Considerations for Water Conservation in Wet Climates

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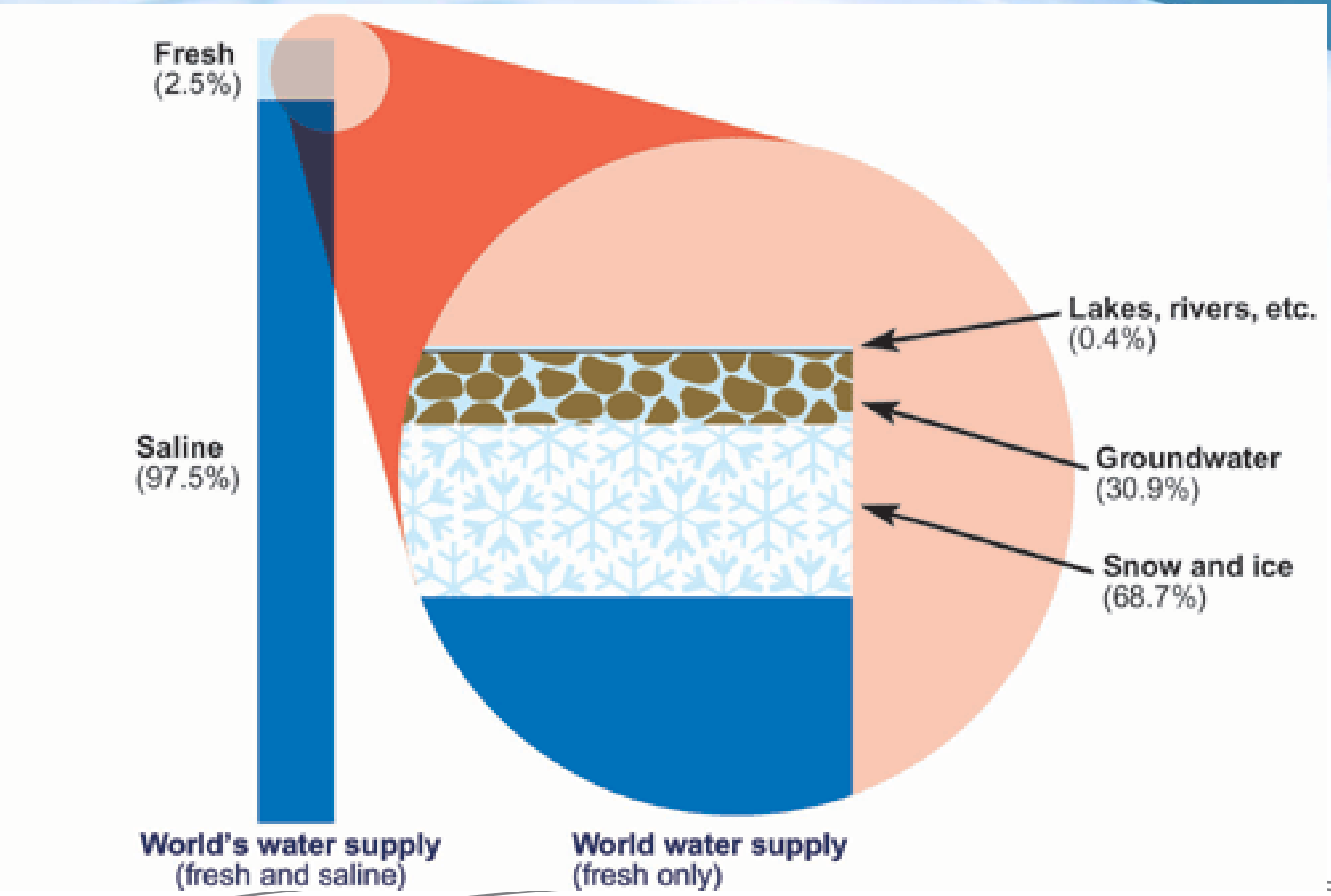
Presented at: Pacific Northwest Section
AWWA
Tacoma, Washington
May 14, 2010

