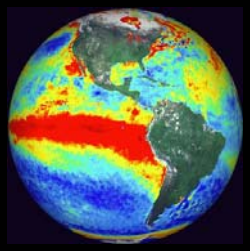
Webcast sponsored by EPA's Watershed Academy

Water, Energy, and Climate Change



October 3, 2007 Webcast

Susan Kaderka, Director, National Wildlife Federation's Gulf States Office

Don Elder, President, River Network

1

Global Warming and America's Watersheds

2

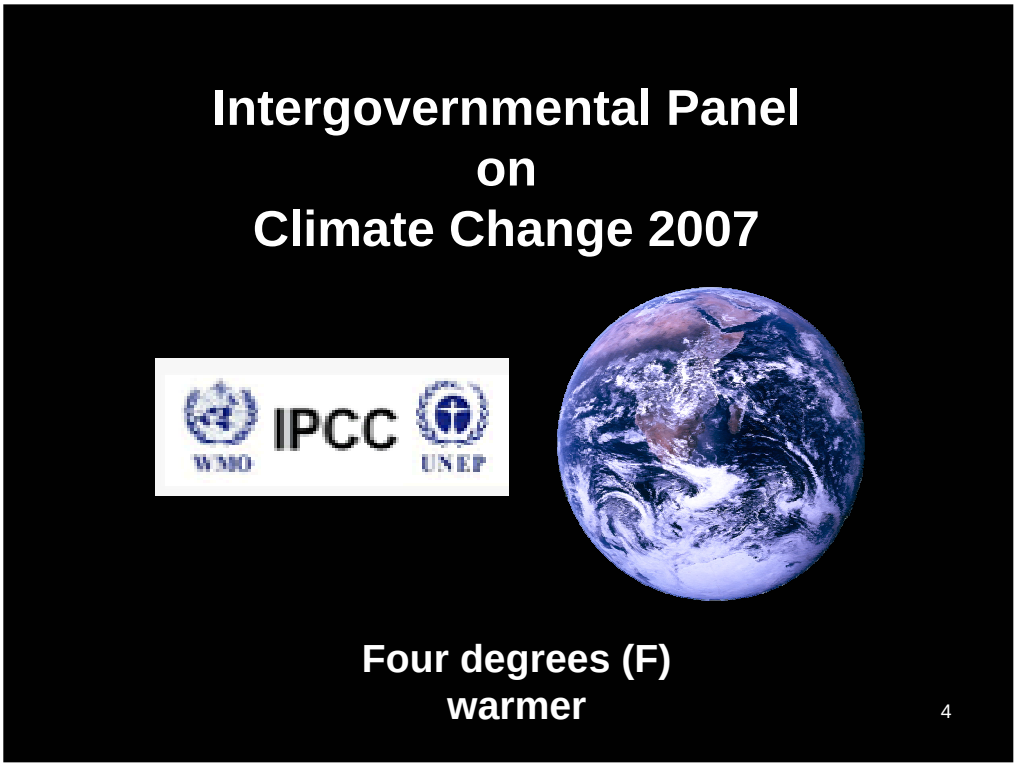
This presentation represents the beginning of a joint training effort by River Network and the National Wildlife Federation.

Last summer, the National Wildlife Federation, developed training materials for the Climate Project, which is Al Gore's project to train 1,000 community leaders around the country to spread the word on climate change by learning to present the slide show featured in the documentary *An Inconvenient Truth.* To date, the people trained through the climate project have given more than 5,000 presentations and reached more than 250,000 people.

National Wildlife Federation has been very inspired by this training model for mobilizing grassroots action and over the past six months or so have been developing customized slide presentations and presentation guides for targeted groups—hunters and anglers, birders, the Chesapeake Bay Foundation.

This presentation is intended for river conservationists. It is designed to be adapted and presented by River Network and NWF members who want to carry the word about global warming's impact on rivers, streams and watersheds to their own state and local constituents.

I want to stress that this is beta test of this slide show—this is the first time we are presenting it—so as I go through this, I'd like you to jot down any thoughts you have about additions or deletions of changes in emphasis. I'll be asking for feedback during the question/answer period.



So lets take a look at what scientists are telling us is likely to happen.

The Intergovernmental Panel on Climate Change (IPCC) is a United Nations committee of more than 2,000 scientists and economists who have been assessing the **extent** of global warming, its **causes** and its **consequences** since 1988.

In all the IPCCC has released 4 reports—1990, 1995, 2001, and most recently, 2007. Each one of them establishing with greater certainty the fact of global warming and the role of human activity in causing it.

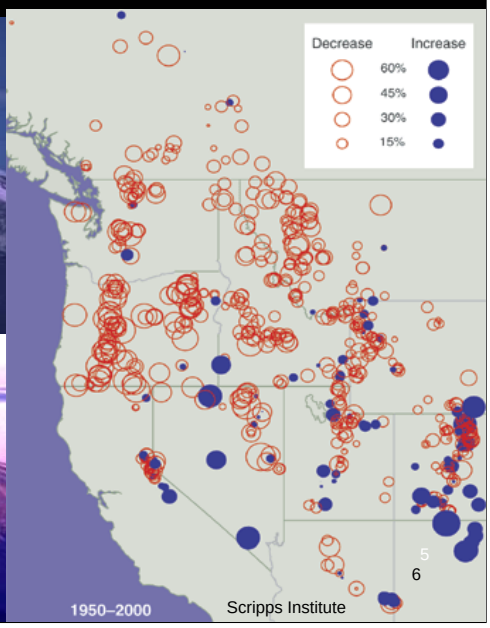
Its most recent report concluded that average global temperatures will almost certainly increase by 5 degrees Fahrenheit over the next century and that sea levels will rise from 10 to 23 inches.

(This sea level rise estimate does not take into account any melting of the ice on Greenland or the Antarctic peninsula because the data on that phenomenon are new (over the past two years or so) and scientists are not agreed on what it means, so they chose not to factor it in to the 2007 report. There are many scientists, however, who think sea level rise will be much worse because of ice that is now on land either melting or breaking off and sliding into the ocean.

The IPCC concluded that water resource issues were among the key concerns for the U.S. and that is what I want to concentrate on today


