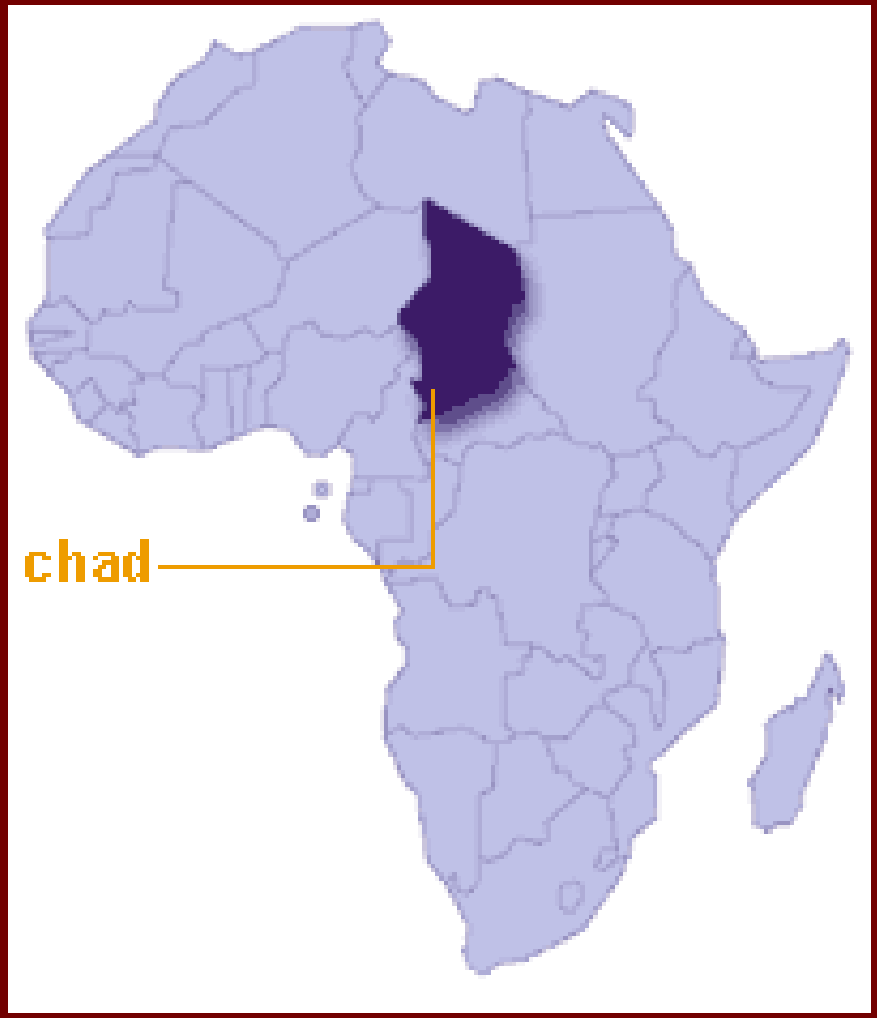
Irrigation Conservation: *Lessons from Texas and Around the World*

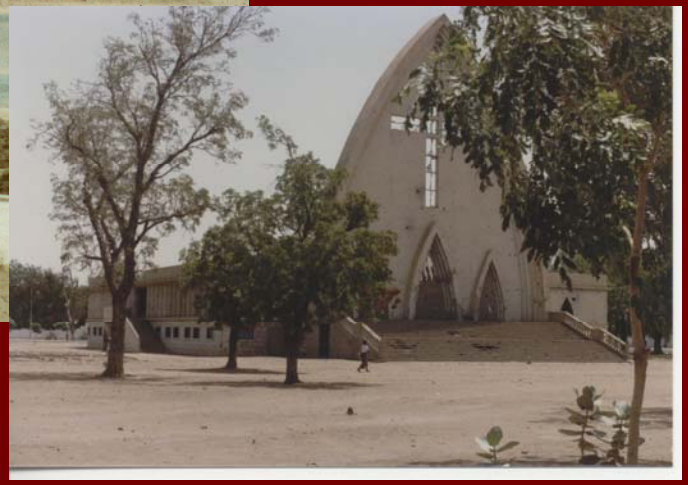
Texas Water Conservation Association
61st Annual Convention, Austin
March 3, 2005

Guy Fipps
Director, Irrigation Technology Center
Professor and Extension Agricultural Engineer

First Job as an Irrigation Engineer 1985 for CARE-International in Chad



Two Years after the Civil War




ALGERIA
LIBYA
EGYPT
Aozou
Emi Koussi
TIBESTI MASSIF
NIGER
Faya-Largeau
S A H A R A
BODÉLÉ DEPRESSION
ENNEDI PLATEAU
Koro Toro
CHAD
Lake Chad
Mao
Abéché
SUDAN
OUADDAÏ PLATEAU
N'DJAMENA
Mongo
Am Timan
Chari
NIGERIA
Bahr Aouk
Bongor
S A H E L
Logone
Laï
Sarh
Moundou
CENTRAL AFRICAN REPUBLIC
CAMEROON


