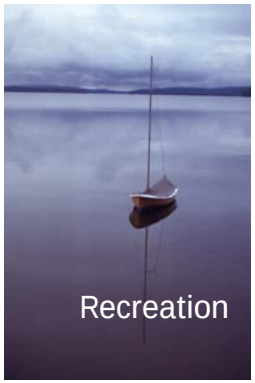
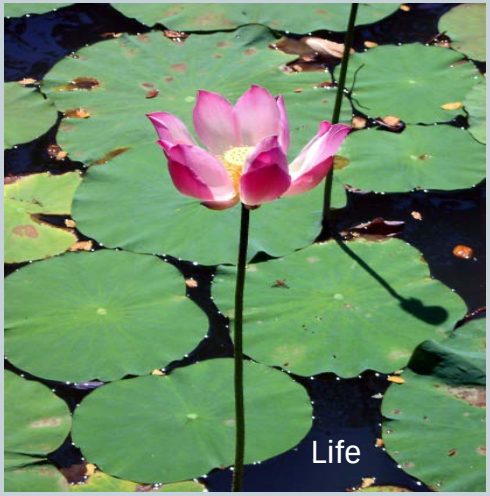
The Future of Water



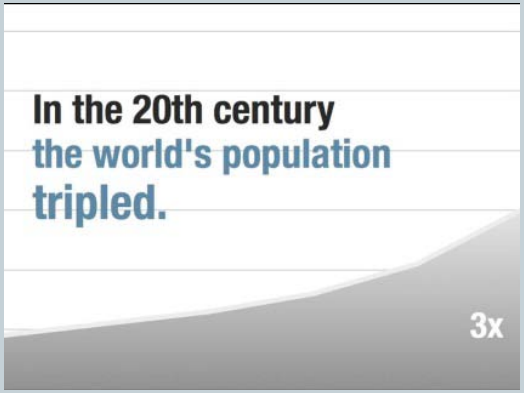
Steve Maxwell

CWCB Meeting
September 20, 2012



What Makes Water Unique?

- Water is our most essential life-sustaining substance
- Water is the most critical input to the world's economy
- The amount of water on the earth is essentially fixed
- Water is the only commodity that truly has no substitute – at any price



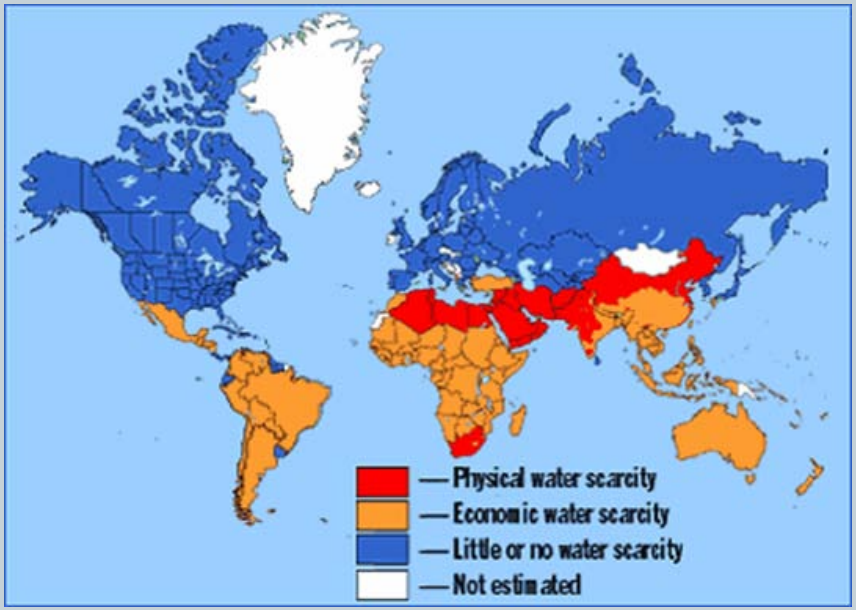
- Demand for water has dramatically increased as the planet's population has increased
- As standards of living increase, *per capita* consumption of water also increases
- As water resources become scarcer, political conflicts are likely to arise

