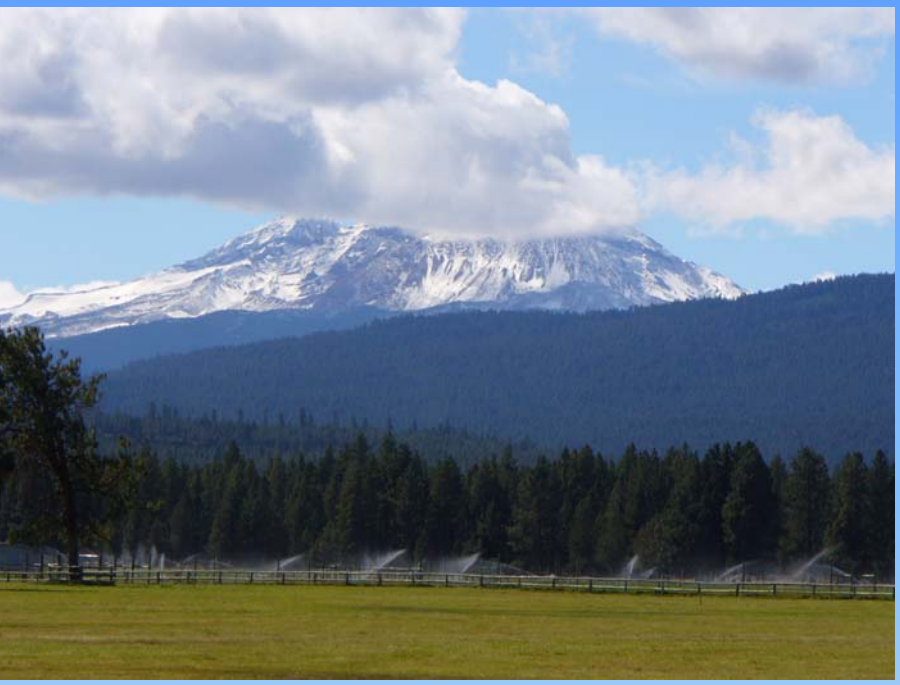

A Reallocation World: Realities, Choices & Evolution

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Messages

- Reallocation will be central to meeting future human and environmental demands
- Economic reality suggests a trade-off between uses that leads to societal choice
- To succeed legal, regulatory and administrative systems need to adapt to the reality of a Reallocation World

Structure

- Integrated Water Resources Management
- Reallocation World
- Economic Realities
- Societal Choice
- Legal Evolution

What are we Managing?

- Water Resources / Ecosystem Water
  - Precipitation
  - Ground water
  - Surface water
- Value-Added Water
  - Irrigation Water
  - Municipal & Industrial Water Supply
  - Bottled Water
- Water-Related Services
  - Hydropower
  - Flood control
  - Transport (locks and waterways)

Scarcity = Crisis?!

But what is root cause?

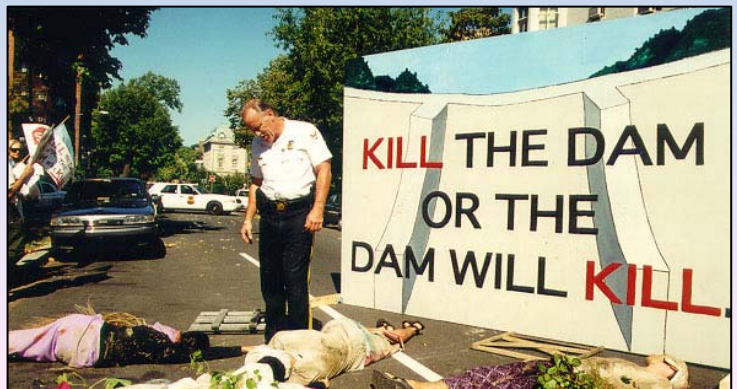
Governance Failure

Integrated Management

- Hydrologic integration - managing components
  - Watersheds (capture, ET and infiltration)
  - Surface Water (extraction, storage)
  - Ground Water (storage, pumping)

and their interrelationships

  - Run-off (watershed to surface water)
  - Recharge (watershed to ground water)
  - Discharge (ground water to surface water)



Context

- Development of new supply limited
- Provisioning Service demands increasing
- Cultural, Supporting and Regulating Services degrading

Global Water Uses

		Consumptive Use of Freshwater (km3/yr)		
		Direct Human Use	Ecosystem Use and Indirect Human Use	Totals
Blue Flow				
Direct	Irrigation	1,800		1,800
	Domestic and Indus.	1,300		1,300
Indirect	stable		9,400	9,400
	flood flows		30,150	30,150
Subtotal Blue Flow		3,100	39,550	42,650
Green Flow				
Direct	Crops	5,000		5,000
	Grazing	20,400		20,400
Indirect	Grasslands		12,100	12,100
	Forests		19,700	19,700
	Arid lands		5,700	5,700
	Wetlands		1,400	1,400
	Lake evap		600	600
	Reservoirs		160	160
	Urban		100	100
	Unaccounted			5,690
Subtotal Green Flow		25,400	39,760	70,850
Grand Total		28,500	79,310	113,500

Source: Falkenmark and Rockstr m(2004)

Future Demands

- 9 billion people circa 2050
- Expected increase in consumptive use of 5,600 km3 of which 4,800 km3 from green water
- A reallocation of 1/8 of remaining green water from ecosystem to human use
- Plus power, water supply and sanitation needs

Questions?

