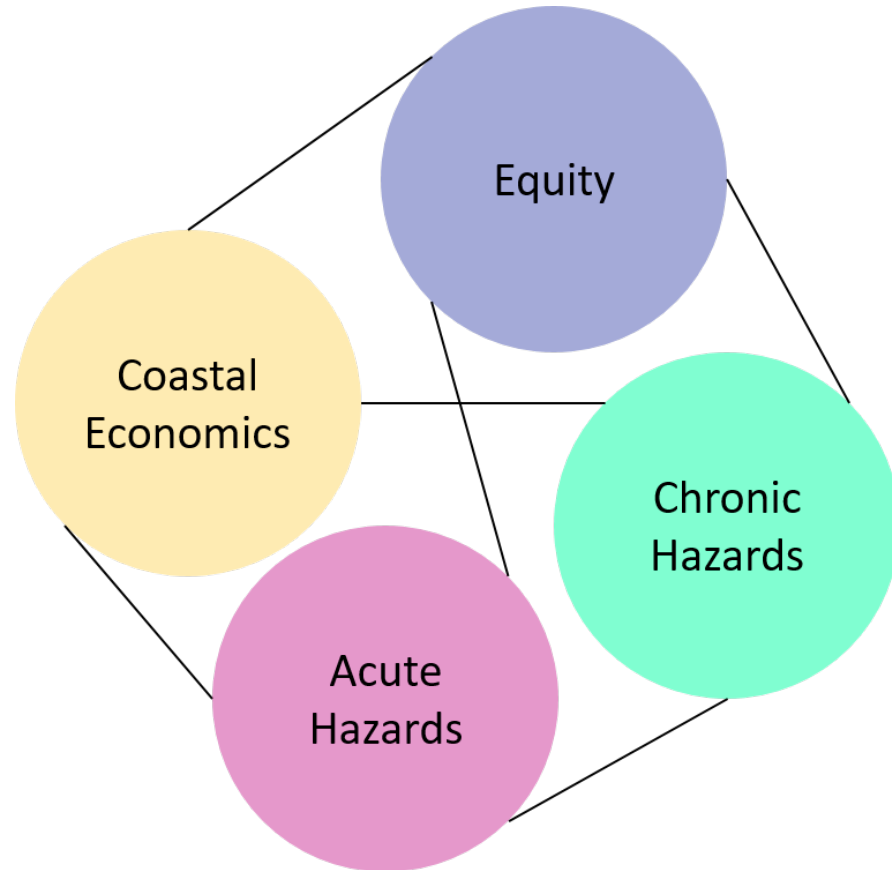


The Problem

A model framework to explore how coupled natural and human systems dynamically respond to different policy and climate change scenarios



