THE USE OF GEOSPATIAL DATA TO SUPPORT VULNERABILITY MAPPING OF THE OREGON COAST

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INTRODUCTION

- This study is an outcome of the project “Geospatial Decision Support Tools for Coastal Resource Management: Vulnerability Maps Characterizing regional Climate Variability and Change Impacts, “funded by the NOAA Sectoral Applications Research Program, Climate and Coastal Resource Management Division.

- **Research goal**: Develop and evaluate web tools used by community stakeholders for exploring and understanding coastal climate variability and change.

- University of Washington, Oregon State University, Oregon Coastal Management Program

GEOSPATIAL DATA

- The use of geospatial data and information in decision support is becoming widespread with governments, businesses, city planners and resources managers

- Clearinghouse: descriptions of existing data (metadata)

- Open Geospatial Consortiums (OGC)

  Web Map Service (WMS)

  Web Feature Service (WFS)

CLIMATE CHANGE

- Climate change and its affects are becoming of great interest to coastal resource managers and stakeholders in the Pacific Northwest.

- Historically, natural patterns have been discovered in climate variability such as El Nino and La Nina that drastically affect the climate of the region. (IPCC, 2007)

Intergovernmental Panel on Climate Change, 2007

VULNERABILITY MAPPING

- Adaptation planning and vulnerability assessments are vital to coastal managers and city planners, geospatial decision support tools aid in more detail analysis.

- These vulnerability assessments provide an opportunity to create a database of community based concerns when developing adaptation planning for climate change.

WHY ARE WE CONCERNED?

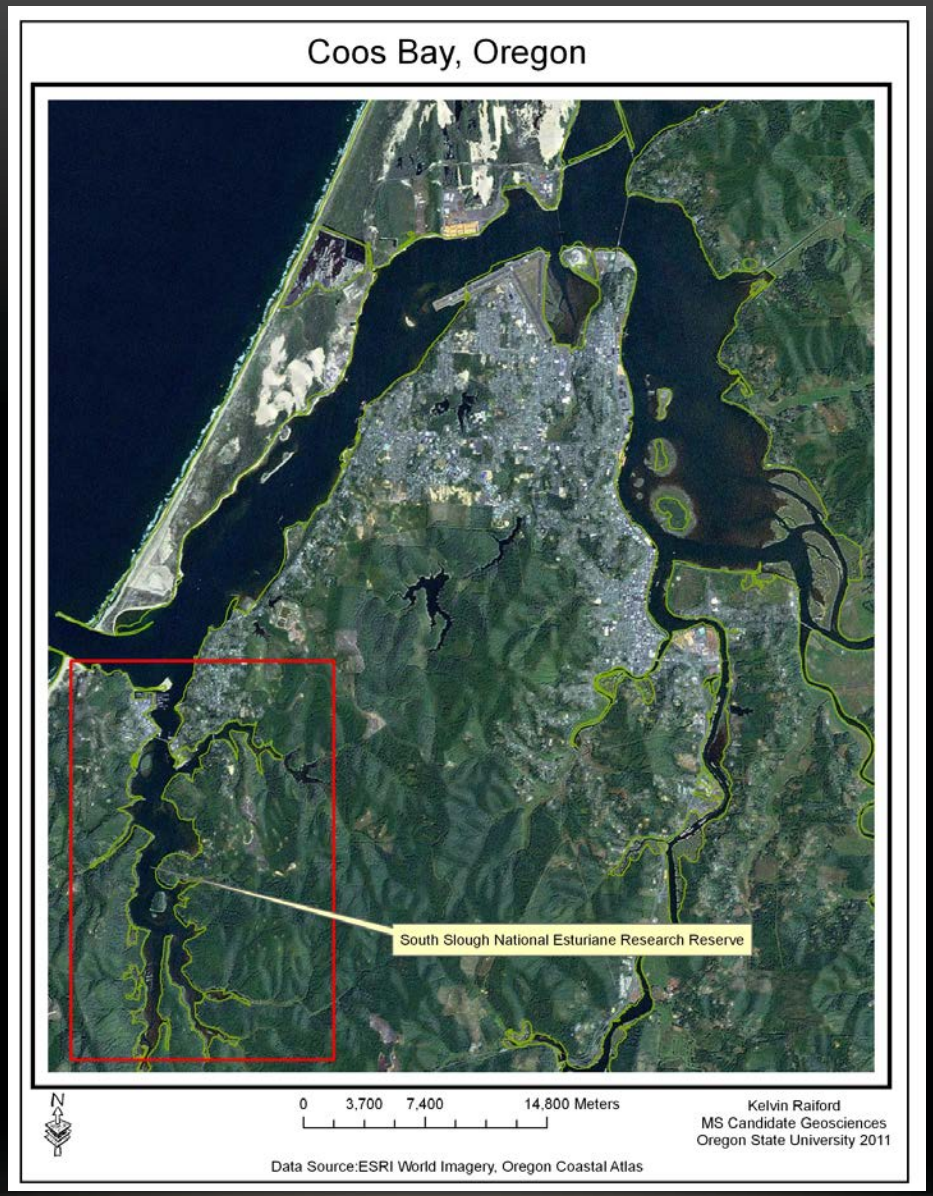
- Coastal ecosystems pressured by population increases
- Habitat degradation
- Overfishing
- Invasive species
- Increases in coastal hazards

