

Willamette Water 2100

Anticipating water scarcity and informing integrative water system response

Project Overview

This project is evaluating how climate change, population growth, and economic growth will alter the availability and the use of water in the Willamette River Basin on a decadal to centennial timescale. The project seeks to create a transferable method of predicting where climate change will create water scarcities and where those scarcities will exert the strongest impacts on human society.

The five year project began in October 2010, and is a collaborative effort of faculty from Oregon State University, the University of Oregon and Portland State University. It is funded by the National Science Foundation.

What questions does the project address?

The project is addressing three main questions:

- Where are climate change and human activity most likely to create conditions of water scarcity?
- Where is water scarcity most likely to exert the greatest impact on ecosystems and communities?
- What strategies would allow communities to prevent, mitigate, or adapt to scarcity most successfully?

What will the project do?

- Model the Willamette water system. The project will develop or adapt hydrologic, socio-economic, and ecological models for the Willamette basin. It will integrate these models into a GIS-based modeling framework called *Envision*.
- Elucidate and explain interactions. *Envision* will allow the team to study interactions, linkages and feedbacks in the Willamette water system. For example – how will fisheries respond if climate change leads to earlier snowmelt and that alters the timing and distribution of stream flows?
- Identify vulnerabilities. The project will use *Envision* to identify areas of the landscape sensitive to water scarcity because of local physical, ecological or socioeconomic factors.
- Compare alternatives. With stakeholder guidance, the project will identify different policy scenarios that can be visualized and evaluated in *Envision*.
- Simplify. Lessons learned in the Willamette will become a foundation for a simplified system for identifying areas sensitive to climate change and water scarcity in regions with limited natural resources data. Project personnel will work collaboratively with the UNESCO-IHE Institute for Water Education and partners in the Blue Nile Basin in Ethiopia.

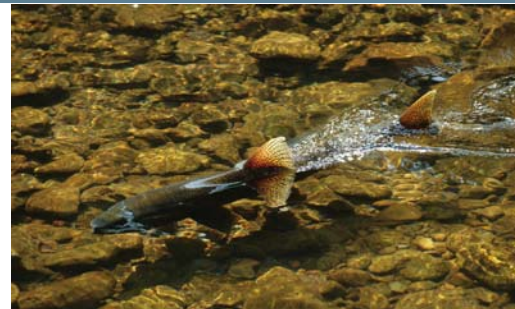


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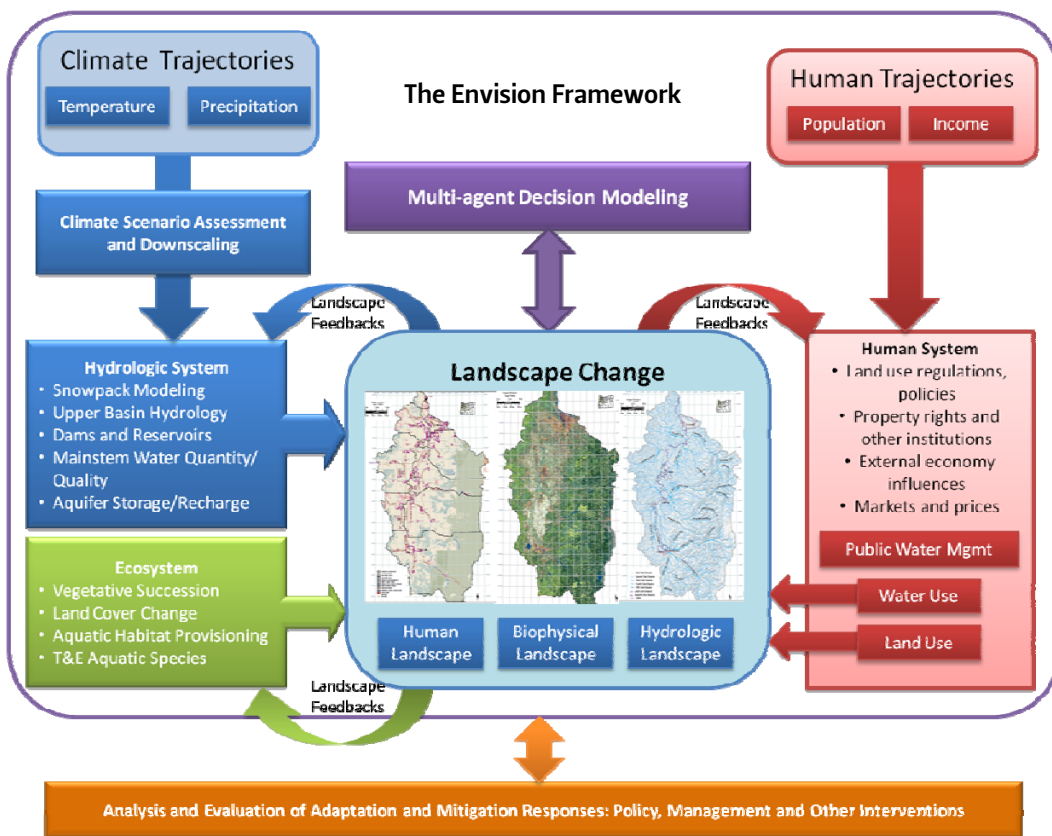


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What is *Envision*?

Envision is a modeling framework developed at OSU to visualize and assess alternative future scenarios. *Envision* integrates a geographic information system, an interface for plugging in hydrological, ecological, and socio-economic process models, “agents” who can make parcel-specific management decisions, and a system for visualizing the results of alternative scenarios. *Envision* enables sophisticated models from different disciplines to share data and communicate via a landscape, a data repository that represents instantaneous conditions at specific locations. Each time one of the models runs, it draws as its input the relevant output from the other state-of-the-art models running within the framework.

Envision gives scientists and stakeholders an ability to ask “what if” questions for different policy alternatives. Users define rules that determine management decisions for individual parcels based on their unique ownership, socio-economic and biophysical characteristics. As *Envision* runs, management decisions incorporate the changing conditions forecasted by the hydrologic, ecological and socio-economic models. When *Envision* completes a scenario, scientists and stakeholders can view maps and data sets depicting how the landscape has changed as a result of both the defined policies and the dynamics of the ecological and physical systems.



Project Executive Committee:

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How are stakeholders involved in the project?



A field trip with researchers and stakeholders, April 2011.
Photo credit: Adam Stebbins.

Through focus groups, field trips and workshops, researchers, water managers, water users and decision makers interact and learn together as part of a “stakeholders learning and action network”. Stakeholders provide input for the model and critique the modeling framework and outcomes. These discussions will help the research team develop and refine realistic policy scenarios, analyze model results and develop usable products.

To learn more about the project or join the stakeholder mailing list, please visit the project website at water.oregonstate.edu/ww2100.