Snow-Fed Rivers

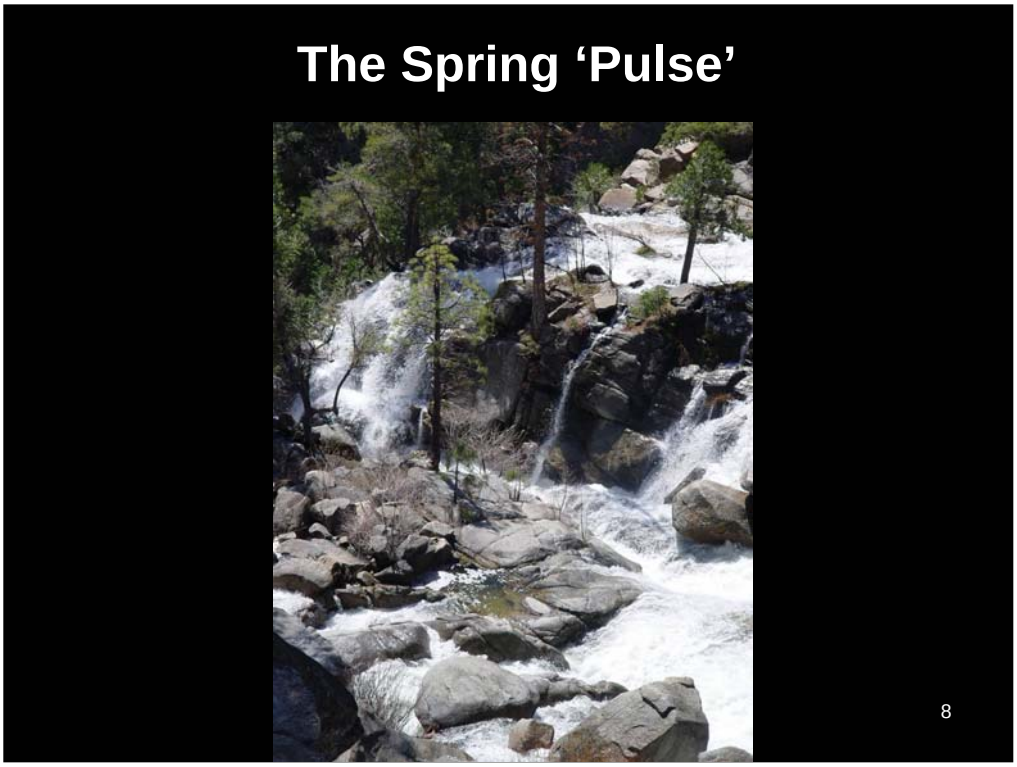
Declining Mountain Snowpack



5
6

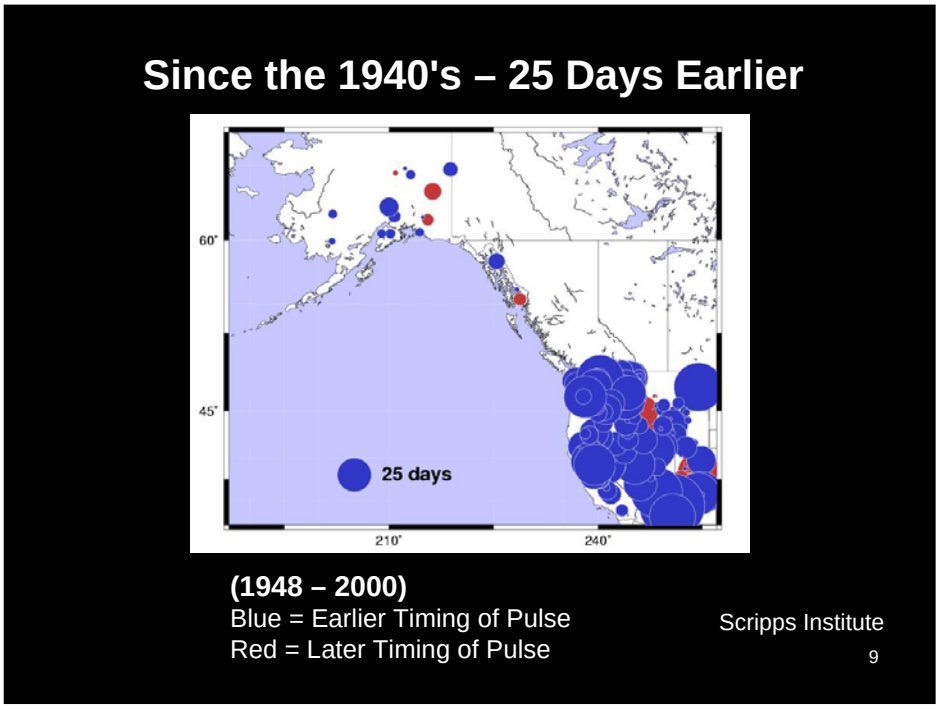
Earlier Snow Melt –
25 Days Since the 1940s

7



On of the ways this earlier snow melt is being tracked and measured is by monitoring the spring pulse—which is the time of initial high flow in the spring that marks the transition between lower winter flows and higher spring flows.

The ecology of the lower lying areas of these mountains—the fish and wildlife and plant life—have adapted over millennia to abundant Spring flows occurring at the same times each year.



Now we see that this spring pulse is coming earlier in the year.

Researchers at the Scripps Institute found that the timing of snowmelt runoff has advanced for many

On average the run-off “pulse” (particular few days in the Spring when the winter snow begins to th

Effects of Changed Timing

Fish Spawning

11

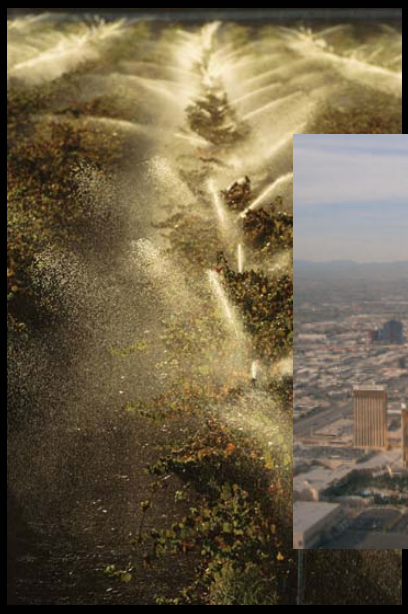
Drier Summers

12

Warmer Streams

13

Increased Competition



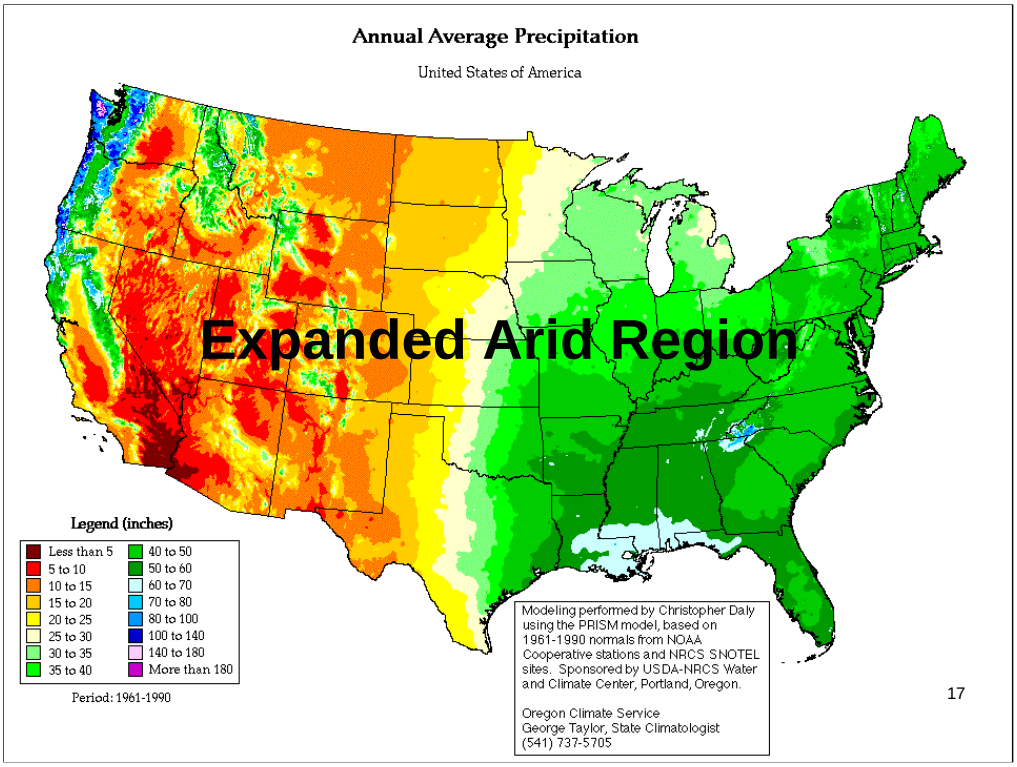
14

Water Storage and Capture

15

Southwest Rivers

16


Annual Average Precipitation
United States of America
Expanded Arid Region
Legend (inches)
Less than 5
5 to 10
10 to 15
15 to 20
20 to 25
25 to 30
30 to 35
35 to 40
40 to 50
50 to 60
60 to 70
70 to 80
80 to 100
100 to 140
140 to 180
More than 180
Period: 1961-1990
Modeling performed by Christopher Daly using the PRISM model, based on 1961-1990 normals from NOAA Cooperative stations and NRCS SNOTEL sites. Sponsored by USDA-NRCS Water and Climate Center, Portland, Oregon.
Oregon Climate Service
George Taylor, State Climatologist
(541) 737-5705
17

?