http://www.adjarainvest.ge

http://www.aegweb.org

Hinrichsen, 1998; National Safety Council, 1998; World Resources Institute, 2000

Region Of Interest



The South Slough National Estuarine Research Reserve is the nation's first estuarine research reserve established in 1974 under Section 315 of the federal Coastal Zone Management Act.

The 4,800 acre reserve is made up of open water channels, riparian areas with freshwater and tidal wetlands.

QUESTIONS DRIVING RESEARCH

- How may concerns about climate change be represented as maps to give policy and decision maker's tools to develop better strategies for management of these vulnerable areas?

- What geographical information system (GIS) data sets are most effective for creating such maps?

PHASE 1

During the coming decades coastal Oregon communities, like coastal areas in general, will be impacted by climate change and variability.

What concerns do you have?

How might these **concerns** be **measured**?

Make your voice heard!

Voicing Climate Concerns is an experiment in participatory democracy. Learn more about this research study or **register now**.

Voicing Climate Concerns is an online activity in which participants brainstorm concerns about climate change and variability along the Oregon Coast and analysts produce maps depicting those concerns contigent on availabity of data. If you would like to participate in the experiment, please log in (or register above):

User Name **Password** Login

Forgot your password?

This research is funded by the National Oceanic and Atmospheric Administration, Climate Program Office, Sectoral Applications Research Program NA07OAR4310410.

DEFINE TERMS

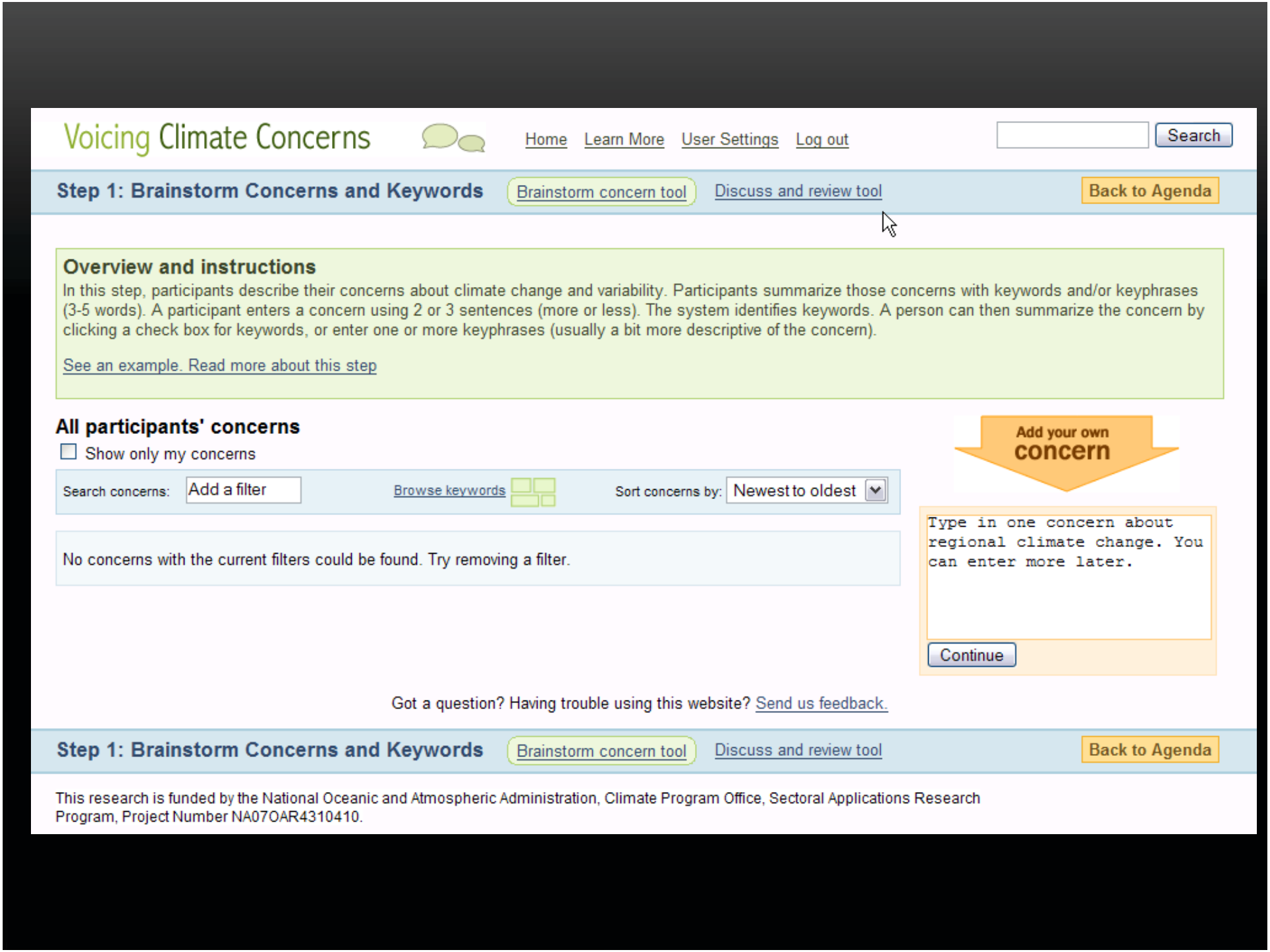
- **A climate indicator:** is simply a specific measurement of change or variability in climate conditions like an expected increase in temperature or precipitation at any location in the estuary over time.

