THE FUTURE OF WATER

A STARTLING LOOK AHEAD

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A NEW ERA

- 1920 Frederick Haynes Newell wrote that conservation meant usage and exploitation of the resource; not wasting water by letting it run downstream unused.
- 1959 Travelers Insurance Company stated pumping up water from the Ogallala would be sufficient for farmers to irrigate their crops, hypothetically forever.
- 1980 concerns were voiced about over pumping of the aquifer.
- We are moving out of an historical age of water development, and into a new era of water allocation.
- *The Economist* magazine concluded that water "is ill governed and colossally underpriced."

LOOKING FORWARD

- Water will increasing be viewed as a true factor of production – like energy, labor, or capital – in manufacturing, policymaking and economic decision-making.
- Water usage will be evaluated in a more holistic manner, from the perspectives of virtual water and the water footprint.
- Boundaries between different types of water – drinking water, wastewater, rainwater, stormwater, source water, groundwater, seawater – will fade, with the emerging management of one water.
- The price of water will rise to reflect its true cost and value.

WATER USE OUTSIDE THE HOME	70%
WATER USE INSIDE THE HOME	30%
PERSONAL USE OF WATER	LESS THAN 1%

- Lawns: the American Dream 2005 evaluation by NASA showed 32 million acres of watered and mowed lawns. Lawn care industry is a $25 billion dollar industry and golf is a $76 billion dollar industry.
- Good news, low water toilets, appliances, and a low-grade public awareness of water shortages in arid areas.
- Delivering high quality water for personal uses may be cheaper in a bottle than treating all the home water delivered to a drinking standard

THE WATER FOOTPRINT

- Toilet paper: producing one roll takes 75-100 gallons of water, a person uses 50-100 roll per year in the United States
- Semiconductor chips estimated to need 400 washings, using ultrapure water manufactured by purifying 3 gallons of drinking water to 1 usable gallon
- International paper used 211 billion gallons in 2008
- Industry is increasing its evaluation of water risk, including cost, availability, supply chain strength

ASSESSING RISK AND INVESTING IN WATER

- Caterpillar, Inc. uses 5 billion gallons of water in 50 facilities in 23 countries.
  - 78% of those facilities have a single water source
  - What happens if water is scarce or expensive?
  - What are the risks to their supply chains?
- If your factory makes potato chips and you have sufficient water rights, what happens if your potato growers don't?
- Industry will move to areas with secure water sources
  - Brewing may return to Milwaukee

WHERE ARE WE GOING? – SCARCITY AND CLIMATE CHANGE WILL DRIVE THE PRICE OF WATER

- Agriculture - Which is cheaper? Locally grown with shipped water or shipped produce grown with rainwater. Buy asparagus grown with shipped water or ship asparagus grown with rainwater from Peru by jetliner and truck
  - Water for crops 70-80% of fresh water
  - Genetically alter crops to grow with less water, with seawater?
  - Move farms to areas with secure water supplies, rainwater?
- Future costs of food will reflect either the cost to move the water to the farm or the cost to move the food to the market.
- Industry will move to areas with secure water sources
  - Brewing may return to Milwaukee

WATER FOR FOOD PRODUCTION

• One glass of beer	20 gallons of water
• One cup of coffee	37 gallons of water
• One gallon of milk	53 gallons of water
• One pound of cheese	371 gallons of water
• One pound of chicken	469 gallons of water
• One pound of pork	756 gallons of water
• One pound of beef	1,857 gallons of water

WHERE ARE WE GOING? – SCARCITY AND CLIMATE CHANGE WILL DRIVE THE PRICE OF WATER

- People will migrate to sustainable water areas
  - In 2020 the world had 7.753 billion people and counting
  - Forever there has been 326 million trillion gallons of water, no more, no less
  - 260 major river basins in the world, watersheds cross 145 national boundaries
  - 60% of the world's population lives in these basins
- Globally political and humanity issues, restriction of water with dams will cause unrest and exacerbate political tensions, ex: China and India.

IMPACT ON MUNICIPALITIES

- Treated drinking water will get more expensive, both raw and treated
  - USEPA estimated in 2010 that water utilities need $335 billion over the next 20 years to maintain and extend water treatment and distribution
  - The number of regulated contaminates removed jumped from 22 in 1976 to 91 in 2000.
  - In 2009 the USEPA published the 100 additional compounds on the Contaminate Candidate List
- Wastewater faces the same treatment challenges and the same lists
- Stormwater currently adheres to 1920 idea of conservation, let it runaway unused

TRENDS WITHIN MUNICIPALITIES

- More use of private contractors to meet construction needs.
- Some privatization of municipalities to run the treatment and wastewater plants. Gives deeper pockets to a small utility. Rates set by the local government and elected officials.
- Mission is to convince the public that water is no longer cheap and in places is no longer plentiful.
  - Smart meters need to be installed to help the public understand their water usage.
- Utility mangers are the most trusted person to spread the message.

WHERE TO FIND USABLE WATER

- Desalinization
  - Thermal
  - Reverse osmosis
  - Innovations – better filters, use less energy, concentrated solar power bringing water to an instant boil
- The International Organization for Dew Utilization
- Recycling and reclaiming water from urine, graywater, wastewater
- Better storage, reducing evaporation

REGULATORY WATER SILOS

- Six federal cabinet departments
- Thirteen congressional committees
- Twenty-three congressional subcommittees
- Regional compacts
- State regulations
- Watershed authorities
- Municipal and agricultural requirements

REGULATION AND CONFLICT RESOLUTION

- Needs to be global and national but most importantly local.
- Water may be plentiful in areas and scarce elsewhere.
- Local water users must have a voice and a role.
- Globally solutions will be challenging as countries build dams and reallocate water.
- Migration to water sources will exacerbate current stresses and conflicts.

NEW MARKETS

- Water marketing and trading will grow
- New products and services
- Technology development and innovations
- Global and local solutions
- Water is predicted to grow, currently the third largest industry, second if oil and gas are combined
- Utilize previously unthinkable plans like the Colorado-Big Thompson project

FEARS, CHANGES, AND CHALLENGES

- Climate change and unknowns of rising water, dryer areas
- Relocation and migration
- Saltwater intrusions
- Desalinization issues of heat, salt buildup, habitat loss
- Loss of control and changes of lifestyle and livelihood
- 1 person in 6 has no access to clean drinking water
- 1 person in 3 does not have adequate wastewater treatment
- Smells

THE FUTURE OF WATER SOLUTIONS FOR TOMORROW

- Four categories encompass the solutions available to us:
  - The importance of developing a broader and deeper public understanding of water issues
  - Adherence to the philosophy of thinking globally while acting locally
  - Pursuit of incremental technological advances and solutions
  - Development of smarter laws and policies

WE SUFFER NOT SO MUCH FROM AN ABSOLUTE SHORTAGE OF WATER AS FROM AN INABILITY TO PROPERLY MANAGE AND ALLOCATE THAT WATER WE DO HAVE.

BIGGEST CHALLENGE:

IF AND HOW WE CAN HAVE A RATIONAL, GLOBAL, AND LOCAL DISCUSSION OF WATER.