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SLIDES: Overview of Groundwater Management Laws in the Western United States

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Overview of Groundwater Management Laws in the Western United States



Groundwater in the West
25th Summer Conference
Natural Resources
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June 16-18, 2004

Gary Bryner

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Natural Resources Law Center

Three Questions:

- ▶ What are the challenges in managing groundwater in Western states?
- ▶ How do state water laws address groundwater?
- ▶ What state legal and management practices are most promising and what challenges remain?

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The State of Groundwater around the World

▶ Advantages of groundwater

- Most is high quality, available year round, laws encourage withdrawal

▶ Problem of overdrafts

- Aquifers are stressed in many places
- Subsidence, intrusion of salt water, impact on surface waters
 - ▶ China, much of Africa, Southern Europe, and Saudi Arabia suffer from falling water tables
 - ▶ Mexico City: sinking by almost a foot a year
- Part of chronic problem of lack of access to clean water

▶ Enduring issue of protecting the commons

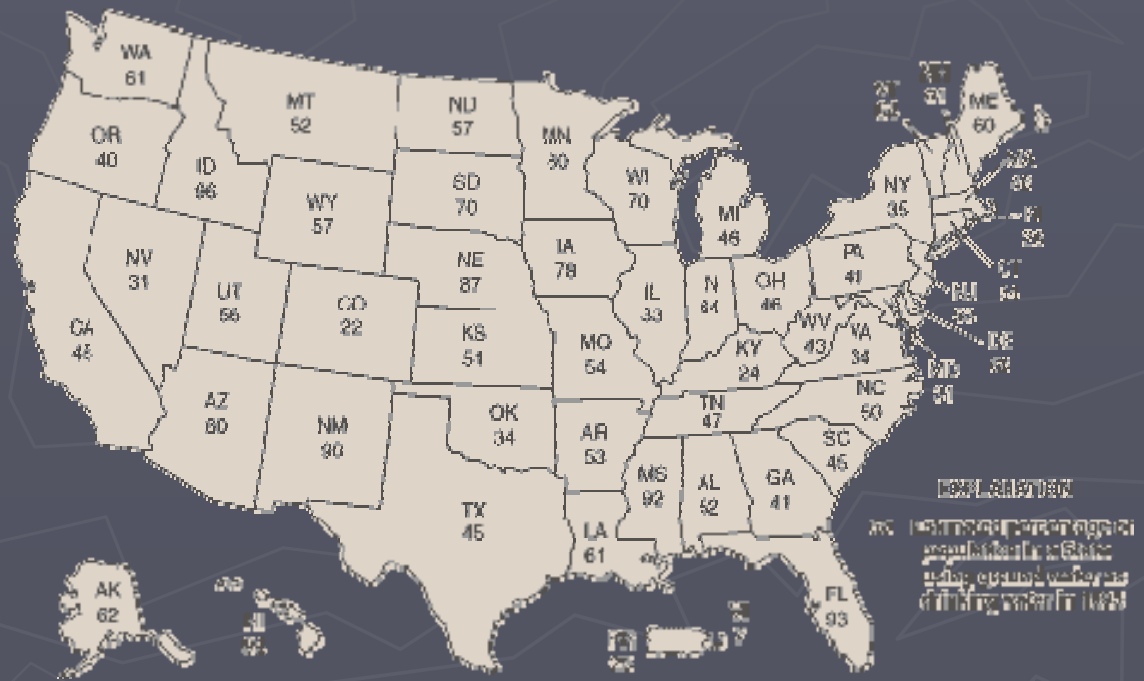
Groundwater in the United States

- ▶ 90% of freshwater in US is groundwater
 - Provides 40% of public water supply
 - 33% of fresh water used in Western States
 - 28 trillion gallons of water pumped each year in the U.S.
- ▶ Groundwater uses:
 - 78%: Irrigation
 - 14%: Public supply systems
 - 4%: Rural domestic and livestock uses



Percentages of state populations using groundwater for drinking water in 1995

- ▶ Arizona 60%
- ▶ California 45%
- ▶ Colorado 22%
- ▶ Idaho 96%
- ▶ Montana 53%
- ▶ Nevada 31%
- ▶ New Mexico 90%
- ▶ Oregon 40%
- ▶ Utah 56%
- ▶ Washington 61%
- ▶ Wyoming 57%



Groundwater Problems throughout the U.S.