MWH

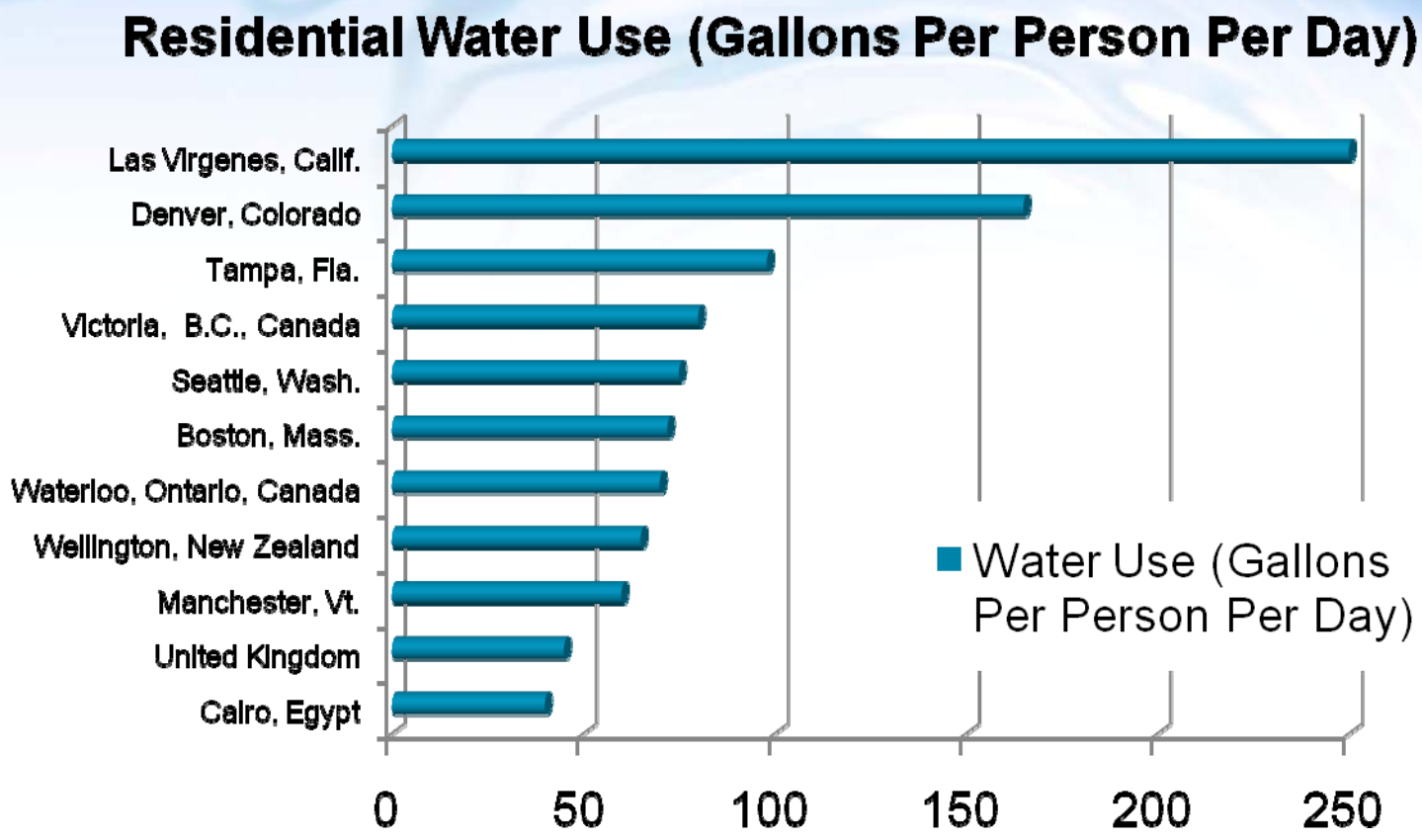
BUILDING A BETTER WORLD

Water is a limited resource

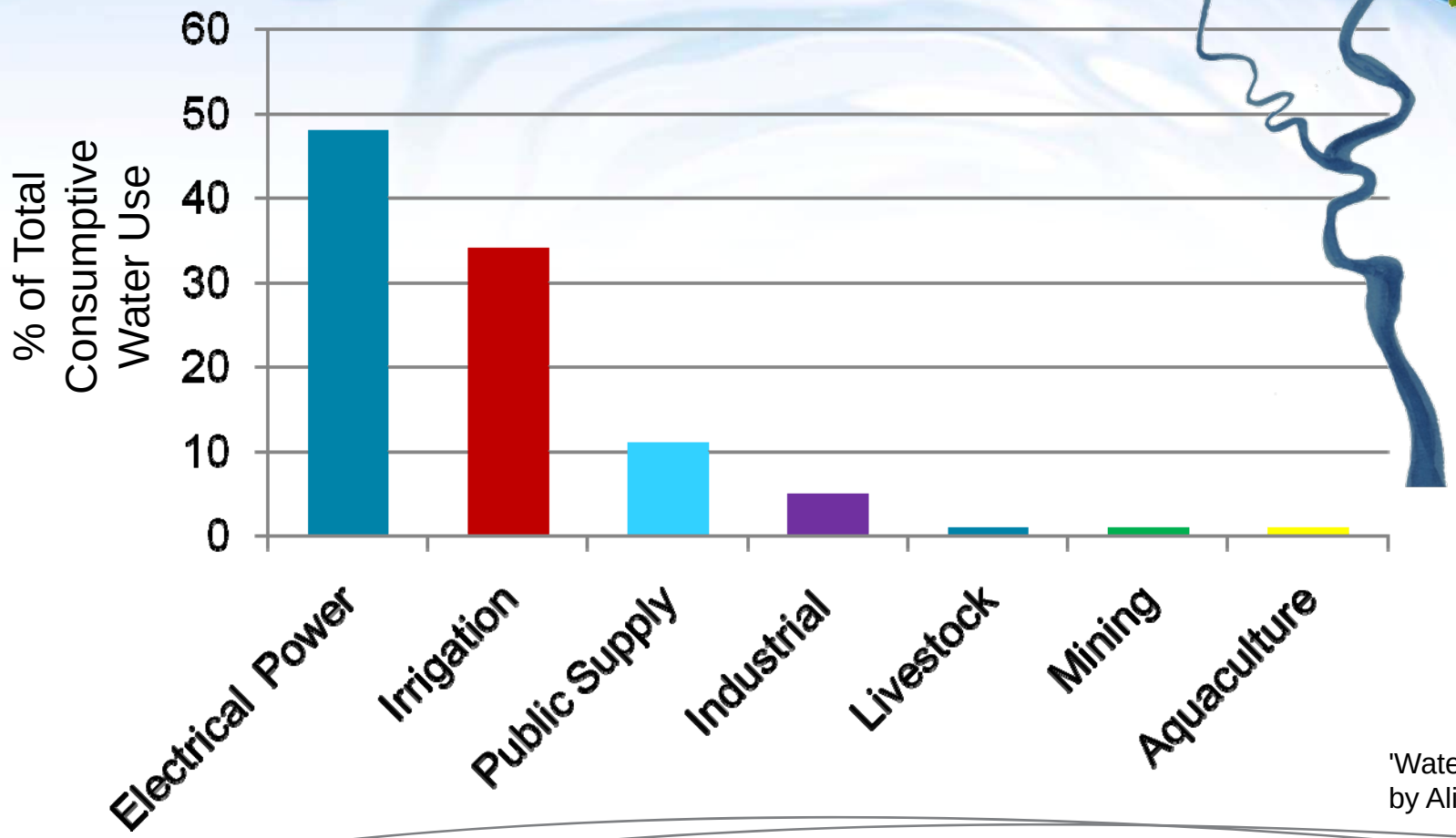


http://ga.water.usgs.gov/edu/earthwherewater.html
http://www.ec.gc.ca/eau-water

Water Use Varies Around the World



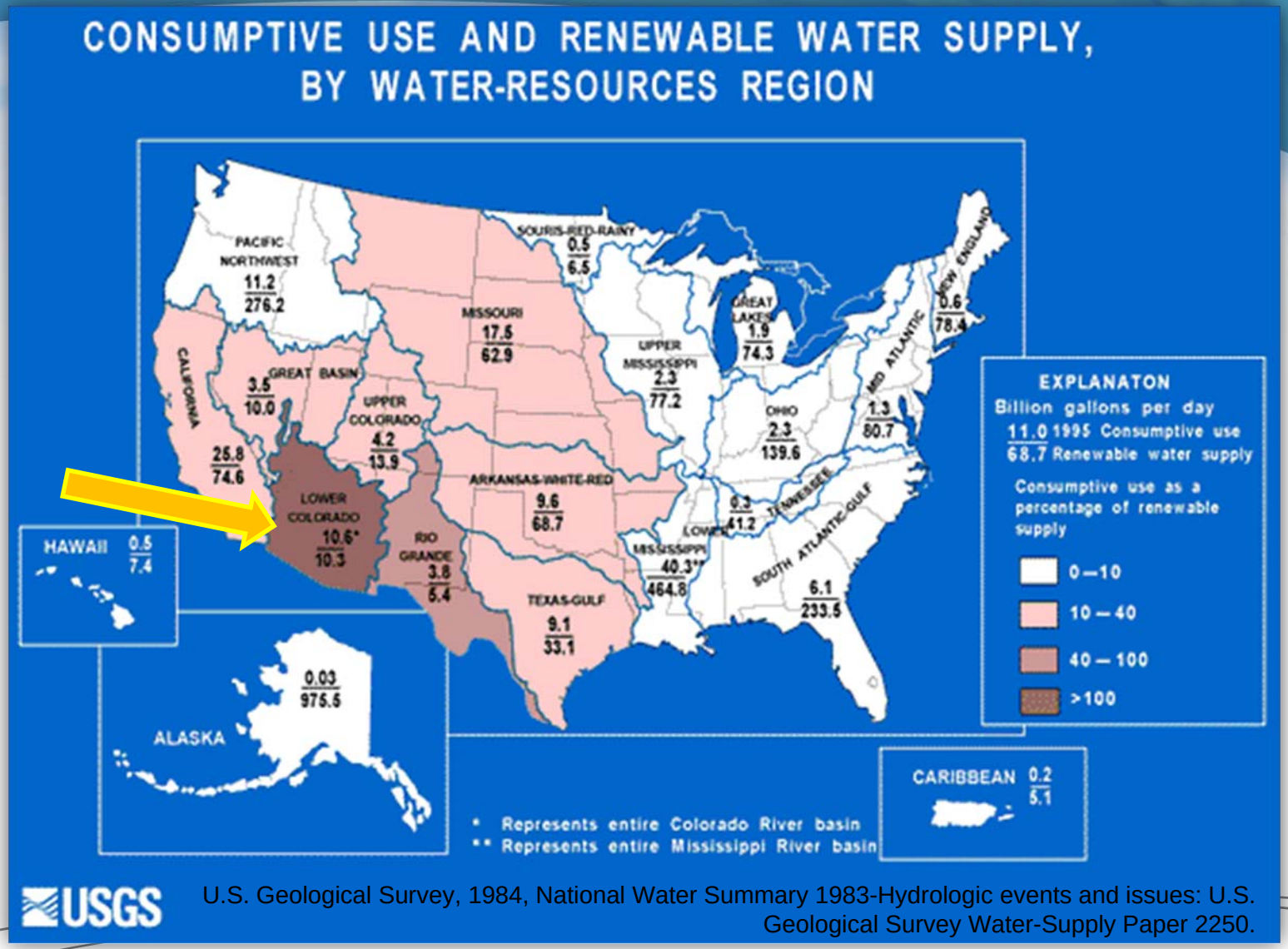
Water use in the United States



'Water is life'
by Alique van Nes

