

This presentation premiered at WaterSmart Innovations

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The Emergence and Implications of Non-Potable Water Use in Irrigation

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The Intelligent Use of Water.™

Topics

- **Key drivers of demand for non-potable irrigation**
- **Trends in non-potable irrigation**
- **Challenges of non-potable water in irrigation**
- **Future of non-potable irrigation**

Drivers of demand for non-potable irrigation

The world's water crisis

Chart 1A – The World's Water

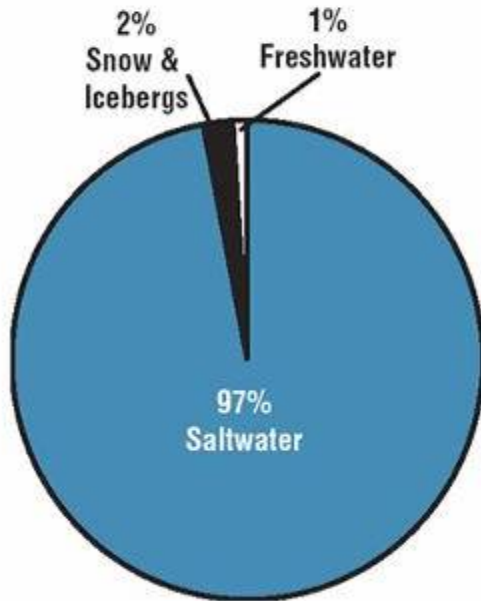
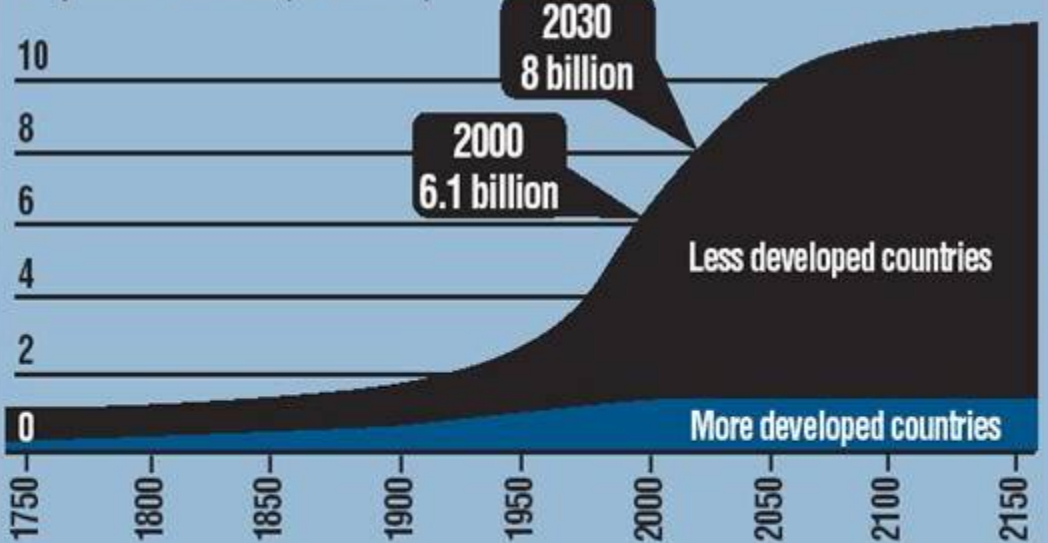
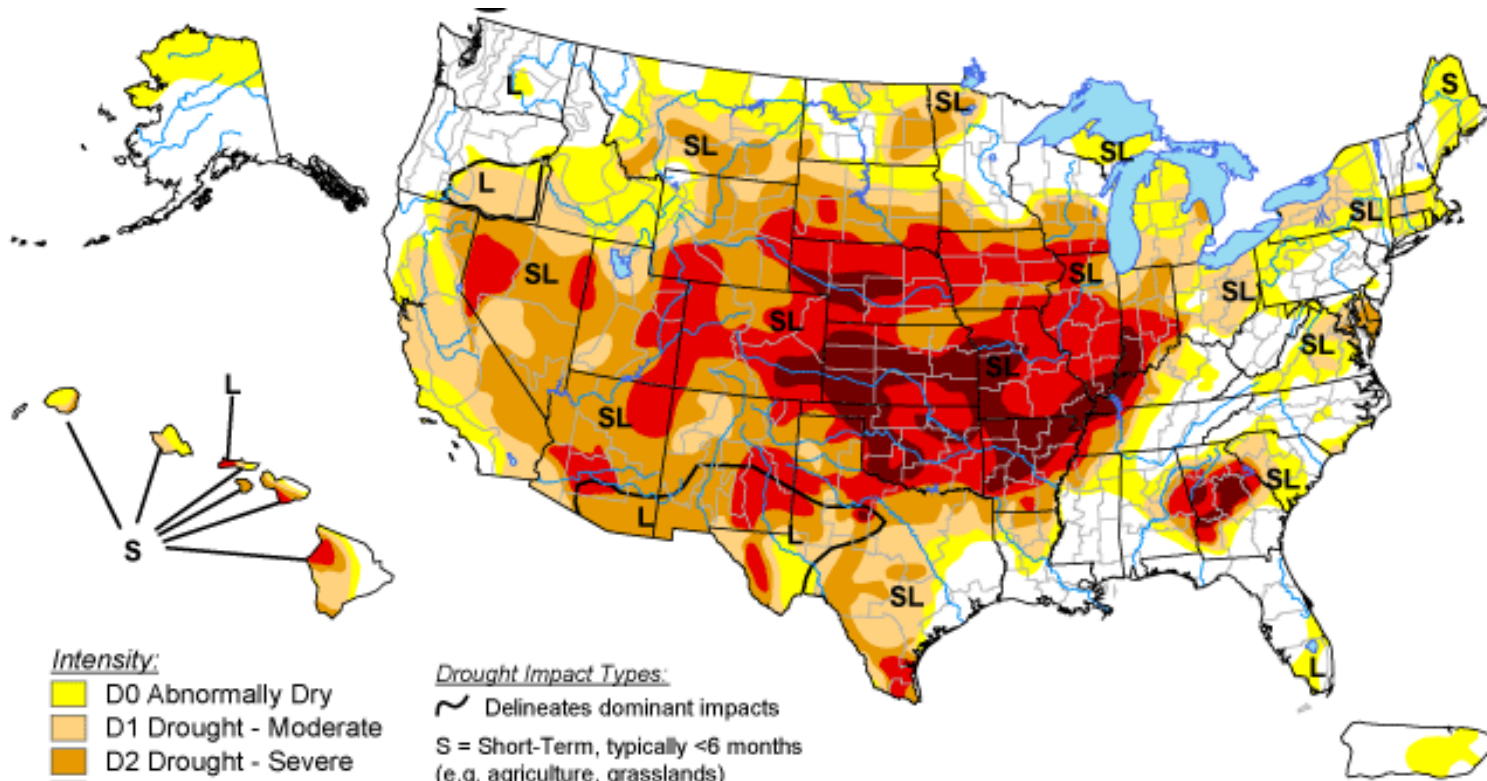


