

Report for 2004OR44B: Basin level datasets for anticipating future water scarcity and conflict in Oregon

There are no reported publications resulting from this project.

Report Follows

Start Date: March 1, 2004 End Date: March 28, 2005

Title: Basin level datasets for anticipating future water scarcity and conflict in Oregon

Focus Category: LIP, M&P, DROU, WQL, WS, WU

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Abstract:

By 2025, Oregon's population is projected to grow twenty-eight percent, adding nearly one million people to the state. As population expands, changes in demographic variables such as income, age structure and employment will influence the nature of future water use in Oregon, expanding claims for water in industrial, municipal and recreational sectors. Independent of population growth, increased claims for in-stream water needs, associated with the implementation of state and federal environmental laws, will further heighten competition for limited supplies. Without strategies to anticipate and address competing water demands, Oregon's water management stakeholders run the risk of allocating financial, technical, and legal resources inefficiently. Without successful strategies, conflicts over water resources, such as the ongoing Klamath Basin situation, are likely to become more frequent and stalwart as the state's population grows.

Information accessibility is the most critical component of appropriate resource allocation, to better understanding long term balance of supply and demand and the prevention of conflict. Action needs to be taken to adapt available data from multiple sources to create datasets that will help facilitate informed and sustainable water management decisions. We compiled datasets pertinent to understanding water supply, demand, quality, conflict and cooperation in Oregon into a consistent, basin-scale format .

- Hydrologic data: Past and current trends in water supply and demand, consisting of three indices: 1) a drought index, 2) a water quality index, and 3) a water allocation index.
- Demographic data: Population structure, income, and employment within hydrologic basins. Each of these variables influences the magnitude of water use in urban and rural communities, but is normally summarized for political units, rather than within basins.
- Hydropolitical data: Interactions of conflict and cooperation over water resources, summarized by basin. News reports, legal proceedings, and stakeholder agreements chronicling key water issues in the state allow for historical insights in past trends in conflict and cooperation among different water use sectors and management entities.

These data as well as premade maps and summary reports will be available in tabular and GIS shapefile format on the web in July 2005, via Oregon State University's Transboundary Freshwater Dispute Database: <http://www.transboundarywaters.orst.edu>; and from links on the webpages of the Oregon Water Resources Department; and Portland State University's Population Resource Center.

This project was a partnership with Oregon State University, Portland State University and the Oregon Water Resources Department, and will train two graduate students in database and GIS skills. This project was as a critical step to supporting proactive, interdisciplinary, and informed decision-making about water resources in Oregon, and a presentation of our findings to our Oregon Water Resources Department partners resulted in two invitations from OWRD to come back and present the information to their regional managers and the Oregon Water Resources Commission.

Problem and Research Objectives:

This was not a research project; it was an information generation project, resulting in several geospatial datasets. The problem addressed was the lack of compatible hydrological, population, and hydropolitical datasets for Oregon Water Resources Department administrative basins which would allow for an understanding of demographic, conflict, and water supply trends in different basins in Oregon.

Our objectives were to:

1. Create basin-level hydrologic indices summarizing: a) drought conditions; b) percent of water allocated for consumptive uses by existing water rights; and c) water quality;
2. Create basin-level demographic layers from Census data which summarized population and other demographic indicators driving water use; and
3. Create basin-level Hydropolitical data which summarized incidents and issues of conflict and cooperation.

Methods, Procedures, and Facilities:

This project was a collaborative effort among three institutions: Oregon State University (OSU) Department of Geosciences; Portland State University's Population Research Center; and the Oregon Water Resources Department.

Procedures:

1. Compiled and consolidated existing hydrologic data (NRCS Surface Water Supply Index; OWRD Water Availability Reporting System; and ODEQ's Water Quality Index and transform it into water availability indices for each of Oregon's 18 administrative basins for the years 1990 - 2004
2. Adapted 1990 and 2000 census data to fit the boundaries of Oregon's 18 administrative water basins, compatible with water availability and hydropolitical indices GIS coverages - PSU
3. Created a hydropolitical event database for Oregon for the period 1990-2004, using Lexis-Nexis database for news events and legal cases from the Federal and State Courts - OSU
4. Summarize the contents of the each of the datasets (hydrologic, demographic, and hydropolitical) in the form of maps – OSU & PSU
5. Document the methodologies associated with the creation of the datasets within a summary report, on the internet as part of metadata associated with each database
6. Train graduate students in database and GIS construction using hydrologic and census data

Principal Findings and Significance:

The best way to illustrate the findings is through the maps that were generated from this project, but we will summarize in the narratives below. The maps showing these results are available on the website. The significance of the findings is that they have created a visual medium for showing trends over time or specific years that can allow for comparison of conditions across the state. The Hydropolitical information is exemplary of this in particular – Our datasets are by no means a complete sample of conflict and cooperation in Oregon, but an initial glance at where and when issues have been covered in the media or by litigation. The Hydropolitical dataset thus can serve as a starting point to get the attention of policy makers and decision makers and to show that it is possible to look at water conflict and cooperation in space and time, and therefore analyze it systematically. The Hydropolitical dataset turned out to be the information that was most interesting to our collaborators at OWRD.

Hydrologic Indices:

Drought index: The drought index showed relative wetness and dryness values for OWRD basins representing variations from the norm – the values were similar to the same values for the SWSI index produced by NRCS.