FORD

The Wadi's in the Lake Chad region

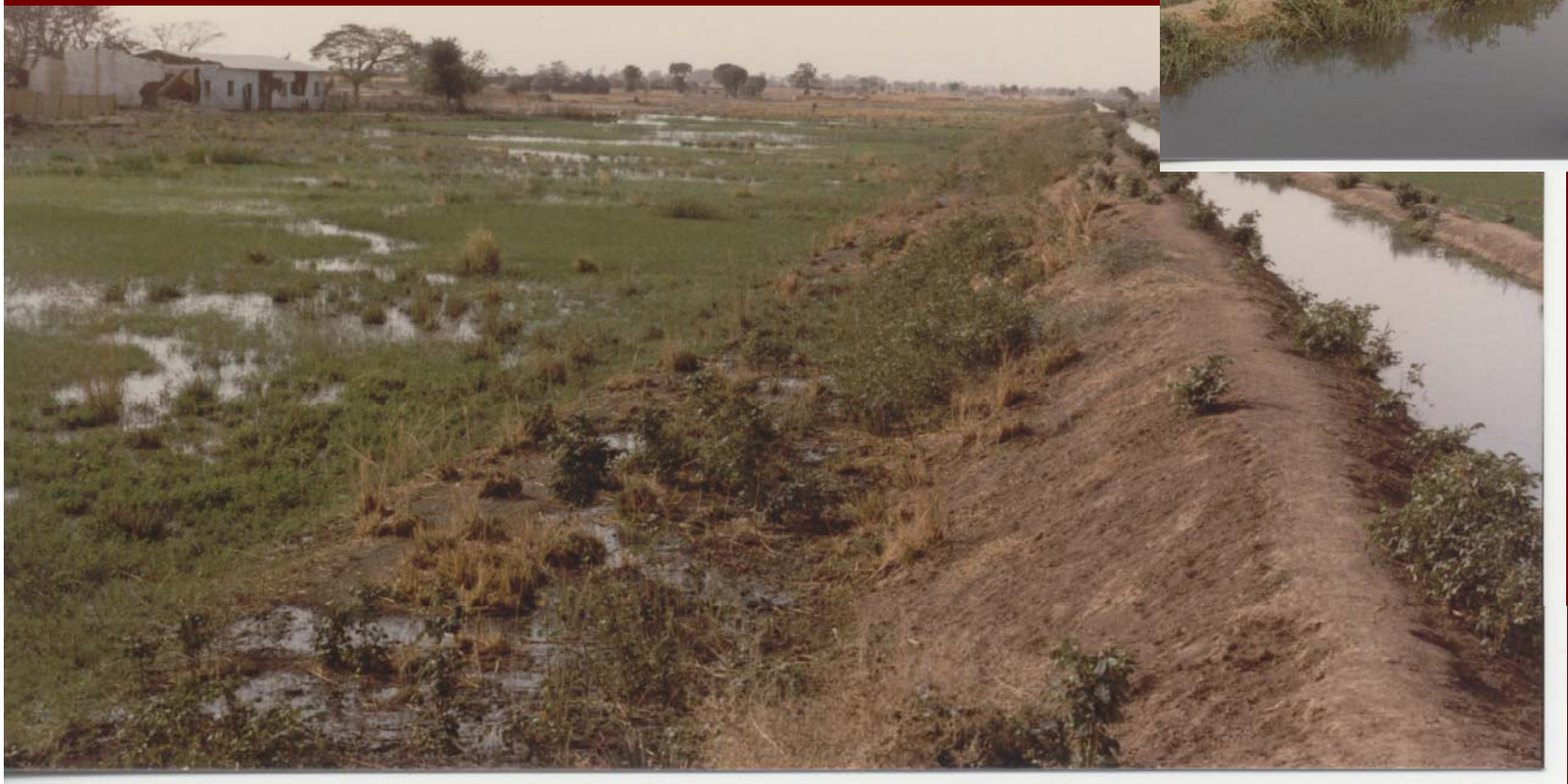
Assignment – find a low cost method of improving the traditional Shaduf irrigation system in Chad's wadi's

Why didn't someone else think of this?

Is this what they mean by thinking *out of the box*?

The other lesson I learned in Chad....