The Solution



Policy Scenarios

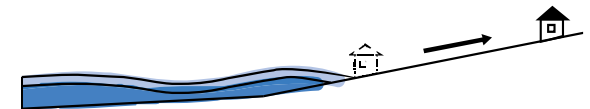
Status Quo



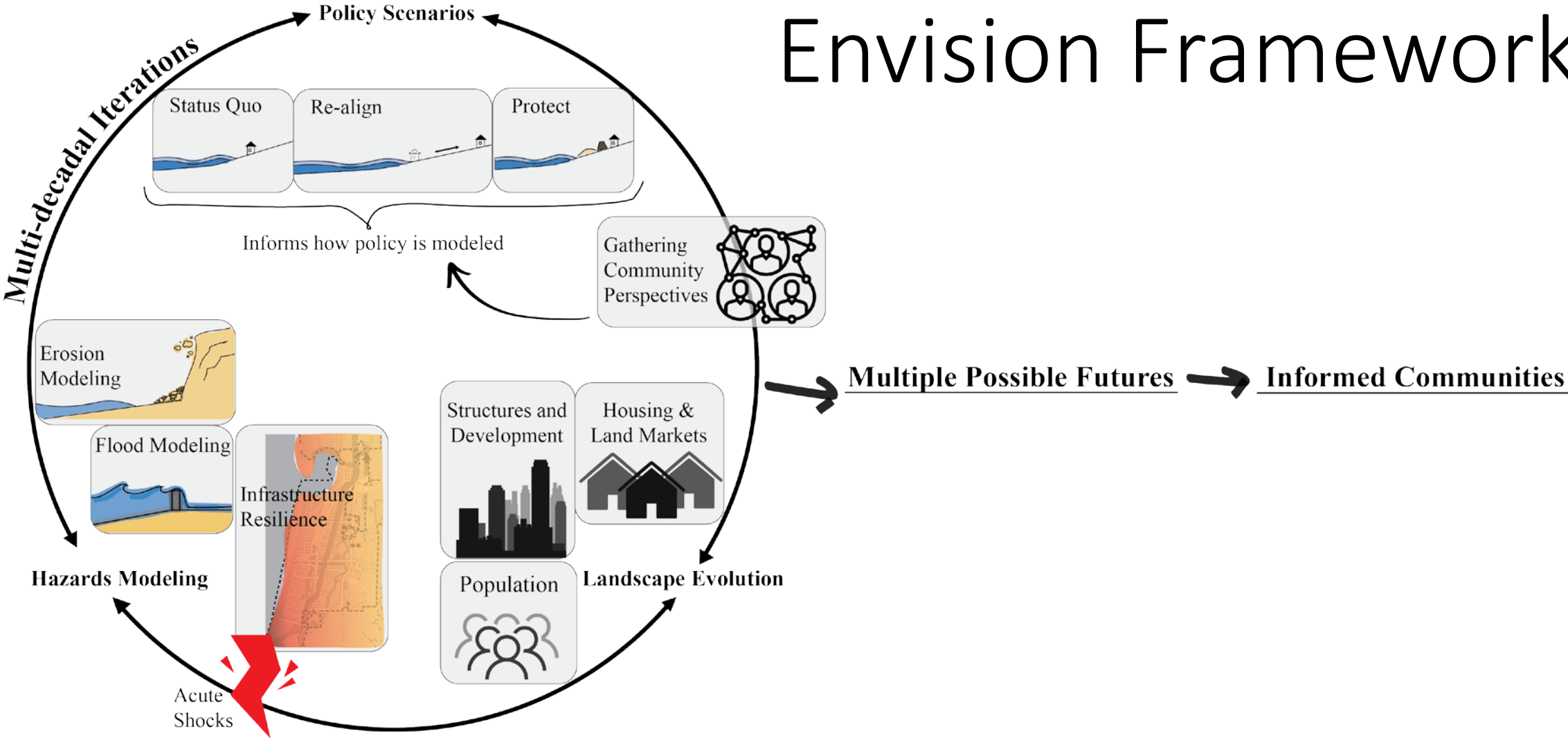
Protect



Realign



Envision Framework



Chronic Hazards

Flooding and Erosion

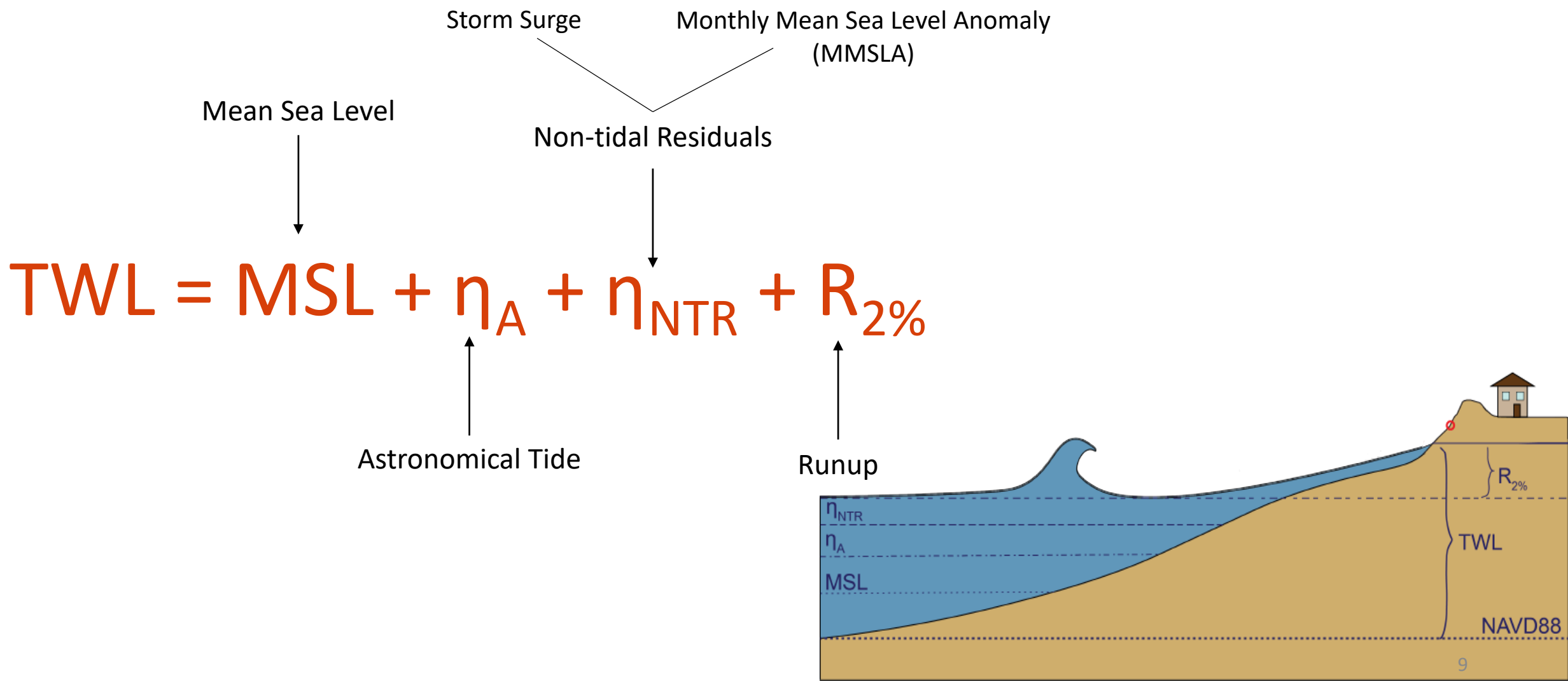
Meredith Leung



Oregon State
University

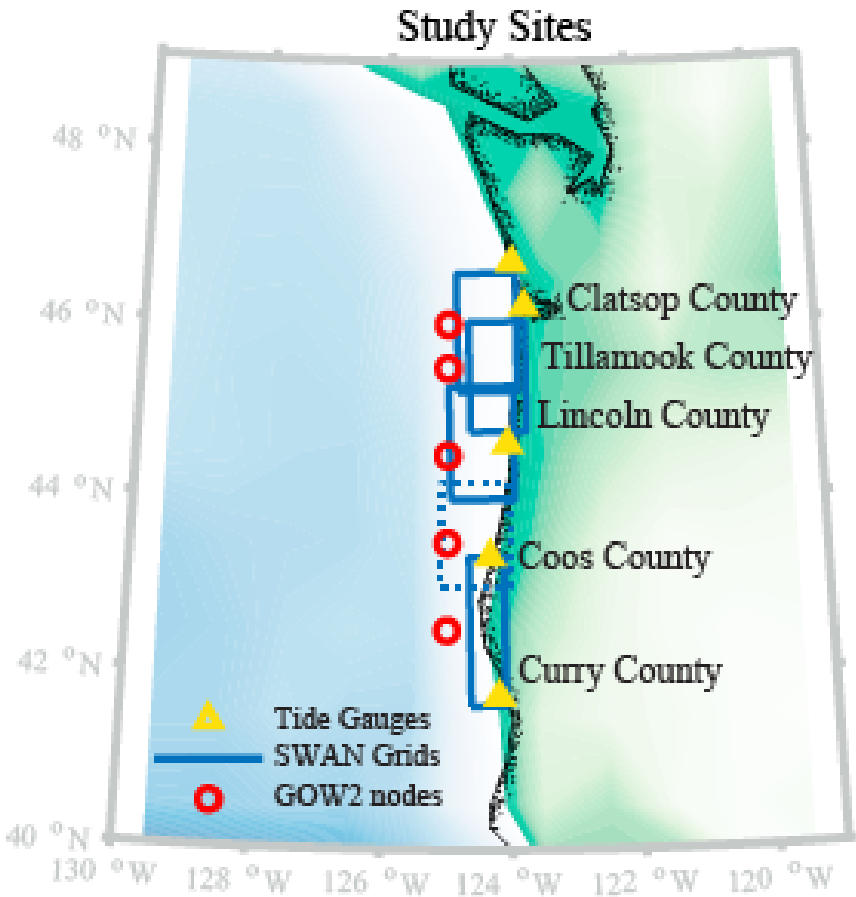
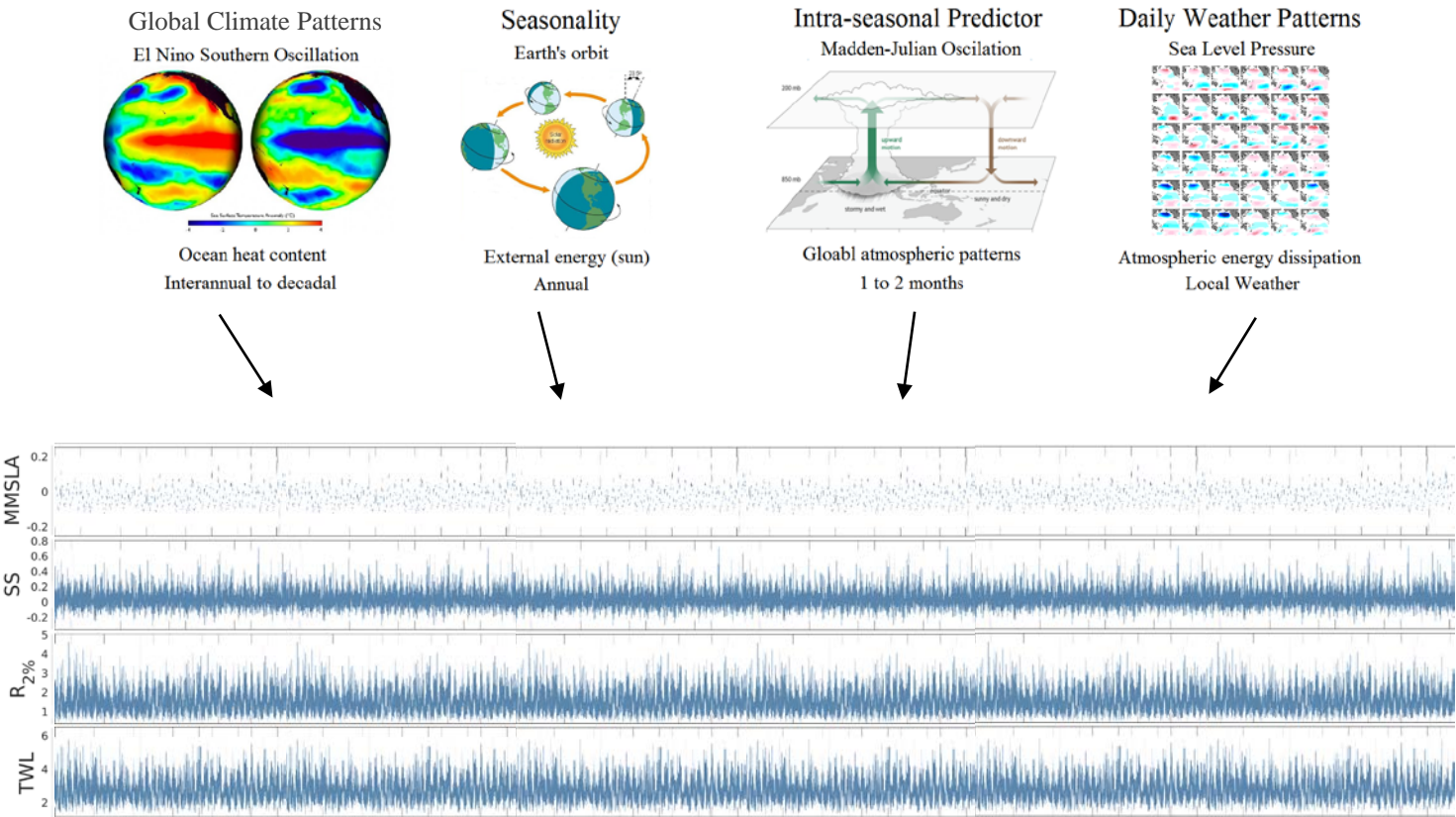


Chronic Hazards



Chronic Hazards

TESLA – statistical framework to forecast TWLs



Anderson, D., Rueda, A., Cagigal, L., J. A. A. Antolinez, F.J. Mendez, and Ruggiero, P. (2019), Time-varying Emulator for Short and Long-Term Analysis of Coastal Flooding, *J. Geophys. Res. Oceans*, in review.

Chronic Hazards

TESLA in Envision:

Trigger: Erosion / Flood Frequency

Policy Response:

Protect

Maintain current backshore protection structures (BPS) and allow more BPS to be built on Oregon Goal 18 eligible lots.

Realign

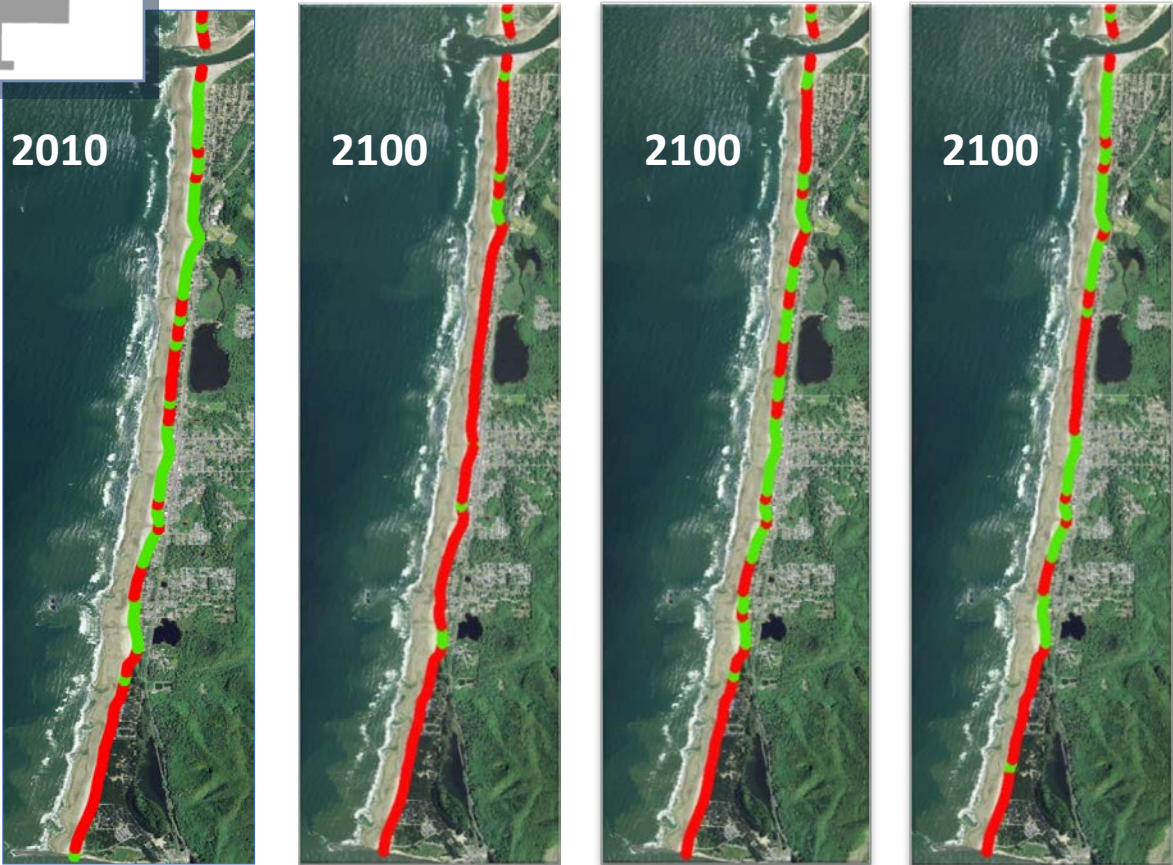
Prohibit repetitive repairs of buildings severely impacted by erosion or flooding and remove buildings from the shoreline after they reach a predetermined repair limit using buyouts.



