Expanding Irrigation in the Southeast

Bringing Agriculture Back to Water
A Sustainable Solution for the 21st Century

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The Past
In 1900 Eastern rain-fed agricultural system was broad based

Potatoes were grown in NE

Cotton was King in the SE

New Jersey/Del Marva Peninsula provided vegetables for urban areas

Corn was grown in almost every State for local use
Headland, AL
Rainfed Corn Yield

Average Mid-west Yields
Headland, AL Rainfed Corn Yield
Crop Model

Bushels per Acre

Year

As long as SE farmers were competing with themselves everything was fine. In fact when droughts reduced supply corn prices went up. But transportation changed this.
Climate Can Dramatically Impact Agriculture
7 year average net profit for rain-fed corn and corn acres planted.
Nearly 90% of Nation’s corn production is concentrated in upper Midwest. Concentration of Nation’s grain production in such a small area makes us vulnerable to regional drought as last summer illustrated.
Alabama imports 200 million bushels of corn – only produces 16 million bushels
By 1950 another factor altered SE’s competitive balance – western irrigation.

Western water projects coming fully online and cheap electricity in the Great Plains for pumping from the Ogallala Aquifer substantially increased the amount of irrigated acreage in the U.S.
Maine Potatoes

In 1939 Maine led the nation in potato production. New York and Pennsylvania were also significant producers.

As water projects came on line on the Snake River, Idaho began to increase its production.


Today Idaho is #1 in potatoes followed by Washington. Maine, New York and Pennsylvania are no longer in the top 5. [Effland 2003]
This massive shift in agriculture was highly subsidized. The Federal government spent billions of dollars on Western water projects for agriculture. This included massive dams, canals, piping to provide basically free water to farmers. Transportation via rivers and highways was made possible through dams and interstates built in large part by the federal government.
The tremendous increase in western agriculture due to irrigation and concentration of grain production in the upper Mississippi Basin came with additional costs beyond what the federal government paid.

For example in California tremendous environmental damage was done as rivers were totally depleted destroying salmon runs and wetlands.

Concentration of production and reduction of Mississippi flood plains has produce apoxia problems in Gulf of Mexico.

See Cadillac Desert

Southeastern Irrigation
In the East the loss of agriculture devastated rural economies

Landowners faced with the competition of Western subsidized irrigated agriculture and deep water holding soils in mid-west resorted to accepting government set asides (CRP) or timber farming.

Land is now in timber or low intensity pasture.

When a farmer is farming he is turning over $500-$750 per acre per year which is part of the local economy.

With timber production or CRP he is only turning over $50-100 per acre per year.

Rural towns dependent on farming business died out.

(Birmingham News. Bernard Troncale)
The Future
The next 50 years may be much different than the last 50 years.

New pressures are now forcing a cost-accounting for Western irrigated-agriculture. In the long-term many observers feel this desert agriculture is not sustainable.

- Ground water overdrafts from pumping
- Water demand from rapid urban growth
- Farmers vs municipalities ($15 farmer cost vs $200-600 municipal water cost per acre-foot)
- Salt and selenium surface poisoning
- River restoration and endangered species initiatives
Aggregate of climate models predict drying in the Southern High Plains and Southwest but no change or an increase in precipitation in the SE.

From IPCC 2007
Even if anthropogenic climate change does not occur, the West may be in trouble.

Recent reconstruction of climate indicate that the past 70 years may have been abnormally wet and future supply could be much less.

From Piechota et al. 2004
Agricultural Security

How can the U.S. preserve its agricultural output in the face of water issues and almost certain reduction agricultural production in the west?

Can we afford to let our food supply go offshore?
The solution we propose is that agriculture should return to the east under a distributed irrigated assisted rain-fed system. The vast and sustainable surface water resources in the east dwarf water availability in the west.