Source: Estimated Use of Water in the U.S. - 2000, *(U.S. Geological Survey,* Dec. 2005).

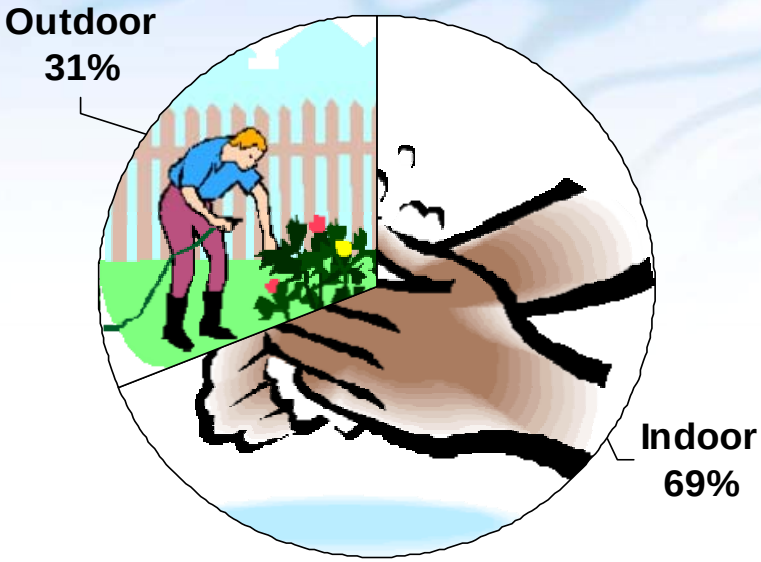
Water demand is great in supply scarce areas



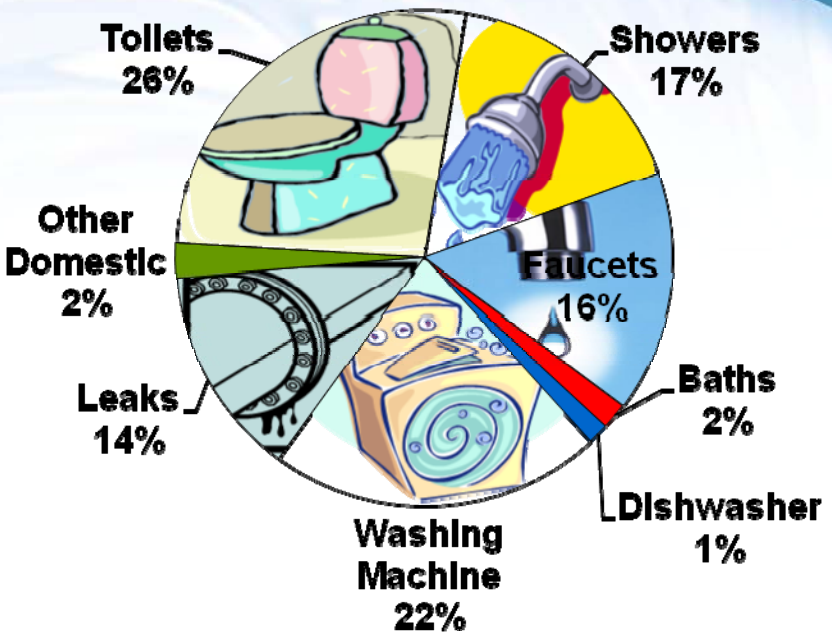
U.S. Geological Survey, 1984, National Water Summary 1983-Hydrologic events and issues: U.S. Geological Survey Water-Supply Paper 2250.