- **A receptor indicator:** is a specific measurement of the properties of a phenomenon, person, place, or thing like habitats, crops, animals, etc., potentially exposed to a change in climate conditions.

- **Appropriate data set**: geospatial data sets specified by participants with the correct unit of measurement.

FIVE STEPS

- 1. Brainstorm Key phrases
- 2. Categorize Key phrases
- 3. Build Index(es)
- 4. Develop Indicators
- 5. Review Report


Voicing Climate Concerns
Home
Learn More
User Settings
Log out
Search
Step 1: Brainstorm Concerns and Keywords
Brainstorm concern tool
Discuss and review tool
Back to Agenda
Overview and instructions
In this step, participants describe their concerns about climate change and variability. Participants summarize those concerns with keywords and/or keyphrases (3-5 words). A participant enters a concern using 2 or 3 sentences (more or less). The system identifies keywords. A person can then summarize the concern by clicking a check box for keywords, or enter one or more keyphrases (usually a bit more descriptive of the concern).
See an example. Read more about this step
All participants' concerns
Show only my concerns
Search concerns:
Add a filter
Browse keywords
Sort concerns by:
Newest to oldest
No concerns with the current filters could be found. Try removing a filter.
Add your own concern
Type in one concern about regional climate change. You can enter more later.
Continue
Got a question? Having trouble using this website? Send us feedback.
Step 1: Brainstorm Concerns and Keywords
Brainstorm concern tool
Discuss and review tool
Back to Agenda
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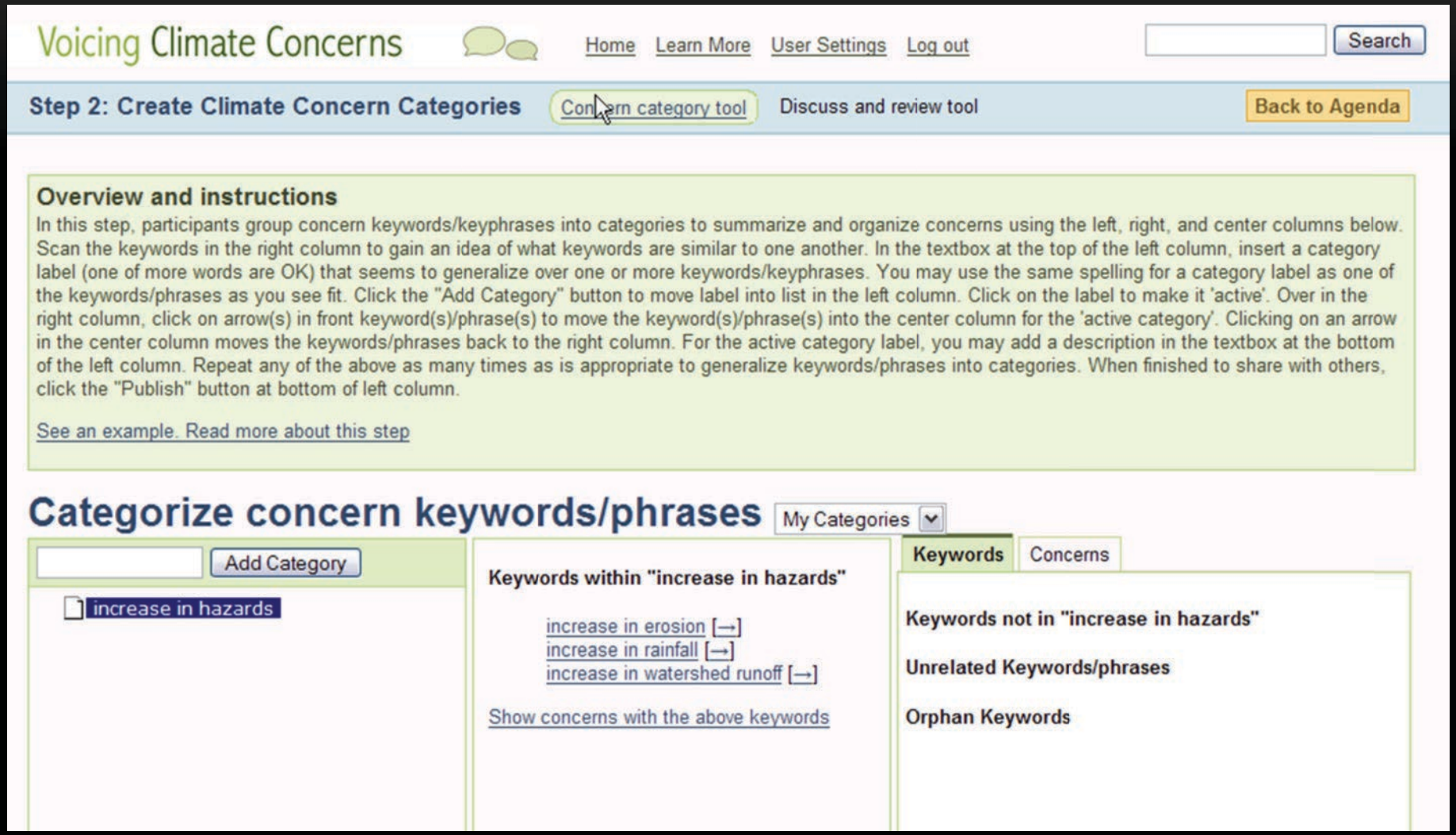
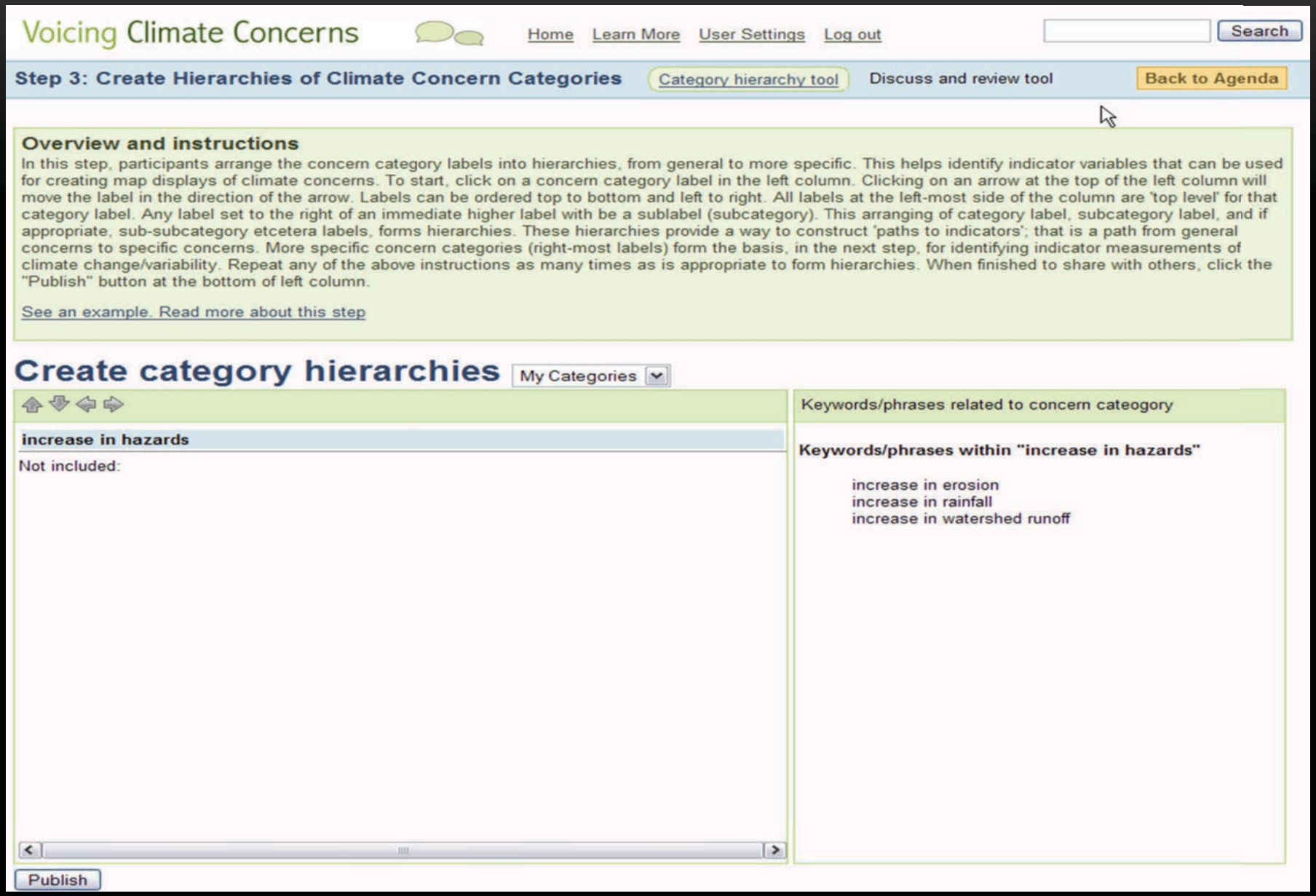
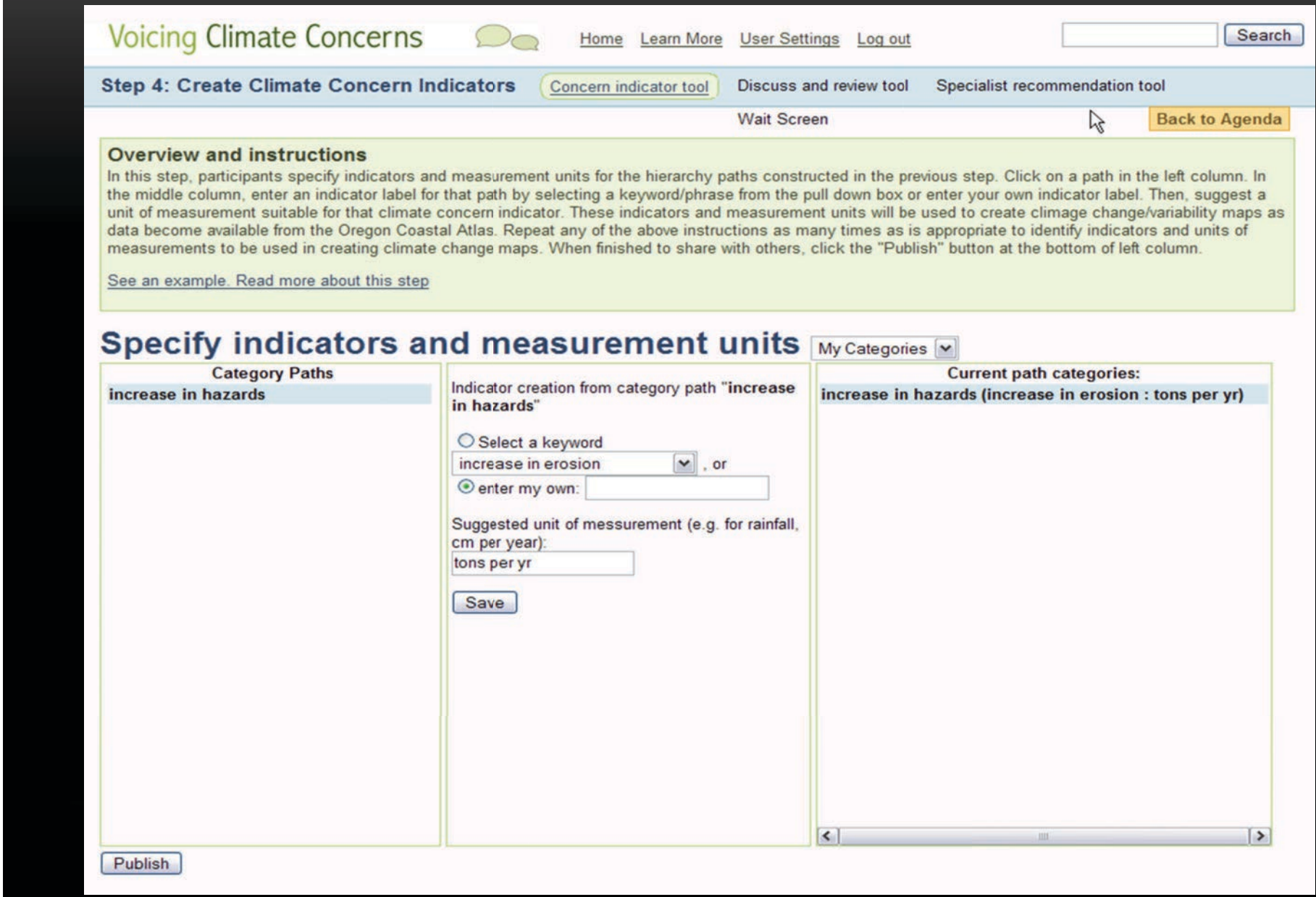