..*is don't locate a rice irrigation scheme in sandy soil!!*



1988 – Employed as an Extension Irrigation Engineer Texas Cooperative Extension

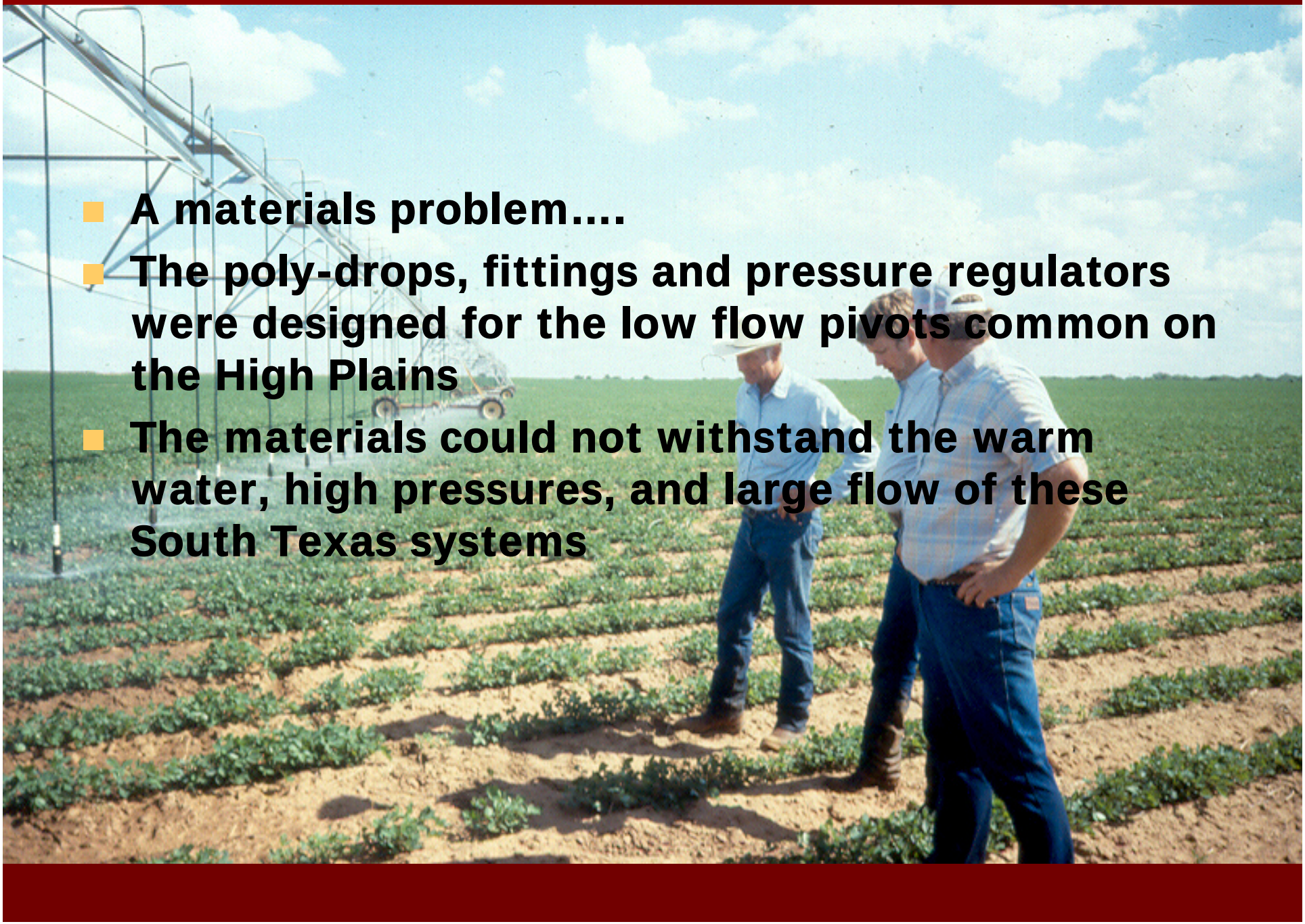
- LEPA was just beginning widespread use on the Texas High Plains
- Developed by TAMU Irrigation Engineers
- Works *"like a charm"*

1989 – the first LEPA in South Texas

- **Material costs by Evergreen GWD**
- **Design and Technical Support by Texas Cooperative Extension**

- **The following Saturday, County Extension Agent calls:**

..the drops are flying off the pivot – what do we do??



- A materials problem….
- The poly-drops, fittings and pressure regulators were designed for the low flow pivots common on the High Plains
- The materials could not withstand the warm water, high pressures, and large flow of these South Texas systems


..moral – don't assume too much when adapting new technologies into different environments
...is there a need for product testing to verify performance??

In the late 1980's

- drip tape and plastic mulch introduced into Texas
- Efficiencies similar to LEPA

Starr County - 1990

Management is just as important as having efficient technology

Management is just as important as having efficient technology

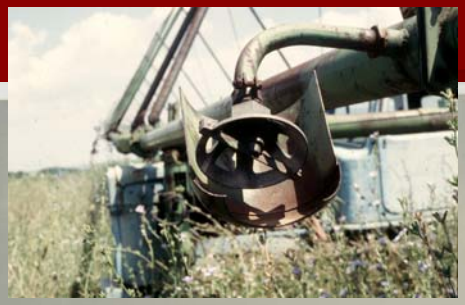
Moral…..people save water

- The first water-move pivot I saw
- Atascosa County – 1990
- Comment – *it's hard to imagine a time where energy and water didn't matter like they do now….*