Loss of Perennial Streams

18


Drier Vegetative Communities

Fiercer Water Competition

20

.

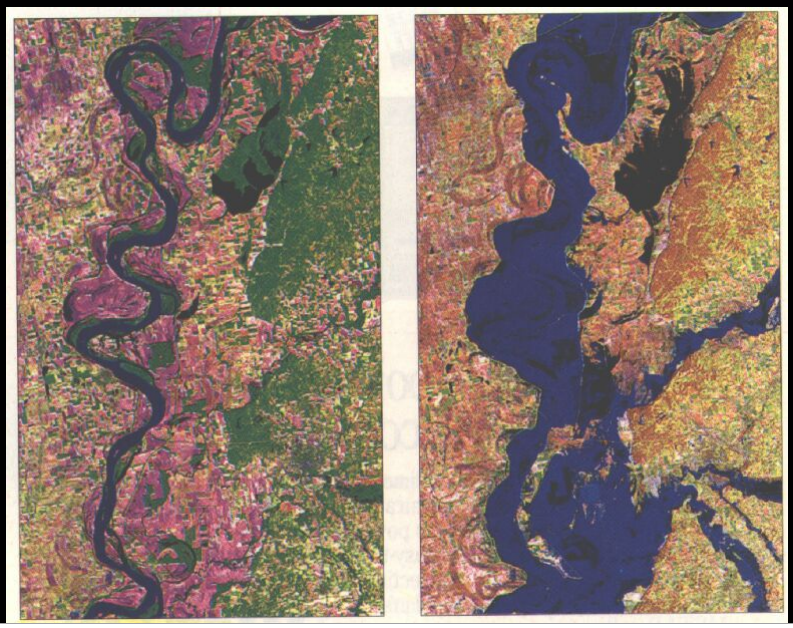
Questions?

Susan Kaderka, Director, National Wildlife Federation's Gulf States Regional Office

21

Midwestern Rivers

More Intense Storms and Flooding

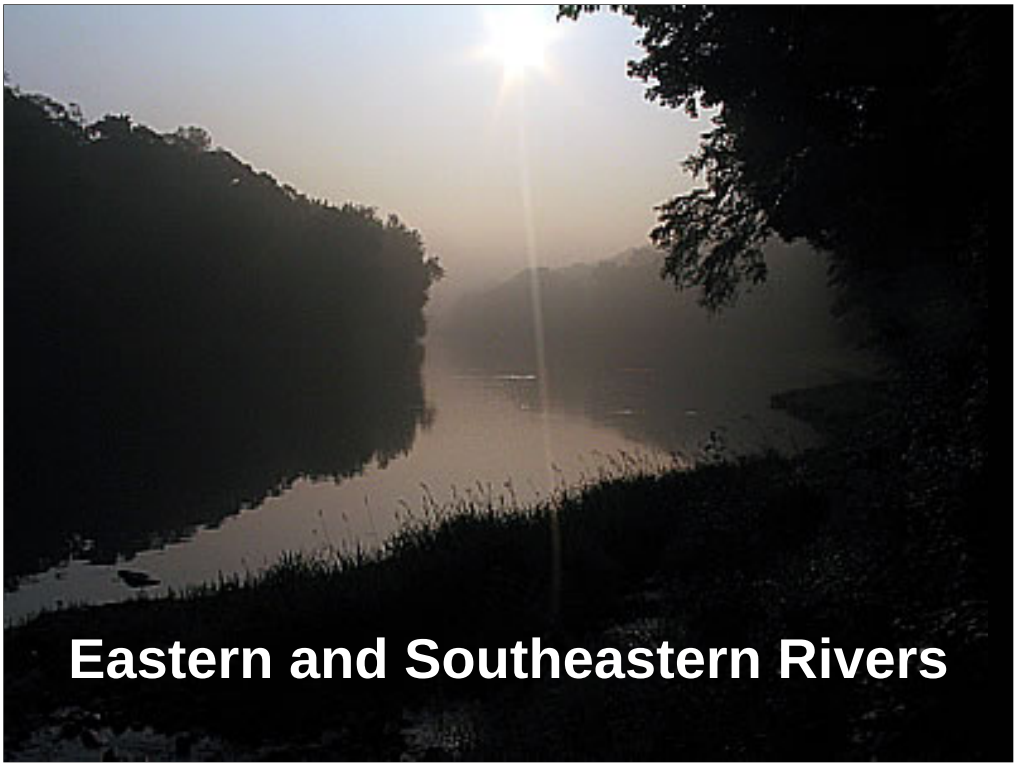


23

24

More Scouring and Pollution

25


Eastern and Southeastern Rivers

Anticipating Greater Extremes

27

Wet Season Flooding

28

Summer Droughts

Warmer Water Temperatures

Brook Trout

30

Coastal Rivers

31

Vulnerable To Sea Level Rise

32

Harder Shorelines

33

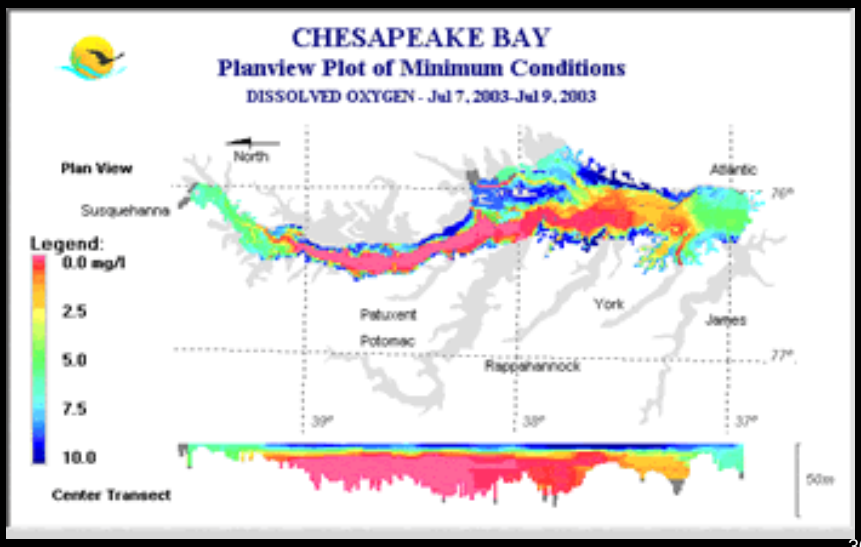
Storm Surges and Saltwater Intrusion

34

Turbidity and Submerged Aquatic Vegetation

35

Larger Hypoxic Zones



Solutions

- Regulatory
- Voluntary
- Incentive-based

37

Improved Forest Management

38

Riparian Restoration

39

Stream Course Restoration

40

In-stream Flow Protection

41

Increased Water Use Efficiency

42

Smarter Flood Plain Management

43

Wetlands Restoration

Water Quality Protection

- Controlling pollution and invasive species

Monitoring and Managing for Temperature Change

46

Greater Focus on Stream Corridor Connections

47

Susan R. Kaderka,
Regional Executive Director
Gulf States Natural Resource Center
National Wildlife Federation

kaderka@nwf.org

48

Questions?