- ▶ Pima County, Arizona



- ▶ Fissure near
- ▶ Picacho, Arizona



Dock on Crooked Lake in Central Florida in the 1970's



The same dock in 1990

California's Central Valley: once rich in wildlife, now a desert

Challenges in Managing Western Groundwater:

- ▶ Dealing with severity of current drought in the West; one of most severe in past 100 years
 - Extreme drought in most of Rocky Mountains
 - Exceptional drought in SE ID, SW MT, SW WY, NE&S UT
- ▶ Meeting burgeoning human needs and ecosystem protection requirements
 - Water crises even in normal years in the future
- ▶ Protecting quality of surface and ground waters
- ▶ Securing maximum benefit of water resources
 - How to encourage conservation and protect water rights

Management Challenges

- ▶ Understanding interaction of ground and surface waters and impacts of natural processes and human actions
 - Surface water sometimes gains water and solutes from aquifers
 - Ground water is sometimes recharged by surface water, affecting quality
 - Surface water and groundwater watershed may not coincide
- ▶ Accounting for surface-water diversions and return flows
 - Diversions from streams resulting from groundwater withdrawal
 - Groundwater return flows from irrigation and other water uses
 - Trading groundwater and surface water rights
- ▶ Managing water quality
 - Determining contributions of groundwater to stream and lake contamination and surface water contamination of groundwater in meeting water quality standards
- ▶ Protecting and creating wetlands

Ecologically Sustainable Groundwater Management

- ▶ Sustainable long-term yields from aquifers
- ▶ Effective use of the water stored in aquifers
- ▶ Preservation of groundwater quality
- ▶ Preservation of aquatic environment by prudent use of groundwater
- ▶ Integration of groundwater and surface water management
- ▶ Balance between consumption and ecosystem protection
- ▶ Conservation and efficient use of resources

Source: U.K vision statement, USGS: "Sustainability of Ground-water Resources"

Legal Challenges

- ▶ Fragmented legal approaches
 - Traditional management and laws treat groundwater and surface waters as separate rather than integrated resource
 - Four different legal doctrines govern groundwater
 - ▶ Common law: Rule of capture--unlimited withdrawal of water below owner's land
 - ▶ American rule: Reasonable use, withdrawal for reasonable and beneficial purposes
 - ▶ Correlative rights: Landowners have right to proportionate share of water
 - ▶ Prior appropriation: First to put water to beneficial use can continue to do so
- ▶ Improving governance of watersheds
- ▶ Legislating ecologically sustainable development

Western States and Groundwater Law



Phipps Wash, GSENM, Utah



Arizona



- ▶ Leader in development of groundwater policy; 1st law in 1945
- ▶ Ground and surface waters not managed conjunctively
- ▶ 1980 Groundwater Management Code
 - Comprehensive framework governing withdrawal, transportation, use, conservation, and conveyance of rights; goals are to
 - ▶ Control overdrafting
 - ▶ Allocate limited groundwater efficiently
 - ▶ Augment supply through development
 - Different management requirements for different areas:
 - ▶ Active management areas: strictest level of management
 - ▶ Irrigation non-expansion areas: only if irrigated between 1975-1980
 - ▶ Reasonable and beneficial use limits on groundwater rights elsewhere



- ▶ Permits required for all non-grandfathered wells in AMA
- ▶ Each AMA has detailed management plan for specific time period; conservation requirements are tightened in each new time period
- ▶ Developers must certify adequate water to meet needs for 100 years
- ▶ Owners with surplus supplies of water can store underground for later use, including Colorado River interstate water



California



- ▶ Chronic problem of insufficient water; groundwater supplies at least part of drinking water for $\frac{1}{2}$ its population
- ▶ State law:
 - Ground and surface waters not managed conjunctively, but surface waters include subterranean streams flowing through definite and known channels
 - Encourages management at local level through creation of special districts (ag interests resist centralization)
 - Three basic rights in groundwater, in priority:
 - ▶ Overlying landowners have equal, correlative right to withdraw water; each to use reasonable share; no permits required
 - ▶ Others may appropriate surplus rights
 - ▶ Prescriptive rights can ripen under adverse possession by developing wells and conveyance systems