Average Indoor and Outdoor Water Use in a Residential Non-Conserving Home

Average Indoor and Outdoor Water Use



Average Indoor Water Use

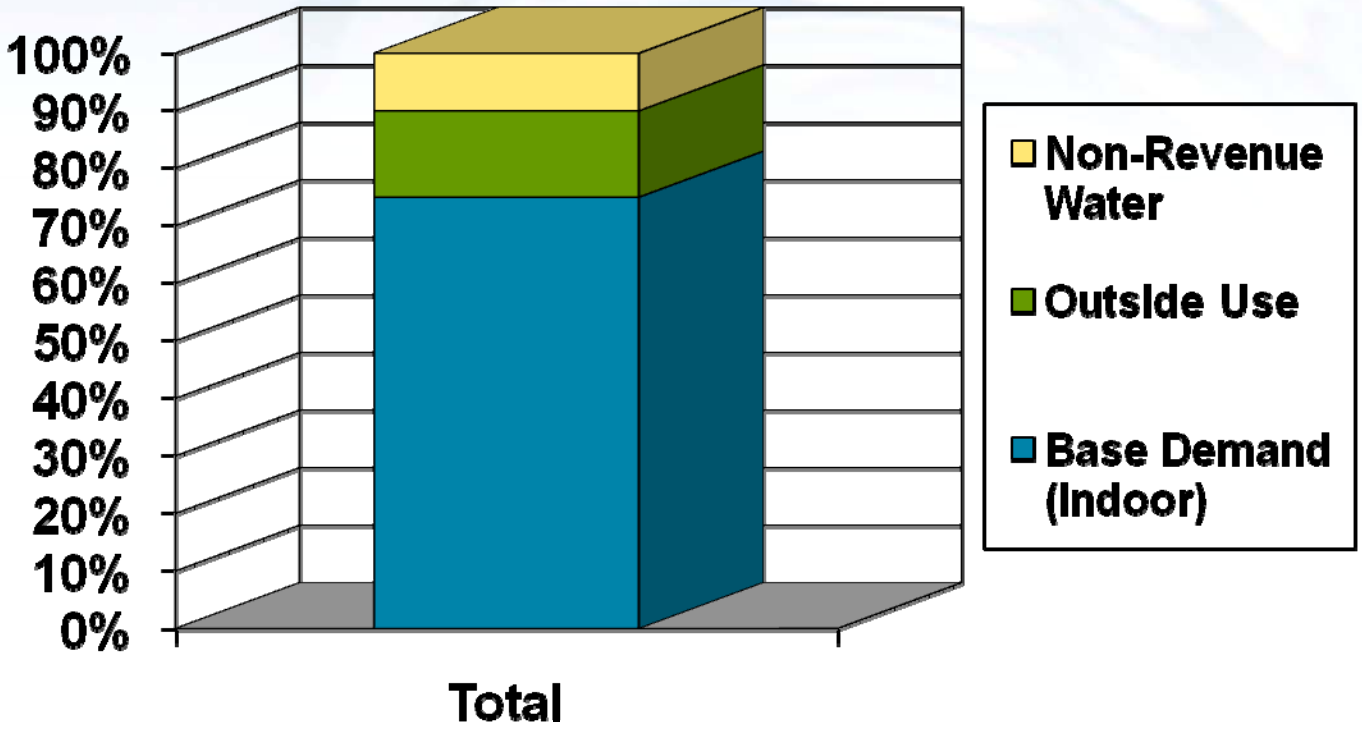


- 80 – 90% of the outdoor component of residential water use goes to watering lawns, plants, and gardens
- Nonresidential outdoor water use is largely devoted to turf irrigation

Source: Vickers, Amy. “Handbook of Water Use and Conservation” WaterPlow Press, 2001

Indoor use data based on average use in a nonconserving home – 69.3 gallons per capita per day

Typical Utility Water Usage Summary



Regional Water Use Data – Public Water Supply

- State of Oregon
  - 180 gallons/person/day average daily water use
  - 2.9 million people served by public water supply

- State of Washington
  - 184 gallons/person/day average daily water use
  - 5.3 million people served by public water supply

Estimated Use of Water in the United States County-Level Data for 2005, USGS, 2005 http://water.usgs.gov/watuse/data/2005/index.html

What is Water Conservation?

1) Any reduction in water loss, waste or use to the benefit of other current or future uses.
2) Reduction in water use accomplished by implementation of water conservation or water-efficiency measures.
3) Improved water management practices that reduce or enhance the beneficial use of water.

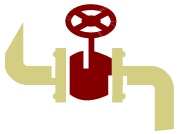
Water Conservation Balancing Act

Water conservation is a balancing act between current and future water needs.

Conservation Definitions

- A conservation *measure* is the device or practice that results in a more efficient use of water and reduces water demand
- Grouped into two main categories:
  - Hardware device or equipment

    - Low-volume toilets
    - High-efficiency machines and shower heads
    - Cost to implement, but little behavioral change needed
  - Behavior or management practices
    - Requires behavioral shift in lifestyle
    - Leak detection and repair
    - Service and adjust valves and connections



Conservation Definitions

- A conservation *incentive* increases customer awareness about the value of reducing water use and motivates water users to implement conservation or efficiency measures
- Grouped into three main categories:
    - Educational
    - Financial
    - Regulatory

- Examples include:
    - Educational: bill inserts, radio and TV advertisement
    - Financial: rebates or discounts for water efficient fixtures
    - Regulatory: water-efficiency policies and ordinances

Conservation Measures – Residential Behavioral / Management

Behavior / Management Practice - Indoor

- Limit shower time
- Turning off the faucet while brushing teeth
- Washing dishes/clothes when machine is full
- Find and fix leaks!

