AGRICULTURAL IRRIGATION TRENDS IN GEORGIA

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Abstract. This presentation will discuss the results of the 2000 Georgia Irrigation Survey along with previous surveys for historical comparisons. Problems associated with estimating agricultural water use will also be discussed.

INTRODUCTION

Since 1970 the University of Georgia Cooperative Extension Service has periodically conducted an irrigation survey in Georgia. The objective of this survey has been to quantify changes in the extent of irrigation practices in the state. The latest survey was conducted in the Fall of 2000.

Irrigation accounts for a significant portion of water use in Georgia. Irrigation water use has been estimated at between 25 and 50 percent of total consumptive water use in the state. Consequently, trends in agricultural irrigation will have a definite impact on Georgia's future efforts to manage its water resources.

BACKGROUND

The first Georgia Irrigation Survey was conducted in 1970 and has been repeated at intervals of one to three years since then. During the late seventies and early eighties the survey was conducted annually because of the rapid growth of irrigation during that period.

The survey is conducted by the Extension engineering unit and involves sending a survey form to all counties in Georgia. Almost all counties have at least one Extension agent who is responsible for agriculture and natural resources programs in that county. This individual fills out the survey form based on his knowledge of agricultural practices in his/her county. The forms are then returned to the Extension engineering unit where the data is compiled and distributed.

RESULTS AND DISCUSSION

Table 1 is a compilation of the statewide summaries for selected years of the irrigation surveys from 1970 to 2000.

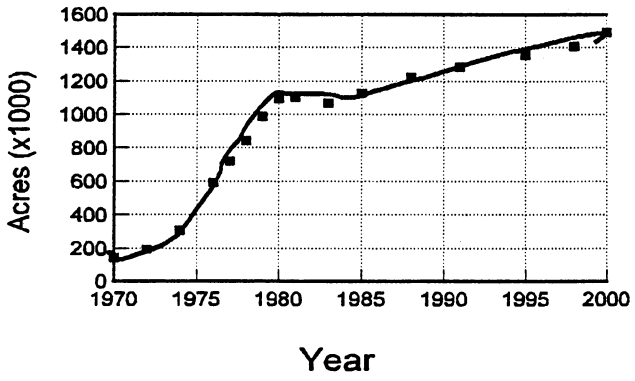

Figure 1. Trends in irrigated acreage in Georgia.

Some years were omitted due to lack of space.

The 2000 survey indicates a total irrigated acreage in Georgia of 1,507,929 acres. This figure represents a more than ten-fold increase since 1970 and a 5.4 percent increase since the most recent survey in 1998 (Figure 1).

A rapid growth occurred in irrigated acreage from the mid-seventies through the early eighties. Many factors contributed to this growth including:

-adoption of new irrigation technologies such as center pivot and drip irrigation.

-general growth and expansion of agriculture in the late seventies.

-trend toward larger farms.

-release of research findings which illustrated advantages of irrigation.

-a series of dry years in the late seventies and extending through the eighties.

Growth since 1982 has been slow. This is most likely due to two primary factors; a generally sluggish agricultural economy and the fact that much of the land that was easiest and least expensive to irrigate already had systems installed. A significant portion of the growth since 1982 has been on specialty crops such as vegetables and fruits.

In 2000, 61 percent of the irrigation systems were supplied from ground water (wells) whereas 38 percent were supplied from surface water (ponds, streams, and rivers). Since 1970,

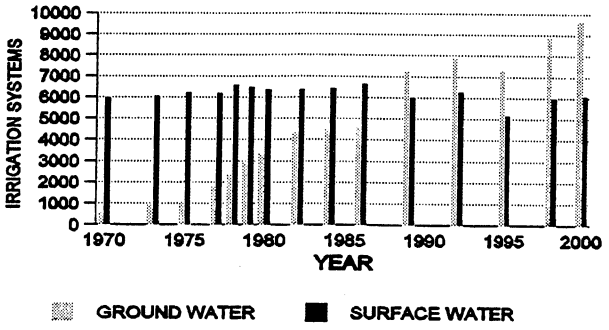

Figure 2. Trends in irrigation water sources in Georgia.

the number of systems supplied from surface water has remained fairly constant while the number of wells steadily increased (Figure 2). This could be due to the fact that most of the systems supplied from surface water utilize farm ponds which were already being used for irrigation. Therefore, when new systems were installed, it was necessary to install wells to supply the additional water. Also, many of the ponds were not adequate to supply some of the larger systems which were being installed.

Figure 3 illustrates trends in the use of various types of irrigation systems which are predominant in Georgia. In the early seventies most of the systems utilized portable aluminum pipe with sprinklers. These systems were highly labor intensive and were used primarily on small fields of tobacco and vegetables.