- ▶ Special enabling acts for groundwater districts in specific basins govern:
 - Conservation
 - Extraction
 - Replenishment programs
 - Rights in times of shortages
 - Priorities for use
 - Riparian and prior appropriation
- ▶ General acts create irrigation and other water districts with no authority to limit extractions
- ▶ Counties have passed ordinances to govern groundwater withdrawal.
 - Some provide for conjunctive use
 - Some allow export of groundwater
- ▶ Uncertainty over relative powers of state, counties and cities to regulate groundwater



Colorado



- ▶ Complex system of water law
 - Groundwater is assumed to be tributary to surface water and is governed by prior appropriation
 - Conjunctive use and management system
 - 1965 Ground Water Act and 1969 Water Right Act identified 4 types of groundwater
 - Goal is full economic development; ok to mine some aquifers
 - Evolving definition of beneficial use
 - Number of agencies involved:
 - ▶ Water Conservation Board authorizes creation of boards and districts
 - ▶ Groundwater Commission governs water rights in 8 designated basins
 - ▶ State engineer and water courts regulate non-designated groundwater and groundwater in Denver Basin aquifers
 - Interbasin transfers of water are allowed except for designated basins

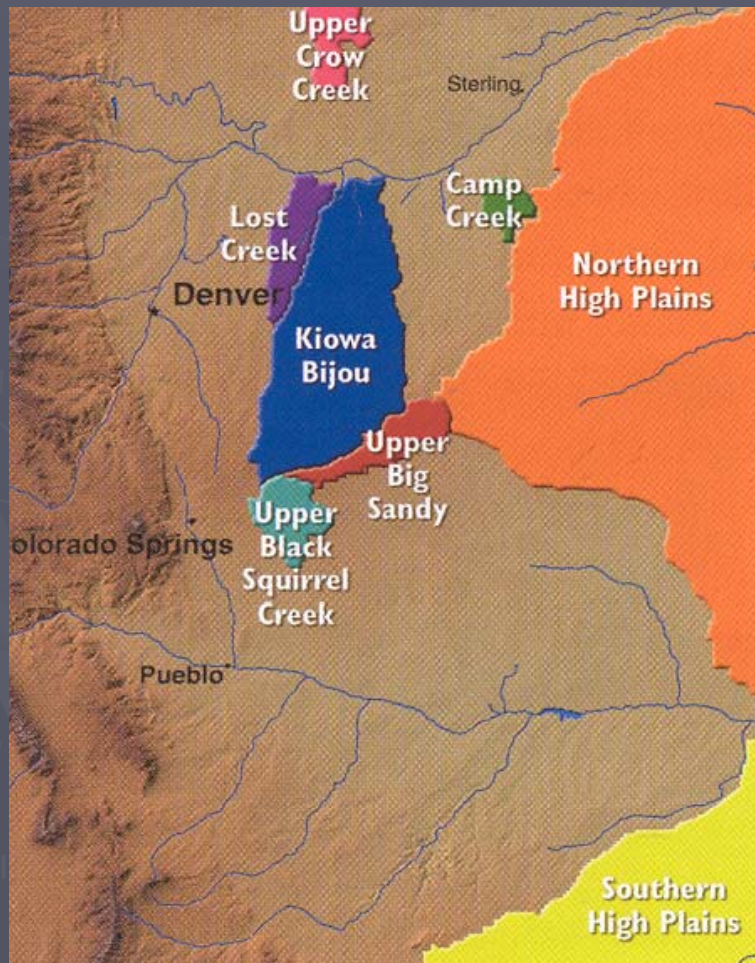


► Types of groundwater

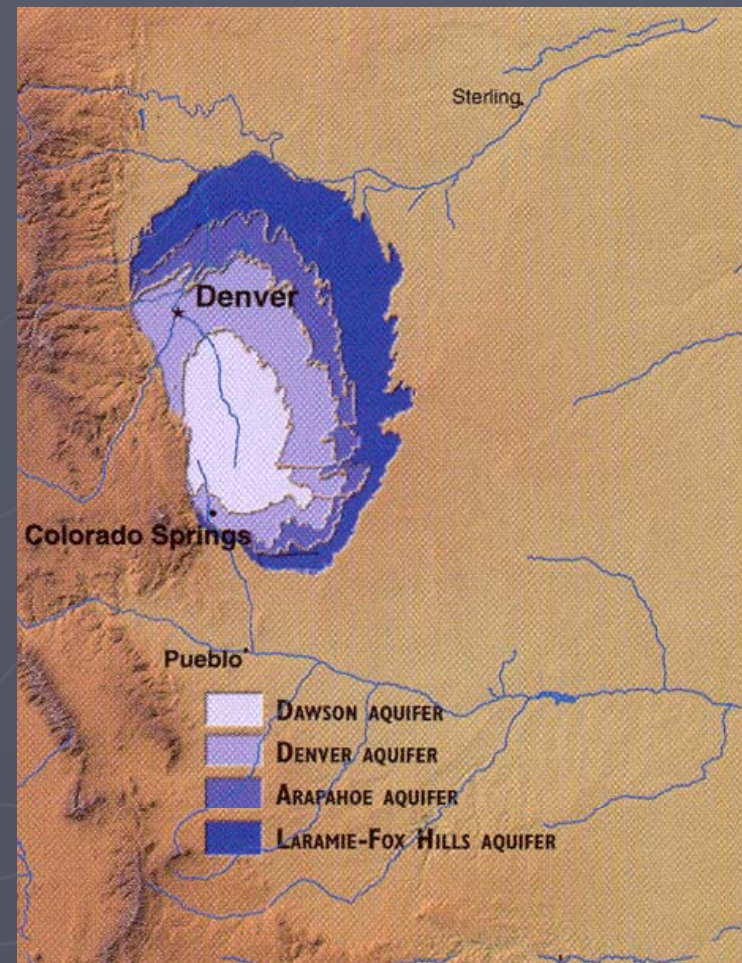
- Deep groundwater—not connected to surface waters
 - Designated Water—under natural conditions does not recharge or supplement surface streams
 - 8 designated basins on eastern plain; <40% depletion within 100 yrs
 - Nontributary Groundwater—outside of a designated basin
 - pumping will not affect surface waters within 100 years, can withdraw at 1%/year by overlying landowner
 - Well permit from state engineer is required
 - Water judges determine water rights
 - Not Nontributary and nontributary Denver basin groundwater
- Tributary Water—water below the surface that is connected to a river
 - Governed like surface waters—prior appropriation, permit from state engineer required for wells



8 designated basins



► Denver Basin Aquifer System





▶ Denver Basin:

- Allocated to overlying landowners except the part of the basin included in a designated groundwater basin
- Two types of water outside of designated basins
