Advanced Water Education Workshop for Valley Educators
Water Facts and Reflections

Arizona Water History:

1. Water needs change over time due to population growth
2. Technology impacts water use and population growth
3. Water rights can be senior, junior, or Native American
4. "First in time, first in right"
5. 1980 Ground Water Management Act regulates the Active Management Areas in Arizona.
6. Arizona did not sign the Colorado River compact in 1922. However, it passed anyway, dividing water between the upper & lower basin states.
7. Junior water users cannot obtain water until the needs of the senior user are met, and the water must be put to beneficial use.
8. Hohokam developed first canal system for agricultural irrigation in 800 A.D.
9. Native Americans have Federal Reserve water rights that come before other water user rights.
10. USBOR created in 1902 to assist with water management issues and growth solely in the West.
11. Roosevelt Dam first reclamation project in the U.S!
12. SRP uses some of the same canal routes as the Hohokam
13. 85% of water behind dams comes from snow melt.
14. Outlook: we do not have enough water to sustain our growing population

ADWR: Statewide Perspective:

1. Participant opinion: ADWR should have statewide responsibility and have stricter guidelines
2. Created to protect Arizona water protection/rights
3. "Tragedy of the Commons"
4. Agriculture land use changing to urban use which changes water user needs
5. Switch from more groundwater use to surface water use
6. Arizona is a leader in water conservation
7. Needs more regulation authority outside the AMA's (statewide)
8. Our current water budget is 8 mAf per year – 54% surface, 37% groundwater, 10% effluent.
9. In general, the goal in AMA's is to reach safe yield by 2025, through direct & indirect recharge.
10. AWS program designed to insure adequate water supply for new users.
11. Looking for new ways to manage statewide supplies.
12. Conserving water today for Arizona's tomorrow.
13. Technology & education transfer to communities throughout the state.
14. Restaurant pre-rinse spray heads lessen water use by 40%

Water Management Mechanisms Panel:
Central Arizona Project:

1. Arizona allocation = 2.8 maf → 1.5 maf to the CAP and 1.3 maf to the Yuma area

2. Brings water to Phoenix, Casa Grande, Tucson and Indian Tribes.
3. We pay for water service, not water
4. CAP distributes central Arizona's share of Colorado water
5. Subsidizes surface water prices for agricultural use to conserve groundwater
6. Provide water to be stored by Central Arizona Ground water Replenishment District (CAGRD)
7. Power revenue used to help pump up hill
8. Arizona has Junior rights as a result of the 1968 Colorado River Basin Act! (CAP has junior rights to the Colorado River water). Ramifications of Junior Status!
9. Ak-Chin Indian community leasing CAP water to Anthem subdivision
10. Colorado River water pumped 800+ feet uphill
11. 3000 cfs delivery capacity
12. Flows 5 mph
13. CAP is the "American Nile"
14. Lake Pleasant stores 810,000 af of CAP water
15. More than 300 miles of canals

Salinity – Desalinization:

1. Expensive – filters, maintenance, brine, infrastructure
2. Water picks up salt (from soil, etc.) as it moves through system
3. Salt disposal becomes problematic if water is desalinized
4. Less than 500 mg/L is soft water
5. Arizona is seriously considering desalinization as a new source of water.
6. Yuma plant created but never used
7. Some say there are plenty of spaces to store brine
8. Takes away focus on conservation and protecting natural water sources
9. Creates jobs!
10. Human sources of salinity. Impact of desalinization in Yuma on Salt Marsh in Mexico
11. The more sever the drought, the higher the salinity level
12. 25% of houses have water softeners, and 50% of new houses are built with water softeners. Increases salt content in overall water distribution system.
13. High salinity can damage crops
14. Evaporation increases soil salinity
15. Salt and Colorado Rivers average 600-800 mg/L of sodium
16. 1973 Minute 242 is added to the 1944 Treaty, regulating salinity of water delivered to Mexico.
17. Desalinization plant was constructed south of Yuma at a cost of $100 million

Water Banking (Recharge and Recovery):

1. Good conservation strategy but for the wrong reasons (-Growth-)
2. Using renewable resources (effluent and other surface water)
3. Recharge can happen: naturally or artificially; directly or indirectly
4. CAGRD – can be used to bank/save water for later use.
5. When water percolates through the soil it is cleaned naturally
6. Farmers can be paid to not pump groundwater