South Russia 1995

- Water move pivots still manufactured and widely used
- *“…work good but have a tendency to fall over”*

Russia's amazing "linear move irrigation boom machine"



Russia's amazing "linear move irrigation boom machine"

- A machine that must have been designed by a committee
- May have solved certain problems
- *But how about meeting minimum performance criteria?*

Aral Sea – Central Asia
The largest ecological disaster on our planet

- NASA photograph from 1998
- Extent of the Aral Sea in 1957

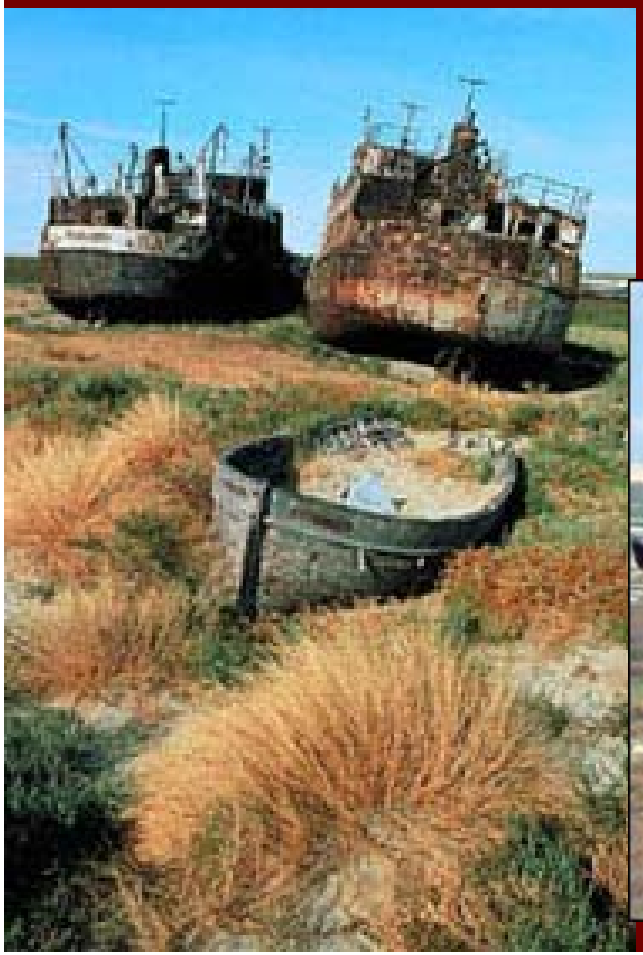

Lake has lost
60% of its area,
40% of its volume

Photo of the Amudarya River, 100 miles from the Aral Sea

- 1960's, Soviet Union expanded irrigated cotton production
- Diverted so much water for irrigation that inflows into the Aral Sea ceased

- Over 100 extinct species animals/fish
- Large areas of exposed sea bed contaminated with chemicals
- Storms pick up dust and contaminants, and deposit over populated areas
- Increased illness, particularly in women and children

..the fishing industry dating back thousands of year now dead



Political Will??

But they still grow rice in the Aral Sea region

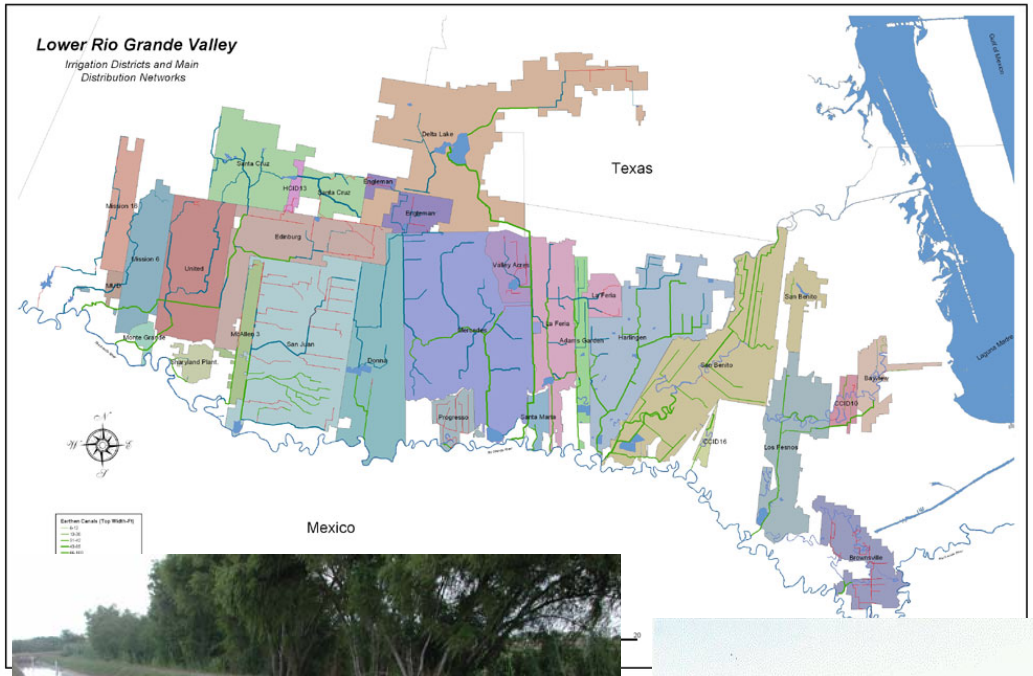
Political Will??