 - ▶ Not nontributary groundwater
 - ▶ Nontributary groundwater
 - ▶ Pumping of either requires replacement of water to surface stream (presumption of connection with South Platte Basin)
- Denver basin aquifers:
 - ▶ Landowners can withdraw at rate of 1%/year until exhausted
- Denver basin groundwater outside of any designated basin:
 - ▶ Allocated like nontributary groundwater
 - ▶ Use must be replaced or augmented by returning part of pumped water to the stream



Idaho



- ▶ Began regulating groundwater in 1951, permits required since 1963 except for domestic use to drill and to appropriate water
- ▶ Groundwater and surface water both subject to prior appropriation
- ▶ Director of Department of Water Resources:
 - identifies critical groundwater areas, approves plan
 - ▶ insufficient to provide “reasonably safe supply” at current withdrawal rates
 - ▶ Can deny permits and curtail withdrawals
 - ▶ Requires reporting and measuring
 - Identifies groundwater management areas that may become critical areas



▶ Conjunctive management of ground and surface water rights

- Recent developments in response to drought
- All water in Snake River Basin is presumed to be connected
- Rules curtail use of junior groundwater rights when shortfalls occur
- If groundwater districts can't provide share of water, pro rata reduction of water for irrigation

▶ Water banking

- Idaho Water Resources Board operates bank
- Authorized in 1979
- Junior groundwater users provide replacement water to senior surface water users
- Local groundwater boards formed to hear claims
- Consists of: director, engineer or geologist, and resident irrigation farmer



Montana



- ▶ Groundwater defined as any water beneath surface
- ▶ State law seeks to:
 - Ensure optimal beneficial use and no waste
 - Secure maximum economic and social prosperity
 - Conserve supplies for recreation and conservation
 - Systematically monitor and assess quality of aquifers and maintain long-term records of chemistry and water level
 - um beneficial use without waste
- ▶ Reasonable use requirements for permit to appropriate water, including groundwater:
 - Minimum stream flows
 - Projected demands on state water supply
 - Feasibility of using low-water quality to meet needs
 - Probability of adverse environmental impact
 - Legislature must approve withdrawals $>3,000$ AC/year