Voicing Climate Concerns
Home
Learn More
User Settings
Log out
Search
Step 2: Create Climate Concern Categories
Concern category tool
Discuss and review tool
Back to Agenda
Overview and instructions
In this step, participants group concern keywords/keyphrases into categories to summarize and organize concerns using the left, right, and center columns below. Scan the keywords in the right column to gain an idea of what keywords are similar to one another. In the textbox at the top of the left column, insert a category label (one of more words are OK) that seems to generalize over one or more keywords/keyphrases. You may use the same spelling for a category label as one of the keywords/phrases as you see fit. Click the "Add Category" button to move label into list in the left column. Click on the label to make it 'active'. Over in the right column, click on arrow(s) in front keyword(s)/phrase(s) to move the keyword(s)/phrase(s) into the center column for the 'active category'. Clicking on an arrow in the center column moves the keywords/phrases back to the right column. For the active category label, you may add a description in the textbox at the bottom of the left column. Repeat any of the above as many times as is appropriate to generalize keywords/phrases into categories. When finished to share with others, click the "Publish" button at bottom of left column.
See an example. Read more about this step
Categorize concern keywords/phrases
My Categories
Add Category
increase in hazards
Keywords within "increase in hazards"
increase in erosion [→]
increase in rainfall [→]
increase in watershed runoff [→]
Show concerns with the above keywords
Keywords
Concerns
Keywords not in "increase in hazards"
Unrelated Keywords/phrases
Orphan Keywords