Background and Context

- 2.5 billion people live without *any* kind of sanitation system
- 95% of the world's cities dump sewage into natural waterways
- Over 10 million children die each year from drinking dirty water
- Millions *in the U.S.* drink water that doesn't comply with SDWA
- The ASCE recently gave U.S. water infrastructure a "D-" rating

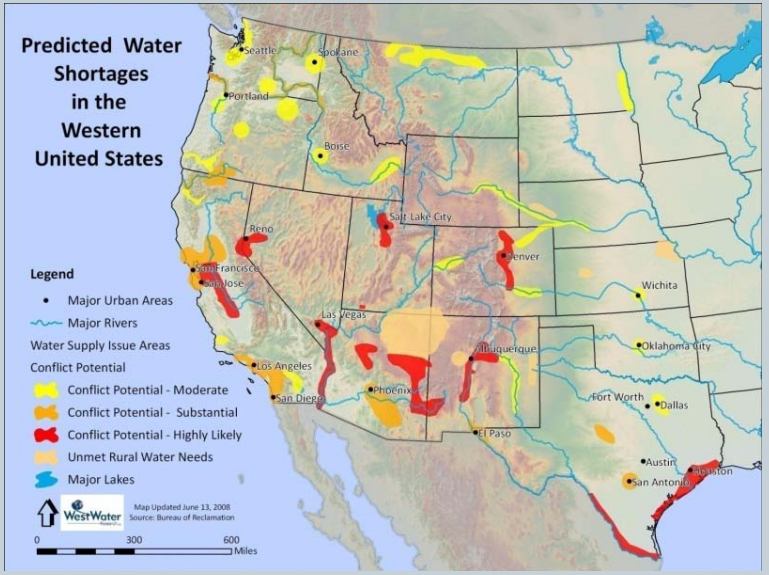
- Incipient climate change will accelerate or intensify many of the water challenges and issues that we already face
- Public awareness is growing, but more attention and more dollars are critically needed – challenges are still not widely recognized

Water Shortages Are Upon Us

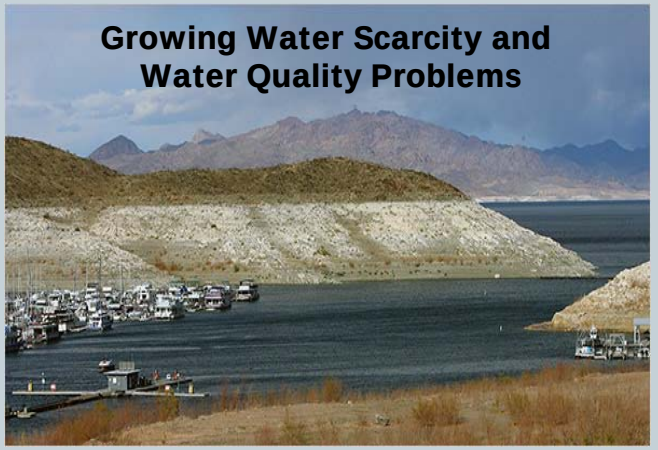


50% of the world's people are projected to be living with chronic water stress by the year 2050

We are experiencing rapid – and often irreversible – depletion of aquifers and natural wetlands



What's the Problem?