Susan Kaderka, Director, National Wildlife Federation's Gulf States Regional Office

49


Join us for our October 17th Webcast on:
Watershed Financing – Moving Beyond Grants
Dan Nees, World Resources Institute
Tim Jones, USEPA
50

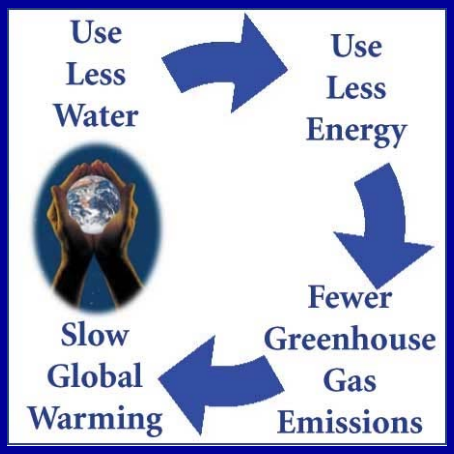
Saving Energy by Saving Water

River Network
October 2007

51

Saving Energy by Saving Water

- Savings potential surprising, substantial
- Quicker, cheaper and more reliable results than most potential strategies
- Only environmental impacts are *positive*



52

Perspective:

- In five minutes, a hot water faucet uses as much energy as a 60-watt bulb uses in 14 hours.

Source: US EPA

53

Municipal water/sewer plant energy use

- U.S. annual total* = 75 billion kilowatt hours per year
- 3% of total U.S. consumption of electricity
- Equal to entire residential electricity demand of California
- More than entire energy-intensive pulp/paper and petroleum sectors *combined*
- Public bill = Already $4B/yr. Increasing.

* 60,000 drinking water treatment plants + 15,000 sewage treatment plants

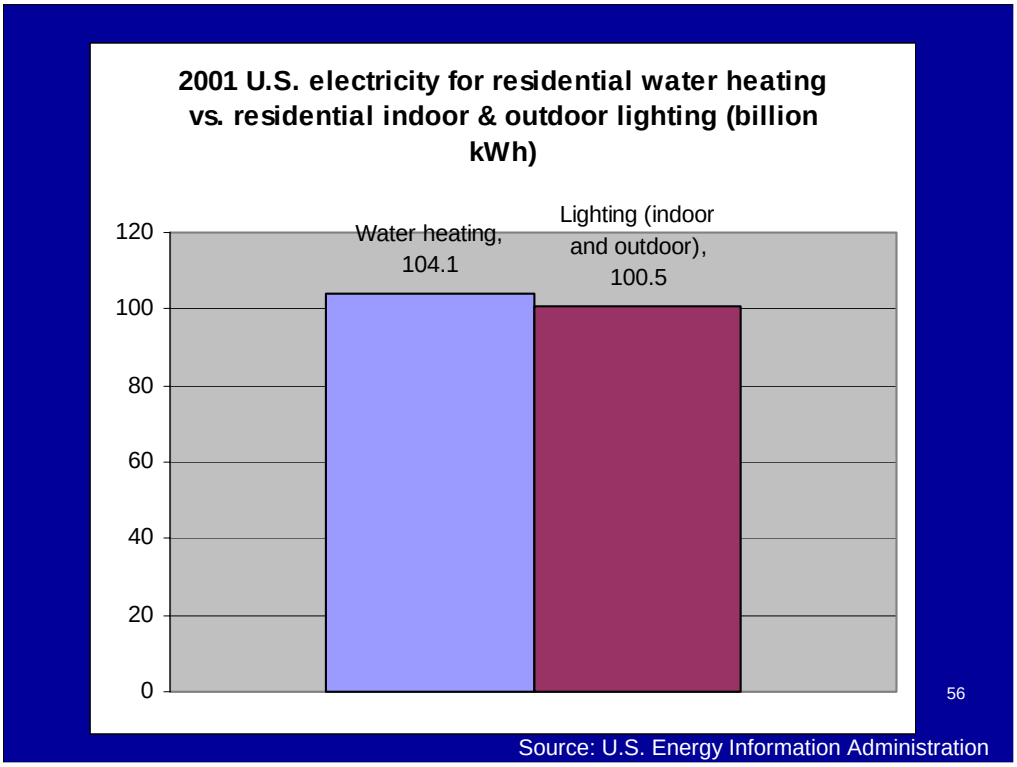
54

Sources: US EPA, Alliance to Save Energy, Pacific Institute & NRDC

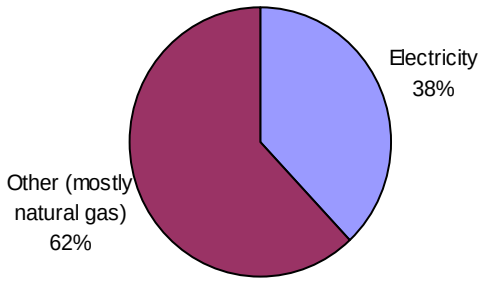
Other water-related energy use includes…

- Groundwater pumping
- Interbasin transfers
- Pumping water to drinking water treatment plants and from there to homes
- Heating water in homes, businesses and institutions
- Heating *and* cooling water in industries
- Pumping water to sewage treatment plants and discharge points
- Etc.

55


2001 U.S. electricity for residential water heating vs. residential indoor & outdoor lighting (billion kWh)
120
100
80
60
40
20
0
Water heating, 104.1
Lighting (indoor and outdoor), 100.5
56
Source: U.S. Energy Information Administration

Energy sources for household water heating

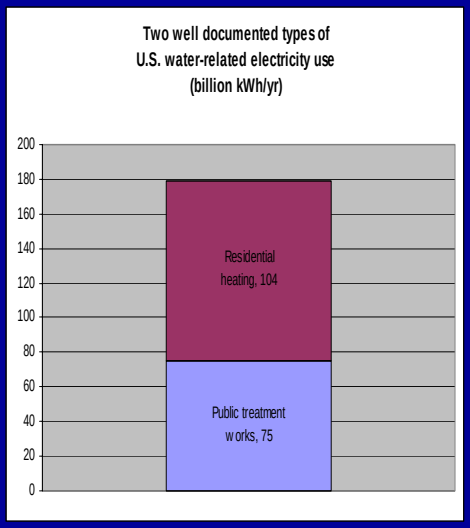


Year 2001
Source: U.S. Energy Information Administration

So, total residential energy use for water heating is *far* more than for indoor and outdoor residential lighting *combined.*

57

Public water treatment + residential water heating = about 180 billion kWh/year in U.S. today



Does *not* include:

- Energy used by the more than 60% of homes that heat with gas instead of electricity.
- Energy used for pumping water uphill and between basins
- Any commercial or industrial use of energy to pump, treat, heat and cool water
- Any agricultural energy use to pump water
- Etc…

58

We estimate total current U.S. water-related energy use to be *at least 300 billion kWh per year*.*

*** Includes energy other than electricity in approximate kWh equivalent.**

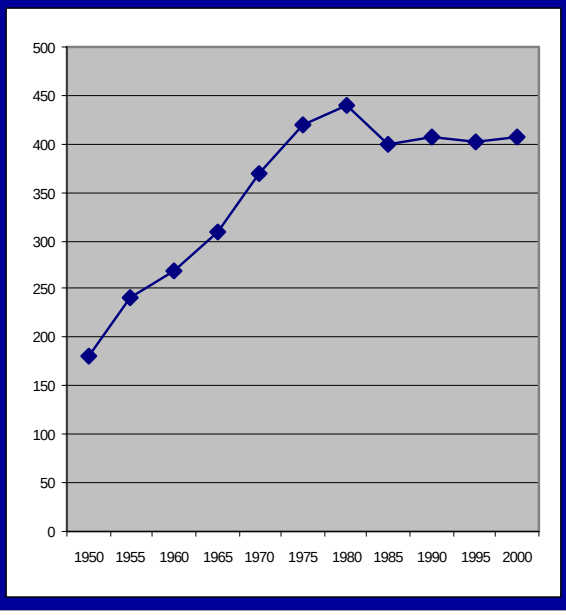
59

Easily achievable water use reductions could allow us to

- Retire hundreds of dirty power plants much sooner
- Give us cleaner, healthier air to breathe
- Significantly advance overall effort to reduce greenhouse gas reductions
- Keep much more water in streams and lakes where it belongs

60

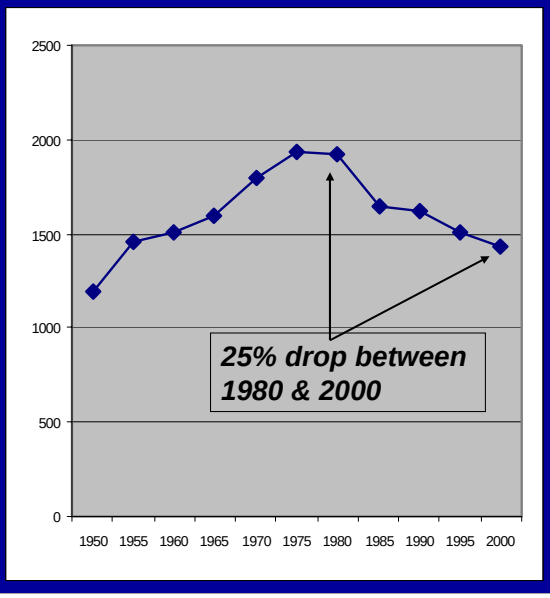
Total withdrawals (BGD)



Source: USGS

U.S. per capita withdrawals

1,190 in 1950, 1,940 in 1975, 1,430 in 2000



Source: USGS

Questions?

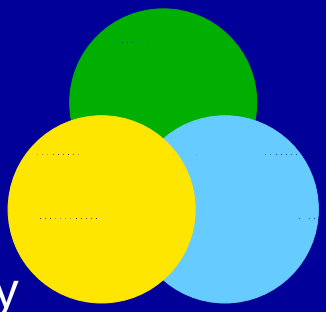
Don Elder, President, River Network

63

Saving Water

A comprehensive, integrated approach

Conservation



Efficiency

Reuse

64

Conservation = Reducing *Waste*

- Does not have to mean hardship
- Does mean changing some habits

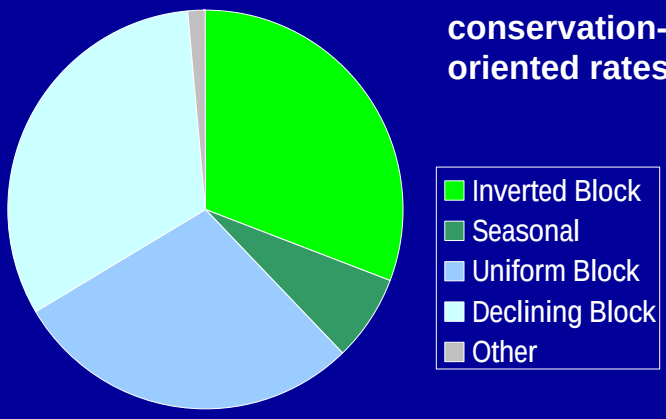
65

Encourage and reward stewardship

Penalize or prohibit profligate waste

66

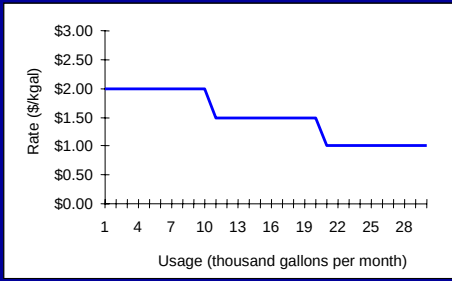
Nationwide survey of water utilities



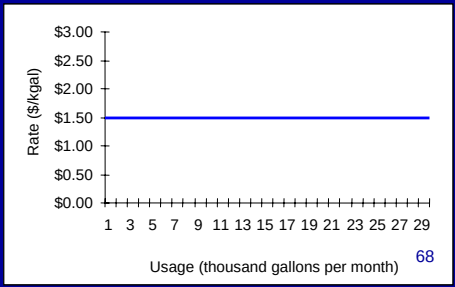
Source: Adapted from the 2002 RFC Water and Wastewater Rate Survey; 148 systems surveyed

Rate structures that are *not* conservation oriented

Declining block



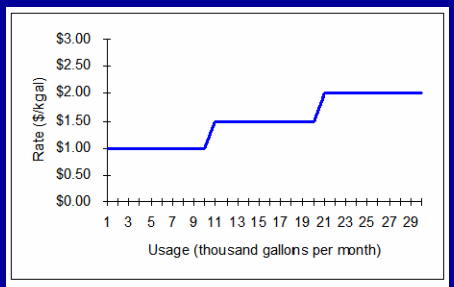
Uniform block



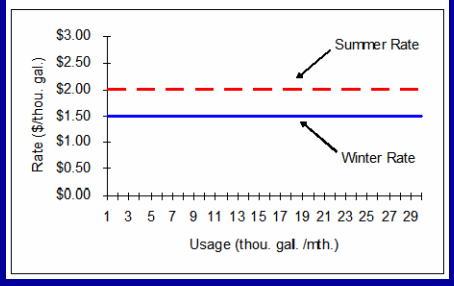
68

Conservation-oriented rate structures

Inverted block



Seasonal

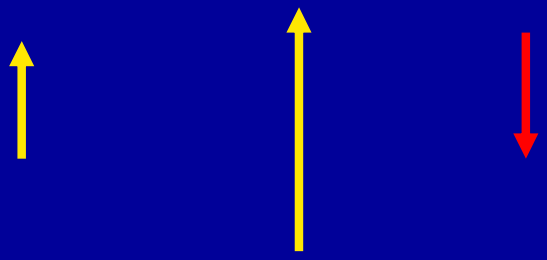


69

Supply-side emphasis

"Must sell more water to generate more revenue!"