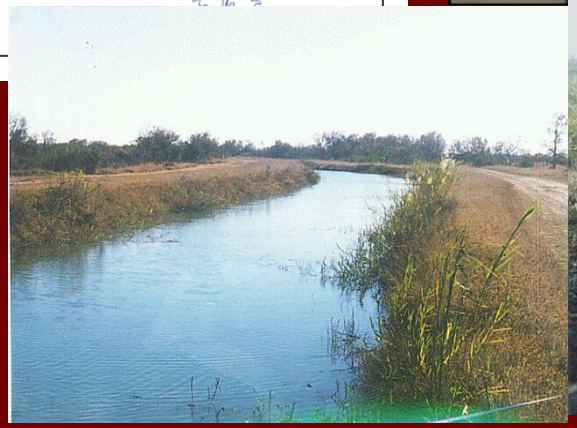
Everywhere you go in Uzbekistan you see inefficient surface irrigation

Political Will??

Everywhere you go in Uzbekistan you see water running down the roads and spectacular fountains.....

Irrigation Districts





There are more good improvement projects than money to pay for them...

Texas Cooperative Extension Irrigation District Program

Federally Funded Program

- Determining regional potential water savings
- District modernization
- Information systems
- Training and technical support
- Project evaluation and water savings documentation

United Irrigation District Canal Replacement Project

- District suspected construction problems
- My team conducted pipeline leak tests

Questions:

What is an acceptable leakage rate for underground irrigation pipeline?

Should performance standards be established for such projects?

Is there a public interest in documentation of project benefits?

- Leakage before repairs:

  43 ac-ft/yr
- Leakage after repairs

  1.2 ac-ft/year

Texas Water Use and Projections

Texas as an Independent Republic

Detail from an 1845 French map titled:
"Amérique Septentrionale; Nouveau Continent"
From "Atlas Universel Illustré"

65%

Agriculture irrigation uses 65% of the total freshwater consumed annually in Texas…