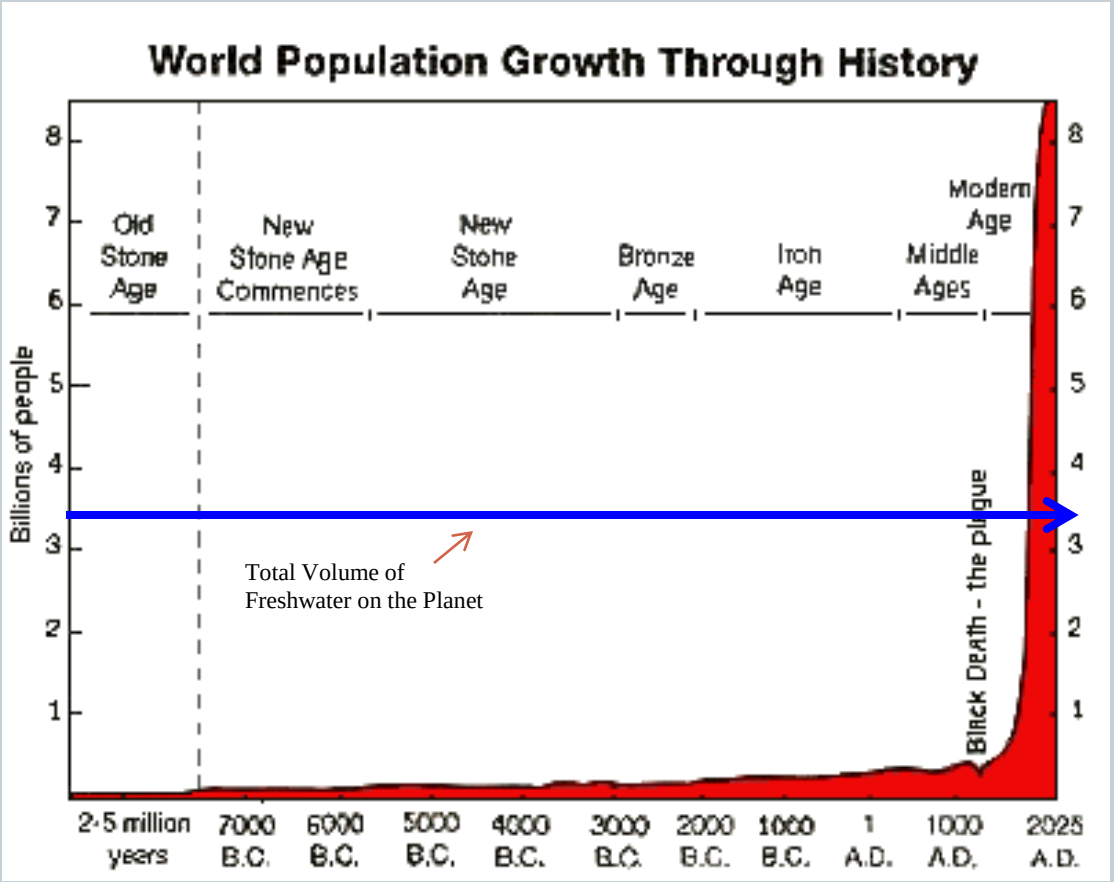
The Bare Facts

- **The Supply of Available Fresh Water on Earth is Essentially Fixed**

- **The Earth's Population and Demand for Freshwater is Rapidly Growing**

- **IT'S ABOUT THAT SIMPLE**

- **Water Use Has Been Growing At More Than Twice the Rate of Population Increase Over the past Century**



Key Trends

- Increasing Regulation
- Failing Infrastructure
- More Focus on Recycling and Reuse
- Residential Consumption Concerns
- Controversy About Privatization
- Fear of Emerging Contaminants


THE VIAGRA IN THE WATER MAKES ME WANT TO SWIM UPSTREAM, BUT THE PROZAC IS MAKING ME TOO TIRED...
Rx
WASTE

Emerging Solutions

- **Municipal conservation– e.g., low-flow appliances, block-tier pricing, changing behaviors – the example of Las Vegas**
- **Agricultural conservation – e.g., center-pivot and drip irrigation, laser field-leveling, ditch lining, soil moisture monitoring ,underground storage**
- **Reuse and recycling – e.g., advanced wastewater treatment, "purple pipe" systems, growing potable reuse projects**