Revenue – Expenses = Margin

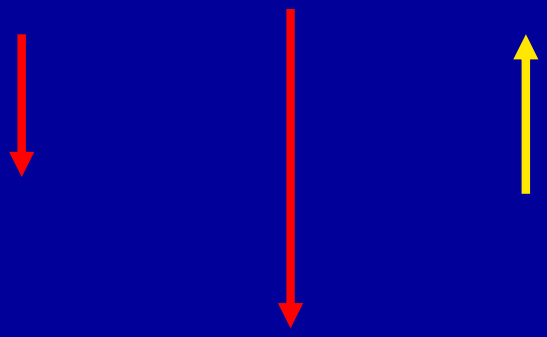


70

Demand-side emphasis

"It's at least as good to reduce demand as it is to increase supply!"

Revenue – Expenses = Margin



71

Efficiency = Getting more *performance* out of every drop used

- No hardship at all
- Saves resources *and* money
- Payback periods quick
- Tremendous existing potential

72

Homes

- Toilets
- Faucets
- Showerheads
- Washing machines
- Dishwashers
- Hot water heaters*

* Tankless models save little or no water, but save a *lot* of energy

EPA Labeling Program

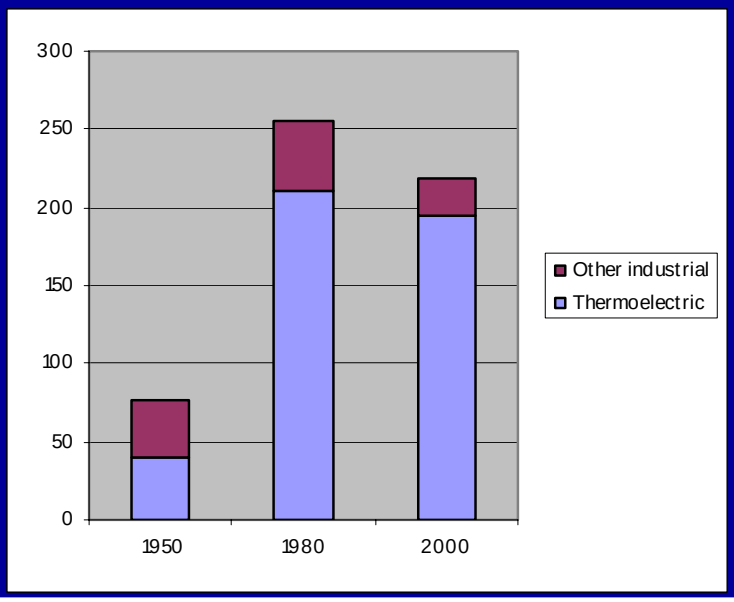
- Helps consumers ensure they are buying high-performing water-efficient devices
- Perform as well or better than water-wasting devices
- http://epa.gov/watersense/

74

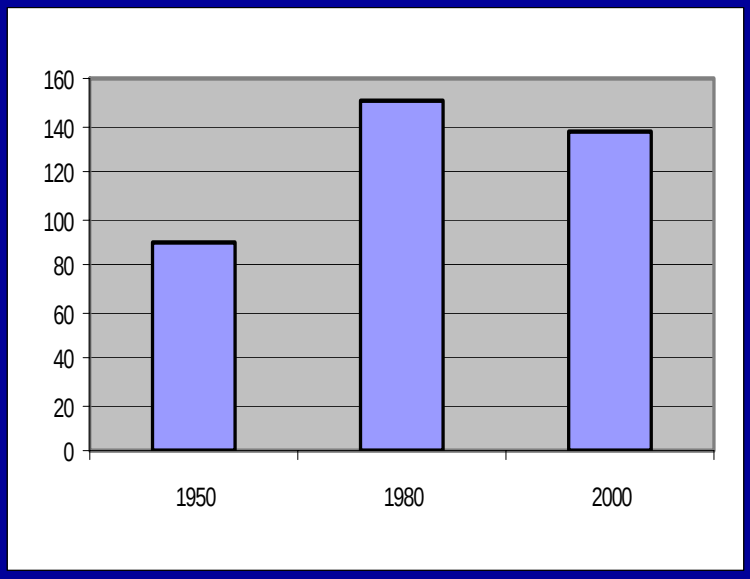
Businesses & Institutions

- Efficiency potential usually as great or greater than residential
- Payback periods faster (because multiple users)
- Financing easier

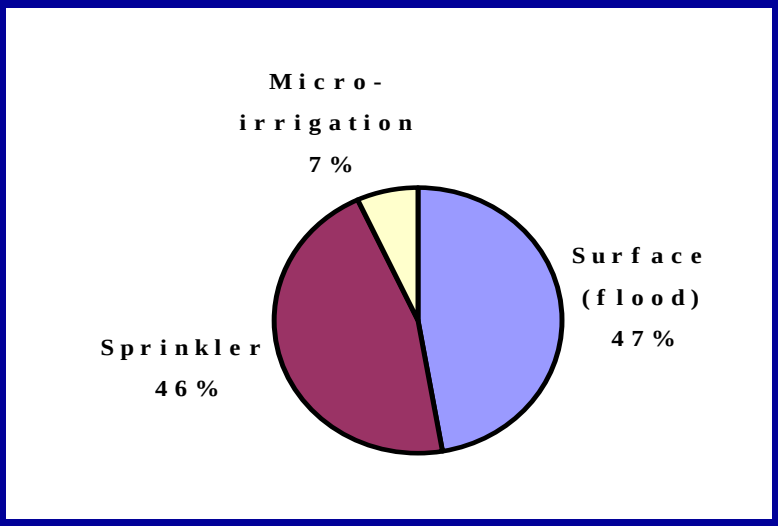
U.S. Industrial Water Use (BGD)



U.S. Irrigation (BGD)



U.S. Irrigation in 2000



78

Advancing Efficiency

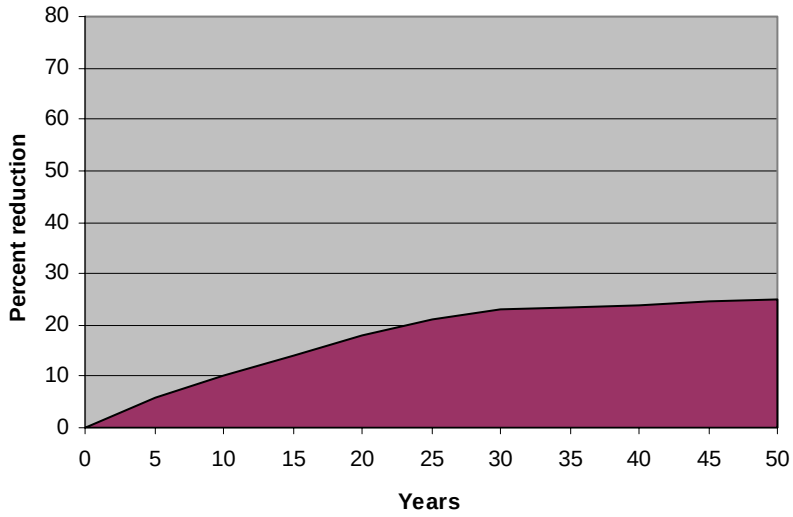
- Education
- Standards
- Requirements
- Phase-outs
- Incentives
- Retrofit programs (utility-sponsored)