Beach Accessibility

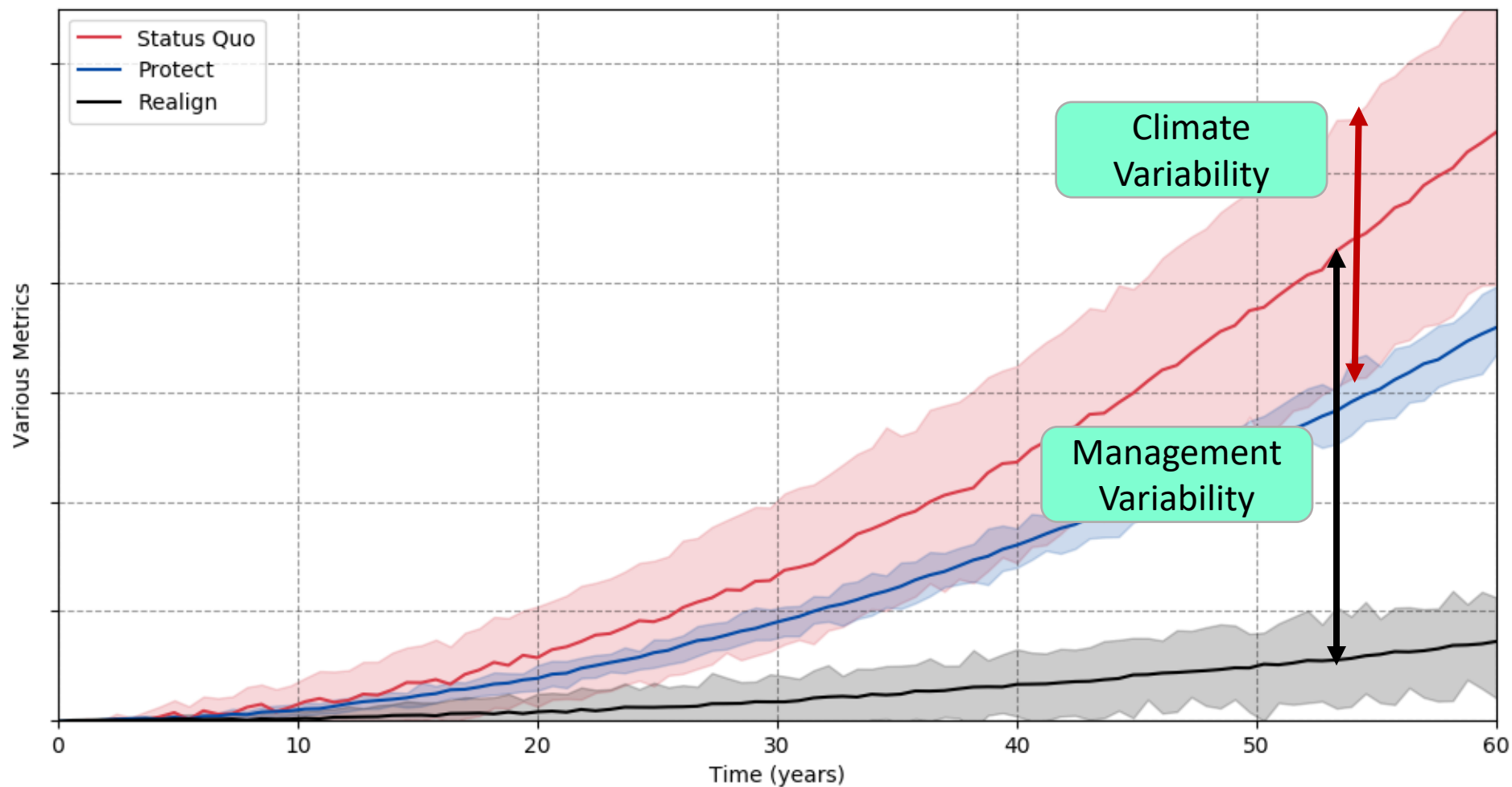
Medium Climate Impact Scenario

- Unlimited Beach Access
- Limited Beach Access



Present Day Status Quo Protect Realign

Mills, A. K., Bolte, J., Ruggiero, P., Serafin, K. A., Lipiec, E., Corcoran, P., Stevenson, J., Zanolco, C., Lach, D. 2018. Exploring the impacts of climate and policy changes on coastal community resilience: Simulating alternative future scenarios. Environmental Modelling & Software.



Acute Hazards

Earthquake and Tsunami

Dylan Sanderson

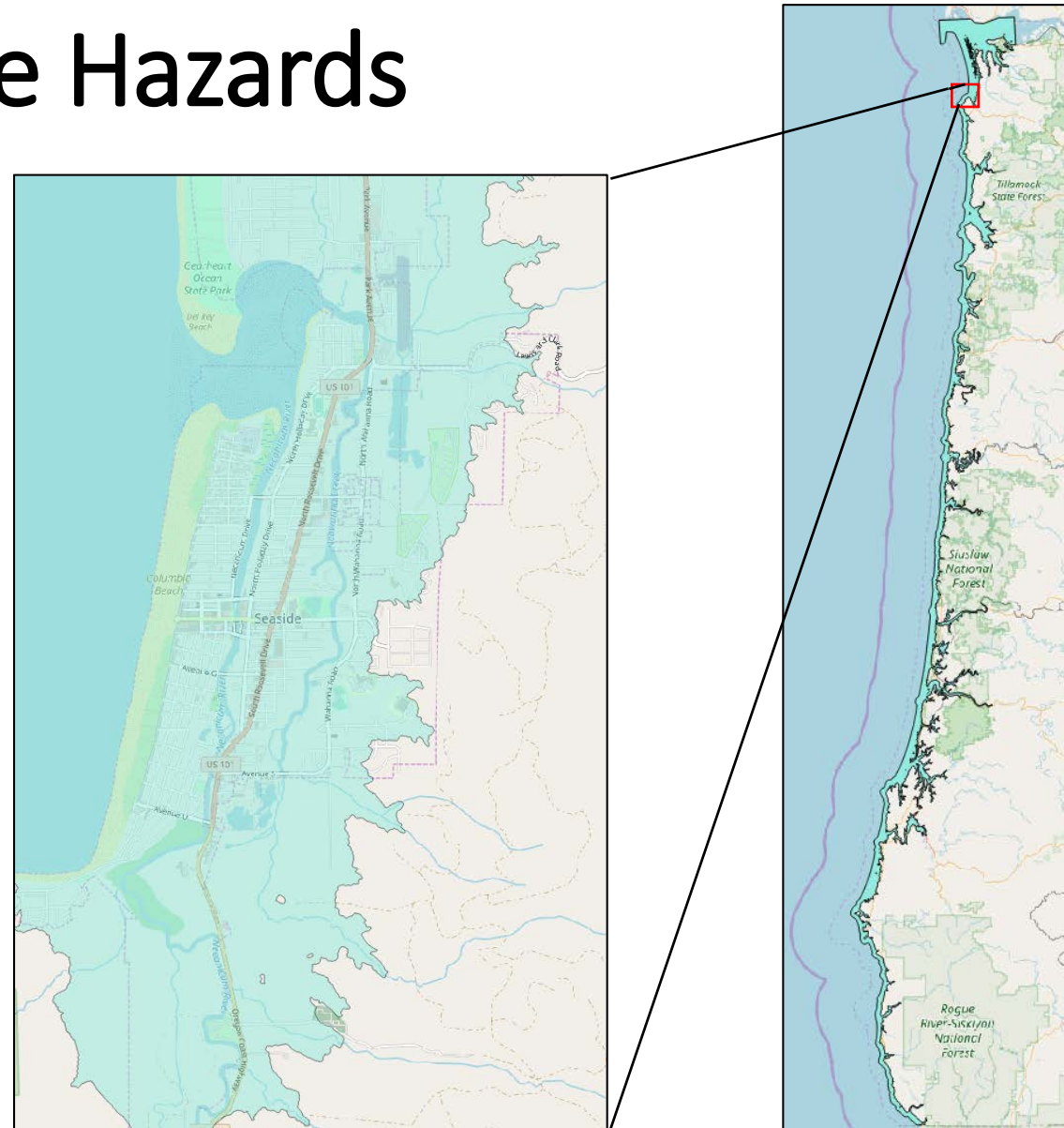


Oregon State
University



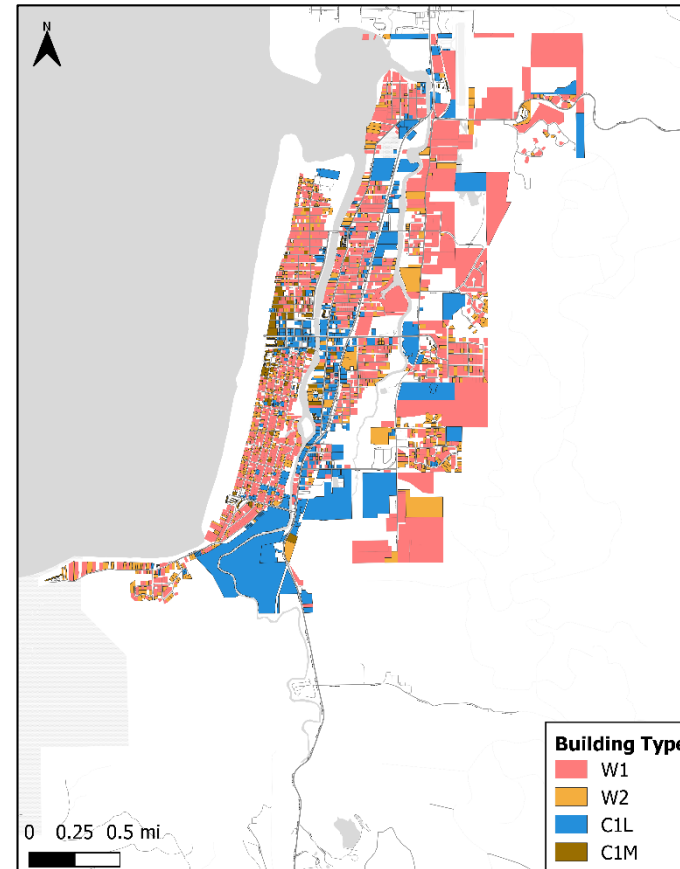
Acute Hazards

- Cascadia Subduction Zone
 - Earthquake and Tsunami
- Built environment
 - Buildings
 - Networked Infrastructure
 - Electric Power
 - Transportation
 - Water
- Impact of Hazards on Built Environment
 - Economic Losses
 - Connectivity
- Extend to entire coast