- **Advancing technology – e.g., advanced oxidation systems, membrane filtration**
- **Out-sourcing and contract operations – e.g., the role of private capital, DBO systems, performance-based contracts**

The Future of Water: Four Key Themes

- 1) Water will increasingly be viewed as a true "factor of production"
- 2) Water consumption will increasingly be viewed in a more holistic manner

- 3) Boundaries between different types of waters will fade
- 4) The price of water will inexorably rise – reflecting its true cost and true value (and reinforcing all three key trends above)

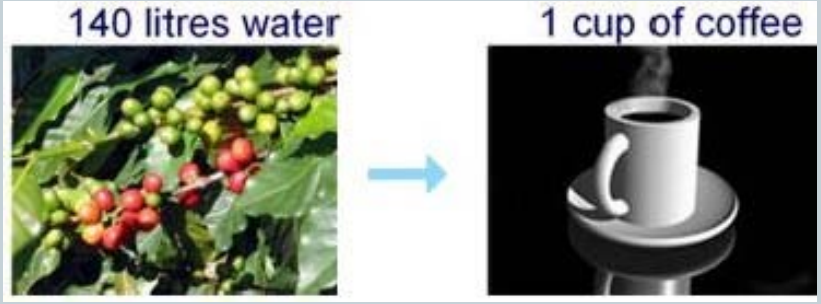
Water as a "Factor of Production"

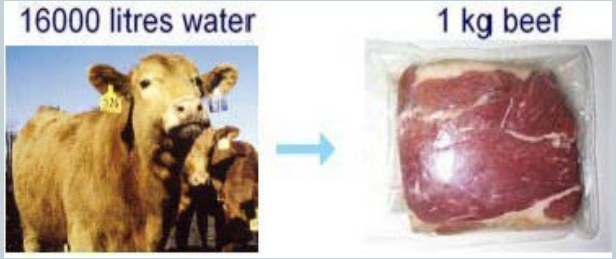
- Water will increasingly be viewed as a true "factor of production" – much like energy, labor or capital – in economic, business, policy and individual decision making
- As water becomes more expensive, it will increasingly drive economic, and individual, decisions

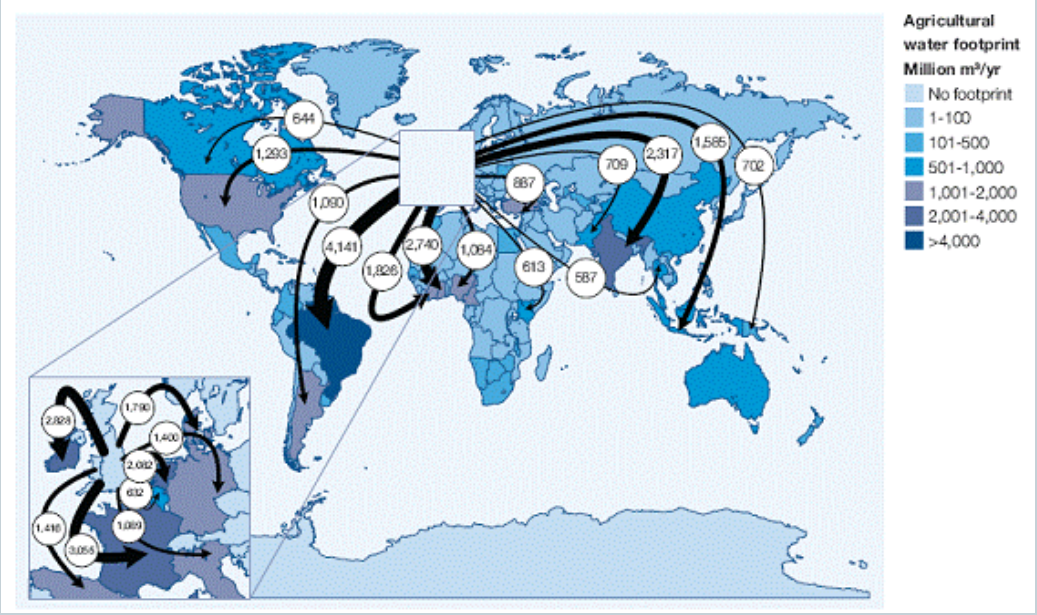
- Availability of abundant clean water will drive the location of industry in the future
- Will cities like Cleveland and Buffalo again be our centers of manufacturing and population growth in the future?