Behavior / Management Practice - Outdoor

- Proper irrigation scheduling to maximize efficiency
- "No Watering" option (drought-tolerant landscaping, rain barrels)
- Use containers for small areas and individual plants
- Replace nonfunctional turf areas with low-water-use alternative ground cover and plants

Conservation Measures – Non-Revenue Water

Hardware

- Leak detection and repair
- Water audit
- Meter testing and repair

Behavior / Management Practice

- Add per capita calculator on water bills and track past and average usage
- Billing system set to look for spikes or non-typical usage
- Meet with top users a few times per year to evaluate/identify areas for improvement in conservation
- Implement asset management program to identify/repair leaks

Water Breakdown Highlights Need to Maximize Revenue Water

Own Sources	Water Exported	Billed Water Exported			Revenue Water
	Water Supplied	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption (inc. water exported)	
				Billed Unmetered Consumption	
			Unbilled Authorized Consumption	Unbilled Metered Consumption	Non-Revenue Water (NRW)
				Unbilled Unmetered Consumption	
		Water Losses	Apparent Losses	Unauthorized Consumption	
				Customer Metering Inaccuracies	
				Systematic Data Handling Errors	
Water Imported			Real Losses	Leakage on Transmission and/or Distribution Mains	
				Leakage and Overflows at Utility's Storage Tanks	
				Leakage on Service Connections	

What about utility revenues???

- Reduce non-revenue water
- Improve customer efficiency to manage future limited supplies
- Capital improvement projects can be postponed or eliminated with population or density increases
- Fiscal responsibility

Conservation drivers are specific to region, state, and purveyor

<u>EXAMPLES</u>

- Regional Drivers
  - Climate change, Saltwater intrusion, Population growth
- State Drivers
  - Regulatory, Water right agreements (e.g., Colorado River)
- Purveyor Drivers
  - Supporting environmental resources, Proportion of residential vs. industry in service area, Water supply management

Pacific Northwest – Specific Drivers
Why Should a Wet Climate Conserve?

- Regulatory: Washington State Water Use Efficiency Rule (January 2007)
  - Applies to Municipal Water Suppliers
- Maintain availability & storage during low-rainfall/ low- snowpack periods
- Stewardship of regional supplies
- Protect instream flows for fish while accommodating population growth
- Reduce wastewater treatment needs

State of the Water Supply & Issues in the PNW

- In Washington
  - Potential droughts are lessened by recent wetter and cooler climate
  - Some eastern areas still being watched for drought declarations
  - Snowpack still <75% of normal in many areas
  - Climate forecast is for higher temperatures and earlier & faster snow melt
  - Continuing needs to keep more water in streams for fish

Washing ton State Department of Ecology 2010 Drought Response Update
http://www.ecy.wa.gov/drought/index.html

State of the Water Supply & Issues in the PNW

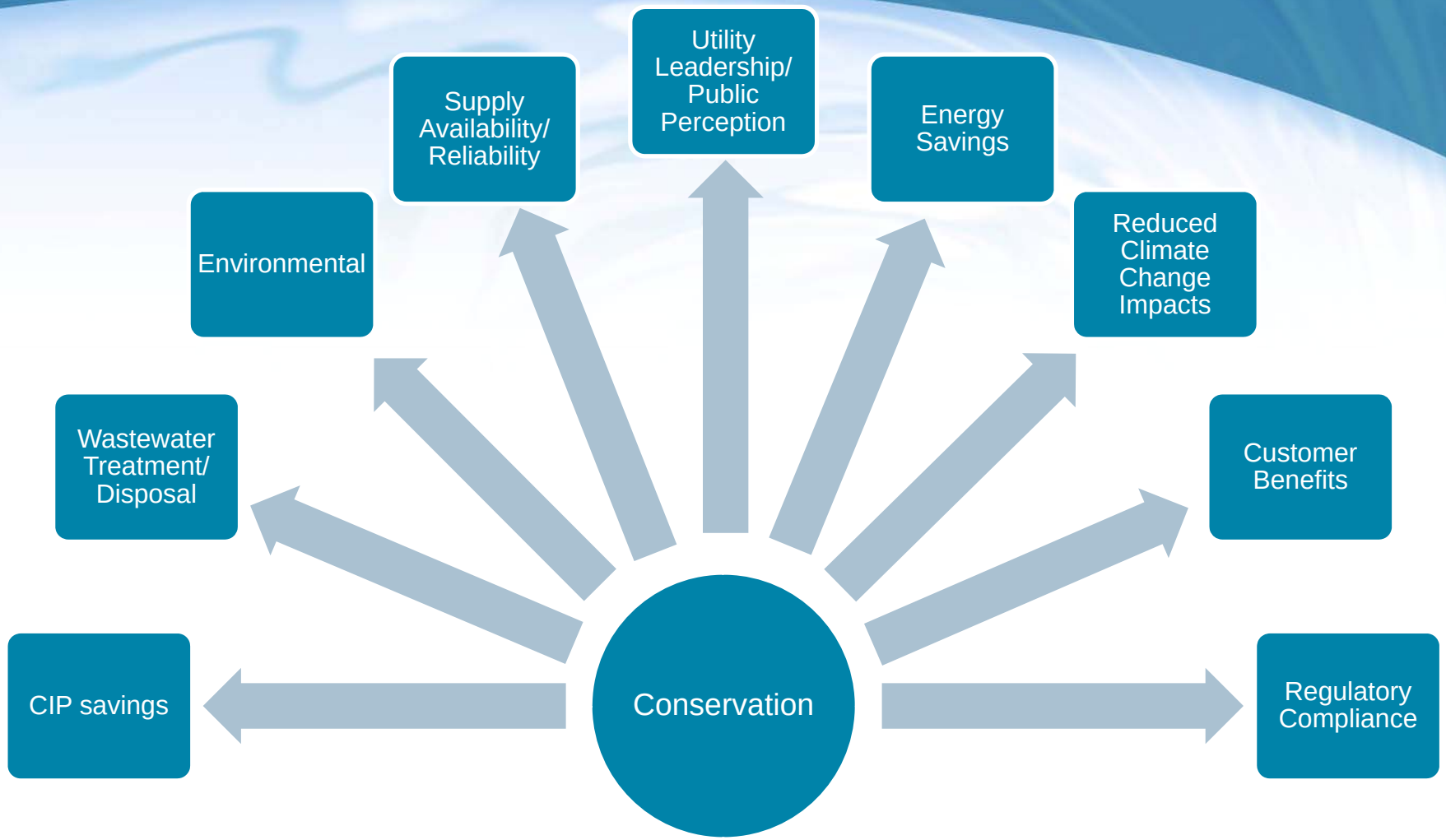
- In Oregon
  - March 2010: drought declared in several S. OR counties
  - Snowpack still <60% of normal in many areas

State of Oregon Water Resources Department
http://www.oregon.gov/OWRD/mgmt_muni_wmcp.shtml