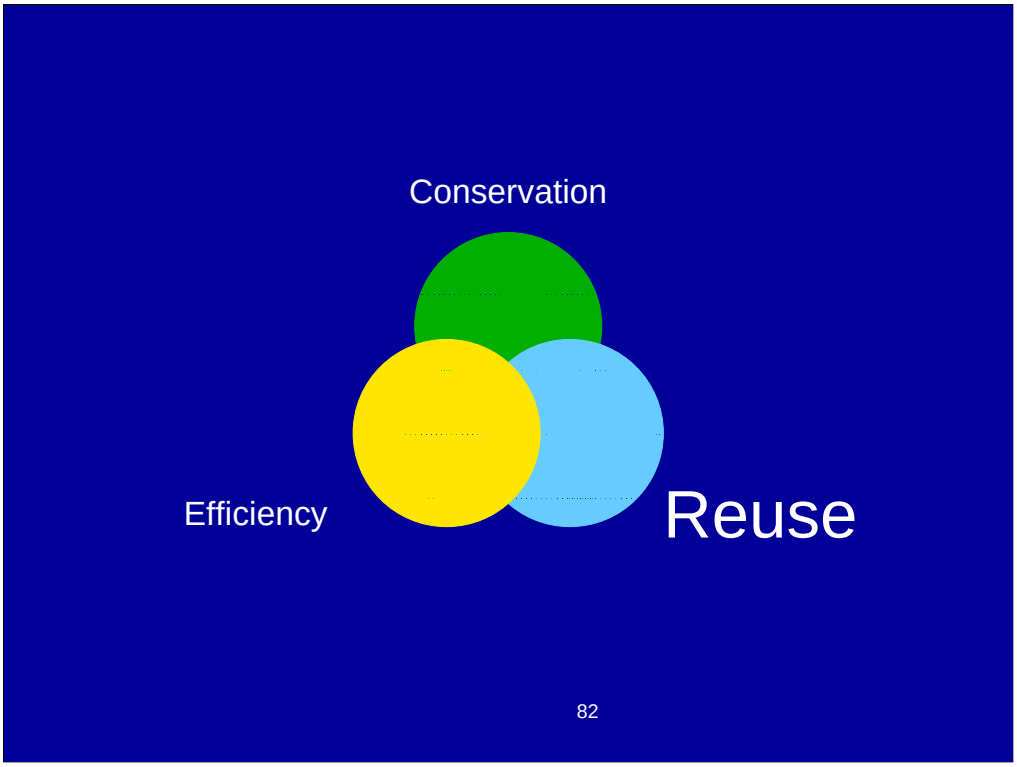
Efficiency potential

(above and beyond conservation potential)

- U.S. Water efficiency potential: At least 25% (conservative estimate)
- Could achieve half this potential in next 10 years, most of rest in next 15
- So, with conservation and efficiency, we could reduce our urban water use by 35% or more within 25 years

Efficiency


80
70
60
50
40
30
20
10
0
Percent reduction
0
5
10
15
20
25
30
35
40
45
50
Years

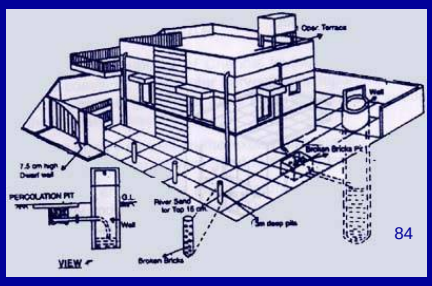

Conservation
Efficiency
Reuse
82

Imagine for a moment that

Some day we will all have easy access to treated drinking water and 1-2 other sources of water...

Many home systems for rainwater harvest

- Small to large scale
- Simple to very sophisticated

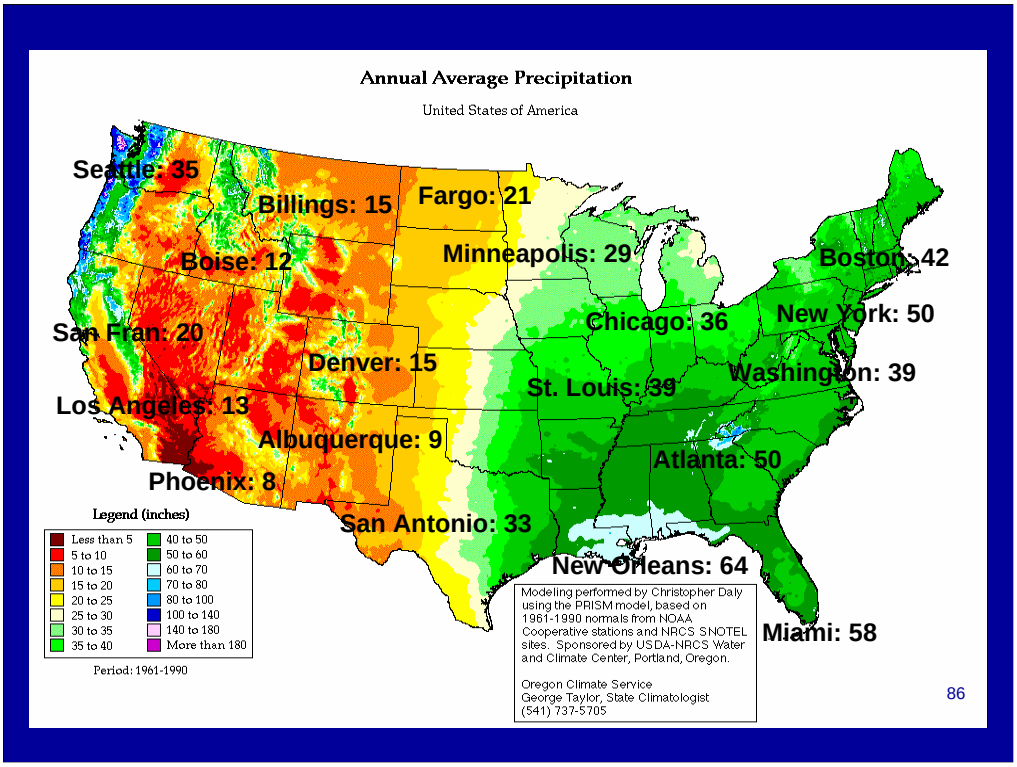


84

Seattle's King Center

- 1600 employees
- Rainwater harvesting meets >60% of entire facility's water needs
- Saves >1.4 million gallons of drinking water per year
- Also keeps runoff from entering storm sewers

85


Annual Average Precipitation
United States of America
Seattle: 35
Billings: 15
Fargo: 21
Boise: 12
Minneapolis: 29
Boston: 42
San Fran: 20
Chicago: 36
New York: 50
Denver: 15
Washington: 39
St. Louis: 39
Los Angeles: 13
Albuquerque: 9
Atlanta: 50
Phoenix: 8
San Antonio: 33
New Orleans: 64
Miami: 58
Legend (inches)
Less than 5
5 to 10
10 to 15
15 to 20
20 to 25
25 to 30
30 to 35
35 to 40
40 to 50
50 to 60
60 to 70
70 to 80
80 to 100
100 to 140
140 to 180
More than 180
Period: 1961-1990
Modeling performed by Christopher Daly using the PRISM model, based on 1961-1990 normals from NOAA Cooperative stations and NRCS SNOTEL sites. Sponsored by USDA-NRCS Water and Climate Center, Portland, Oregon.
Oregon Climate Service
George Taylor, State Climatologist
(541) 737-5705
86

Many potential of treated "wastewater"

