Session 8: Ecosystem Sciences

Ocean Acidification and Communities

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FOCAL ECOSYSTEM COMPONENTS

Ecological Integrity
Diversity, Seabirds, Marine mammals, Salmon, Forage species, Groundfish, Species interactions

MEDIATING COMPONENTS

Habitat
Marine, Estuarine, Freshwater

DRIVERS AND PRESSURES

Climate & Ocean Drivers
(e.g., climate, ocean upwelling)

Human Activities
(e.g., fishing, farming, mining, recreation, research, education, activism, restoration, management)

Local Social Systems
(e.g., laws, policies, economies, institutions, social networks, hierarchies, cultural values, built environment)

Social Drivers
(e.g., population growth and settlement patterns, national and global economic and political systems, historical legacies, dominant cultural values, and class systems)

Human Wellbeing
Conditions, connections, Capabilities (e.g., safety, community, livelihood)
Social Vulnerability to Ocean Acidification

Vulnerability

Biophysical

Social

OA Exposure + Relative Sensitivity + Variable Adaptive Capacity

Squaxin Island Tribe case study
Focus on shellfish
Importance to NOAA’s Mission & Vision

Provide science to understand and predict changes ... in oceans and coasts, to share that knowledge and information with others, and to conserve and manage coastal and marine ecosystems and resources.

To ensure healthy ecosystems, communities and economies that are resilient in the face of change.

- Integrated Ecosystem Assessments
- Ecosystem Based Fisheries Management
- NOAA Ocean Acidification Program
Ocean Acidification and Impacts to Shelled Mollusks

Source: [http://www2.epa.gov/cira/climate-action-benefits-shellfish](http://www2.epa.gov/cira/climate-action-benefits-shellfish)
Regional Social and Ecological Vulnerability to OA

Community Social Vulnerability Index for Shelton, WA, 2010
(source: Karma Norman, et al, NOAA NWFSC)

Shelton:
Composite score 5.91
SocVI Rank: 64 of 880
Fishing Dep. Rank: 2 (moderate)
What are the community well-being & health risks from ocean acidification?

“Shellfish is part of us, it is who we are, eating it fills our souls. It’s part of everything that we are. If we weren’t able to harvest, if we weren’t able to go out on the beaches and the tides with my family, I wouldn’t even have that social time to share and remember and to just be together and have a moment of – ‘this is what our people have done for thousands of years and we are still continuing to do that.’” -Tribal Participant
Approach
OA risks to community health & well-being

Scoping, Define Indicators, Assess, Act
Community-based, collaborative

Ethnographic interviews (n 20)
• define goals & context
• develop indicators

Participatory workshop (n 20)
• assess indicators
• sensitivity to OA ~ projected future impacts
• prioritize adaptation actions
The socio-cultural importance of shellfish

[Clams] are important for celebrations and feasts, during funerals, and all occasions; the well-being of the shellfish is part of the well-being of people, because the cultural-ecosystem is the same.

Identity & heritage
Ceremonial & spiritual
Subsistence & economic livelihood
Food & nutrition security
Gifting & sharing
Social connections
Knowledge transfer
Sense of place
Practice Treaty rights
Access
Decision-making

SHELLFISH SPECIES: clams (littlenecks/manilas, butter clams, geoduck, cockles, horse clams), shrimp/prawns, oysters, mussels, sea cucumbers, sea urchins, limpets, Dungeness crab

Health here in the tribal community? I think it’s spiritual health, mental health, physical health. I think health here is being connected our culture [...] everybody here is really involved in our culture. We’re canoe families. People of the water. We’re very connected with the Puget Sound [...] A big part of our health has to do with being connected with that water.
<table>
<thead>
<tr>
<th>Health &amp; Well-being Indicator</th>
<th>Means</th>
<th>% Change</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Current Status</td>
<td>Future Status</td>
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<tr>
<td>Physical Health</td>
<td>2.46</td>
<td>3.56</td>
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<tr>
<td>Cultural Use and Practice</td>
<td>2.21</td>
<td>3.14</td>
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<td>Community Connections</td>
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<td>Balance/Resilience</td>
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<td>Education</td>
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<tr>
<td>Self-Determination</td>
<td>2.54</td>
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</tbody>
</table>

Results are not representative of the entire community; results can be used for discussion purposes.
Adaptation Actions

• Community Garden and First Foods Restoration Programs
• Climate Change Adaptation Vision with Health & Well-being
• Engaging Youth in Climate Science and Restoration
• Culturally-appropriate, local actions
Summary

• Ocean Acidification and other ocean changes put **culturally-important marine resources at risk**

• We can **identify specific cultural and health indicators** using participatory methods

• Some cultural and health indicators appear to be **more sensitive** to ocean changes than others
  - **More sensitive**: cultural use and physical health followed by community connections
  - **Less sensitive**: self-determination and education

• Some communities **more vulnerable** than others owing not simply to exposure, but **non-substitutable** cultural ties to impacted species
Next Steps

Olympic Coast Social-Ecological Vulnerability Assessment (Sept 2017-2019)

• NOAA OA Program (recommended for funding)
• Lead PIs: UW Applied Physics Lab (Newton) & Washington Sea Grant/NWFSC (Poe)
• Partners:
  o Coastal Treaty Tribes
  o OCNMS
  o ONP
  o NOAA PMEL
  o JISAO
Indigenous Health and Well-being Indicators

**Physical Health**: the strength and state of the body, nutrition, and being free from illness and pollution.

**Community Connections**: active in community functions, helping each other, harvesting with family and caring for elders.

**Natural Resources Security**: local natural resources are abundant, healthy and safe. The community has access to these natural resources at the right seasons to support culture and economy, including through sharing.

**Cultural Use and Practice**: The community is able to carry forth their cultural practices to show respect and honor traditions by harvesting and using local First Foods and natural resources.

**Education**: Knowledge, values and beliefs are actively passed on from elders to youth through story-telling, traditional foods practices, language.

**Self-Determination**: exercise Treaty reserved rights to harvest, and enact self-government in healing, education, development and restoration programs.

**Resilience/Balance**: balance of holistic health and well-being, confident that one’s health and the health of the next 7 generations are not at risk due to environmental changes or relationships with others.