Challenges of Urban Growth, Water and Wastewater: the Southern Arizona Story

G. Schneier-Madanes CREDA / CNRS – Paris 3 Sorbonne Nouvelle
Ed Curley WESTCAS / Pima County Regional Wastewater Reclamation
Juan Valdés HWR – University of Arizona

And the collaboration :
Thomas Maddock III HWR, University of Arizona
Stuart Marsh School of Natural Resources, University of Arizona
Kyle Hartfield Office of Arid Lands, University of Arizona , University of Arizona

Arizona Remote Sensing Center

Regional Wastewater Reclamation Department

cnrs

THE UNIVERSITY OF ARIZONA.

Summary

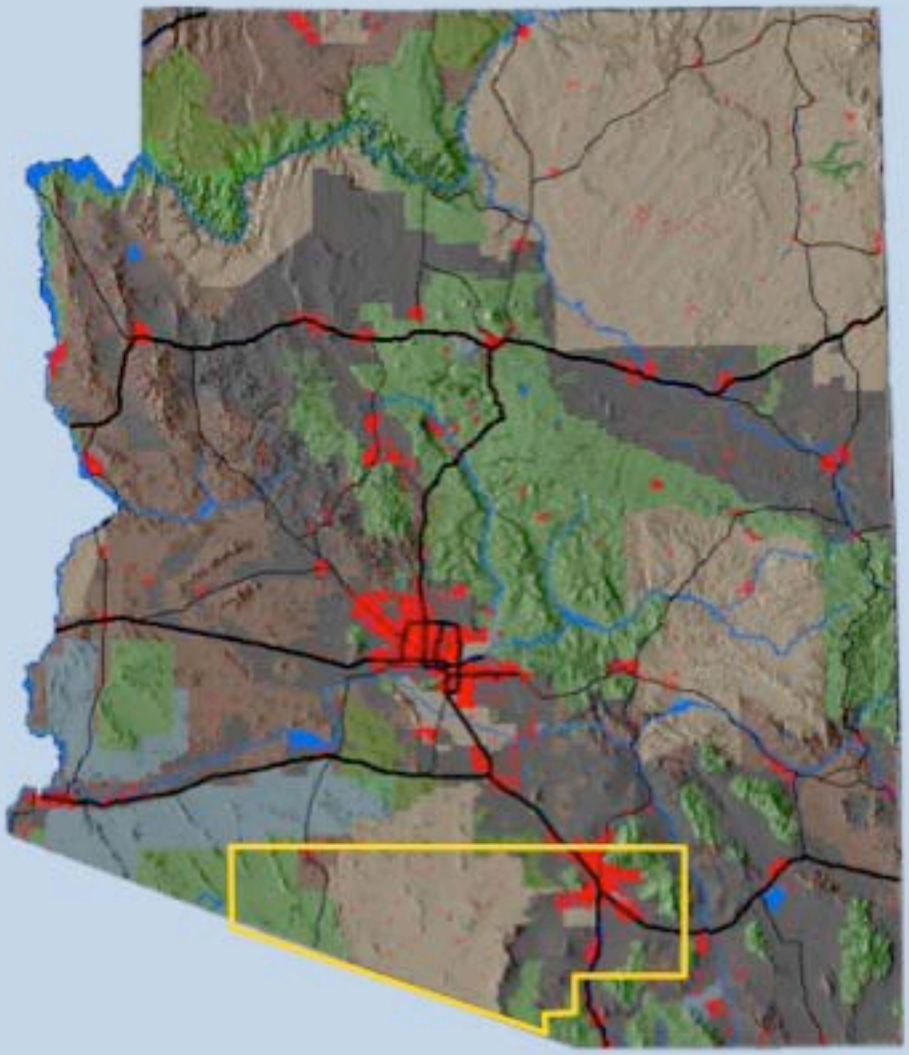
1. Introduction
2. History and Development of the Tucson Metropolitan Area
3. Management of Water Resources and Wastewater in the Tucson Metropolitan Area.
4. Water resources (surface, groundwater, wastewater)
5. Patterns and actors of urban growth, water & wastewater: leap frog & wildcat
6. Multi-temporal Remote Sensing of Urban Growth
7. Case Studies: Dove Mountains, Rita Ranch
8. Climate Change Impacts
9. Current & Future challenges