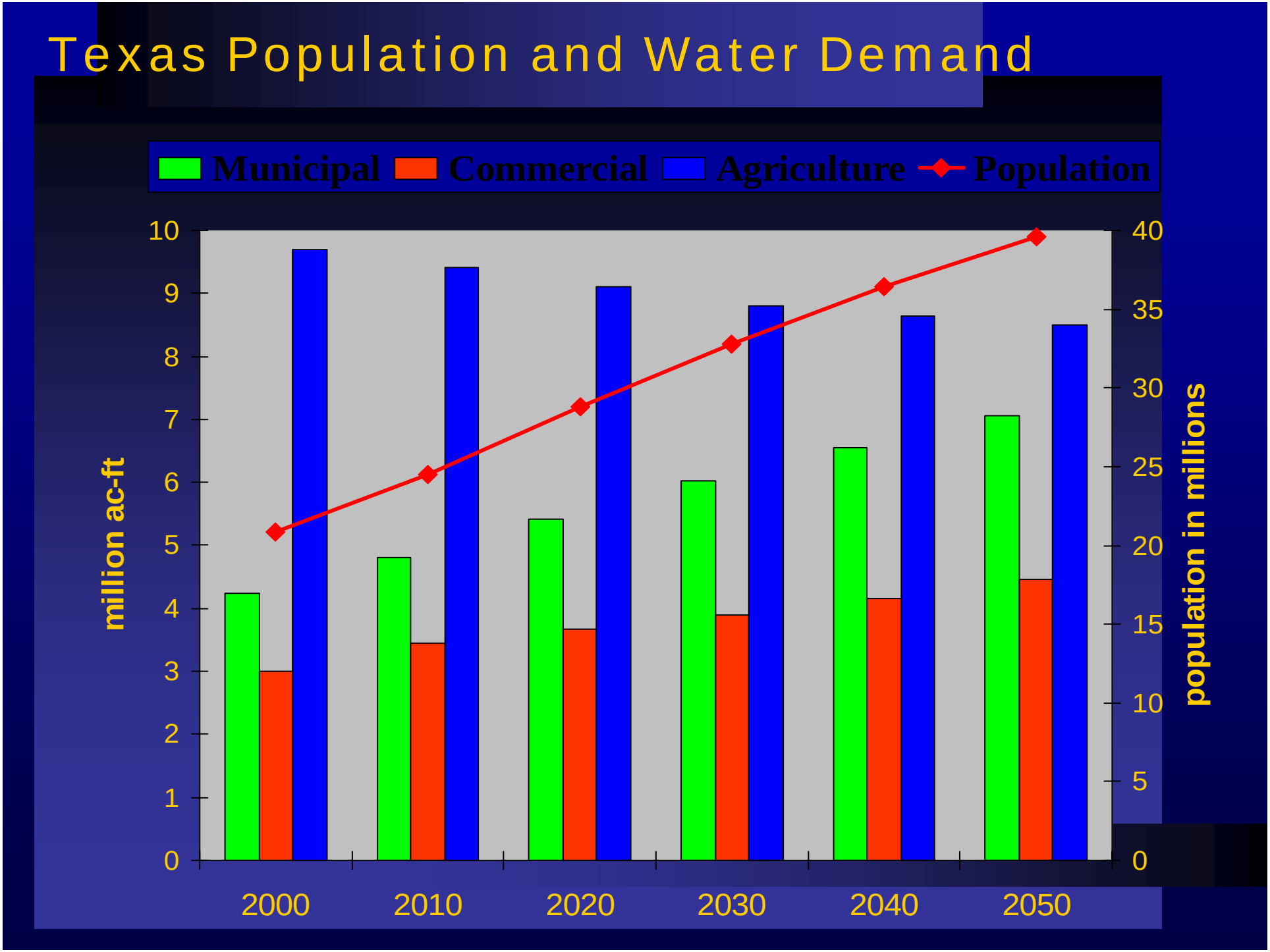
annually

20%-40%

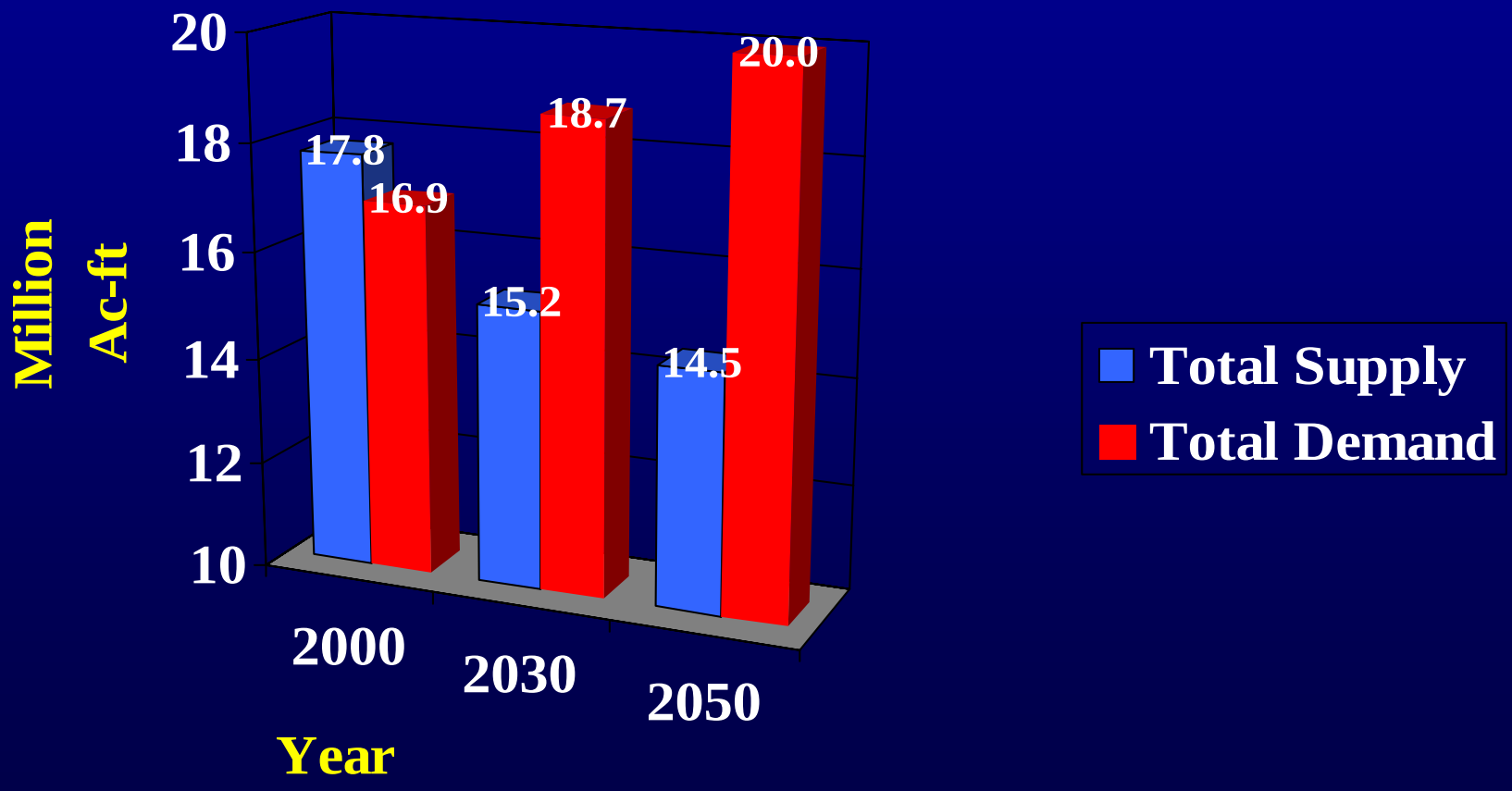
...and landscape irrigation accounts for 20-40% of all municipal freshwater consumed annually...

consumed

Texas Population and Water Demand



Total Water Supply and Demand



Population

Water Resources

Solutions?