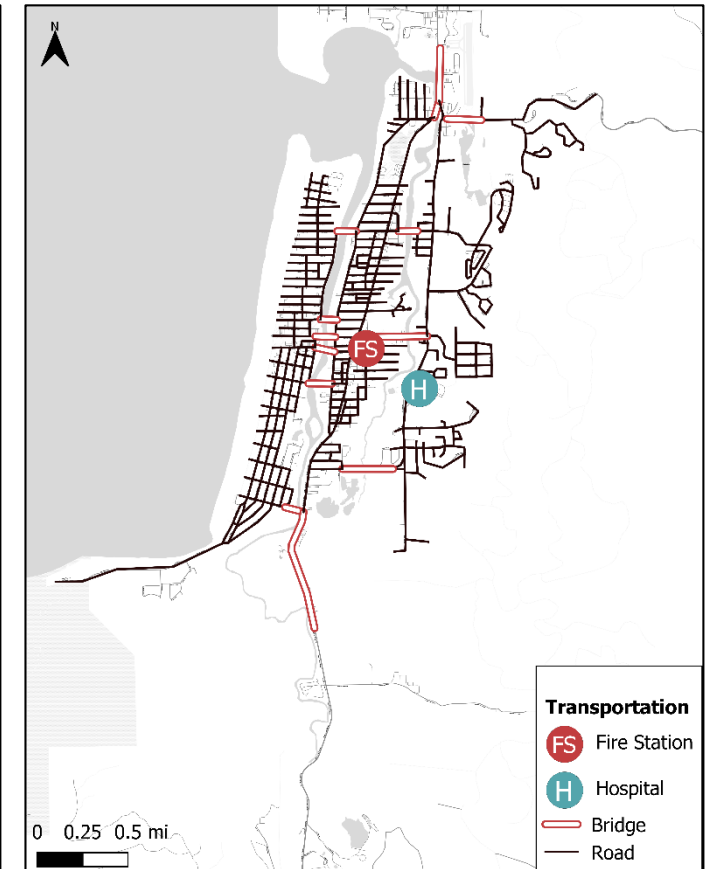


Acute Hazards

- Cascadia Subduction Zone
 - Earthquake and Tsunami
- Built environment
 - Buildings
 - Networked Infrastructure
 - Electric Power
 - Transportation
 - Water
- Impact of Hazards on Built Environment
 - Economic Losses
 - Connectivity
- Extend to entire coast