A More Holistic View of Water

- We only directly utilize some 50 to 300 gallons per day of water
- But we consume far more water contained in the products and services that we consume, and the various activities we engage in
- We must also begin to consider our *total* water footprint – the *virtual* water that we consume as well
- In the UK, 40 gallons/person/day vs. virtual use of 1220 gallons







Managing "One Water"

- The silo thinking of the past has kept water use and water reuse interests segregated
- We must encourage comprehensive thinking, planning, and management of our waters – on the transformational scale now necessary

Clean Water

Wastewater

Rain Water

WATER

Storm Water

Groundwater

Recycled Water

Rising Water Prices

- **The average family pays less than $20/mo. for water – far less than monthly electricity, cable TV, internet, or phone service bills**
- **Yet there is strong political resistance to 5% or 10% rate increases – probably less than what many spend monthly on bottled water!**
- **Recent surveys indicate about a 5% annual increase in water and sewer rates on average**
- **Cost per 1000 gals. in the US – $0.80 to $5.50**
- **High variability in water prices across the country, and around the world – Denmark pays almost 3 cents per gallon, while the U.S. pays about 4/10 of a cent per gallon**
- **Unfortunately, the U.S. ranks near the bottom in terms of efficient water usage**

Country	Average Water Price (Cents/Gallon)	Per Capita Domestic Use (Gallons per Head per Day)
Denmark	2.96	30.0
France	1.34	61.1
Germany	1.04	39.7
Australia	0.82	159.2
U.K.	0.69	36.6
Canada	0.64	204.7
Czech Rep.	0.53	56.1
Turkey	0.53	62.6
Japan	0.48	98.2
Portugal	0.47	81.1
Spain	0.46	90.0
U.S.A.	**0.43**	**162.1**
Poland	0.39	39.2
Italy	0.31	127.1
South Korea	0.19	145.3
Mexico	0.19	52.6
Russia	0.16	96.8
China	0.11	25.0
India	0.05	36.6

The Price of Water

Price of Water vs. Price of Other Consumer Liquids ($U.S./gallon)

Product	Average Price
TAP WATER	$0.0043
Coca-Cola	$3.00
Gasoline	$4.00
Tide Liquid Detergent	$8.50
Imported Beer	$12.00
Evian Bottled Water	$25.00
Starbucks Latte	$22.00
Pepto-Bismol	$65.00
Vicks 44D Cough Syrup	$100.00
American Whisky	$150.00
Visine Eye Drops	$750.00
Revlon Nail Enamel	$1000.00
Good French Wine	$1000.00
Chanel No. 5 Perfume	$45,000.00

Annual Spending in the U.S.

$2 billion a year on Viagra
$13 billion a year on cosmetic surgery
$22 billion a year on mood-altering drugs

$45 BILLION A YEAR ON CLEAN DRINKING WATER

$52 billion on pet care
$90 billion a year on tobacco products
$93 billion a year on legalized gambling
$160 billion a year on alcoholic beverages
$720 billion a year on military defense

Future Trends

- We must promote a broader and deeper public understanding of water issues
- In terms of water issues, we must think globally, but act locally
- We must develop smarter laws and policies

- The water industry will continue to experience strong and predictable – if not spectacular – growth
- Water prices will continue to inexorably rise - sharply in many areas
- More efficient pricing and allocation systems will emerge, by necessity
- A key future challenge will be starting to manage water as an economic commodity, while simultaneously insuring that it is available to all