Focus

- Urban development results in significant pressure on water resources and networks
- Pressure depends on urban forms, environmental setting and governance
- Problem: How to tackle the ever growing need for water and relieve the pressure on resources to achieve sustainability?
- Utilizing this knowledge to inform future water policy.
-

The Tucson AMA

The Arizona Growth Corridor - 2010



7 million inhabitants

The Tucson Region

- Population:
  980,263 in Pima County
  520,116 in City of Tucson

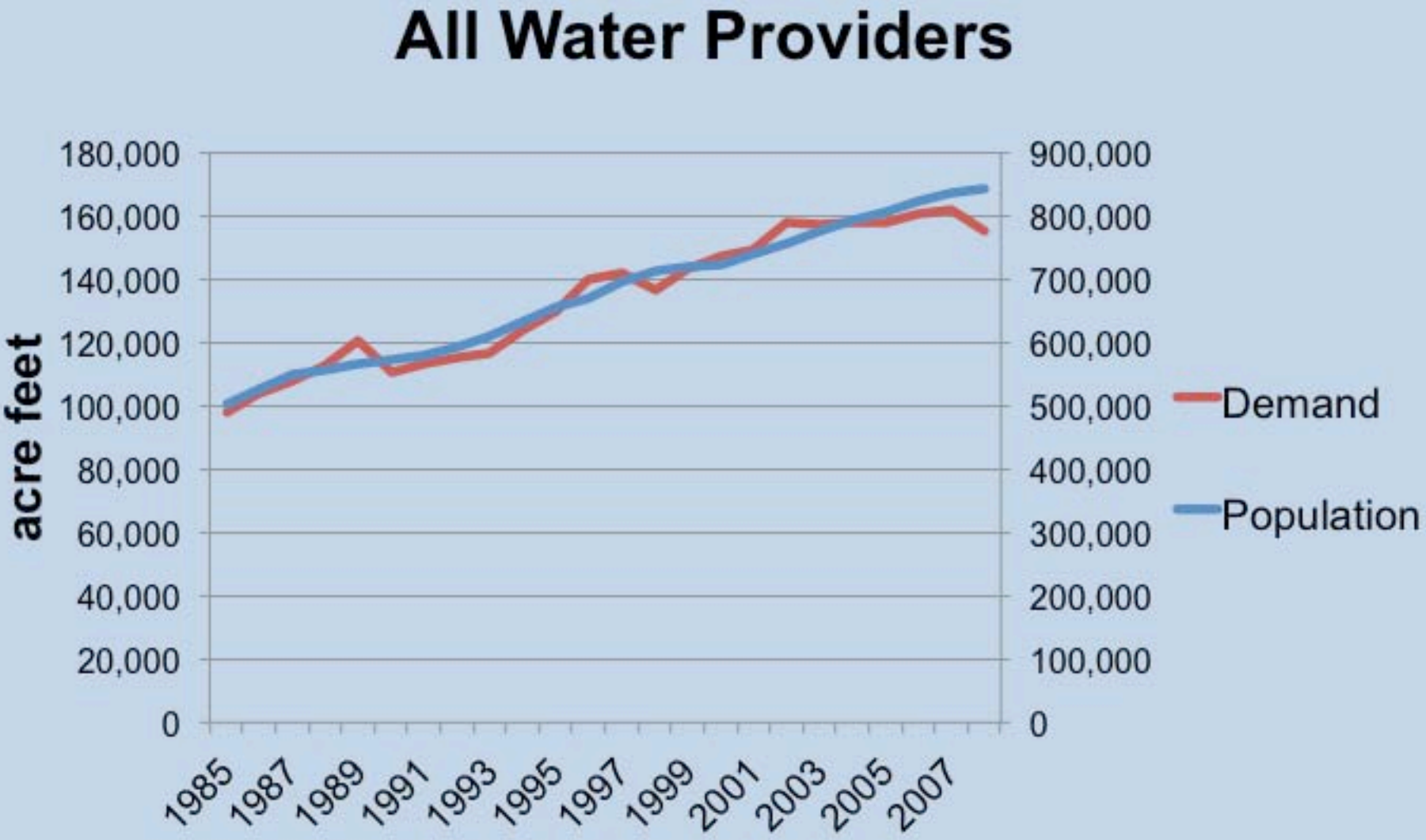
- 23,828 km² = 5,888,000 ac

- Annual rainfall: 30.5 cm = 12.0 in
  (metro area)