- What impact will change in green water consumption have on ecosystems?
- Can we restore environmental flows (i.e. reallocating blue water to ecosystem uses) while we reallocate green water?
- What happens after population peaks?
- Who is in charge of planning here?

Economic Realities

- Need to grow the pie - make water more productive
- The opportunity cost of water use must be made clear to users
- Need to define and enforce rights
- Need to cap and prioritize uses
- Need to develop reallocation mechanisms

Societal Choices

- Will we make the choices we face explicit?
- Who will make the decisions?
- What criteria will we use?
- Can we think about optimizing ecosystem services instead of trading off between ecosystem and human uses?

Key Questions

- Who owns the water?
- What kind of uses are permitted and conditions of use?
- How is use of water prioritized?
- How are shortages accommodated?

Priority Systems

- No Prioritization
  - First in line, first in right
  - First in time, first in right
- Prioritized Uses
  - Household Use
  - Riparians
  - Human Uses
  - The Reserve
  - Environmental Flows

Legal Evolution

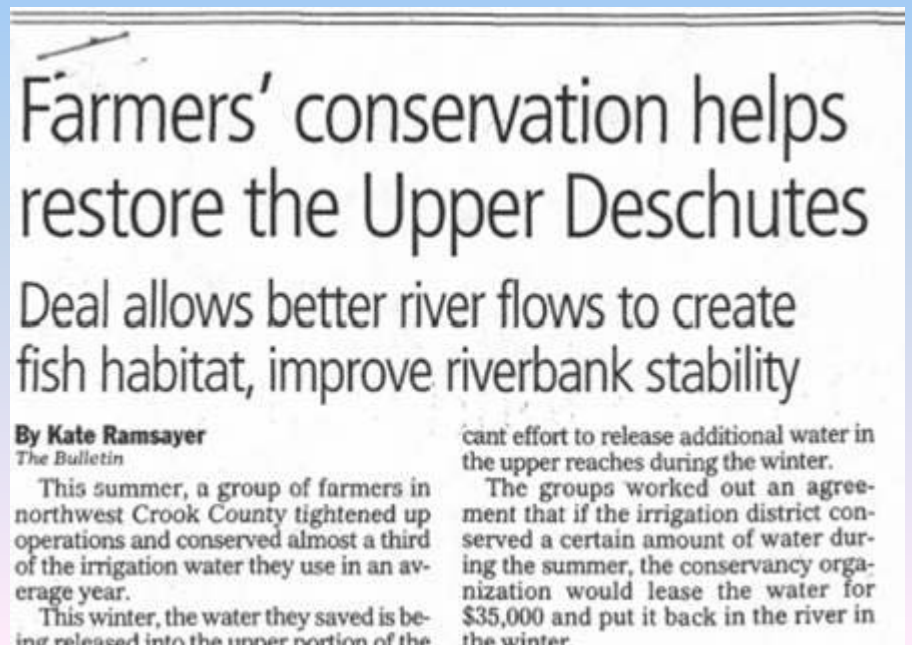
- A range of allocation and management systems exist
- Legal evolution or revolution?
- Choice of institutional arrangement and incentive mechanisms

Fundamental Precondition for IWRM

- Solve the common pool problem for water
  - Clear agreement on water-sharing and enforcement
  - Well-defined and enforceable property rights

Behavioral Objective

- Incentive compatibility: has the objective of aligning individual incentives (costs and benefits) to produce efficient allocation and use of resources/environment from societal perspective



Farmers' conservation helps restore the Upper Deschutes

Deal allows better river flows to create fish habitat, improve riverbank stability

By Kate Ramsayer
The Bulletin

This summer, a group of farmers in northwest Crook County tightened up operations and conserved almost a third of the irrigation water they use in an average year.

This winter, the water they saved is being released into the upper portion of the

cant effort to release additional water in the upper reaches during the winter.

The groups worked out an agreement that if the irrigation district conserved a certain amount of water during the summer, the conservancy organization would lease the water for $35,000 and put it back in the river in the winter.

Arrangements and Incentive Mechanisms for EFlows

- Voluntary Arrangements
  - Exchange water/rights for compensation
  - Users agree on sharing water/rights
- Centralized Arrangements
  - Command and Control - water/rights reallocated
  - Project Investments - management and conservation
  - Market-Based Instruments - taxes and payments
- Regulated Market Arrangements
  - Cap and Trade Systems

Cap and Trade

- Requires environmental use be recognized as a beneficial use
- Requires adjudicated or recognized claims
- Needs clear priority of allocation
- Needs Cap on surface and other uses
- Requires administrative transfer mechanism
- Needs protectability of environmental flows

Conclusions

- A Reallocation World!
- Call it optimization or tradeoff, can we make the needed choices?
- Legal, regulatory and administrative adaptation is required!
- Can developed countries lead and help developing countries plan and leapfrog?

Thanks!

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