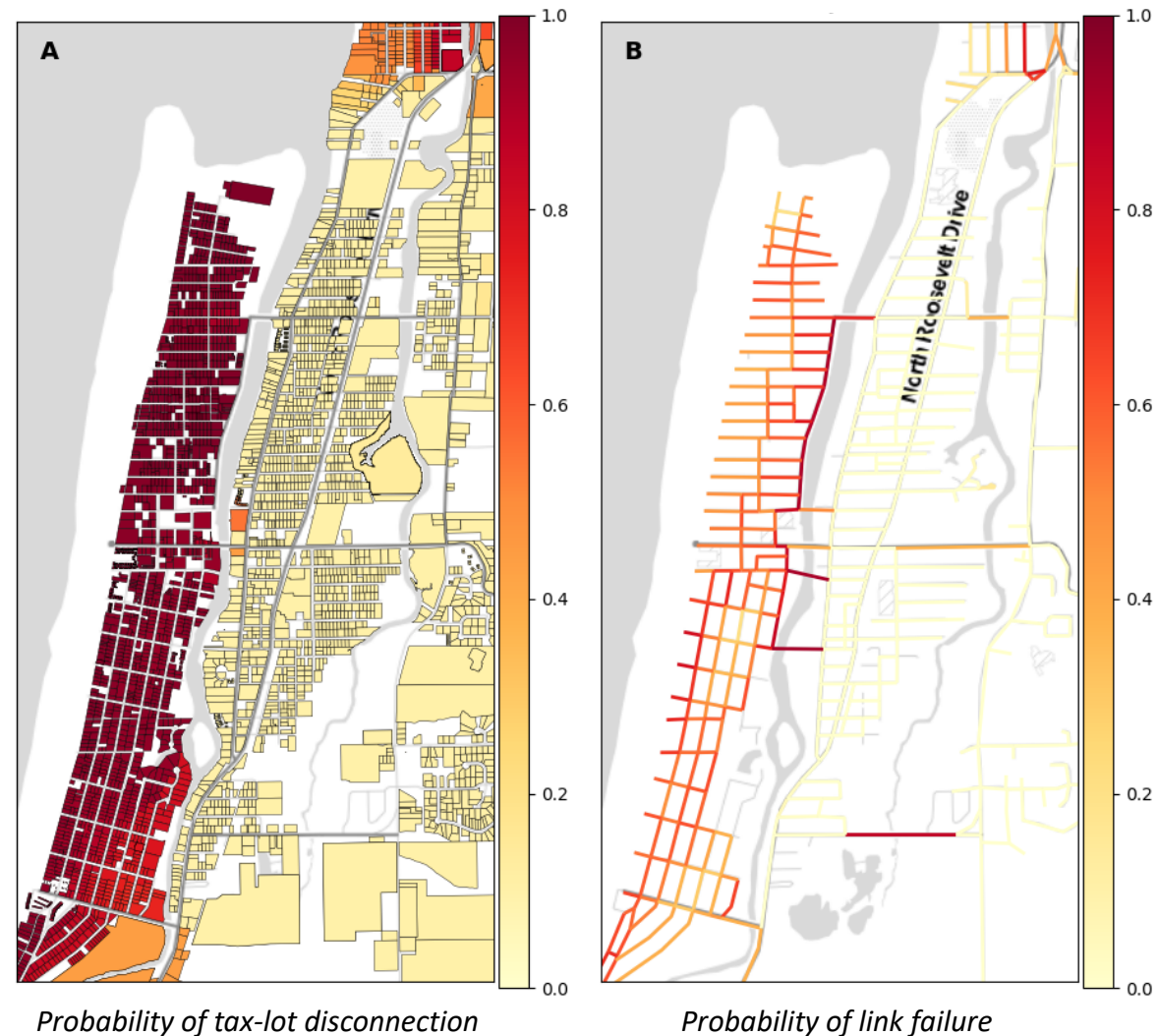
Buildings at Seaside, OR



Transportation System at Seaside, OR

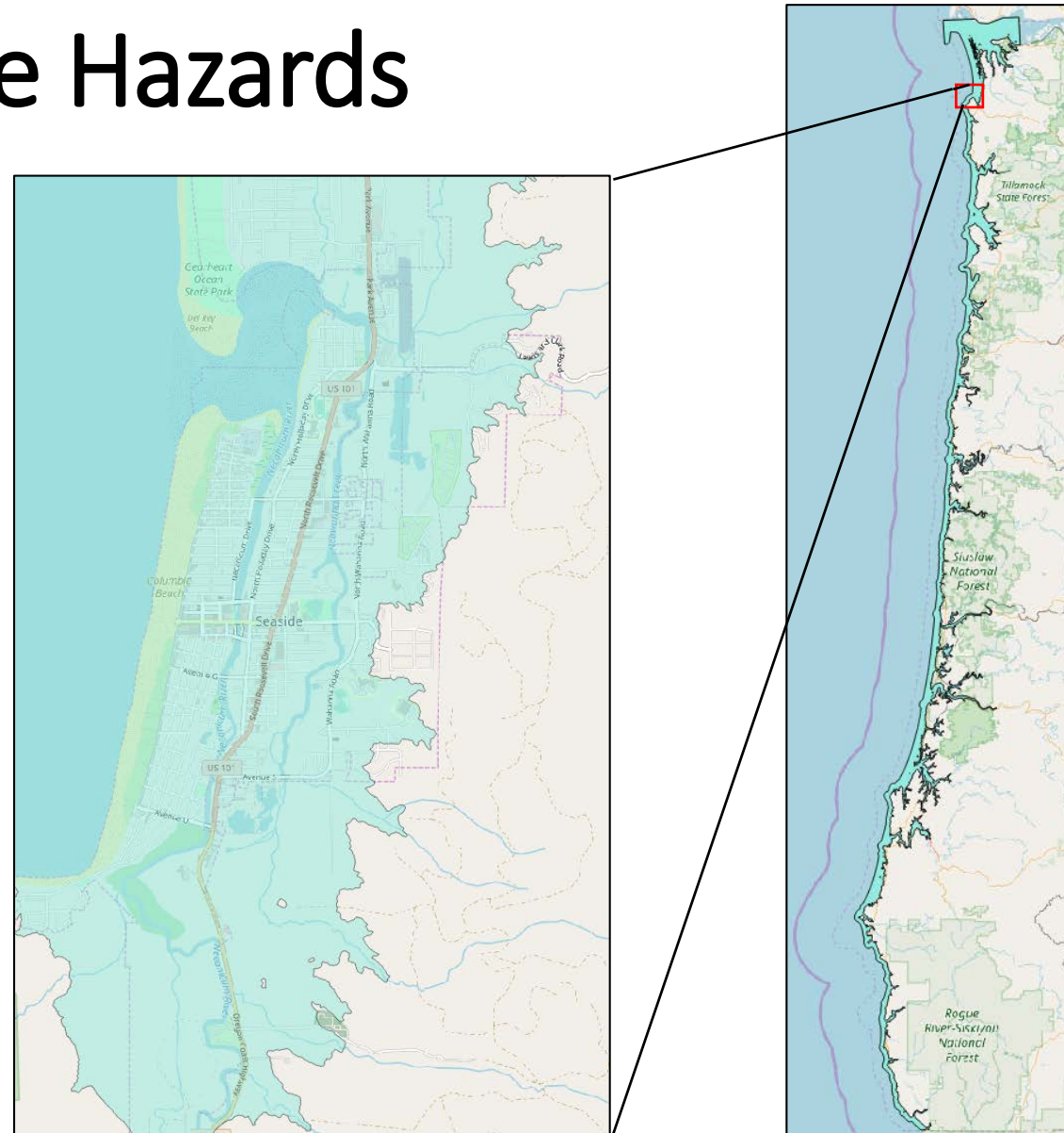
Acute Hazards

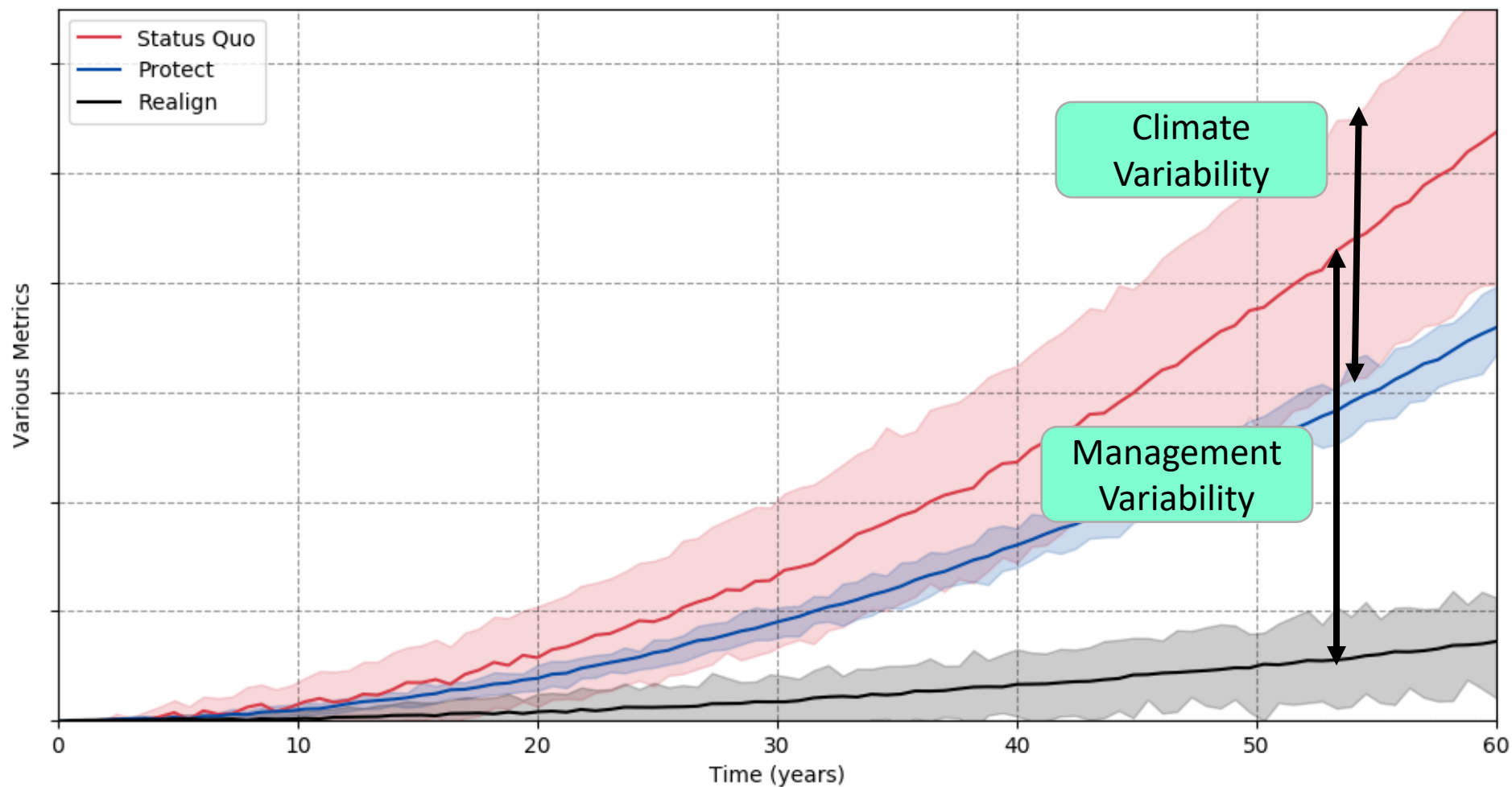
- Cascadia Subduction Zone
 - Earthquake and Tsunami
- Built environment
 - Buildings
 - Networked Infrastructure
 - Electric Power
 - Transportation
 - Water
- Impact of Hazards on Built Environment
 - Economic Losses
 - Connectivity
- Extend to entire coast