In the west 4 ft of water or more is needed for crops. In the SE we need only 6-12”

The Alabama River in Monroe County had an annual flow for the driest year on record (2000) of near 10 million acre-ft - 12 times that of the Rio Grande
For corn the average difference can be $300 per acre!
Headland, AL 1951 - 1999

Irrigated vs Rainfed

Grain Weight (bu/ac)

Mid-west

For corn the average difference can be $300 per acre!

Net Profit

Corn Price

Alabama 2010
Iowa 2010
Net Profit

- Alabama 2010
- Iowa with Transportation Basis $-0.50

Net Profit

Alabama can compete
Can we expand irrigation and not adversely impact water resources in the East?

Average Inches of Annual Precipitation in the United States 1961-1990

Source: USDA-NRCS; http://www.twnrcs.usda.gov/prism.html
River Flows Are Huge in SE

Colorado River – Glen Canyon
10 million acre-ft/yr

Tennessee – Huntsville
30 million acre-ft/yr

Tombigbee River - Coffeeville
19 million acre-ft/yr

Alabama River - Monroeville
24 million acre-ft/yr

Apalachicola – Blountstown
16 million acre-ft/yr
Net Consumption of Water

EXPLANATION
Billion gallons per day
11.0 1995 Consumptive use
68.7 Renewable water supply
Consumptive use as a percentage of renewable supply:
- 0—10
- 10—40
- 40—100
- >100

102%
27%
2.5%
WASSI Model Developed by U.S. Forest Service
Currently Run for Southeast

\[
\text{WASSI} = \frac{\text{Total Water Demand}}{\text{Water Supply}}
\]

Water Demand is the sum of uses from 7 private sectors plus public use.

Water Supply is computed from the hydrologic model plus groundwater supplies plus return flows.

Return flows are taken as percentages of withdrawals for the use sectors.
WASSI Flows Compared to Stream Flow – Alabama River at Claiborne
With Rule Curves for Reservoirs in Alabama
Maximum WASSI and Year

Southeastern Irrigation
Per cent of time stress < 0.40
For 1961-2007
The challenge for water resource management in the Southeast is to avoid policies that restrict water use during the majority of times that water resources are not stressed trying to protect the resource the few times when extreme droughts do strain water availability.
There are solutions for the times water sheds get stressed due to extreme drought conditions.

1. Additional water storage – off stream reservoirs

2. Water Transfer

3. Water withdrawal restrictions coupled with a water insurance program (USDA insurance programs currently recognize regulatory drought like actual drought)
Many parts of the east simply not participating in irrigated agriculture.
Even in dry years crops need less than a foot of water. Irrigation can be supported with a fraction of the winter river flow removed.
It is our opinion that the nation cannot continue to subsidize desert agriculture to support low value high water use crops such as cotton, corn and alfalfa. The value of water in the west is vastly overvalued relative to what can equivalently be derived from eastern agriculture.

The recent DOI agreement on allocation of Colorado River water included a requirement to line the American canal at a cost of $200 million which will save 77,000 acre-ft per year. This would equivalently serve 20,000 irrigated acres.

In Alabama $200 million would build on-farm storage for 300,000 acre-ft which would support 300,000-600,000 acres of irrigated land.
Programs that have been enacted to expand irrigation in a sustainable manner

1. Agricultural Water Enhancement Program (AWEP) under the 2008 Farm Bill (Senator Sessions and Congressman Everett)


3. Alabama Orr - Booth Irrigation Tax Credit Bill (2013)
Middle Atmosphere Temperature in Tropics
73 IPCC AR5 Models vs Observations

Model Average

Observations
Circles - Avg 4 Balloon datasets
Squares - Avg 2 Satellite datasets

Note: 73 model simulations from KNMI Climate Explorer available on 1 June 2013. All series are 5-year running averages with slope-intercept at 0 in 1979.
It is important that Southern Legislatures Support Research that is Important to the Economics of the Region

• Support work on the use of water for the good of the region

• Support research on skeptical views of climate change. The South will take substantial hit on reduction of fossil fuel emissions.

• Support initiatives to stop fighting over water and put in place systems that both protect environmental flows and allow the use of water for the good of the region.