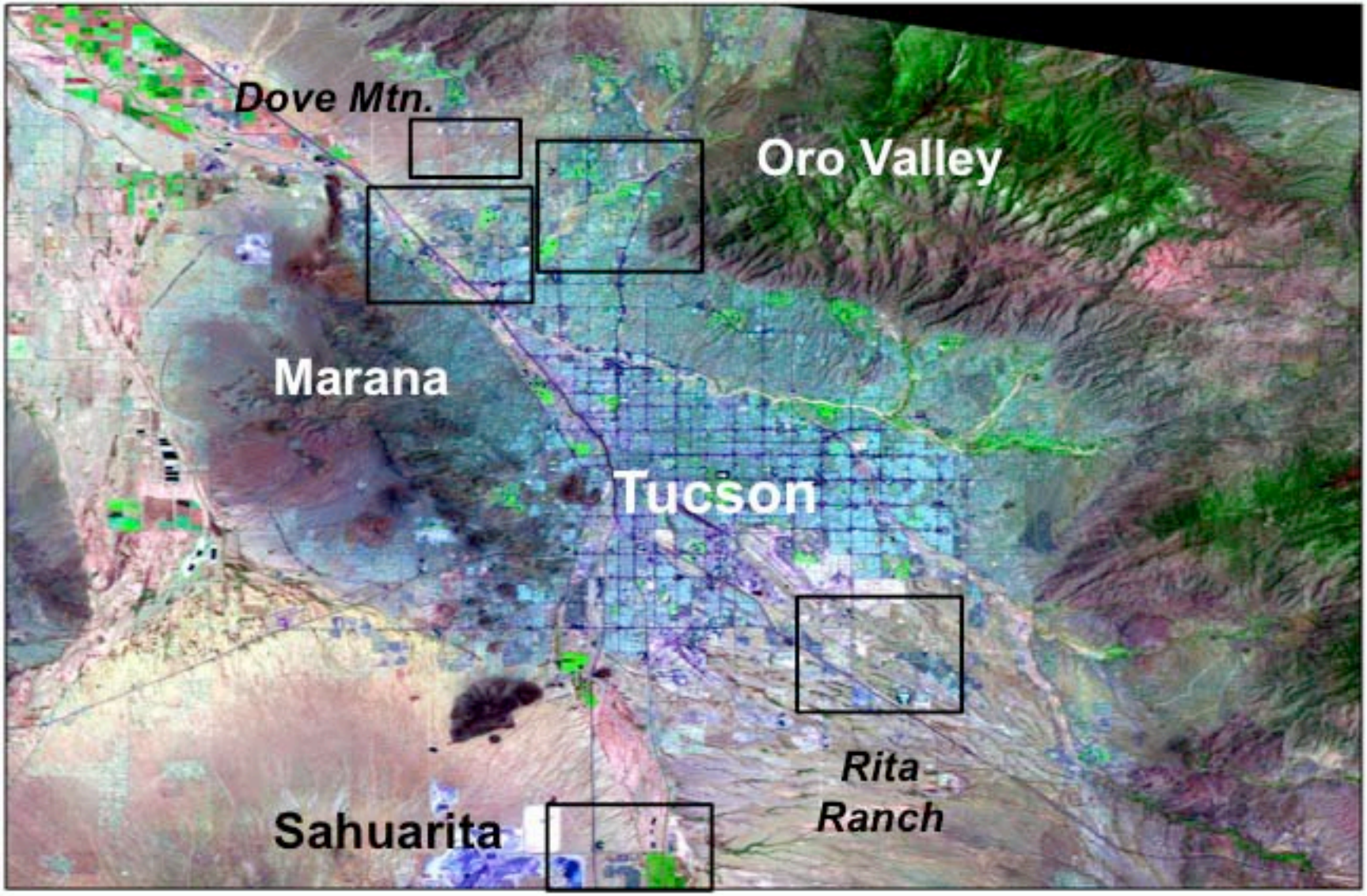
Urbanization

- Newly urbanized areas lay well beyond the center of Tucson.
- Outlying communities have become cities – Marana, Oro Valley, Sahuarita
- The degree of urbanization varies between jurisdictions.
- Sprawl = “Leap-Frog” and “Wildcat Development”

Growth population and evolution of water demand



Project Study Areas



Infrastructure – 1984-2010

- Correlation built environment growth / number of wells / water /sewer connections.

- These four areas were converted from farming and ranching on the basis of the low cost of the land, the water rights that came with the land, their proximity to transportation networks, and the developer's willingness to pay for the cost of building the water/ sewer connection to the development.

- The private "legacy development".

Growth in Relationship to Regulation

- **Arizona Groundwater Management** → preservation scarce water resources.
  - **Our results:** only restrictions on spacing of wells and no effective policy restrictions ➔ post-act urbanization did not stop significant increases in new groundwater wells
- **Land planning policies for the cities** → in-fill based upon zoning.
  - **Our results:** conversion of farming and ranch lands at lower cost + developer financed sewer infrastructure + access to publicly funded transportation networks ➔ sprawl and exurbanization.
- **Pima County:** growth = ~ 2%/year over the last 30 years.
  - Converted areas show much great percent growth due to these physical and economic drivers.

Preliminary Findings

- 1980-2000: growth in the built environment = alteration of desert and riparian habitat.