- In Idaho
  - Cool temperatures and rain in April enhanced snowpack & delayed snow melt
  - Reservoirs are refilling, but not all will fill
  - Irrigation demands are delayed with current weather
  - Snowpack still 45%-85% of normal

Idaho Mountain Express, May 7, 2010
http://www.mtexpress.com/vu_breaking_story.php?bid=9239

Benefits to Water Conservation in the PNW



Some Existing PNW Conservation Programs

- Washington's Water Use Efficiency Rule
- Partnership for Water Conservation
  - http://www.partners4water.org/aboutus.html
- Oregon Building Codes Division Water Conservation Systems
- Individual municipality & water district water conservation plans/programs

Basic process used to implement water conservation

Evaluate current water usage

Evaluate ability to meet goal

Benchmark → Optimize Efficiency → Evaluate → Integrate

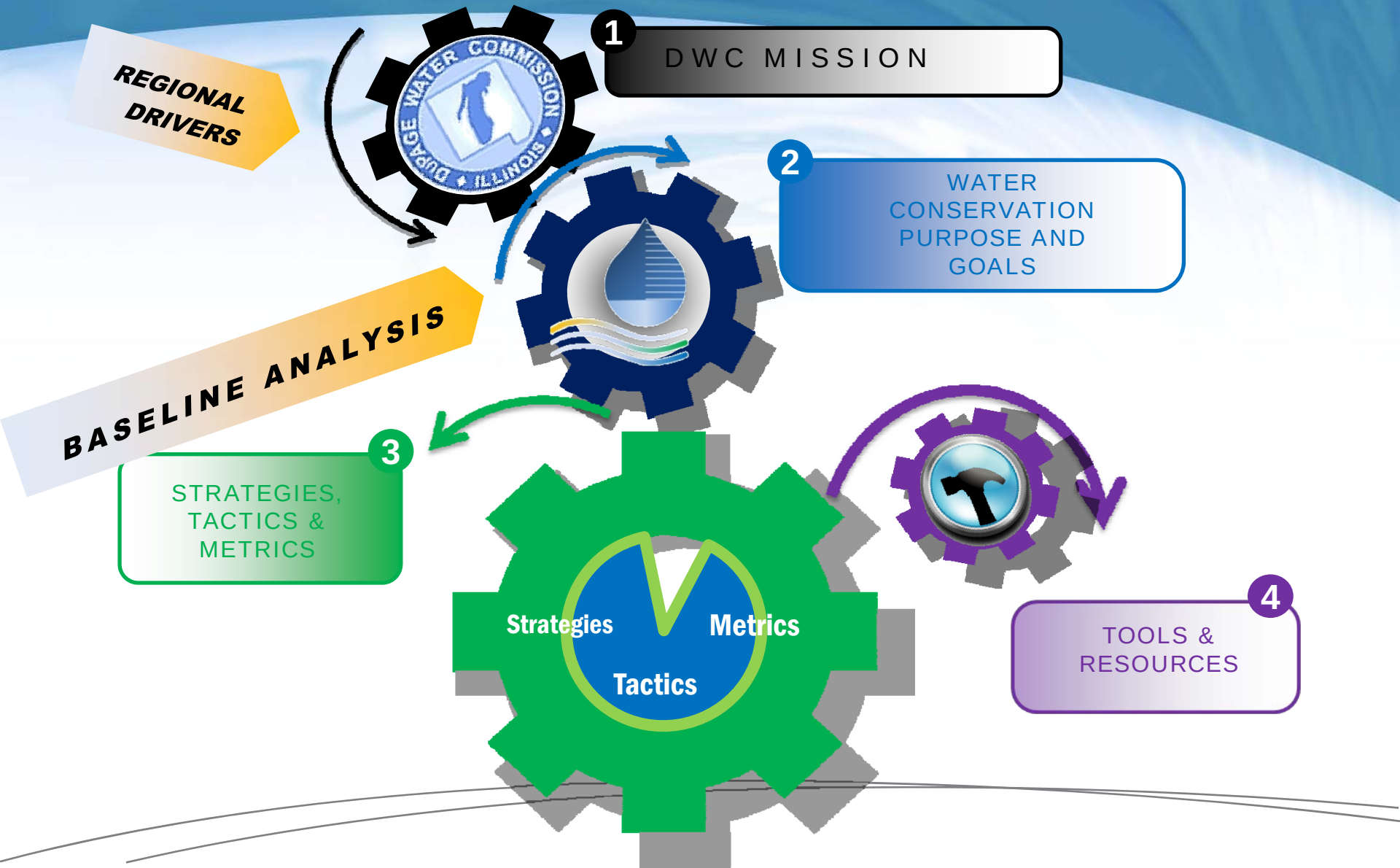
Set conservation goal; identify areas for improved efficiency or reduction; select measures

Implement selected measures

Case Study 1

A Water Conservation and Protection Program (WCAPP)
DuPage Water Commission, IL

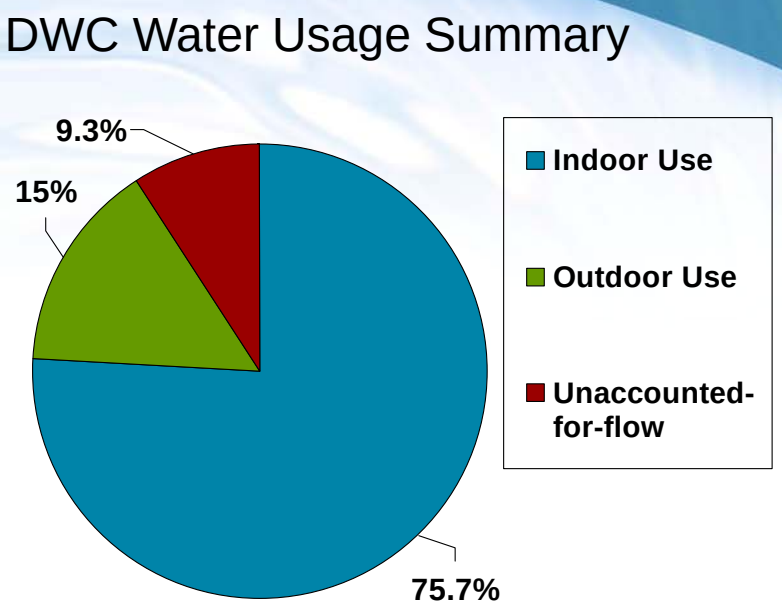
Roadmap outlines the approach used to create the WCAPP