Population

Water Resources

One Component of the Texas Water Plan:

Improve Irrigation Efficiencies to free up water for other uses…

How do we achieve real water savings in irrigation?

Obstacles

* no independent verification of manufacturer's/dealer's claims
* no standard definition of efficiency or ways to measure it
* no performance standards exist for irrigation systems and facilities
* most consumers and decision makers lack background to evaluate proposed systems

...intelligent and enlightened approaches to address the complex issues of urban and agricultural irrigation...

The Irrigation Technology Center

A new center of the Texas A&M University System

Irrigation Technology Center
Organizational Details

Created by the TAMUS Board of Regents – May 2002

Fipps named Director in Oct 2003

A Center of the Texas Water Resources Institute

Jointly administrated through:

Texas Cooperative Extension

Texas Agricultural Experiment Station

ITC - Mission

- Promote efficient irrigation and water conservation while *maintaining profitable agricultural production and quality urban landscapes*
- Help coordinate irrigation research and extension programs of the Texas A&M University System
- Develop new facilities, capabilities and programs for water research, education and service
- Establish an equipment testing and verification program
- Develop minimum design and performance standards for irrigation systems

Water Technology and Conservation Center *(WTCC)*

WTCC is the proposed name for a new, major facility to be built in San Antonio

- 4 testing laboratories
- outdoor testing facilities
- true-scale urban and ag irrigation systems for applied research and training

WTCC is a major program of the ITC

("a center within a center")

Water Technology and Conservation Center *(WTCC)*

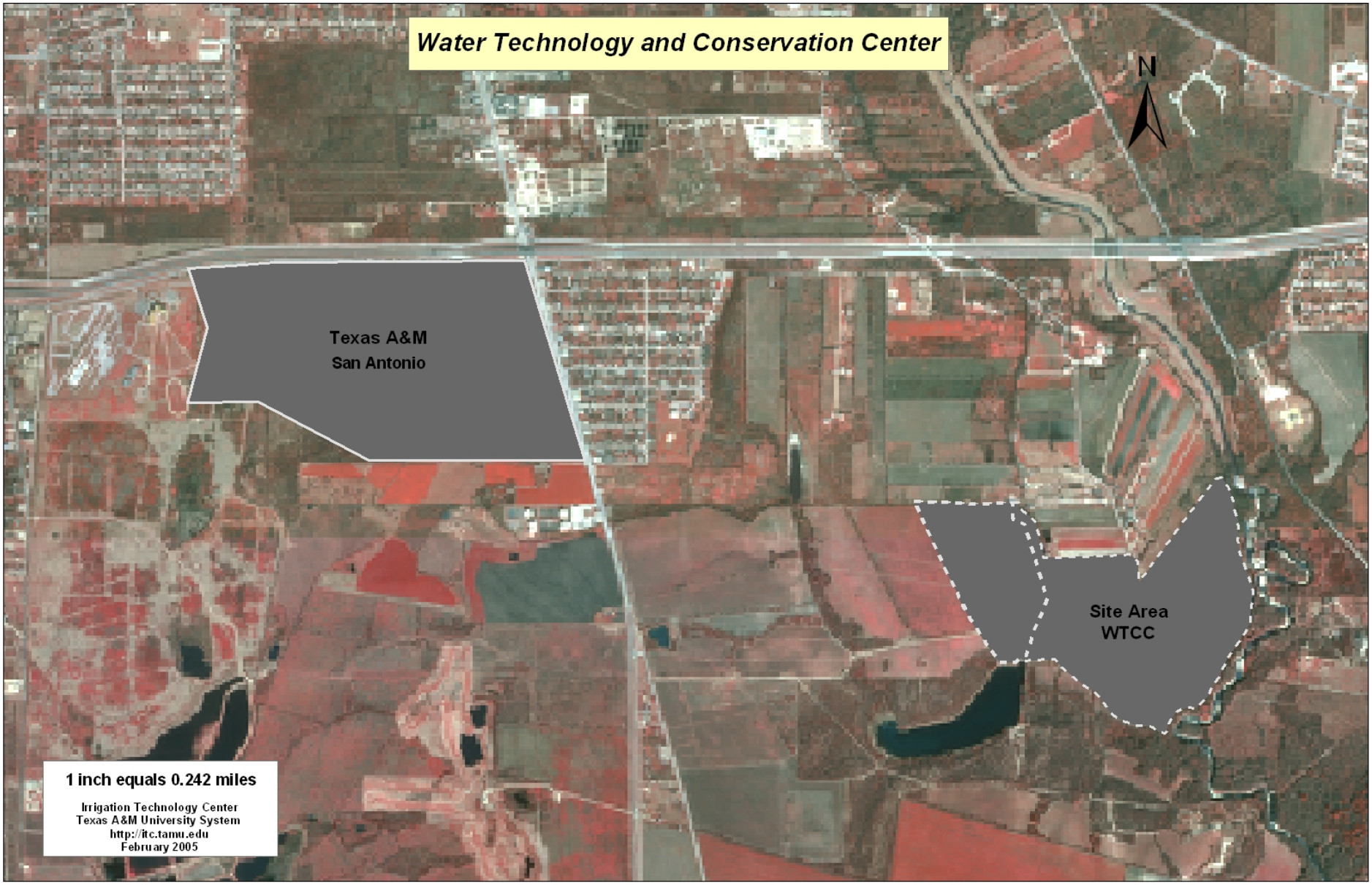
Why San Antonio?