Consumptive Use Index: Most streams in Oregon are fully allocated, and become over-allocated in the summer months, particularly in the eastern side of the state.

Water Quality Index: These values did not differ substantially from the DEQ values when placed in OWRD basins.

Population Indices:

Population Density: Willamette Basin is both the most populous basin and the one with the highest population density. Overall, western basins tend to have larger populations and higher densities.

Income: Average household income had followed a pattern similar to that of population change, with most densely populated or fast growing counties seeing bigger gains, while all coastal basins and those in the southeast experiencing declines. Household income in OWRD administrative basins follows the rule of the "Rich getting richer, poor getting poorer": the basins with most gains in average household income also had highest levels of income in 2000, while all coastal basins had the lowest income levels. Average household income is the highest in Willamette and Sandy, followed by Deschutes and Rogue basins.

Population Growth: Most rapid population growth had occurred in Sandy & Deschutes basins in the 1990s. Only one basin - Owyhee - had seen a decline in population. Growth in the Deschutes basin seems to be related to in-migration. About one third of Deschutes Basin's residents moved from outside of their county of residence since 1995, the highest level among basins.

Hydropolitical Indices:

News Events: Please note that this collection is limited to the records uncovered by a preliminary search of Lexis Nexis and Oregonian Newspaper on line articles and is in no way comprehensive. The values for each basin are presented as the number of reports/square mile and therefore are area corrected. In general, the news media reported more incidents of conflict or cooperation on the Western Side of the state, with the largest percentage of events reported per square mile in the Sandy, Klamath and the Willamette Basins. The Colombia River Basin, which is not an OWRD administrative basin, also had a large number of news reports on water related conflict and cooperation. The major issues reported in the news events had to do with 1) Endangered Species Act and 2) Water Quality were the top issues discussed

. Fifty percent of the events reported were reporting incidents of cooperation, the overwhelming majority of these were scored at the highest level of cooperation, where stakeholder groups were formerly engaged in an activity that involved them working together on a water related issue. Ten percent of the events were scored as neutral, and the remaining 40 percent were conflictive. The conflictive events were concentrated in a median range of intensity; with the media reporting disagreements, dispute, or litigation among stakeholders regarding a water related issue.

Litigation Records: This data set explored what the distribution and issues were in water related cases that went to either the state or federal courts. Please note that this collection is limited to the records uncovered by a preliminary search of Lexis Nexis on line cases and is in no way comprehensive. The values for each basin are presented as the number of reports/square mile and therefore are area corrected

State Courts: Water rights and water quality were the primary issues driving water litigation in the State Courts. Willamette, Umatilla, and Rogue basins had the highest number of cases per square mile.

Federal Courts: The Clean Water Act, Endangered Species Act, and National Environmental Protection act were the dominant Federal Laws under which litigation was filed. The primary issues were water quality, hydropower, and discharge. The Willamette/Sandy/Hood and Klamath basins had the highest incidence of Federal Litigation per area, followed by the Rogue, Umatilla, and Grande Ronde.

Training and publications:

From OREGON STATE UNIVERSITY:

Kristel Fesler, MS Geography, Second year of program

From PORTLAND STATE UNIVERSITY:

Sonoko Endo, MS Urban Studies and Planning, Second year of program

Laurel Harris, MS Urban Studies and Planning, Second year of program

Presentations:

Past:

March 1 – Presentation results to Oregon Water Resources Department Technical Services Division

May 3 – Presentation to Oregon Water Resources Department: Regional Managers Meeting

Future:

July – Presentation to Oregon Water Resources Commission

Webpage: Data sets and project summary will be accessible in July via Oregon State University's Transboundary Freshwater Dispute Database: <http://www.transboundarywaters.orst.edu>; which is linked to the webpages of the Oregon Water Resources Department; and Portland State University's Population Resource Center.

The screenshot shows a Microsoft Internet Explorer browser window. The address bar contains a local file path: `file://webster/1916/wa/uf/ufckv.htm`. The webpage content is as follows:

Basin Level Datasets for Anticipating Future Water Scarcity and Conflict in Oregon

A Collaboration between Oregon State University Department of GeoSciences, Portland State University Population Research Center and Oregon Water Resources Department.

Funding provided by: United States Geological Survey

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Information accessibility is the most critical component of appropriate resource allocation, to better understanding long term balance of supply and demand and the prevention of conflict. Action needs to be taken to adapt available data from multiple sources to create datasets that will help facilitate informed and sustainable water management decisions. We compiled several sets of data pertinent to understanding demand for water in Oregon into a consistent, basin scale format for analysis purposes.

Three categories of data sets were compiled to gain understanding of water conflict in Oregon. All data sets were compiled into administrative basin.

- Hydrologic data: Part and current trends in water supply and demand, consisting of three indices: 1) a drought index, 2) a water quality index, and 3) a water allocation index.
- Demographic data: Population structure, income, and employment within hydrologic basins. Each of these variables influences the magnitude of water use in urban and rural communities.
- Hydropolitical data: News reports and legal proceedings

Additional Outcomes of this Project:

As a result of this project and the contacts made through it, we were able to obtain funding for the following follow-up projects:

1. \$80K Western Waters Basins at Risk, Bureau of Reclamation, March 2004 – March 2005
2. \$27K Fish vs. Farmers: Conflict Resolution and Management Training for Western Waters Stakeholders