Voicing Climate Concerns
Home
Learn More
User Settings
Log out
Search
Step 3: Create Hierarchies of Climate Concern Categories
Category hierarchy tool
Discuss and review tool
Back to Agenda
Overview and instructions
In this step, participants arrange the concern category labels into hierarchies, from general to more specific. This helps identify indicator variables that can be used for creating map displays of climate concerns. To start, click on a concern category label in the left column. Clicking on an arrow at the top of the left column will move the label in the direction of the arrow. Labels can be ordered top to bottom and left to right. All labels at the left-most side of the column are 'top level' for that category label. Any label set to the right of an immediate higher label with be a sublabel (subcategory). This arranging of category label, subcategory label, and if appropriate, sub-subcategory etcetera labels, forms hierarchies. These hierarchies provide a way to construct 'paths to indicators'; that is a path from general concerns to specific concerns. More specific concern categories (right-most labels) form the basis, in the next step, for identifying indicator measurements of climate change/variability. Repeat any of the above instructions as many times as is appropriate to form hierarchies. When finished to share with others, click the "Publish" button at the bottom of left column.
See an example. Read more about this step
Create category hierarchies
My Categories
increase in hazards
Not included:
Keywords/phrases related to concern cateogory
Keywords/phrases within "increase in hazards"
increase in erosion
increase in rainfall
increase in watershed runoff
Publish


Voicing Climate Concerns
Home
Learn More
User Settings
Log out
Search
Step 4: Create Climate Concern Indicators
Concern indicator tool
Discuss and review tool
Specialist recommendation tool
Wait Screen
Back to Agenda
Overview and instructions
In this step, participants specify indicators and measurement units for the hierarchy paths constructed in the previous step. Click on a path in the left column. In the middle column, enter an indicator label for that path by selecting a keyword/phrase from the pull down box or enter your own indicator label. Then, suggest a unit of measurement suitable for that climate concern indicator. These indicators and measurement units will be used to create climage change/variability maps as data become available from the Oregon Coastal Atlas. Repeat any of the above instructions as many times as is appropriate to identify indicators and units of measurements to be used in creating climate change maps. When finished to share with others, click the "Publish" button at the bottom of left column.
See an example. Read more about this step
Specify indicators and measurement units
My Categories
Category Paths
increase in hazards
Indicator creation from category path "increase in hazards"
Select a keyword
increase in erosion
, or
enter my own:
Suggested unit of messurement (e.g. for rainfall, cm per year):
tons per yr
Save
Current path categories:
increase in hazards (increase in erosion : tons per yr)
Publish