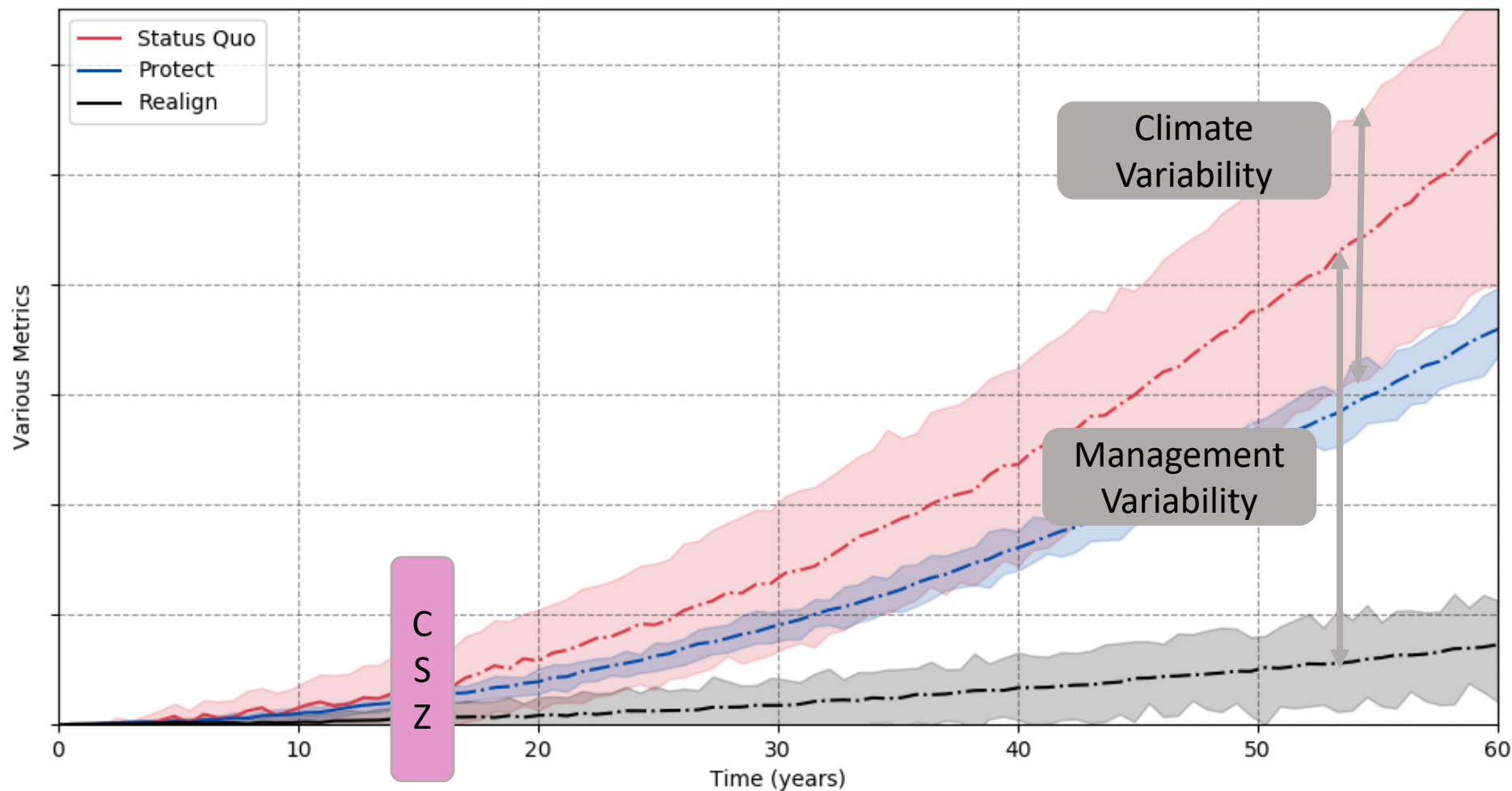


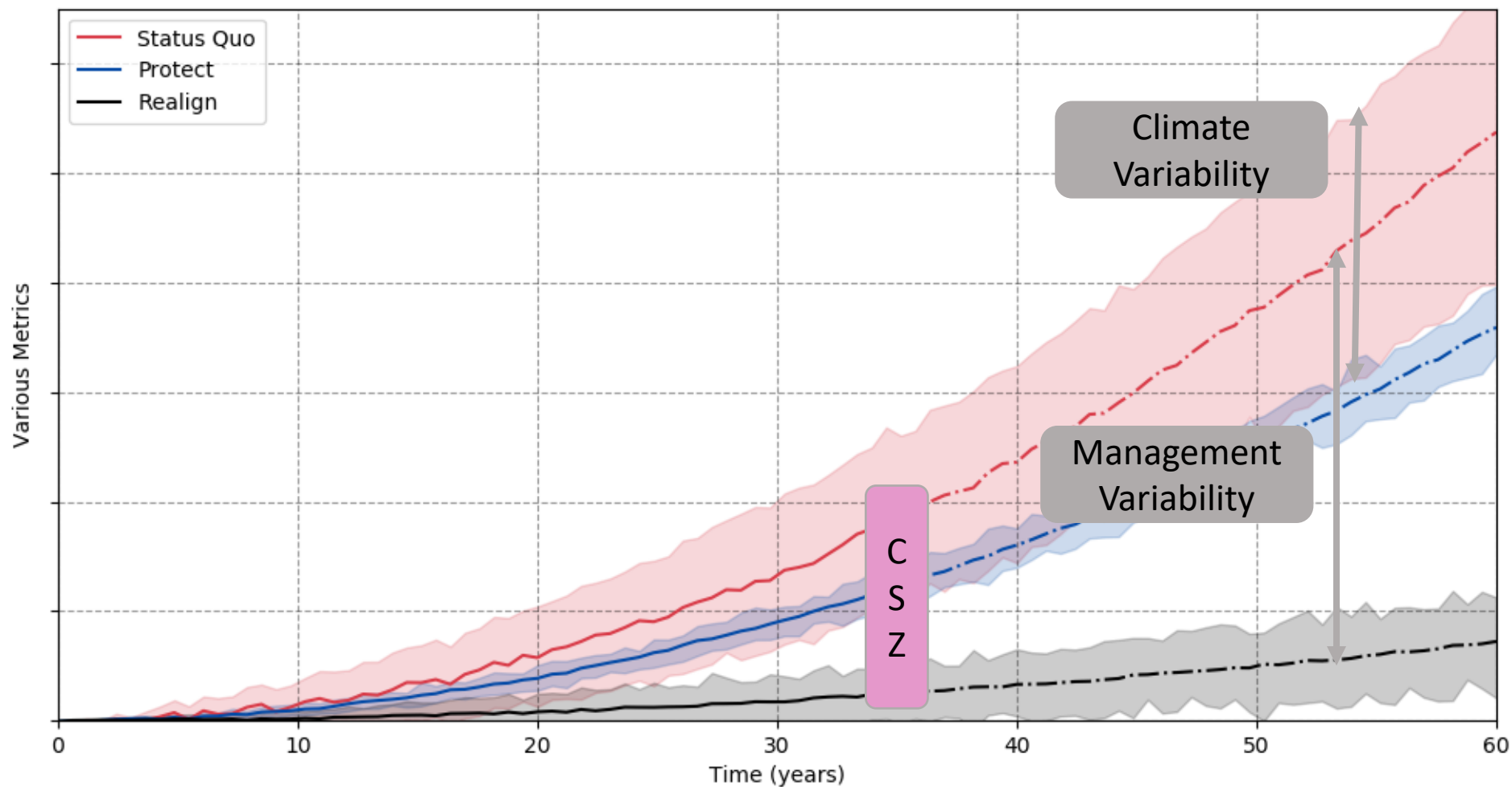
Acute Hazards

- Cascadia Subduction Zone
 - Earthquake and Tsunami
- Built environment
 - Buildings
 - Networked Infrastructure
 - Electric Power
 - Transportation
 - Water
- Impact of Hazards on Built Environment
 - Economic Losses
 - Connectivity
- Extend to entire coast









Coastal Economics

Land Use & Hazard Planning

Amila Hadziomerspahic



Oregon State
University



Coastal Economics

- How people respond to policy, risks and changes in environment
- Needed to fully understand behavioral feedbacks
- Can incorporate economic models of housing market responses to land use and hazard planning policy changes:
 - Shoreline armoring decisions and Goal 18 modifications
 - Tsunami hazard planning and impacts on coastal housing values



Shoreline Armoring

- Goal 18 and coastal armoring eligibility
- Identified price premium for Goal 18 eligible homes
 - Price ↑ by 22% for eroding, low elevation parcels
- Estimated impacts on ineligible neighbors
 - Price ↓ by 7-9%



Tsunami Risk and Information Shocks

- **Question:** Can new information about the risk of a Cascadia earthquake and tsunami change people's risk perceptions?
- **Relevance:** Oregon's resilience to a magnitude 9.0 Cascadia earthquake is low
- **Goal:** To identify the impacts of tsunami inundation zone designation and risk information shocks on coastal housing values



Tsunami Risk

Research design:

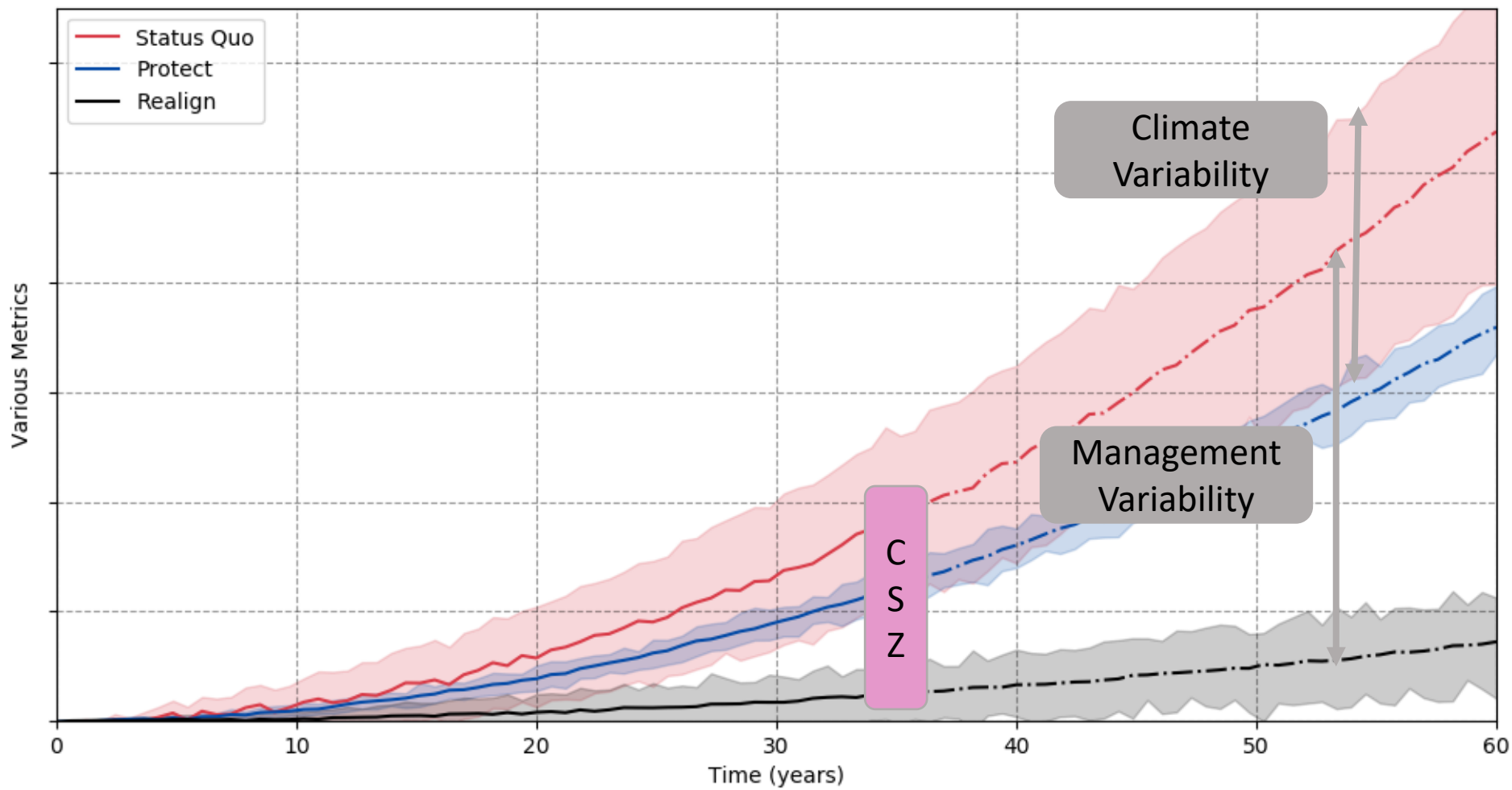
- Use information from Oregon housing market to determine effect of two events on property prices
- Events: 2011 Tohoku earthquake and tsunami, 2015 New Yorker article
- Treatment: Property inside tsunami inundation zone

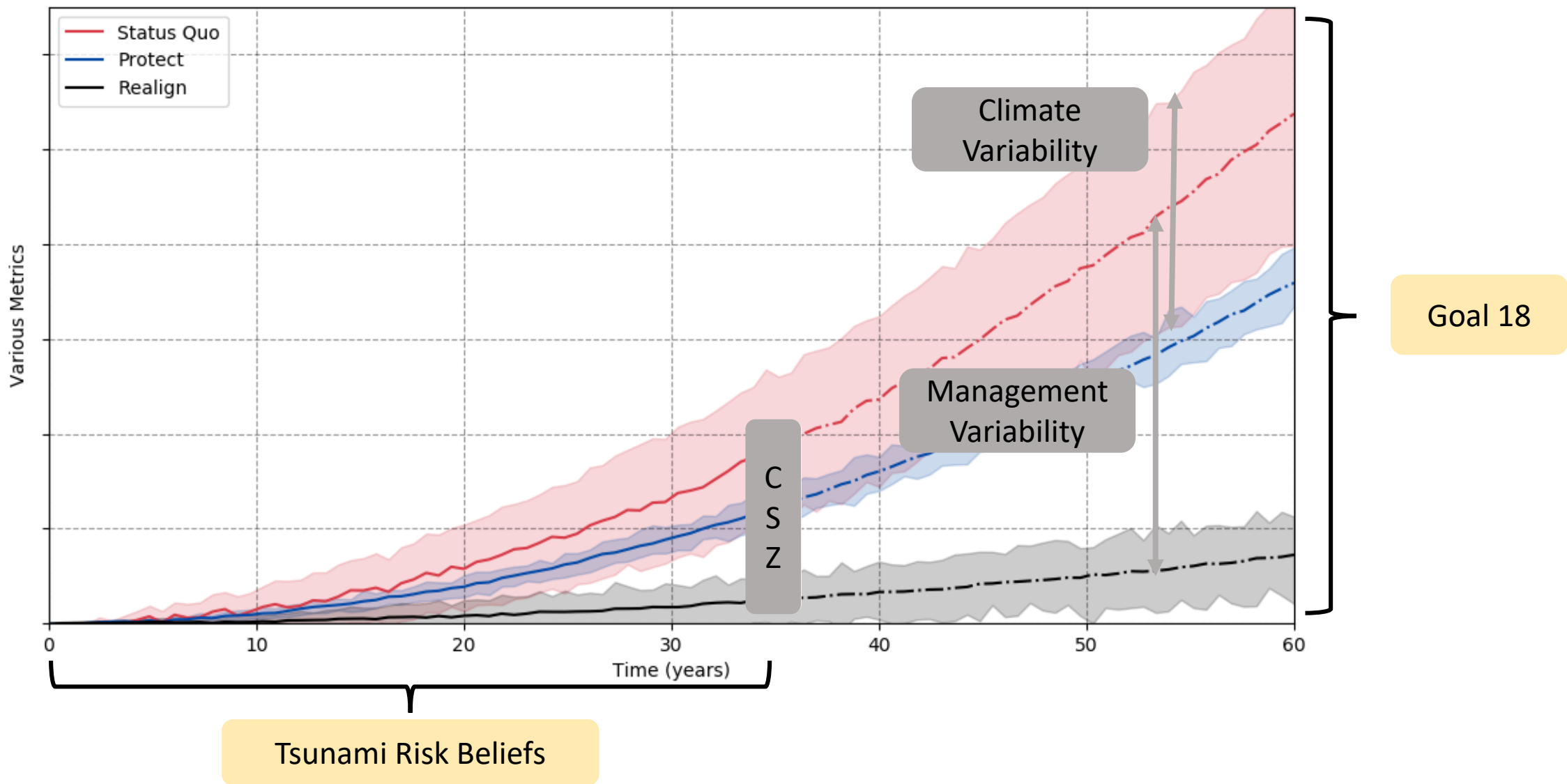
© NorthCoastCitizen.com

Preliminary result: No effect.

