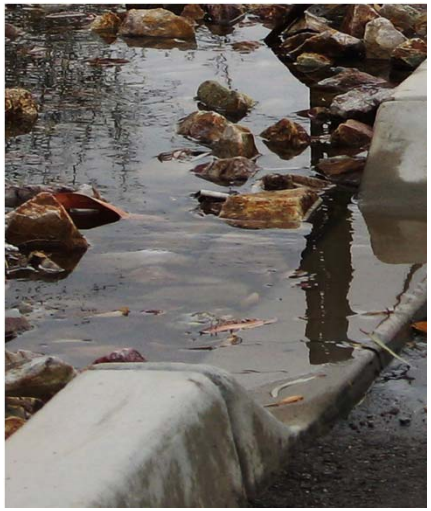
Regional Tree & Shade Summit 2.0:
Branching out One Community at a Time
A.E England Building, Phoenix, AZ
March 9, 2016

The Importance and Roles of Trees to Green Infrastructure

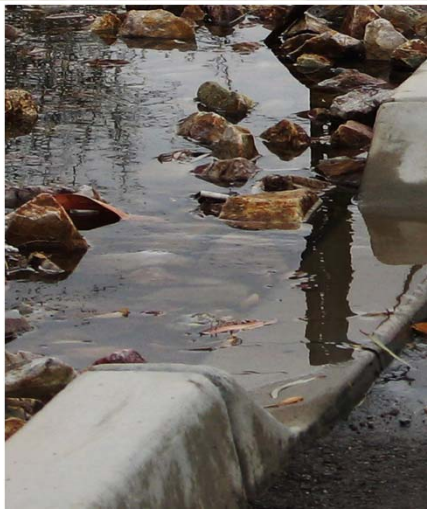


Irene Ogata, PLA, ASLA
Urban Landscape Manager
Planning & Development Services Dept.

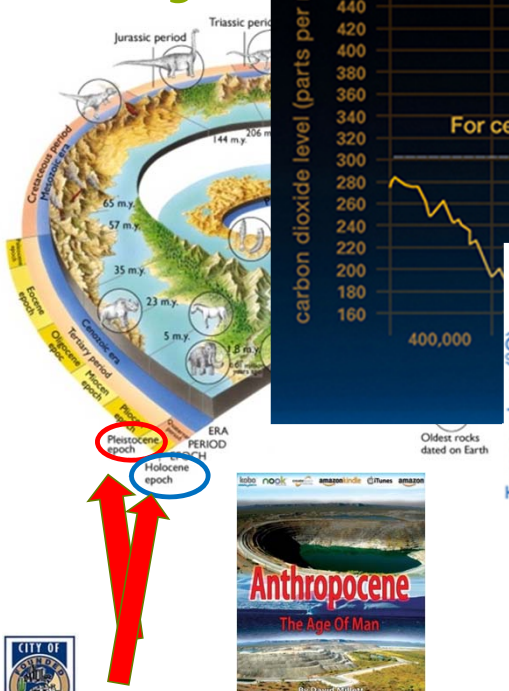
Branching Out One Community at a Time

The Importance and Roles of Trees to Green Infrastructure

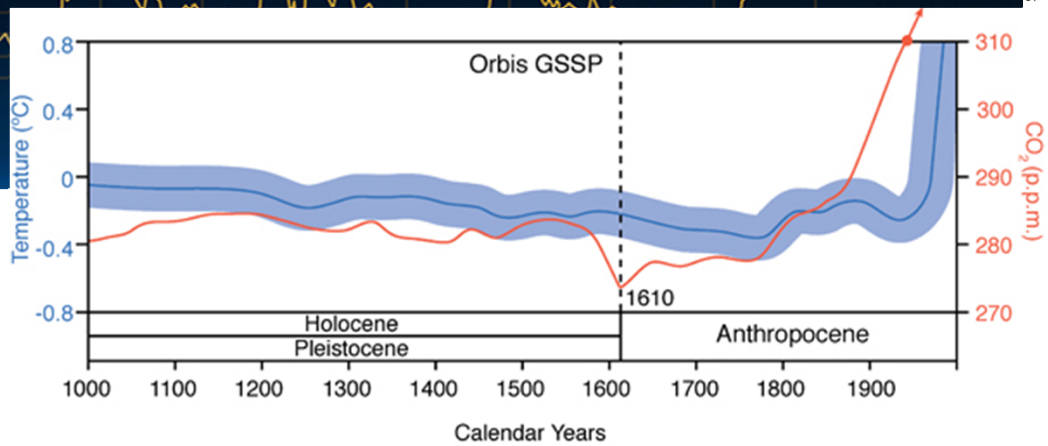
- *Changes: Latest Normal*
- *Drivers: National Differences*
- *Adapting: Messiness*