- mild climate to allow year-round use of facilities
- Agriculture, urban, manufacturing, tourism and environmental interests share the same water resource
- local financial support

WTCC – Site Selection
Current Thoughts and Plans

WTCC to be located near the proposed TAMU-SA campus site

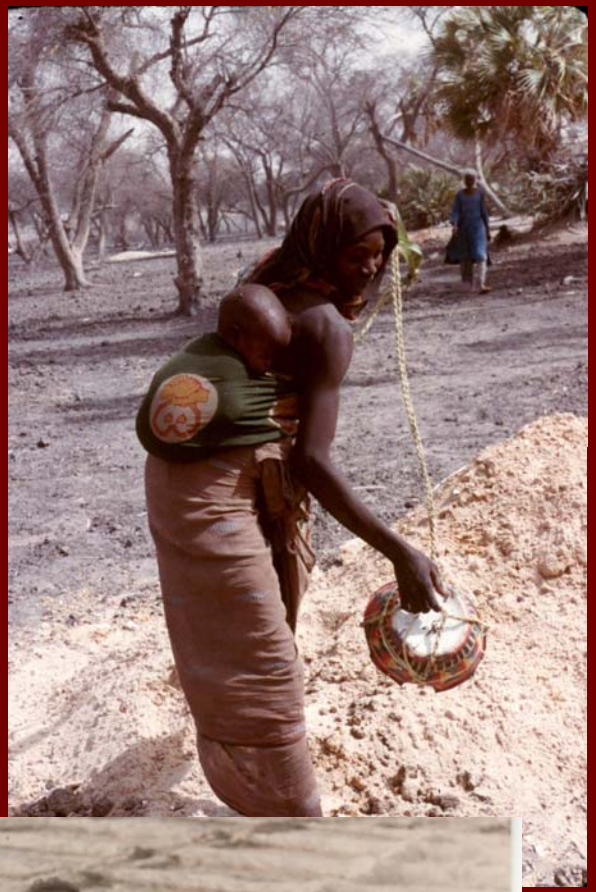
Initial development on a 200 - 250 acre site in City South San Antonio

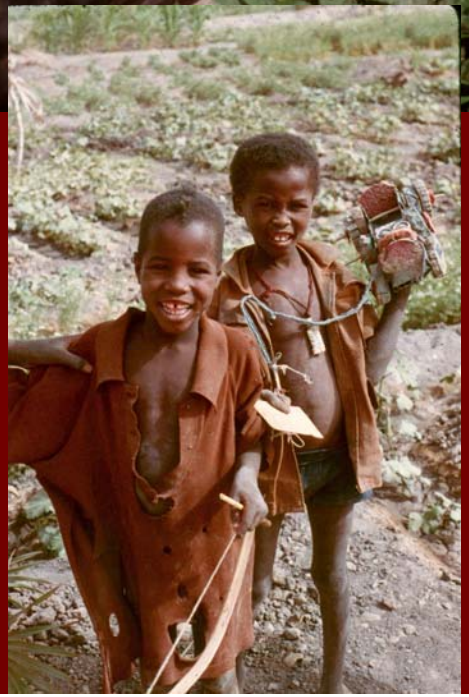

Water Technology and Conservation Center
N
Texas A&M
San Antonio
Site Area
WTCC
1 inch equals 0.242 miles
Irrigation Technology Center
Texas A&M University System
http://itc.tamu.edu
February 2005

WTCC – Local Funding Initiative

- Currently under consideration by SA region water agencies and the Legislature
- $500,000 per year for the next two years to initiate programs and facilities for the WTCC
- 50% from local agencies with a 50% match from the Legislature

The Importance of Irrigation Water Conservation.....





Thank you….

This slide set is posted on my website:

http://gfipps.tamu.edu