Program purpose and goal provides foundation for conservation efforts

- Goal:

  To be the regional leader in promoting water conservation by reducing current DWC demand of Lake Michigan water in gallons/person/day by 10% in 10 years



Source: Summary of data from DWC and Illinois Department of Natural Resources Data does not include unaccounted for flow values for Argonne or IAWC

Program purpose and goal provides foundation for conservation efforts

Consistent Message

Customer Tools

Reduce Demand by 10% in 10 years

DWC Water Conservation and Protection Program

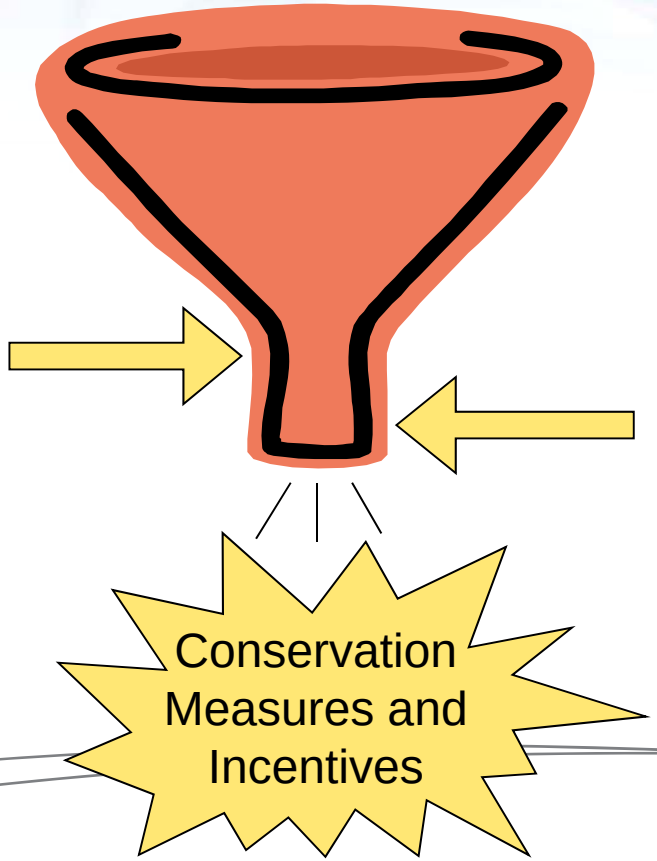
Screening process used to select conservation program elements

Regional Drivers

Case Studies

Conservation BMP's

Local Conservation Efforts



Must Have Criteria:

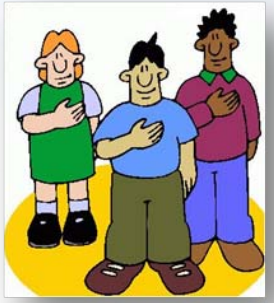
- Easy to Implement
- Educational Benefit
- Socially Acceptable

Final Screening Criteria:

- Benefit Towards Goals
- Potential for Use

WCAPP focuses on conservation education and awareness

Four education programs were developed, combining conservation measures (hardware) with educational materials (incentive)



