

Introduction

- Economics PhD Candidate,
Washington State University
- Master of Science in Applied
Mathematics
- Specializations: Climate and water
economics, research computing



My comparative advantage

- Experience working with **gridded data** in raster, netcdf, and binary formats
- Emphasize **reproducibility** and **openness** in my research
- Four years as a research assistant on interdisciplinary projects involving economists and hydrologists¹
- Certified **Software and Data Carpentries**² instructor
- Experience with **regional modeling** using Implan and REMI Policy Insight

¹To paraphrase my advisor, “Engineers say economists assume optimal behavior that isn’t true, and economists say engineers don’t account for human responses to changing conditions.”

²An organization that teaches workshops on research computing skills. Software carpentry lessons available [here](#), data carpentry lessons available [here](#).

Who gets Water in a World of Declining Snowpack?



Image source: Yosemite Conservancy

Scientific Project

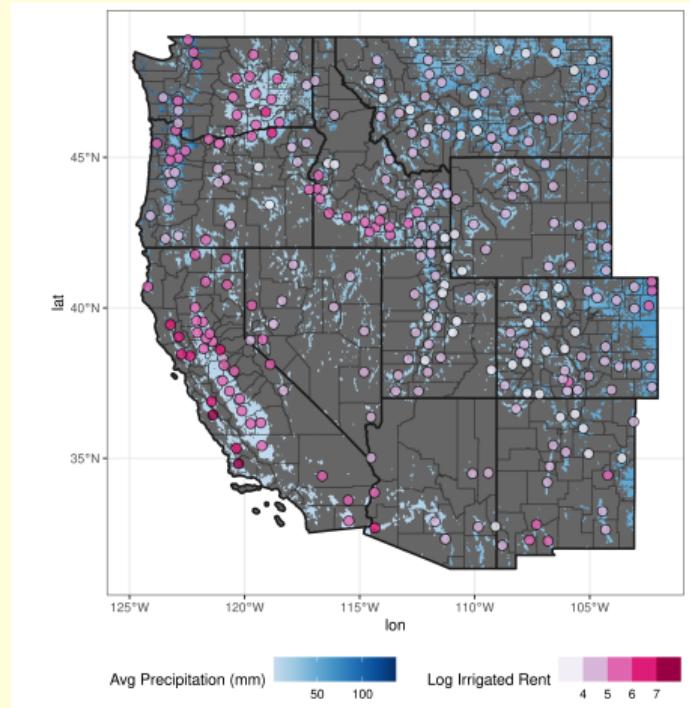
Three central questions:

- What are the economic implications of changing water supplies?
- How do our institutions help or hinder allocating water to its best use?
- What happens when institutions fail to allocate water equitably?

What are the economic implications of changing water supplies?

Climate affects water supplies through local precipitation and nonlocal precipitation and snowpack

- I estimate surface water supply in a watershed using daily 4-km gridded climate data on temperature and precipitation
- I develop a conceptual model of how demand for water by agricultural producers responds to climate and its effects on water supply



How do our institutions help or hinder allocating water to its best use?

Institutions determine the right to use water and how that right can be transferred.

- I examine how prior appropriations helps allocate water in the context of an arid region with no irrigation infrastructure, but makes reallocation difficult once the region has developed.
- To what extent can water be shifted between uses in France and how do France's institutions facilitate of water supplies to its best use?

STATE OF WASHINGTON
DEPARTMENT OF WATER RESOURCES
DIVISION OF WATER MANAGEMENT

RECEIVED
DEPARTMENT OF ECOLOGY
MAY 20 2005 5672

CASH OTHER NONE

RECEIVED
DEPARTMENT OF ECOLOGY
MAY 26 2005 005797

Ground Water

W.R.I.A. (Leave blank)