→ *No evidence that coastal residents are taking tsunami risk into account?*







Equity

Distributional Effects of Policy Planning

Katie Stanton



Oregon State
University



What we do

- Investigate societal impacts of coastal hazards and community needs
- By understanding the effects of community/policy actions (retrofit, realign, etc.) we can:
 - More accurately match the needs and resources available to all groups
 - Provide decision makers with more grounded, well-informed set of actions



Which mitigation strategies will be accepted and adopted through community member's perceptions and behaviors?

- Interviews, focus groups, and value attachment mapping with:
 - Latinx coastal community members
 - Non-profit and government employees that serve and/or interact with underrepresented groups



Example - Critical Infrastructures, Retrofit, Realign

- There is a lack of focus regarding sense of place for traditionally disadvantaged communities in building resilience.
- *Sense of place* for disadvantaged communities includes understanding the differences in which “critical infrastructures” are utilized, accessible, and valued.



Preparación para Desastres—Una Conversación de la Comunidad Latino

Debes ser mayor de 18 años, identificar como Latino/a/x, y vivir en Newport.

Únase a nosotros para una conversación comunidad para compartir en qué desea que se centren los esfuerzos de preparación para desastres.

- ¿En qué lugares de tu comunidad te gustaría estar protegido?
- ¿Qué quieres que haga tu comunidad en preparación para emergencias?

Septiembre 6, 13, 20 y 27, 2019 - 5:30 a 7 p.m.

Niños bienvenidos, tarjetas de regalo por participación y quédate después para cena y una clase de cocina gratis!!



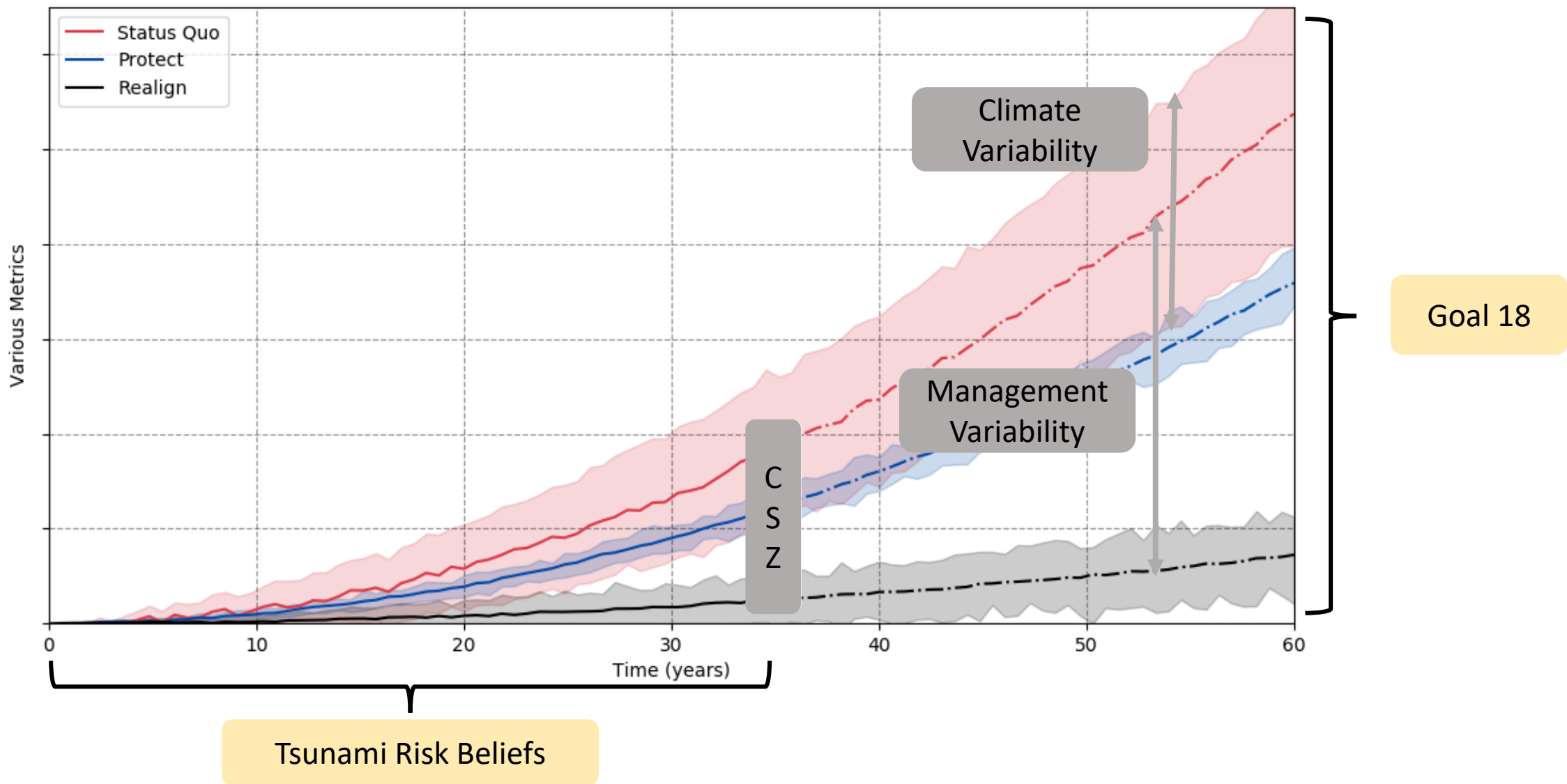
St. Stephens Iglesia
414 SW 9th St, Newport, Oregon 97365

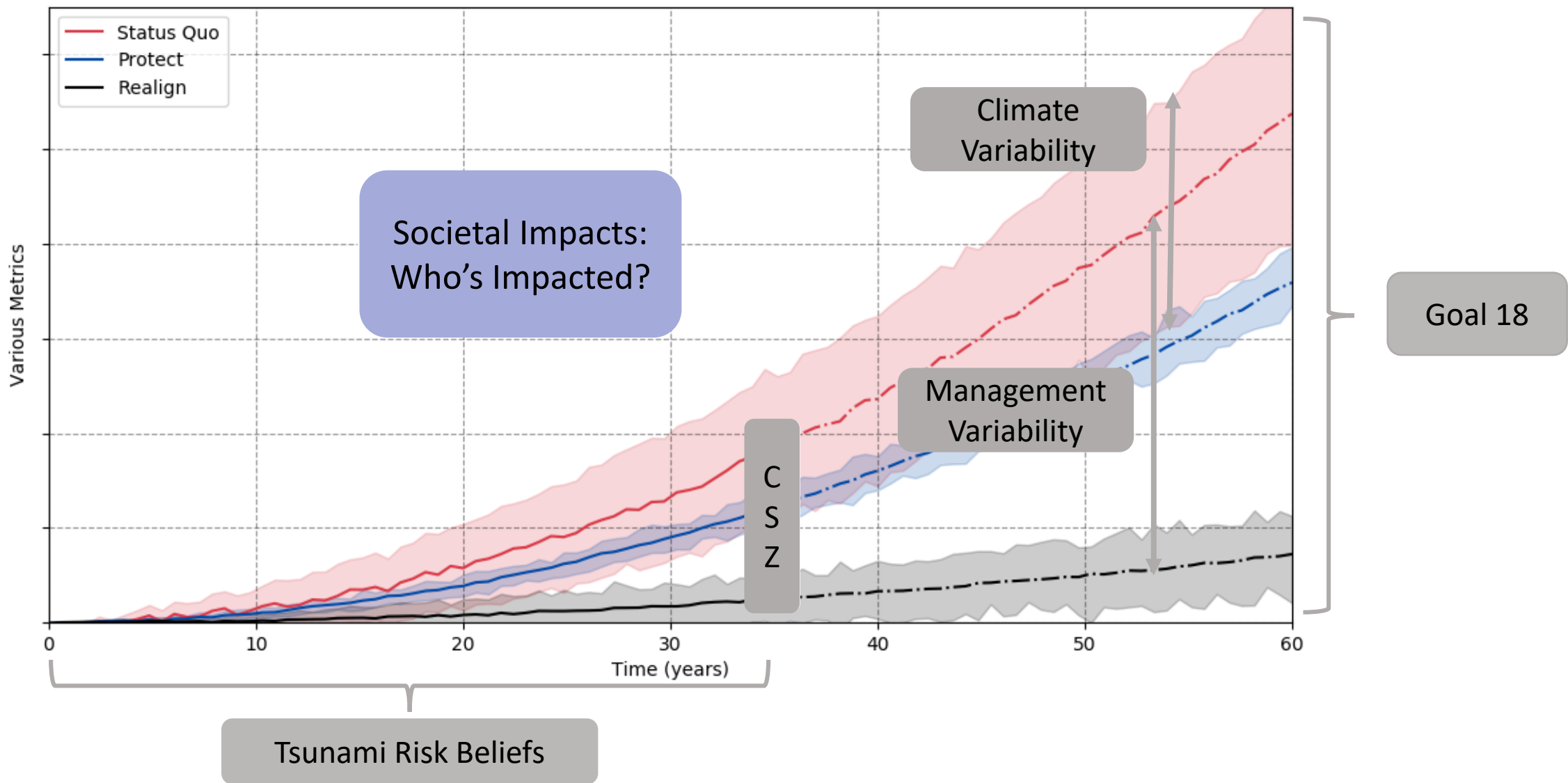
Si tienes preguntas contacta:

| | |
|----------|---|
| Katie: | stantoka@oregonstate.edu |
| Beatriz: | Beatriz.Botello@oregonstate.edu or 541-283-5120 |
| Jenna: | tiltj@oregonstate.edu or 541-737-1232 |
| Debra: | djones@halc.info |