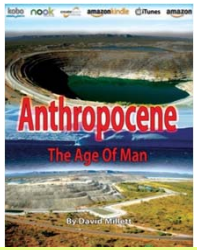
Geologic ti



Source: http://climate.nasa.gov/climate_resources/24/

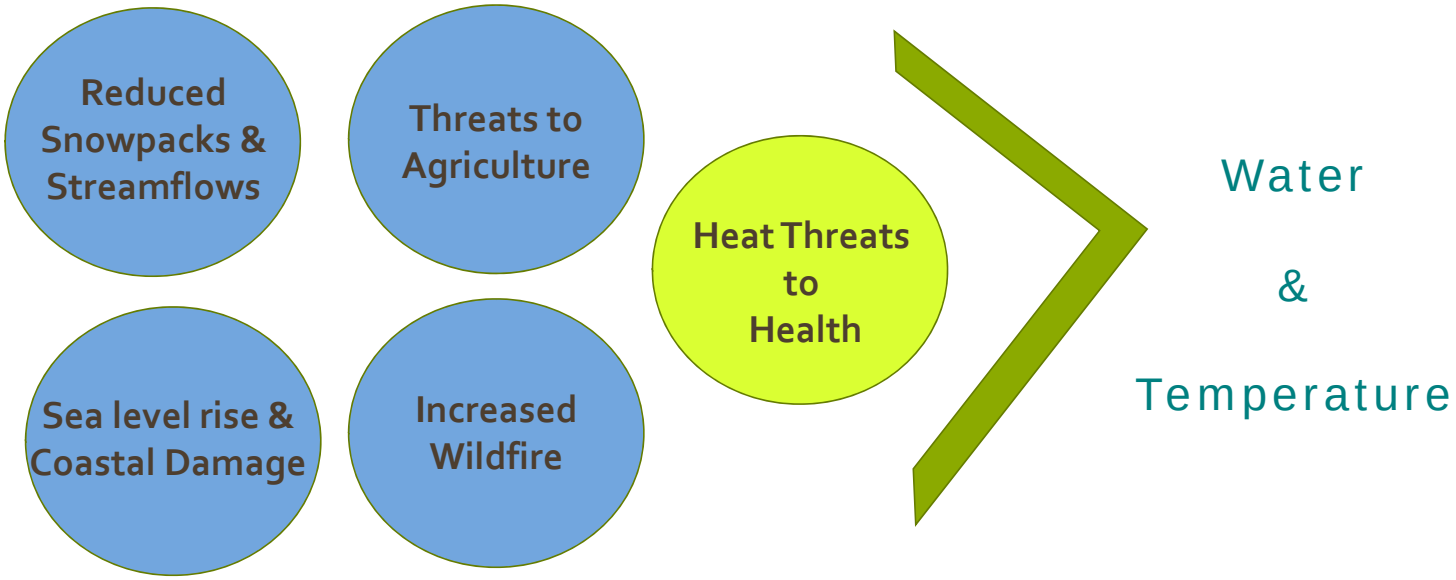


Source: http://www.scientificamerican.com/article/mass-deaths-in-americas-start-new-co2-epoch/