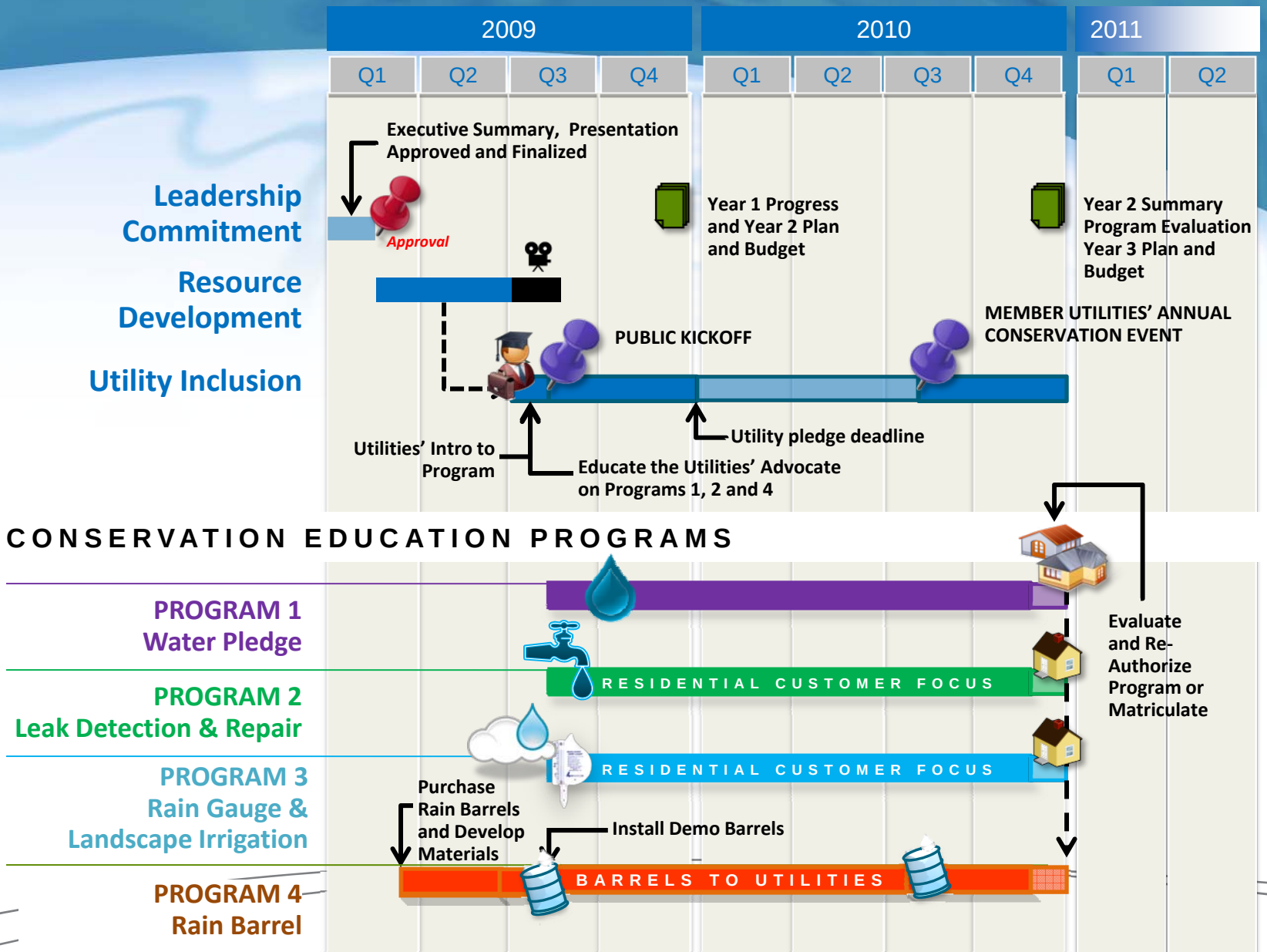
1. Water Pledge

3. Rain Gauge and Landscape Watering

2. Residential Leak Detection and Repair

4. Rain Barrel

Program implementation outlined in detail for 2009 and 2010



Results and Successes

Displays

Summary of Educational Items	
Item	**Quantity**
Leak Detection Tablets	1,750
Bumper Stickers	95
Recycled Rain Gauges	800
Recycled Magnets	1,000
FSC Certified Toilet Leak Pamphlet	250
Shower Timers	50
Total Educational Items	**3,945**

DWC engaged over 1000 residents in 2nd half of 2009

Member Utilities ramping up participation in conservation program

Summary of Member Utility Progress on WCAPP	
Category	**% of Utility Participation**
Participated in Training	**79 %**
Identified Conservation Coordinator	**93 %**
Picked-up Rain Barrel	**79 %**
Completed Water Conservation Pledge	**79 %**

www.preservingeverydrop.org

The Lombard Garden Club, the Lombard Historical Society, and the Lombard Park District's

6th Annual Prairie Days

Case Study 2

Denver Water

Denver Water: Tap-Smart Plan

- Driver: Water Shortage; Regulatory
- Goal: Reduce water usage to 165 gallons per capita per day[1] by 2016
  - Customers must reduce their use by a total of 12.7 billion gallons to meet this goal
- Targets:
  - 3.2 billion gallon permanent demand reductions during recent drought
  - 1.4 billion gallon reduction planned through conservation-oriented rates
  - 8.1 billion demand reduction thru Tap-Smart Plan

[1] Per capita, system-wide water use is a measurement of treated water deliveries made by Denver Water divided by the total population served including residential, commercial, industrial, institutional, and unaccounted for water

Denver Water: Tap-Smart Plan

- Conservation measures cover 7 categories
  - City and County of Denver government programs
  - Education and Outreach
  - Diagnostics
  - Rebates and Incentives
  - Rules
  - Research, Monitoring and Evaluation
  - General Administration of all the measures

Source: Denver Water Tap Smart Plan

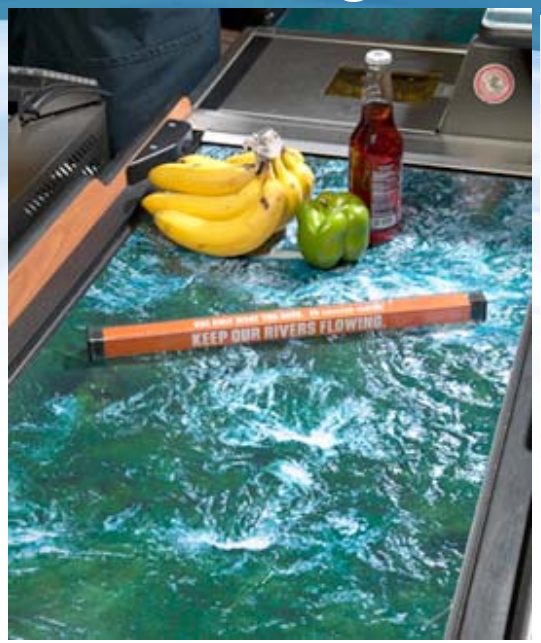
Denver Water: Results are in the Numbers

- Average per household use decreased by 37% from 1994 to 2004.
- Indoor use decreased by an average of 11% / customer / year. Approx 7% due to efficient fixtures & appliances.
- Substantial indoor conservation potential remains, particularly through habit changes.
- Outdoor use decreased by an average of 53% between 1994 and 2004.

Much of Denver Water's progress toward winning its race to that 2016 water use reduction goal can be attributed to its award–winning advertising campaign. - **Solutions: Saving Water for the Future, 2009**

Source: *Post Drought Changes in Residential Water* Use Prepared for Denver Water by Aqua Craft, Inc.

Tap-Smart: Innovative Program Messaging Targets Behavior Changes



Case Study 3

Water Management and Conservation Plan (WMCP)
Portland, OR

City of Portland - Water Management and Conservation Plan

- Drivers: Climate change, population growth
- Goal: Reduce water needs from Bull Run Watershed (surface water) so that the Columbia South Shore Water Field (groundwater) can remain a backup supply

WMCP Program Areas

- Media outreach
- Community events, presentations & activities
- Education projects
- Curriculum materials
- Water-efficient landscape demonstration gardens
- Residential technical assistance programs
- Educational & technical assistance for industrial, commercial, and institutional customers
- Low-water-use landscaping programs
- Outdoor water efficiency projects
- Water reuse programs

Source: Water Management and Conservation Plan for the City of Portland, Oregon, Final Draft Report, March 2008

Results and Successes

- Behavioral changes from conservation education have helped to drop retail single-family consumption by 25% from 1992 - 2008.
- Portland Water Bureau's conservation page is one of the most popular on its website.
- Rebates enabled replacement of nearly 1,000 toilets in low-income multi-family properties with corresponding 25% water use reduction.
- Sub-metering in multi-family properties aids in water use reduction.
- Residential conservation kits saved 10,000 gal/year/household

Source: Water Management and Conservation Plan for the City of Portland, Oregon, Final Draft Report, March 2008

From “Water – Use It Wisely”

- Tip #13 - Wash your fruits and vegetables in a pan of water instead of running water from the tap.
- Tip #68 - When the kids want to cool off, use the sprinkler in an area where your lawn needs it the most.
- Tip #84 - Leave lower branches on trees and shrubs and allow leaf litter to accumulate on the soil. This keeps the soil cooler and reduces evaporation.
- Tip #91 - One more way to get eight glasses of water a day is to re-use the water left over from cooked or steamed foods to start a scrumptious and nutritious soup.

WATER USE IT WISELY.

Source: http://www.wateruseitwisely.com/100-ways-to-conserve/index.php