Chart 1B – The World's Population ⁶

Population Growth (in billions)



Widespread drought conditions



Intensity:

- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

- Delineates dominant impacts
- S = Short-Term, typically <6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically >6 months (e.g. hydrology, ecology)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://droughtmonitor.unl.edu/>

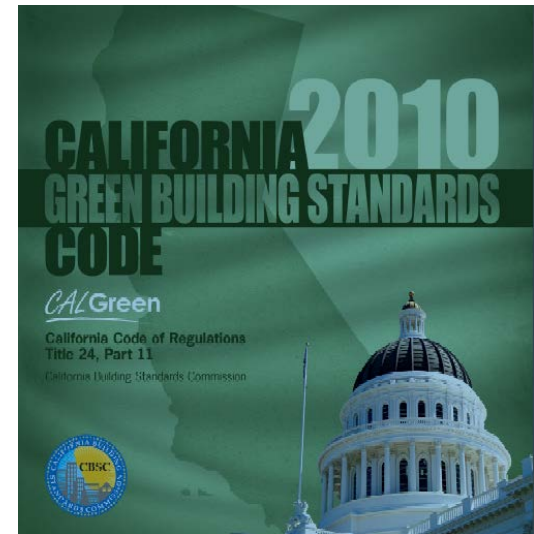


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Author: Michael Brewer/Liz Love-Brotak, NOAA/NESDIS/NCDC