7. Participant opinion: Effluent water should be re-/used before pumping ?????????
8. Need to improve technology to ensure that new pollutants (pharmaceuticals) don't build up in the water supply.
9. Creates revenue for the state
10. Participant Opinion: Water needs to be recharged in the area that it is being pumped.
11. Water banking allows us to leave groundwater in place for future use.
12. Sweetwater recharge facility (Tucson) has a wetland area to filter the water and educate the public
13. Arizona stores water for California and Nevada
14. Industry should be required to recharge groundwater
15. pH is one of the parameters that controls what stays in solution or what precipitates out of solution.

Reclaimed Water:

1. Water resource that grows with population increase
2. Public opinion will be biggest obstacle to reuse
3. Reclaimed water is a great conservation strategy
4. "Toilet to tap" or "Showers to flowers"
5. Public education = PURPLE as identifying color
6. Regulations for new buildings with double piping and duel metering.
7. Nomenclature becoming more palatable
8. Research needed to get pharmaceuticals out of the water
9. Used for golf course irrigation and decorative water features (golf brings in tourism money)
10. In Phoenix metro area 55% of reclaimed water is directly used, 16% is recharged for future use

Urban Heat Island:

1. The core area of an Urban Heat Island does not cool down!
2. The temperature increases 1.4 degrees Celsius for every 1,000 units built
3. It's 2-4 degrees Celsius warmer at night than the rural areas, this causes more/ higher water use
4. Xeric landscape adds to the heat island effect while mesic landscape mitigates it
5. Changing personal habits can positively effect the urban heat island effect
6. Natural environment (urban mountains) also retain heat
7. Anthropogenic heat contributes too (cars, planes, etc.)
8. 2% increase in water consumption when night time temperatures increase 1 degree Celsius
9. If we have El Niño conditions in the winter we see an increased urban heat island effect in the summer
10. City is being expanded into open desert which is expanding the heat island
11. Xeric increases temperature and decreases water use, mesic decreases temperature but increases water use
12. Earth's temperature (average) is 60 degrees Fahrenheit but would be 5 degrees Fahrenheit with no green house gases! We need some; not too much.

Drought & Climate Change:

1. Weather and climate are different
2. Arizona should adjust projections based on current research
3. Drought is less than average precipitation and climate affects drought
4. Climate of an area affects people, animals and vegetation in that area.
5. Droughts are natural occurrences (seems to be every 20-30 years from the paleo-record)
6. Micro climates xeric versus mesic landscape can have a direct effect on the climate of an area. (heat island effect)
7. Drought occurs in every climate if the amount of precipitation is less than the average. (e.g. Drought in rainforest)
8. Climate change can produce what the current society would consider an extended drought
9. Drought and climate change are related to human behaviors
10. Baseball season – climate; one inning of one game – weather; team history – paleoclimate
11. Jet stream has an effect on whether we get moisture
12. Early snow melt has been correlated in Arizona's Central Highlands to increased fire activity.

Drought Indicators:

1. Dendro chronology, dendro climatology, dendro hydrology
2. Salinity: increase or decrease in lakes
3. Reduction in CAP and SRP allotment
4. Natural runoff reduction
5. Narrow tree rings represent stress caused by lack of precipitation (Arizona winter precipitation)
6. Tree ring records provide historic information on drought, climate change and precipitation
7. Specific examples of paleoindicators are ice core, coral, charcoal, pollen, lake sediments, archeological sites
8. Calibrate models with data to improve predictions
9. Trees are "Natural archives"
10. Drought indicators are an historical representation that can be used to make predictions about future drought, though predictions will have some uncertainty.
11. A new study concludes that: severe droughts in the Colorado River Basin can occur simultaneously with severe droughts in the Salt River Basin.
12. 20-30 year periods of drought are normal according to the tree ring record.
13. This is not the "worst drought"
14. At this point, this drought compares to that of the 1950s drought
15. Trees do better recording dry years (like 2002) than wet years
16. Colorado River watershed and Salt Verde Watershed system according to the tree ring record experience drought synonymously! One not always the "back up "for the other