During the seventies and early eighties the use of traveling guns increased dramatically, but has declined slightly since then primarily because of the high labor requirement and cost of operation.

It is significant to note that the use of center pivot

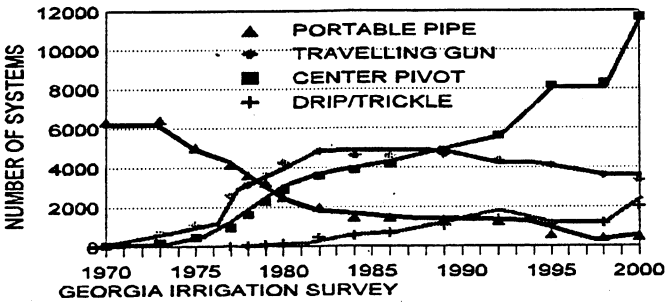

Figure 3. Trends in the use of the most predominant irrigation methods in Georgia.

Table 2. Water Applied in 2000

Crop	Inches Applied
Corn	14.1
Cotton	11.6
Peanuts	11.2
Tobacco	7.4
Soybeans	6.0
Small Grains	4.4
Vegetables - Sprinkler	10.5
- Drip	12.6
Pastures	7.5
Apples	6.0
Blueberries	8.9
Peaches	7.2
Pecan - Sprinkler	13.8
- Drip	12.8
Field Nursery	35.5
Vineyards	13.0
Turfgrass	18.3
Greenhouses	14.2
Golf Courses	31.6
Athletic Fields	
All Other Crops	7.6

This information was compiled from estimates supplied by county Extension agents for educational purposes only.

systems and drip irrigation have steadily increased. Although their use has increased for a variety of reasons it is interesting to note that these type systems are considered to be the most efficient available today both in terms of energy consumption and water use, especially with the increased use of low pressure center pivot systems. Changes in sprinkler technology have also made certain sprinkler packages on center pivots more efficient in their water delivery.

ESTIMATING AGRICULTURAL WATER USE

Based on the acreage irrigated and the inches applied for each crop (Table 2) the total amount of water used for irrigation in 2000 was 14,972,955 acre-inches. Therefore the average amount of water applied to an acre in 2000 was 9.72 inches. The 2000 total water use is calculated to be 404.27 billion gallons of water or about 1108 mgd on average.

CONCLUSIONS/DISCUSSION

Even though Georgia receives a relatively abundant amount of annual rainfall, the patterns of rainfall are very inconsistent, particularly during the summer growing season. Consequently, irrigation is increasingly being viewed as a necessary input for profitable agricultural production in Georgia.

Irrigated acreage in the state has increased more than ten-fold since 1970, but indications are (Figure 1) that future growth will occur at a much slower pace. Increasingly, farmers are