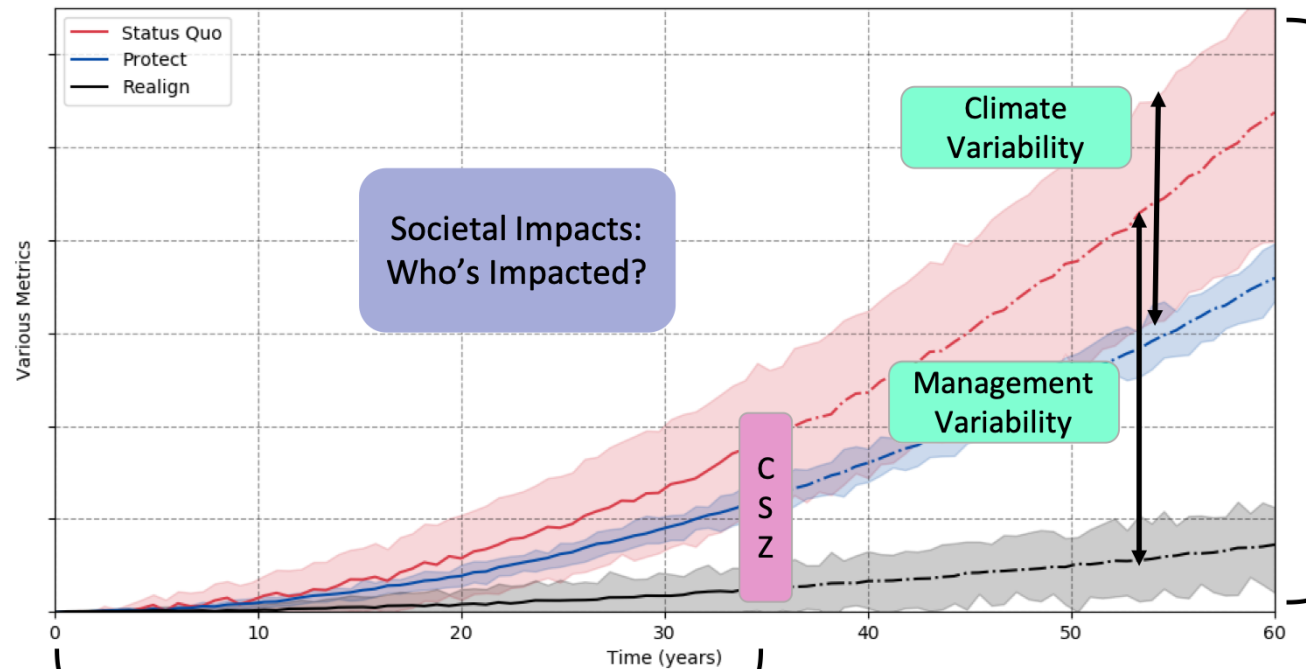
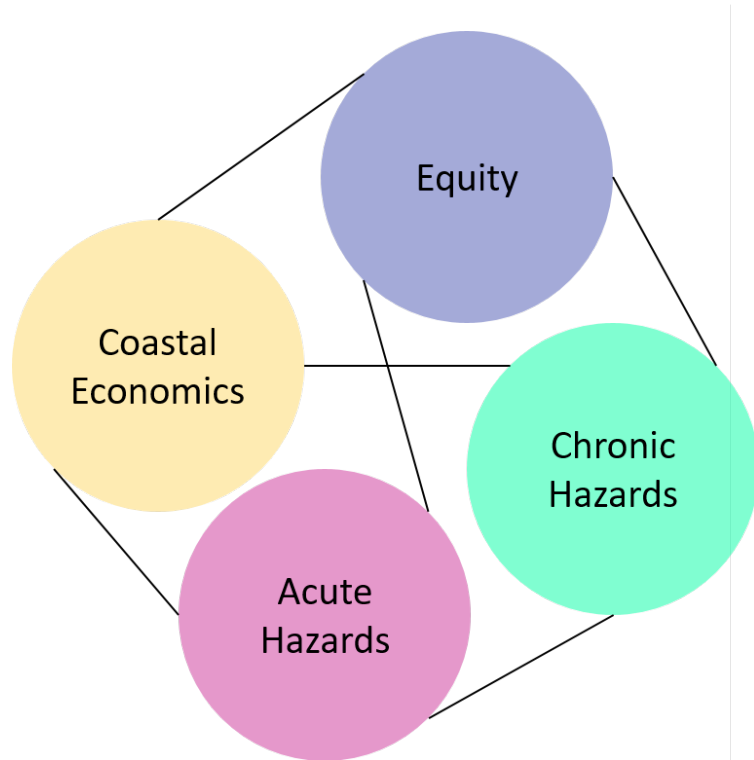


Imaginando una Costa de Oregón Resiliente: Co-desarrollo de futuros alternativos para la planificación de la adaptación y la toma de decisiones. El propósito de este estudio de investigación es identificar cómo las acciones o estrategias potenciales de la comunidad para disminuir el impacto de los peligros costeros (por ejemplo, inundaciones, terremotos, tsunamis) pueden afectarlo.





Brief Research Questions



Tsunami Risk Beliefs



Oregon State
University



Graduate Student Perspectives: A Reflection on Interdisciplinary Research



Oregon State
University



Graduate Student Perspectives: A Reflection on Interdisciplinary Research

Technical challenges in interdisciplinary work



Oregon State
University



Technical challenges in interdisciplinary work

| Policy Options | | | | | |
|----------------|--------------------|-------------------------|--------------------|-------------------------|-----|
| Baseline | Realign – Targeted | Realign – Laissez Faire | Protect – Targeted | Protect – Laissez Faire | ... |
| ✓ | ✓ | ✓ | ✓ | ✓ | |

Technical challenges in interdisciplinary work

| Policy Options | | | | | | | |
|-----------------|----------|----------|--------------------|-------------------------|--------------------|-------------------------|-----|
| Chronic Hazards | | Baseline | Realign – Targeted | Realign – Laissez Faire | Protect – Targeted | Protect – Laissez Faire | ... |
| | Baseline | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Small | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Medium | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Large | ✓ | ✓ | ✓ | ✓ | ✓ | |

Technical challenges in interdisciplinary work

Acute Hazards ↗

| | | Policy Options | | | | | |
|-----------------|----------|----------------|--------------------|-------------------------|--------------------|-------------------------|-----|
| Chronic Hazards | | Baseline | Realign – Targeted | Realign – Laissez Faire | Protect – Targeted | Protect – Laissez Faire | ... |
| | Baseline | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Small | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Medium | ✓ | ✓ | ✓ | ✓ | ✓ | |
| | Large | ✓ | ✓ | ✓ | ✓ | ✓ | |

Graduate Student Perspectives: A Reflection on Interdisciplinary Research

Technical challenges in interdisciplinary work



Oregon State
University



Graduate Student Perspectives: A Reflection on Interdisciplinary Research

Communication across disciplines



Oregon State
University



Graduate Student Perspectives: A Reflection on Interdisciplinary Research

Early career interdisciplinary work



Oregon State
University



Graduate Student Perspectives: A Reflection on Interdisciplinary Research

Final thoughts



Oregon State
University



Take-Aways



The value of interdisciplinary research

to the community for applied problems
to the scientists (particularly grad students) for future collaborations



Interdisciplinary problems provide unique opportunities for

researcher's growth
the development of a holistic perspective when problem solving.



By gaining this perspective we enable our work to be directly applied for the benefit of

community members, students, scientists, managers and all stakeholders.

Thanks!

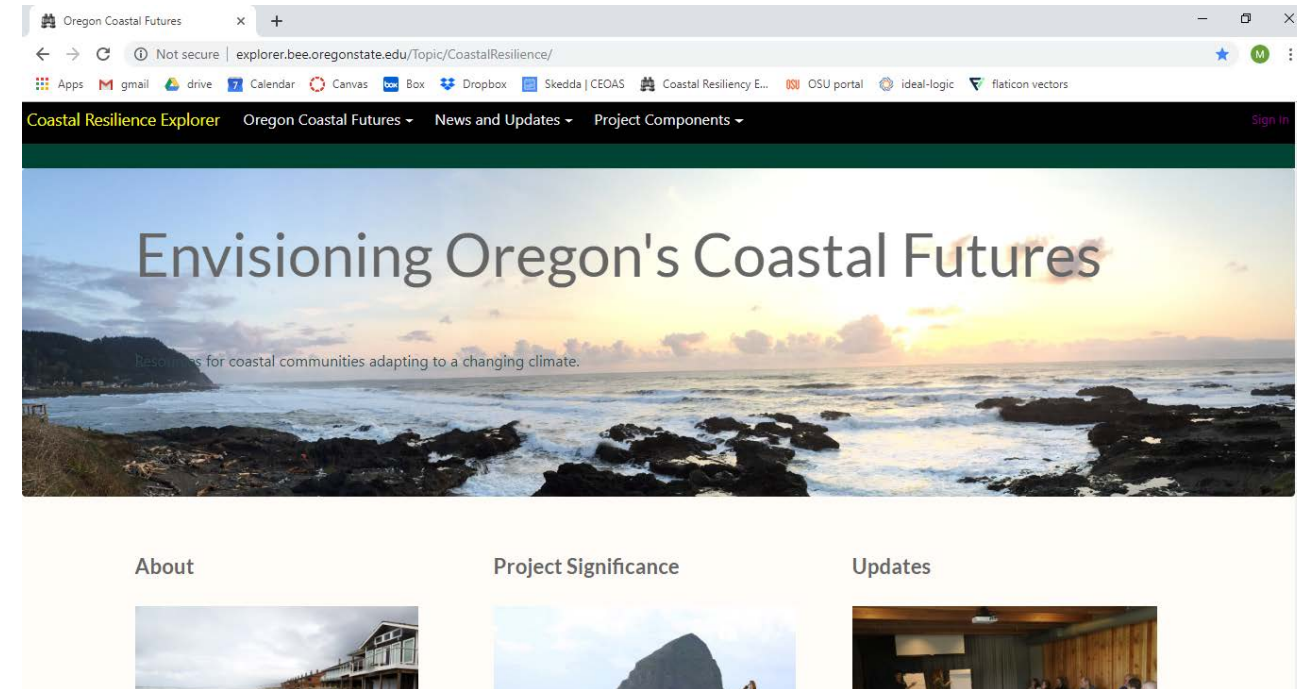
Contact us:

Amila Hadziomerspahic : hadzioma@oregonstate.edu

Meredith Leung: leungmer@oregonstate.edu

Dylan Sanderson: sanderdyl@oregonstate.edu

Katie Stanton: stantoka@oregonstate.edu



<http://explorer.bee.oregonstate.edu/Topic/CoastalResilience/>



Oregon State
University