▶ Limiting groundwater withdrawals:

- Department of Natural Resources creates controlled area
 - ▶ Withdrawals exceed recharge or likely to occur in future
 - ▶ Significant disputes over rights
 - ▶ Declining groundwater levels
 - ▶ Withdrawals adversely affect water quality
 - ▶ 1979- Claims to water filed

▶ Areas designated as controlled:

- Can close area to further appropriation
- Can apportion withdrawal limits among rights holders based on priority dates
- Can give preference to domestic and other uses
- Can designate temporary areas for 2 years

▶ Has been done primarily for surface water



Nevada



- ▶ Ground and surface water regulated separately by law under prior appropriation rules
- ▶ State Engineer issues permits to appropriate groundwater
 - Permits granted even if water level will be lowered, as long as other right-holders are protected
 - Must deny application if detrimental to public interest
- ▶ In practice, managed conjunctively
 - Engineer can issue rights to underground water to supplement inadequate surface supplies
- ▶ Surface water can be stored underground for later use



▶ Engineer can designate a groundwater basin for administration:

- Permit required for wells
- If basin is being depleted, can issue rules "essential for the welfare of area involved"

▶ California-Nevada Interstate Compact:

- Each state can develop groundwater as long as it doesn't reduce amount of water other state would have received if groundwater not developed



New Mexico



- ▶ Almost 90% of population dependent on groundwater
- ▶ Worst drought in last 50 years
- ▶ Groundwater governed by prior appropriation
 - 33 groundwater basins
 - ▶ Water put to beneficial use before designated date is a right
 - ▶ Water used after requires a permit
- ▶ State engineer issues criteria for gradual mining of mined basins (aquifers unconnected to surface waters)
 - Each driller has a correlative right to take his/her share over a designated period of time
 - For groundwater connected to surface water, Engineer protects existing wells and surface water rights



- ▶ Ground and surface water conjunctively managed
 - Conflicts over denial of well applications because of impact on surface right holders in Rio Grande Basin
 - Engineer may require depletion of groundwater offset by return of water such as treated effluent to the river
 - State law authorizes injecting treated water into depleted aquifers
- ▶ Out-of-state groundwater transfers
 - State law banned them
 - Federal court ruled violation of commerce clause
- ▶ Water banking:
 - Farmers can lease water without losing long-term rights



Oregon



- ▶ Prior appropriation—permits required for both surface and groundwater appropriation
 - Conjunctive management where surface and groundwaters are connected
 - ▶ Water Resources Dept to ensure groundwater appropriations don't interfere with more senior surface rights
 - Certain water uses are exempt from permit, such as domestic use <15,000 gal/day; commercial use <5,000 gal/day and watering stock
 - ▶ Problem of thousands of exempt wells
- ▶ Aquifer storage and recharge
 - license needed to divert, store, and recover water
 - Water withdrawn only for original beneficial use
 - License good for not more than 5 years



- ▶ Basin programs
 - Water management policies and objectives governing appropriation within each basin
 - Critical basins are more regulated
- ▶ Commission encourages voluntary agreements among users
- ▶ Conservation projects can result in right to conserved water, minus $\frac{1}{4}$ of water saved for environmental purposes
- ▶ Water Resource Commission can designate critical groundwater management areas if overdrafts, contamination, other problems
 - Close to further appropriation or limit withdrawals by existing right holders
 - Rules require groundwater users to drill wells away from watercourse to protect surface waters



Utah



Prior appropriation for surface and groundwater

- Appropriations are treated identically
- ▶ Conjunctive management of surface and ground water
 - Key to meeting demand during current severe drought
- ▶ Water is fully appropriated and agricultural rights are often senior
 - Need to convert from agricultural to M&I, conserve, and treated wastewater to meet growing demand
 - 2002 law: if water users fail to use entire water allocation for five years, unused portion is forfeited and reverts to public



- ▶ State Engineer adopts groundwater management plans where overdrafting occurs

- Places cap on total maximum annual withdrawals
- Sets well spacing requirements

- ▶ Artificial recharge and recovery:

- Permit allows appropriator to trace water in and out of reservoir and avoid conflicting claims
- Pilot projects

- ▶ Interstate transfers allowed under permits

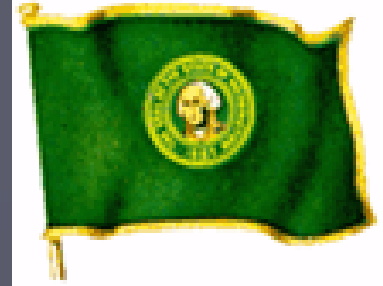
- ▶ Limited water banking



Washington



- ▶ Prior appropriation for surface and groundwater
 - Groundwater code enacted 1945
 - ▶ Groundwater is all waters existing beneath the land surface or bed of stream or lake or other surface water body
 - ▶ Permits required for all withdrawals except watering stock, watering lawns or gardens <math>< 1/2</math> acre, or 5,000 gal/day for domestic or industrial purposes
 - Two types of groundwater
 - ▶ Natural: exists wholly due to natural processes
 - ▶ Artificial: intentionally or incidentally from irrigation
 - ▶ Only natural groundwaters and abandoned artificial waters are subject to appropriation (abandoned requires 5 years nonuse)
- ▶ Comprehensive state water resources plan
 - Watershed Resource Inventory Areas for areas with allocation problems
 - Department of Ecology sets minimum water flows for streams and lakes



- ▶ Department can designate groundwater areas and manage to prevent overdrafts.
 - Can order decrease in withdrawals according to priority of rights
 - Create groundwater management program for each area
 - ▶ Long-term monitoring
 - ▶ Annual withdrawal rates and safe-yield guidelines
 - ▶ Ensure long-term benefits to residents of the state
- ▶ Out-of-state water use allowed
- ▶ Aquifer storage and recovery projects require water right and reservoir permit
 - Must be reviewed by Dept of Fish and Wildlife and affected Tribes to ensure no adverse impact on fish



Wyoming



- ▶ 1947 law: prior appropriation for groundwater
 - 1957 law required permits for withdrawals
 - Groundwater is any water under the surface of land or bed of surface waters
- ▶ Where ground and surface waters are connected, priorities of rights to use it are to be correlated and single schedule of priorities established
 - Groundwater permits specify that they are subject to regulation and correlation with surface water rights if waters are determined to be connected
- ▶ Control areas created where withdrawals are approaching recharge rate, levels are declining, waste is occurring, or need to protect public interest



▶ Control areas:

- Create control area advisory board—5 people living in area
- If state engineer finds insufficient water, can:
 - ▶ Close area to further appropriation
 - ▶ Determine permissible withdrawal and apportion total among appropriators
 - ▶ Specify well spacing
- Domestic and stock use have preference

▶ Noncontrol areas:

- Permits granted unless not in public's interest
- ▶ Special rules for appropriation in Yellowstone Park
- ▶ Legislature must approve export of water outside the state

Summing Up: What state legal and management practices are most promising?

- ▶ Recognition of interconnectedness of surface and groundwater in many areas
- ▶ Designation and careful management of groundwater basins
- ▶ Regulatory power to protect long term viability of aquifers
- ▶ Careful assessments and monitoring of aquifer water quality and quantity
- ▶ Recognition of value of ecosystem services and minimum water requirements for ecosystem health
- ▶ Recognition of the value of injecting water for underground storage
- ▶ Prospective actions to manage limited water resources
- ▶ Allowing transfer of water rights for highest value uses
- ▶ Others?

What are the some challenges in state groundwater law?

- ▶ How to integrate surface and groundwater management
 - Interactions are often complex, uncertain; how to understand them better?
 - Very difficult to do now; how to integrate separate rights and priorities?
 - How to monitor and regulate millions of small, exempt wells?
- ▶ How to secure adequate water to meet growing needs
 - What mix of conservation standards, infrastructure improvements, increased prices and other approaches are appropriate?
 - Should new applicants for water rights be required to purchase and retire existing ones?
 - Should states allow mining of separated aquifers?
 - Should states raise water prices so they reflect the true cost of using water and encourage the most valued use?
- ▶ How to balance consumption and ecosystem protection
 - Both are in our interest; ecological economics demonstrates the economic value of ecosystem services; how does that value compare with other values—agriculture, industry, stock watering, domestic use?
- ▶ Others?