Example of a synthesized list of indicators

Indicators:	**Units:**
Biologic	count
Storm	low barometric pressure
Sea Level	cm per year
Roads	number of possible failures
Rainfall	cm per year
Reactions	number of changes per community
Water volume	acre feet per year
Property	feet per decade change
Species	count loss or gain
Agriculture	bushels per acre
Shore	change per decade
Ecosystem	sq km per year
Erosion	cm per year
Fresh water impact	cubic feet per sec
Marine water impact/economic	dollars lost
Public infrastructure impact	dollars per year lost
Private structures impact	dollars per year
Temperature	degrees
Fire	acres affected
Resource impact	dollars lost

A synthesized list of geospatial data sources

Geospatial Data Sources	URL
Oregon Coastal Atlas	www.coastalatlas.net
Oregon Explorer	www.oregonexplorer.info
Oregon Spatial Data Library	www.oregon.gov/DAS/EISPD/GEO/sdlibrary.shtml
Geospatial One Stop	www.geodata.gov/
Oregon Climate Service	www.ocs.orst.edu/
Oregon Hydrologic Data (USGS)	http://or.water.usgs.gov/data_dir/datapage.html
Oregon Department of Geology and Mineral Industries	http://www.oregongeology.org/sub/default.htm
National Geospatial Program	http://www.usgs.gov/ngpo/
NOAA National Estuarine Research Reserve System	http://cdmo.baruch.sc.edu/
NW Geodata Clearinghouse	http://nwdata.geol.pdx.edu/
USDA:NRCS:Geospatial Data Gateway	http://datagateway.nrcs.usda.gov/
National Atlas	http://nationalatlas.gov/mapmaker
US Census Bureau (Geography)	http://www.census.gov/geo/www/

Example of the appropriate GIS data sets

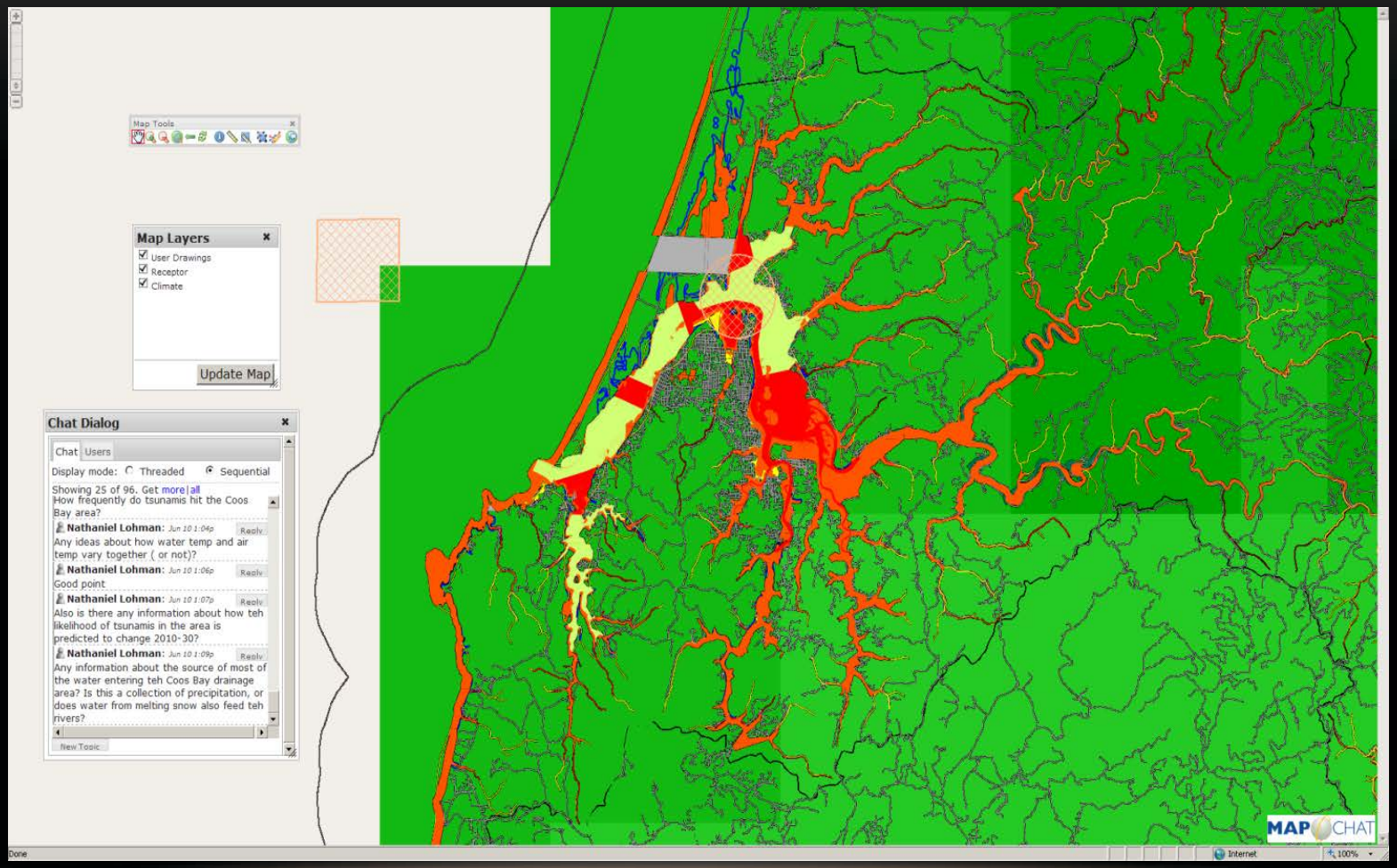
Receptors
Shellfish
Flood zone
Salinity zone
River water quality
Chinook
Coho
Steelhead
Road network
Shoreline erosion
Land use-cover
Wetlands