Graphic: http://www.igbp.net/news/

Climate Change Impacts: Southwest Region | 5 Sectors



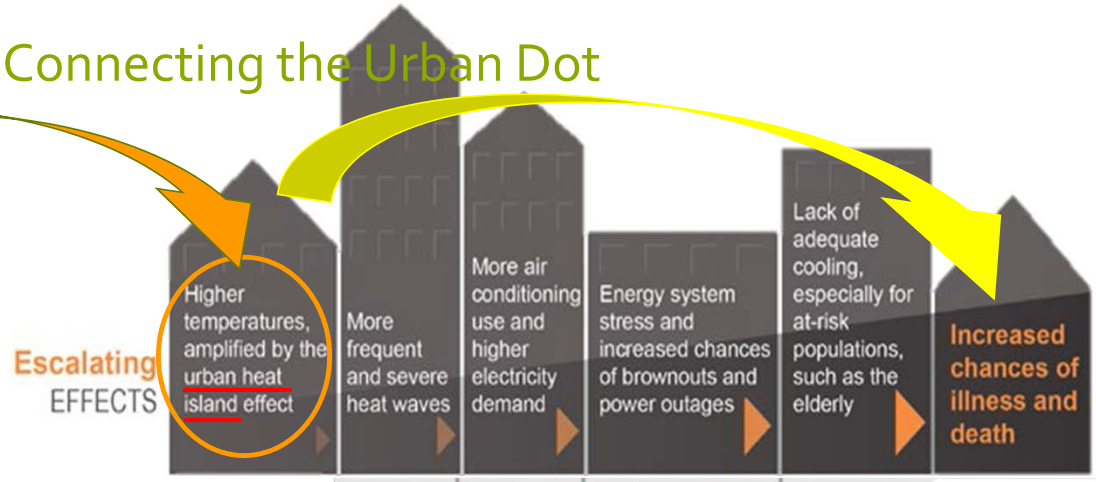
Garfin, G., G.Franco, H. Blanco, A.Comrie, P.Gonzalez, T.Piechota, R.Smyth, and R.Waskom, 2014: Ch. 20: Southwest. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J.M.Melillo, Terese (T.C.) Richmond, and G.W.Yohe, Eds, U.S. Global Change Research Programs .

Integrative Systems

Climate Change: Connecting the Urban Dot

Heat Threats to Health

"**Heat stress**, a recurrent h
problem for urban residents, has been the leading weather-related cause of death in the United States since 1986. . . – and the **highest rates nationally are found in Arizona.**