1. NAME [REDACTED]
ADDRESS [REDACTED]

2. SOURCE FROM WHICH THE RIGHT TO TAKE AND MAKE USE OF WATER IS CLAIMED:
W.R.I.A. (Leave blank)

A. IF GROUND WATER, THE SOURCE IS Spring
B. IF SURFACE WATER, THE SOURCE IS

3. THE QUANTITIES OF WATER AND TIMES OF USE CLAIMED:
A. QUANTITY OF WATER CLAIMED 8 gal. min.
CUBIC FEET PER SECOND, OR GALLONS PER MINUTE
B. ANNUAL QUANTITY CLAIMED 1 acre foot PRESENTLY USED 1 acre foot
YACRES FEET PER YEAR

C. IF FOR IRRIGATION, ACRES CLAIMED 5 acres PRESENTLY IRRIGATED 5 acres

D. TIME(S) DURING EACH YEAR WHEN WATER IS USED Jan. to Jan.

4. DATE OF FIRST PUTTING WATER TO USE MONTH YEAR 1895

5. LOCATION OF THE POINT(S) OF DIVERSION/WITHDRAWAL 5' S.E. 1310' West
of the center of sec 25 FEET FROM THE CORNER OF SECTION S.E.

BEING WITHIN N.W. OF SECTION 25 T. 10 N. R. 37 (E or W.) W.M.

IF THIS IS WITHIN THE LIMITS OF A RECORDED PLATTED PROPERTY, LOT _____ BLOCK _____ OF _____

NAME OF PLAT OR ADDITION:

6. LEGAL DESCRIPTION OF LANDS ON WHICH THE WATER IS USED:

COUNTY _____

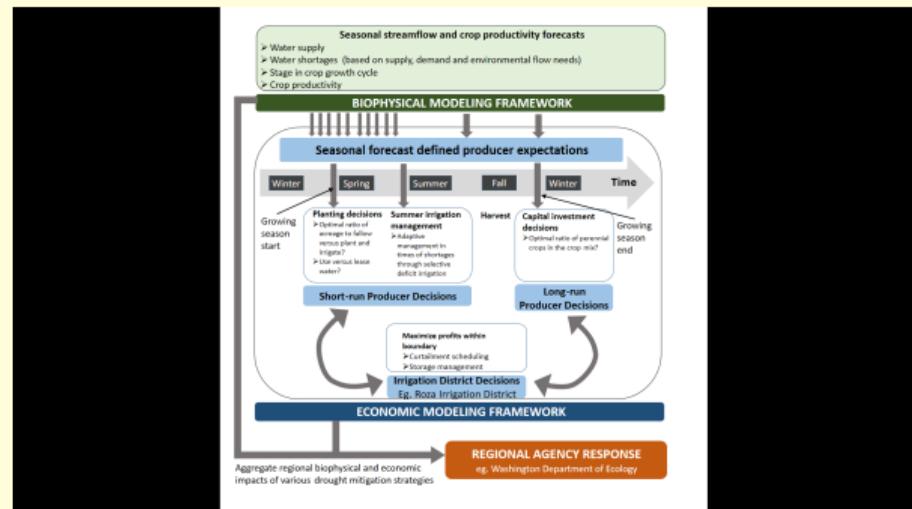
7. PURPOSE(S) FOR WHICH WATER IS USED: Castle & pasture irrigation

8. THE LEGAL DOCTRINE(S) UPON WHICH THE RIGHT OF CLAIM IS BASED: Appropriation

Water allocation through markets in response to predicted water supplies

A large interdisciplinary project to evaluate the extent to which seasonal water supply forecasts, consumptive use monitoring, and batch trading can facilitate water allocation

- Couple improved seasonal forecasts with economic models of water demands to evaluate allocation
- In western U.S. water rights can't be allocated administratively



Highlights

- Experience working as part of an interdisciplinary group on coupled biophysical and economic models and in developing conceptual frameworks for modeling
- Understanding of regional economic models and how to implement them to estimate economic contributions of different sectors
- Programming experience: R/Python, code is written to be self-contained and understandable

What happens when institutions fail to allocate water equitably?

Marginalized groups may resort to conflict if institutions fail to allocate resources equitably

- Bring together multiple global gridded datasets to evaluate the relationship between drought and riot occurrence
- Incorporate PDSI as well as blue water availability in each grid cell as estimates of water supply