Increasing regulation

- **New Green Codes requiring use of non-potable and/or reclaimed water**
- **Stronger regulation in particular markets**
 - US: California, Florida, Texas, Arizona
 - Worldwide: Australia, Israel, Spain
- **Anticipate similar levels of regulation across the US**



Increasing Water Costs

Residential Water Bill Increases (Past 12 Years)

- **Atlanta, GA 233%**
- **San Francisco, CA 211%**
- **Wilmington, DE 200%**
- **Philadelphia, PA 164%**
- **Portland, OR 161%**

Trends in non-potable irrigation

Widespread applications

- **Golf courses**
- **Municipal landscaping**
- **Sports Fields**
- **Dust control**
- **Agriculture**
- **Wetlands restoration**



Public agency adoption

- **City of Sydney**
 - Supplies 1 billion gallons of recycled water a year to irrigate farms, golf courses, sports grounds and parks
 - Award-winning Pirrama Park, with sustainable solar panels and rain water harvesting



Residential adoption

- **Gladden Farms
Marana, AZ**
 - 1,500 homes equipped with purple valve boxes for future non-potable water system
- **City of Tampa**
 - Distributes treated wastewater for residential landscape irrigation



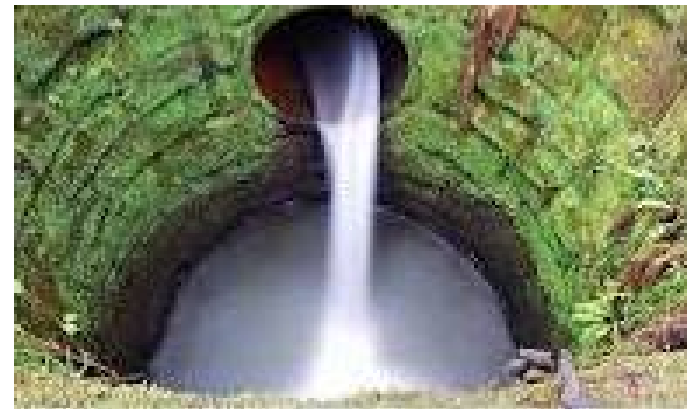
On-site reclamation

- **Sydney Olympic Park Water Reclamation and Management Scheme (WRAMS)**
 - Locally integrated approach to water conservation based on rainwater harvesting, wastewater reprocessing and reducing water demand



Challenges of non-potable water in irrigation

Do you know your water source?



Challenges of non-potable water

- Availability
- Public skepticism
- High in chlorine, saline
- Seasonal fluctuations
- Dual piping expense vs. potable water



The future of non-potable irrigation

Emerging irrigation technologies

- Continued purple identification
- Manufacturer investments in reclaimed-resistant materials
 - Valves
 - Spray heads
- Expansion of irrigation systems to include water harvesting equipment
- Innovation in intelligent control systems



Broader adoption

- **Broader adoption, particularly by public agencies and homeowners**
- **Singapore**
 - Aiming to increase desalinated water to 30% of total water supply by 2060



Drivers of broader adoption

- **Increasing regulation, with new Green Codes requiring non-potable irrigation in new construction**
- **Decreased or subsidized pricing**
- **Irrigation technologies that can withstand variety of non-potable water sources**
 - Graywater systems
 - On-site reclamation
 - Desalination