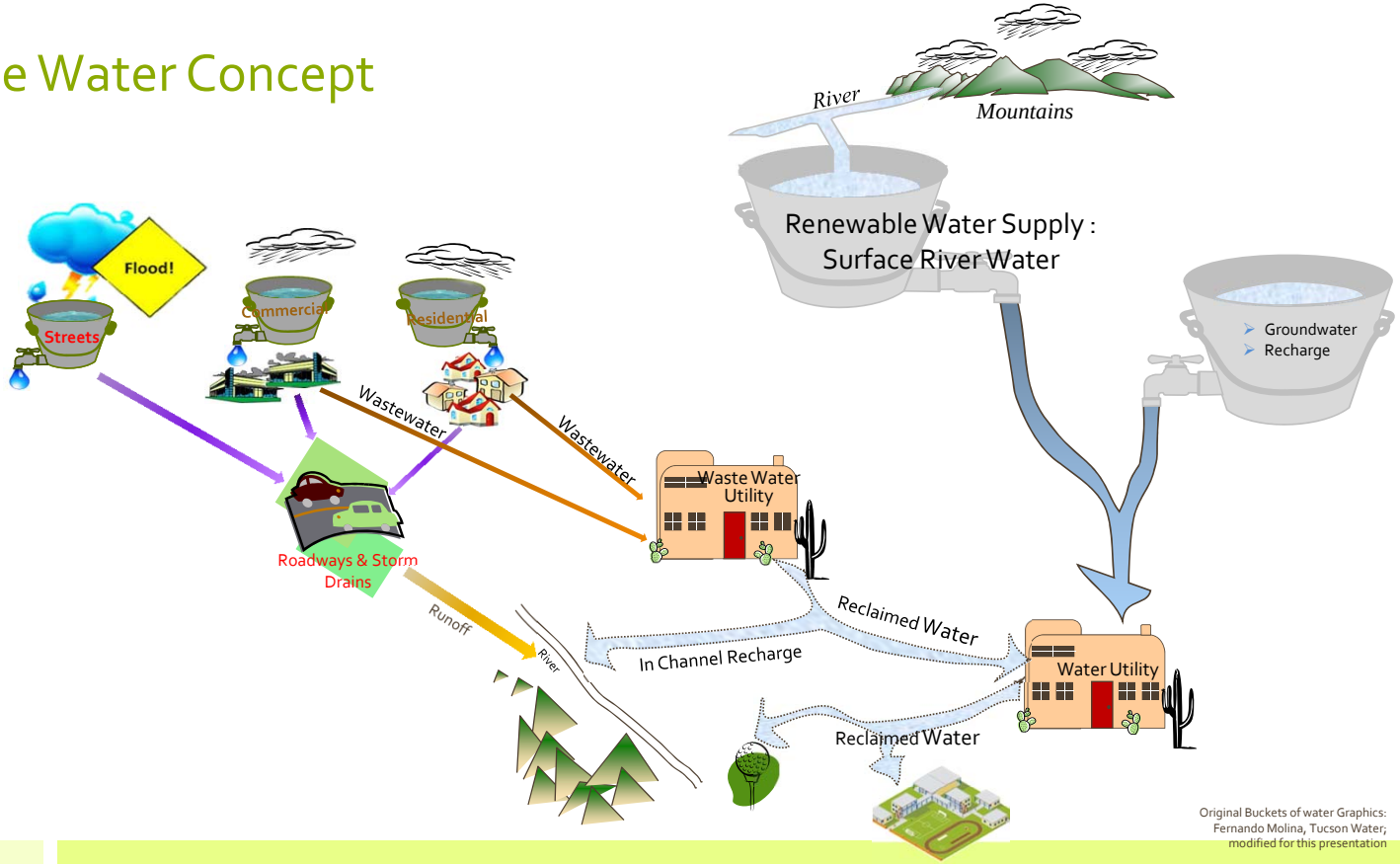
Preparedness & Response OPTIONS

- Use of white roofs, shade tree planting, and increased shading
- Reduce non-air conditioning demand through use of ENERGY STAR appliances
- Application of smart grid technologies and addition of solar power generation for summer peak demand
- Increased preparedness through provision of cooling centers and programs to check on elderly residents

Garfin, G., G.Franco, H. Blanco, A.Comrie, P.Gonzalez, T.Piechota, R.Smyth, and R.Waskom, 2014: Ch. 20: Southwest. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J.M.Melillo, Terese (T.C.) Richmond, and G.W.Yohe, Eds, U.S. Global Change Research Programs .

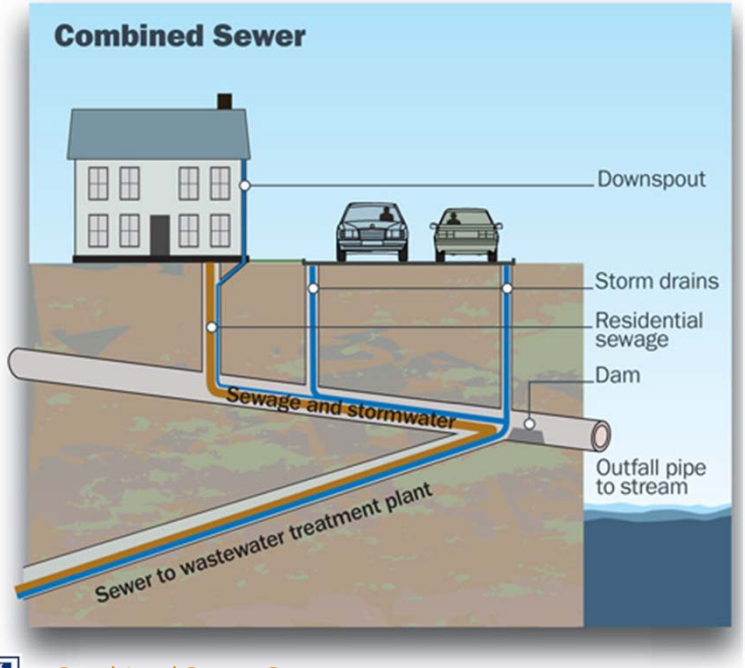
2013 Assessment of Climate Change in Southwest United States: Chapter 15. Human Health: Coordinating Lead Authors: Heidi Brown (Univ. of AZ); Andrew C. Comrie (Univ. of AZ); Deborah M Dreschsler (CA Air Resources Board)