Climate
Tsunami inundation
Air temperature change
Precipitation change
Sea level

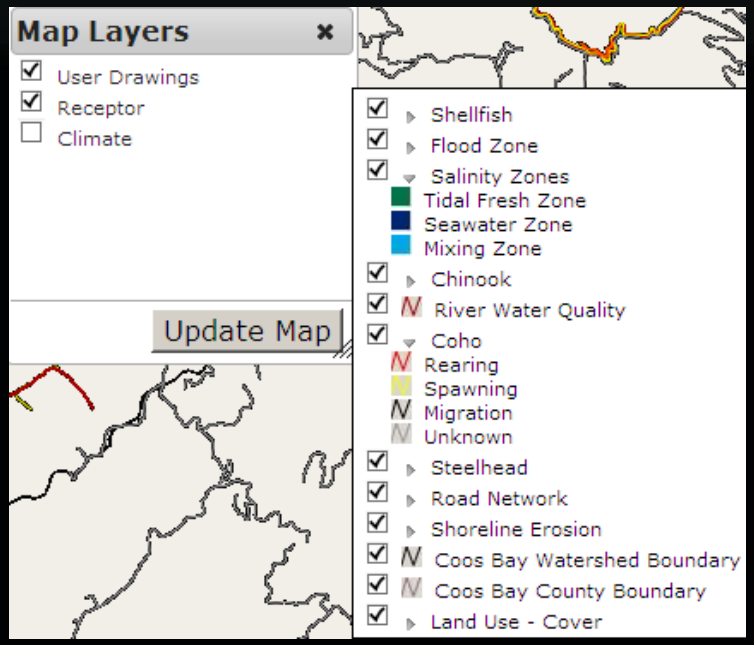
Phase 2

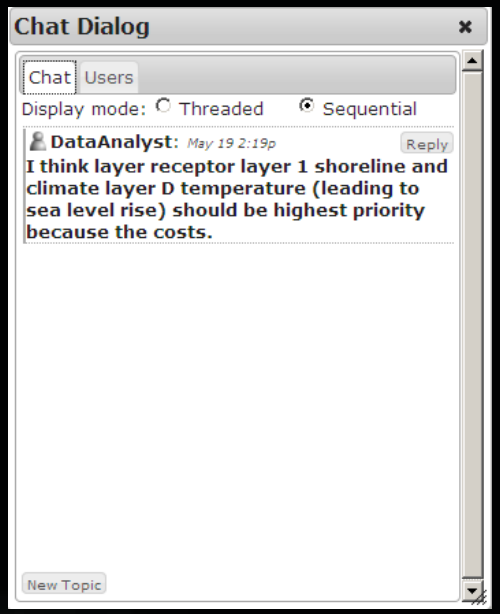
MapChat2 is used within an asynchronous online workshop called Deliberative Mapping of Vulnerability (DMV).

MapChat2 user interface



MapChat 2 map layers and chat dialog box





DISCUSSION AND CONCLUSIONS

- Several limitations and challenges faced while conducting this research
- Data mining and data set availability
- Concerns about climate change can be mapped by using a structured set of web based tools
- The GIS data sets that were found to be most effective in creating such maps were derived from the VCC experiment

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QUESTIONS??

Thank you for your time and have a wonderful day!!