A look at the future

The Nature Conservancy



RAIN WATER HARVEST SYSTEM

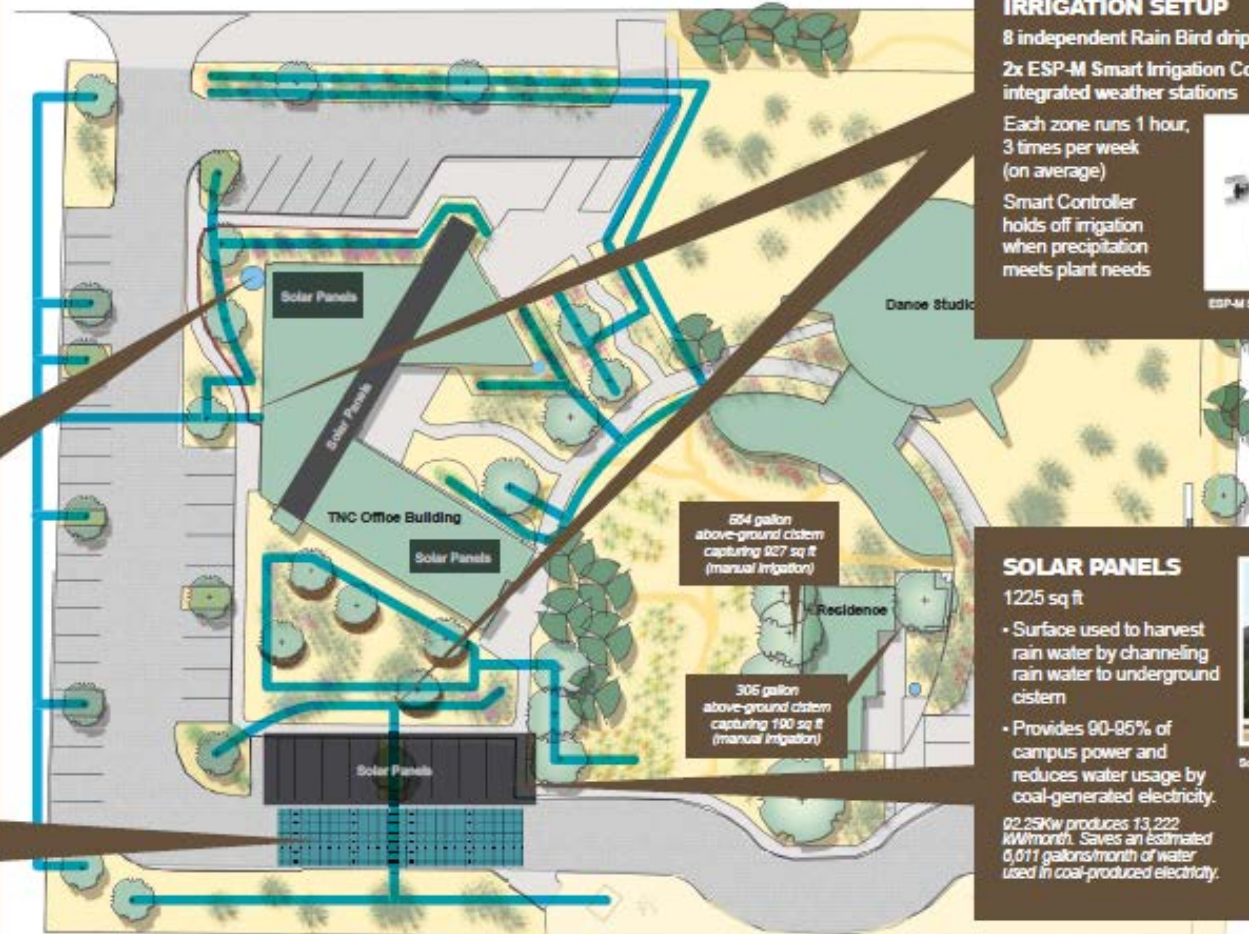
- 30,000 gallon underground cistern
- 3,800 gallon above ground cistern
- 564 gallon above-ground residential cistern
- 305 gallon above-ground residential cistern
- 6,670 sq ft of rain water harvesting space
- Provides 40% of total irrigation water usage



3,800 gallon above-ground cistern



30,000 gallon underground cistern



IRRIGATION SETUP

- 8 independent Rain Bird drip hydrazones
- 2x ESP-M Smart Irrigation Controllers with integrated weather stations
- Each zone runs 1 hour, 3 times per week (on average)
- Smart Controller holds off irrigation when precipitation meets plant needs



ESP-M Smart Irrigation Controller

SOLAR PANELS

- 1225 sq ft
 - Surface used to harvest rain water by channeling rain water to underground cistern
 - Provides 90-95% of campus power and reduces water usage by coal-generated electricity.
- 02.25kW produces 13,222 kWh/month. Saves an estimated 6,011 gallons/month of water used in coal-produced electricity.



Solar Panels



Thank you

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