One Water Concept

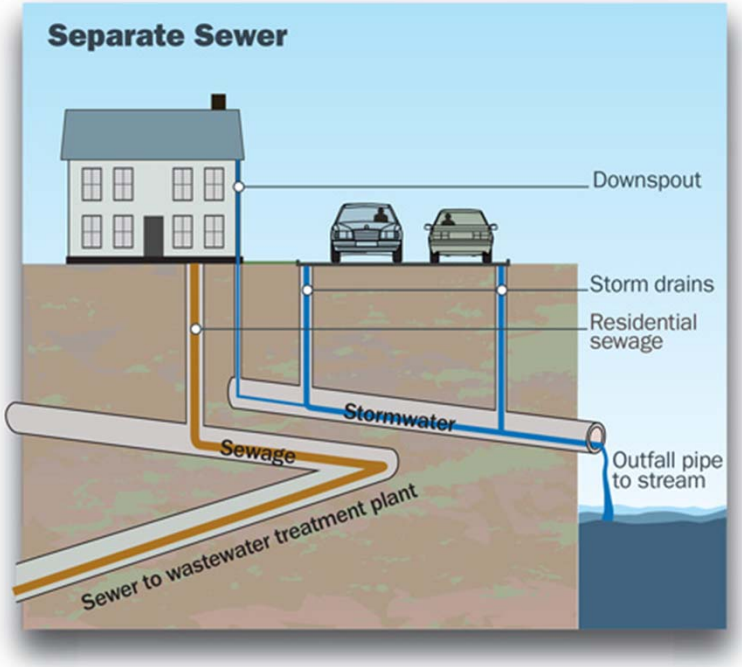


Original Buckets of water Graphics:
Fernando Molina, Tucson Water;
modified for this presentation