Table 1. Compilation of Georgia Irrigation Survey

For Years: 1970, 1975, 1977, 1980, 1986, 1989, 1992, 1995,1998, 2000

	1970	1975	1977	1980	1986	1989	1992	1995	1998	2000
Acres of irrigationsystems	144,629.00	307,416	592,088	988,356	1,128,584	1,223,835	1,286,707	1,356,726	1,430,235	1,507,929
Number of irrigation systems	6,572	7,038	8,343	10,599	11,886	13,283	14,159	14,584	12,833	17,428
Irrigated acreage by crop:										
Corn	30,418	76,996	250,227	410,241	341,296	281,135	290,505	143,611	216,496	195,006
Cotton	2,627	1,116	9,270	17,655	69,554	109,868	178,818	543,308	569,507	645,690
Peanuts	38,227	91,334	19,544	271,323	375,160	374,398	365,221	313,064	312,905	305,582
Tobacco	42,402	54,518	46,081	46,522	31,605	33,725	36,926	37,885	33,831	30,890
Soybeans	795	4,725	21,728	133,695	94,349	105,240	63,504	20,637	26,615	21,733
Winter & Small Grains	-	-	-	-	12,758	36,006	21,933	7,283	7,008	32,894
Vegetables - Sprinkler	20,061	26,223	39,727	49,005	97,890	124,737	123,053*	106,563	107,486	108,745
- Drip	-	-	-	-	-	-	9,596*	12,497	13,130	22,452
Pastures	5,440	4,613	10,668	13,991	24,216	18,442	29,617	26,172	34,820	26,267
Apples	-	152	1,100	1,378	677	514	365	54	225	178
Blueberries	-	-	-	-	1,130	1,936	2,201	2,669	3,230	4,644
Peaches	1,542	721	1,995	4,594	5,343	5,083	3,807	5,347	4,186	3,444
Pecan - Sprinkler	485	1,356	4,662	16,266	48,538	69,335	22,269*	22,774	19,823	23,172
- Drip	-	-	-	-	-	-	45,668*	48,213	44,696	57,181
Field Nursery	1,453	424	602	1,115	3,013	4,567	4,307	4,484	5,285	5,369
Vineyards	-	145	240	1,581	517	604	561	665	752	953
Turfgrass	-	1,557	1,764	2,252	5,409	9,195	11,411	15,389	34,007	32,711
All Other Crops	1,179	2,121	7,411	7,665	10,163	5,014	9,507	1,728	3,965	192
Golf Courses	-	-	6,069	7,638	**-	**-	**-	**-	**-	
Athletic Fields	-	-	-	614	6,966	15,111	18,795	21,015	24,649	22,951
Number of irrigation systems by type:										
Portable pipe (hand-move)	6,365	5,026	4,179	2,517	1,452	1,352	1,250	*** 599/32	*** 454/37	*** 497/31
Cable-tow	69	1,090	2,585	3,825	3,618	3,554	3,135	2,851/73	2,049/70	1,705/66
Hose Reel (hose pull)	-	-	-	429	955	1,132	1,198	1,276/93	1,608/82	1,642/78
Center Pivot	87	478	983	2,858	4,191	4,855	5,660	8,167/108	8,410/121	10,059/111
Lateral Move (linear)	-	-	-	7	28	29	23	21/120	19/84	27/81
Drip-Trickle	-	-	21	159	687	1,040	1,356	1,083/67	1,167/57	2,014/37
Solid Set Sprinkler	32	122	135	211	288	429	764	709/37	427/68	720/43
Golf Courses	-	291	229	250	257	-	-	-	-	-
Athletic Fields	-	120	175	256	405	892	766	579/37	650/37	748/33
Number of irrigation systems by type of power:										
Gasoline Engine	2,985	2,009	1,936	885	658	617	506	347	254	208
L.P. Gas Engine	1,116	1,377	1,033	822	788	781	876	684	738	553
Diesel Engine	2,292	3,434	4,180	6,794	7,485	7,950	7,769	9,366	7,779	8,076
Electric Motor	179	329	441	919	2,420	3,014	4,206	4,187	5,018	6,653
Undesignated Sources	-	-	-	1,179	5	3	4	-	-	-
Number of systems by source of water:										
Ground water	582	1,118	1,771	3,387	4,628	7,260	7,876	8,391	8,881	10,101
Surface water	5,990	6,258	6,211	6,378	6,666	6,018	6,283	6,165	5,998	6,328
Waste water	-	-	-	-	-	-	11	177	140	197
Number of acres under chemigation:										
Fertilizer	-	-	-	-	136,618	133,285	155,749	106,164	118,725	103,842
Herbicide	-	-	-	-	31,958	20,077	15,810	16,870	13,918	10,200
Fungicide	-	-	-	-	6,617	9,200	12,026	6,975	7,385	1,764
Nematicide	-	-	-	-	1,200	700	1,587	1,500	2,545	402
Insecticide	-	-	-	-	4,819	7,615	4,112	3,003	5,355	1,170

*Drip and Sprinkler acreage separated beginning 1992.

**Golf courses and athletic fields combined for these years.

***Number of systems/average, system size in acres rounded to nearest acre.

This information was compiled from estimates supplied by county Extension agents for educational purposes only.

using more efficient methods of irrigation which should help improve the effectiveness of the irrigation water applied.

The amount of irrigation water applied will vary tremendously from year to year depending on the amount of rain received in the agricultural areas during the growing season. Estimates of yearly average water applications indicate that annual irrigation water use fluctuates between 100 and 300 billion gallons. The annual water use calculation is from individual estimates that could be very subjective depending on the perceived rainfall received. High irrigation use will generally occur during periods of lower than normal rainfall. Since this typically coincides with periods when water tables are naturally low, this may present an interesting challenge in managing the area's water resources. A second problem that arises is the unit of measurement for agricultural water use. In some areas of the nation agricultural water use is expressed in area-depth units (i.e. acre-feet) but in Georgia the units of water measurement have traditionally been volume per unit of time (i.e. million gallons per day-MGD). This has slowed communication efforts between agencies and commodity groups but should improve in time. Thus far, relatively few conflicts have occurred, and where they have it has typically been isolated incidences during extremely dry years.

Since 1991, all large agricultural water users have been required to obtain a withdrawal permit from the Environmental Protection Division, Georgia Department of Natural Resources (DNR). In 1998 DNR indicated that over 18,000 permits had been issued to agricultural water users. Attempts to define agricultural usage have been difficult due to the number and variety of agricultural permits. However, this permitting process should ultimately allow state agencies to more accurately estimate agricultural water use in Georgia.

RELATED LITERATURE/PUBLICATIONS

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