

# Connecting Communities Through Data, Visualizations & Decisions

## Visualization for Terrestrial and Aquatic Systems (VISTAS)

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### Visualization of Terrestrial and Aquatic Systems *VISTAS the Team and Software*

- NSF-funded collaboration between environmental-, computer-, and social-scientists, has integrated new technologies and computer science research into visualization software
- We overlay 2D data onto 3D elevation maps to better understand how complex terrain affects ecological processes
- Visualizing phenomena with VISTAS helps environmental scientists build better models and formulate new hypotheses and insights

### This Project – Scientists & Decision Makers *Knowledge Co-Production*

- Our collaborators use VISTAS to improve their own understanding of models and data, explain results to decision makers, and work with stakeholders to jointly produce knowledge
- We use social science methods to study how software developers, environmental scientists, and decision-makers work together to co-produce technology and visualizations
- We partnered with 3 projects: 1) climate change impacts at the local level, 2) salmon recovery on Native Lands, and 3) vegetation changes in the Great Basin

#### Challenge

We aim to address our collaborators' needs for easy-to-produce and effective visualizations of complex data sets:

- Climate change presents critical problems for society and nature; what tools are best for understanding and communicating impacts?
- How do negotiations between user needs and technological capacity shape tool development and implementation?
- How do tools impact scientific results and community responses to critical ecological challenges?



Above: Decision makers & scientists meet to select climate impact models, a common example of stakeholder engagement among our collaborators

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#### Approach

##### Social science approach:

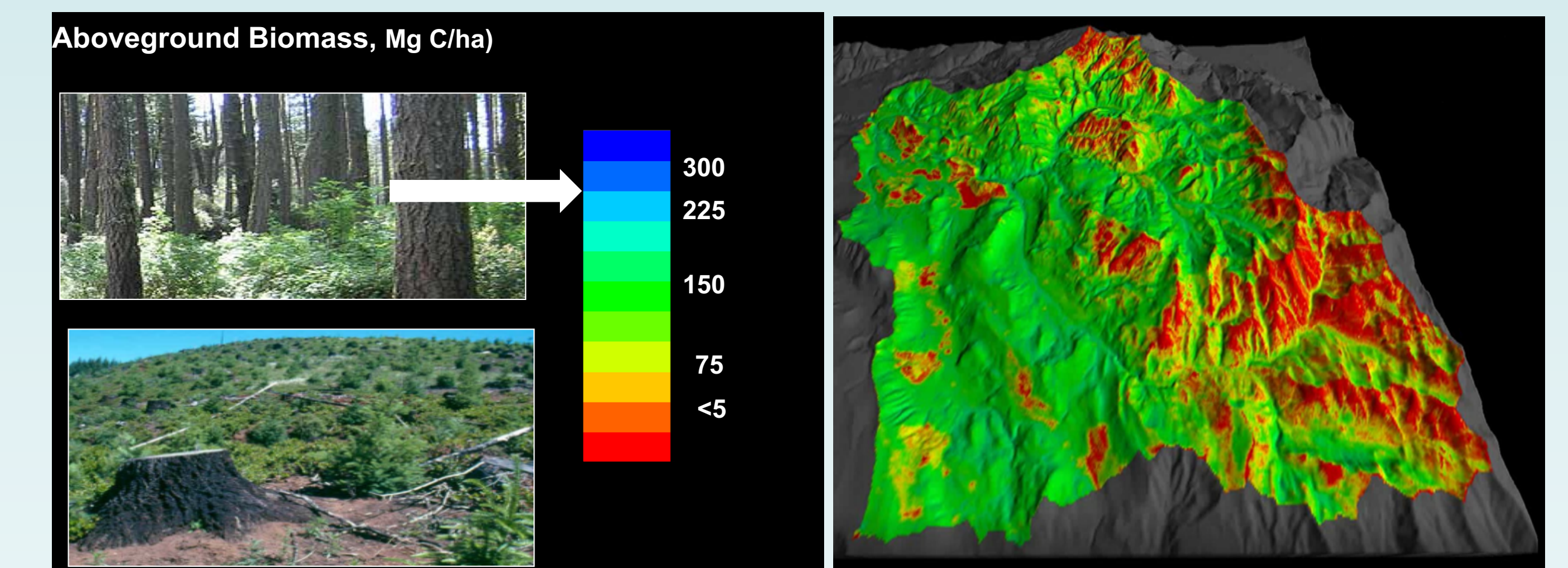
- Case studies structured through comparative pre/post-test design: baseline, development, and post-assessment phases
- We ask: Does the technology impact scientific understanding and the ability to communicate science?
- We conducted and analyzed baseline and post-assessments in-person interviews

##### Computer science approach:

- Visualization research to develop software that enables effective presentation and knowledge co-production
- Technical support for environmental- and social-science collaborators as they design and create visualizations

Below: Project timeline coupling social and computer science approaches

	Pre-period: Nov – Feb 2017	Development period: Feb 2017 - May, 2018	Post-period: May-Sept, 2018
VISTAS software co-development		Vector flows, data analytics, Python integration	
Participant interviews	Prior to development (N=12)		After development (N=11)
Participant observations	Attend weekly development meetings, record interactions, collect documentation		



Left: forest biomass examples; Right: biomass visualized in VISTAS

#### Findings and solution

Through social science inquiry into the software co-production process, three main findings have emerged:

- Our environmental science collaborators had complex data visualization needs not met by existing software platforms
- Visualization needs of scientists changed/updated throughout the project as they interacted with developers
- Participants gained new insights about their science, communicating this science, and working with other disciplines/domains to address complex problems

##### Solution:

- Co-development between environmental scientists and software developers is a viable (and recommended) way to produce visualizations, and visualization software



VISTAS funded by NSF BIO/DBI 1062572, 0940748,  
NSF CISE/IIS 0940748, 0917708 and an HJA LTER ROA  
<http://blogs.evergreen.edu/vistas>



Poster prepared for  
9th Annual Cyber-Physical Systems  
Principal Investigators' Meeting  
November 15-16, 2018  
Alexandria, VA