Add industrial Use slide here

San Antonio wastewater recycling

- Already has large-scale reuse program
- Primarily commercial and industrial purposes today, served by 80 miles of delivery pipeline
- Source is cheaper and more reliable
- Already reducing demand on Edwards Aquifer and region's rivers by 29 million gallons per day

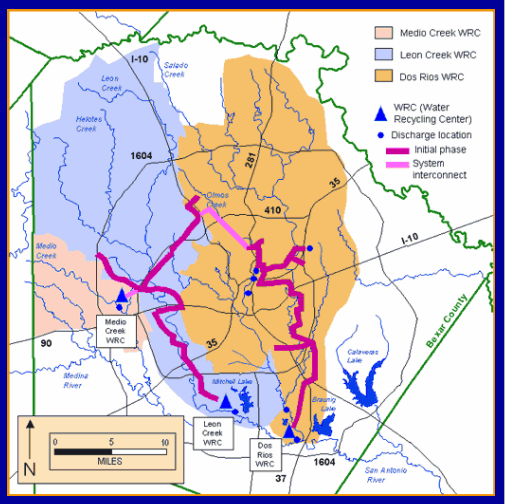
Dos Rios recycled water outfall

88

For more info: http://www.saws.org/our_water/recycling/

San Antonio wastewater recycling program

- City committed in 1996 to major expansion
- Now building a 64-mile pipeline around entire city for broader delivery
- Also capturing gases in the process and generating power with it



89

So, we *can* easily imagine that some day we will all have easy access to treated drinking water and 1-2 other sources of water.

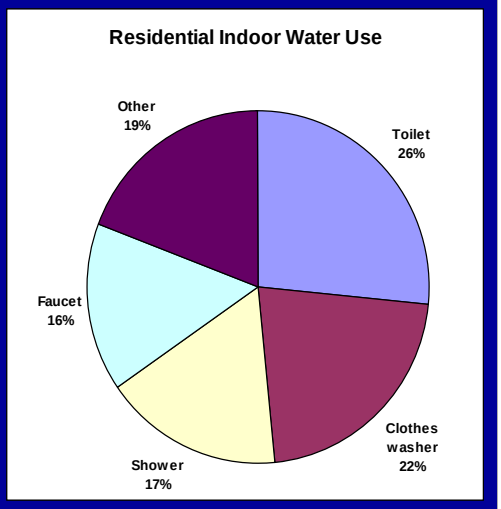
How would we use it?

90

Highest quality water

91

- Drinking, cooking and bathing account for less than 1/3 of *indoor residential* water use
- Almost all other uses could be met as well with captured rainwater or other sources
  - Other residential
  - All outdoor
  - Most industrial

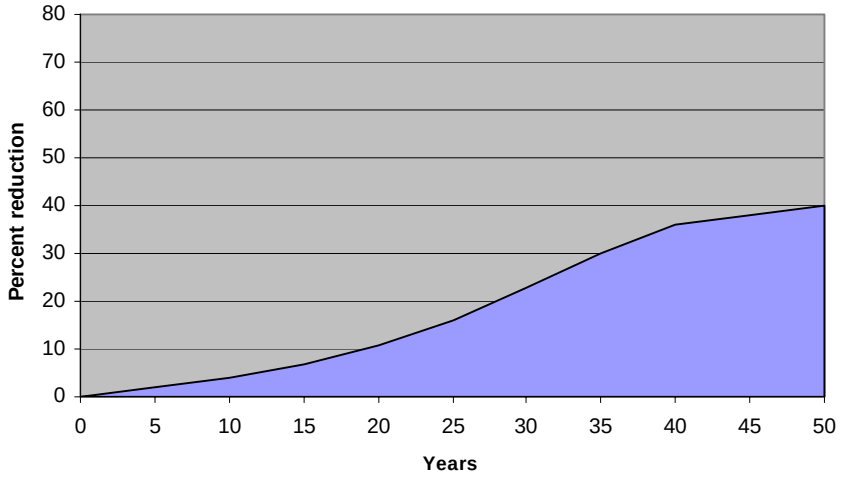


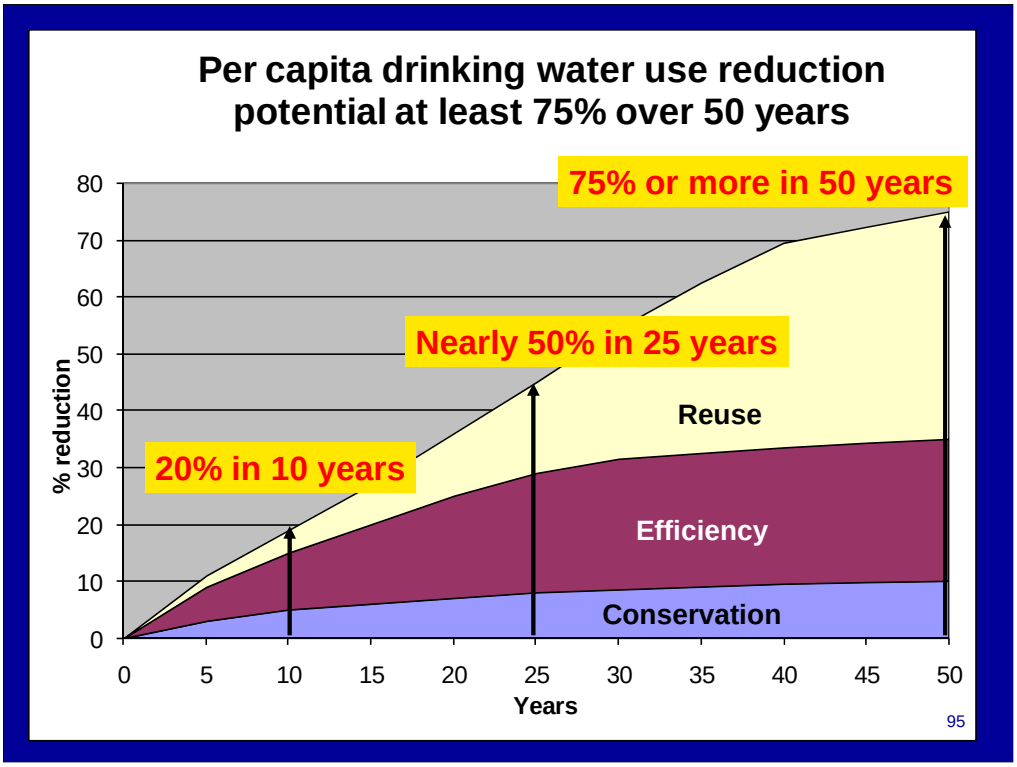
92

Other uses of other sources of water

Reuse

(Stormwater + Wastewater)




Per capita drinking water use reduction potential at least 75% over 50 years
75% or more in 50 years
Nearly 50% in 25 years
20% in 10 years
Reuse
Efficiency
Conservation
% reduction
Years
0
10
20
30
40
50
60
70
80
0
5
10
15
20
25
30
35
40
45
50
95

Questions?

Susan Kaderka, Director, National Wildlife Federation's Gulf States Regional Office

Don Elder, President, River Network

96

Interested in Finding Out More? Check Out Our Additional Resources Page…

http://www.cluin.org/conf/tio/owwecc/resource.cfm

Did You Enjoy this Webcast? Have Some Comments? Ideas for Future Webcasts? Let Us Know on Our Evaluation Form…

http://www.cluin.org/conf/tio/owwecc/feedback.cfm

97