- In spite of water regulations: growth of the built environment + development of new wells and sewer/ water lines at very high rates.
- Scenario: conservation vs public works
- The dilemma : groundwater decline vs urban growth (new homes, golf courses)

Access to Colorado River water

+ environmental awareness / environmental policy / growth of a reclaimed water

Shrink Your Water Footprint

All numbers are measured in gallons of water used per person per day.

A pledge to conserve!

In the arid Southwest, we're in such a plight
The water is precious – waste is not right,
And so I will place my name down below
And promise to waste not, so "want not" we'll know

I pledge here today to stop running toilets
And only to flush when the content, it warrants
In restaurants, I'll order my water for thirst
But otherwise, go dry, unless I'm coerced

I'll install "low-flow" for my washer and showers
And close the tap tight, when I tooth brush for hours
I'll water my plants, but not in mid-day
And I won't spray my hose to clean my driveway

As rainwater falls from the sky, It's for free
So I'll contour my yard, my shovel and me
I may even purchase a cistern or tank
And mulch all my xeriscape, really quite swank

Yes, I will convert to the ways of the cactus
To Conserve in the desert, an upstanding practice
I pledge on this day to do all that I can
To let others know, because here is the plan:

To use water wisely, our planet to nurture
And save it for children of kids in the future

Name:

PAG
Pima Association of Governments

PAGnet.org • 792-1093

Source: http://www.pagnet.org/documents/Environment/WaterPledge.

Thanks for your attention !