Stormwater System Drivers



Combined Sewer System



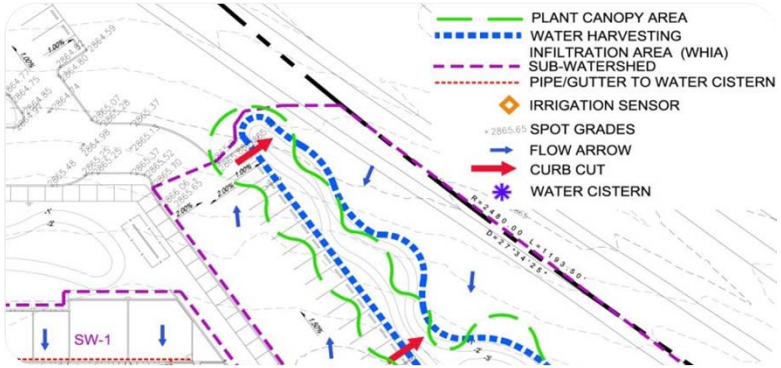
Separated Sewer System

Source: Environmental Health Perspective: http://ehp.niehs.nih.gov/123-a243/

Connecting Water, UHI and Shade Trees : **Accepted Standards**

Curbs allowed by TDOT

Connecting Water, UHI and Shade Trees : **Commercial RWH Ordinance**



The Water Budget

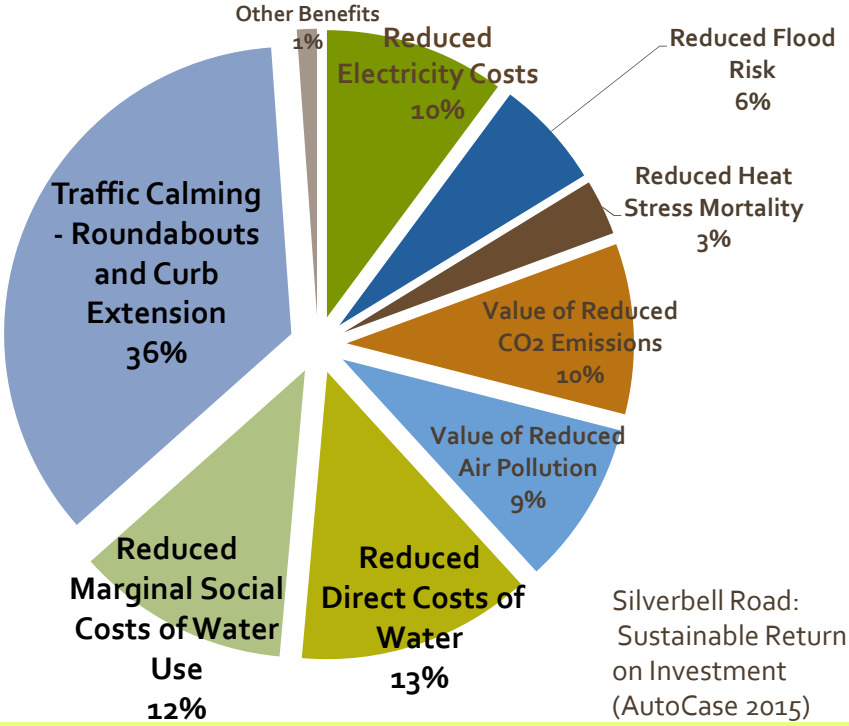
Rainfall
+ Plant H_2O Need
+ Basin area needed
= Minimum Required H_2O Volume
for healthy plant survivability

Connecting Water, UHI and Shade Trees: TDOT APG Green Streets

TDOT : Houghton Road

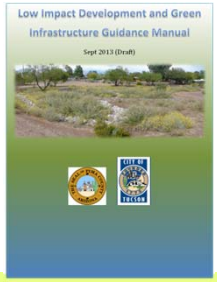
TDOT : St. Mary's Rd | Downtown Links

Metrics: Cost-Benefit Analysis



Silverbell Road: Sustainable Return on Investment (AutoCase 2015)

- **GI/LID Practices Evaluated**
  - **8 GI features evaluated**
    - Water Harvesting Basins
    - Bio Retention Basin
    - Xeriscape Swale
    - Cistern
    - Infiltration Trench
    - Detention Basins (or Extended Detention Basin
    - Pervious Pavers
    - Curb Extentions (chicanes, medians, traffic circles and road diets with inlets to collect stormwater



The Cost of Maintenance

March 2013

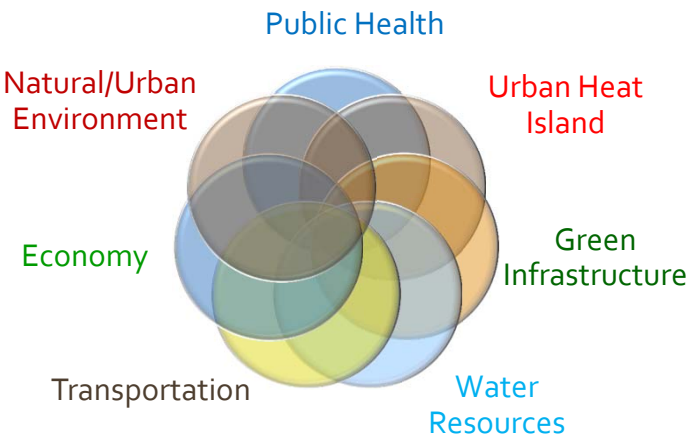
The Importance of Operation and Maintenance for the Long-Term Success of Green Infrastructure

A Review of Green Infrastructure O&M Practices in ARRA Clean Water State Revolving Fund Projects

Findings:

- Variability in tracking activities
- Trend toward accountability practices: developing O&M Manuals
- Very few tracking systems
- Trend to provide training or education
- Mix of public-private shared responsibility
- Mix of funding : general funds to stormwater utility fees

Integrative Practice of Green Infrastructure



Multiple Overlapping Elements

Multiple Interacting Players

Resources

Univ. of Arizona Water Resource Research Center newsletter article:
https://wrrc.arizona.edu/LID-green-infrastructure

Rainwater Harvesting Guidance Manual:
http://www.tucsonaz.gov/files/transportation/2006WaterHarvesting.pdf

Green Infrastructure for Southwestern Neighborhoods:
http://watershedmg.org/download-green-infrastructure-manual

Single-family Rainwater Harvesting Incentive Rebates:
http://www.tucsonaz.gov/water/rwh-rebate

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