

AGRICULTURAL IRRIGATION TRENDS IN GEORGIA

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INTRODUCTION

Abstract. According to the 1992 Georgia Irrigation Survey conducted by the University of Georgia Cooperative Extension Service, Georgia currently has approximately 1.3 million acres of irrigated cropland. Annual irrigation water use is estimated to fluctuate between 100 and 250 billion gallons depending on seasonal precipitation. Indications are that future growth in irrigated acreage will be slow. Increases in total water use will likely be offset, at least partially, by the use of more efficient irrigation methods.

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 use and in irrigation practices in the state. The latest survey was conducted in the Fall of 1992.

Irrigation accounts for a significant portion of water use in Georgia. Based on estimates of total consumptive water use (excluding thermoelectric use) by the U.S. Geological Survey (Clark and Pierce, 1986 and Casteel and Ballew, 1991) and estimates of irrigation water use from the 1992 Georgia Irrigation Survey (Harrison and Tyson, 1993), irrigation represents between 15 and 30 percent of consumptive water use in Georgia. Consequently, trends in agricultural irrigation will have a significant impact on Georgia's future efforts to manage its water resources.

This paper will present the results of the 1992 Georgia Irrigation Survey along with previous surveys for historical comparisons.

METHODS

Since 1970 the Georgia Irrigation Survey has been repeated at intervals of one to three years. 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 department 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 department where the data are compiled and distributed.

Data collected include acreage of irrigation by crop, numbers of systems by type, numbers of systems by type of power, numbers of systems by water source, acres under chemigation, and estimates of water use.

RESULTS AND DISCUSSION

Table 1 is a compilation of the statewide summaries of the irrigation surveys from 1970 to 1992. The years 1977 and 1979 were omitted due to lack of space but were included in the charts that follow.

The 1992 survey indicates a total irrigated acreage in Georgia of 1,286,707 acres. This figure represents a more than eight-fold increase since 1970 and a 5.1 percent increase since the most recent survey in 1989 (Figure 1).

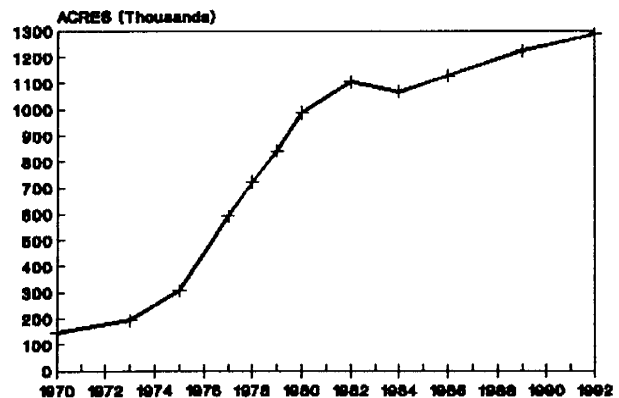


Figure 1. Trends in irrigated acreage in Georgia, based on the Georgia irrigation survey.

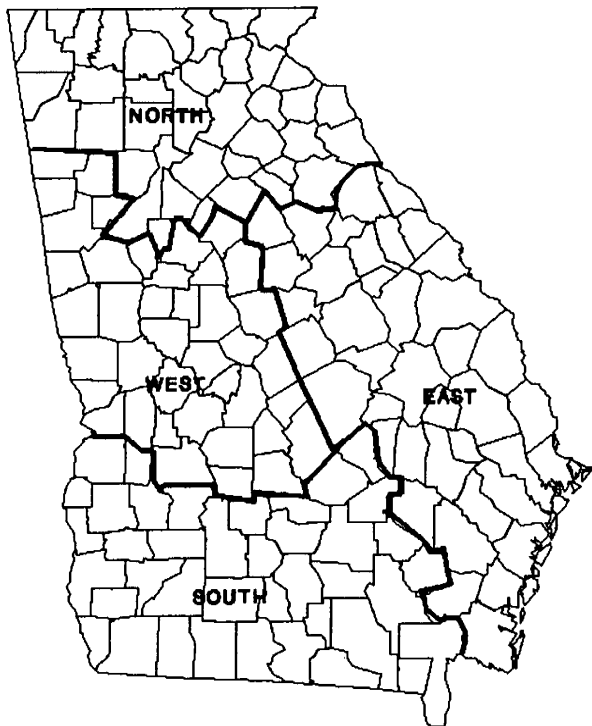


Figure 2. Map showing cooperative extension service districts in Georgia.

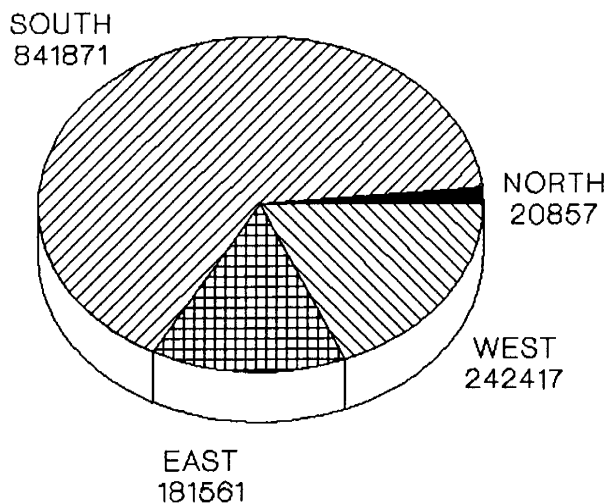


Figure 3. Irrigated acreage in Georgia by cooperative extension service districts.

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

- development 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 had already had systems installed. A significant portion of the growth since 1982 has been on specialty crops such as vegetables and fruits.

As illustrated in Figure 3 the vast majority of irrigation occurs in the southern half of the state. Sixty five percent of the irrigated acreage is in South District alone, and most of the irrigation in the East and West districts is below the fall line, which runs from Columbus to Augusta. This is significant in terms of managing the state's water resources since water use in South Georgia does not impact the water supply for the metro-Atlanta area where there is such a great concern over the adequacy of the water supply. In 1992 56 percent of the irrigation systems were supplied from ground water (wells) whereas 44 percent were supplied from surface water (ponds, streams and rivers). Since 1970, the number of systems supplied from surface water has remained fairly constant while the number of wells steadily increased (Figure 4). 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, particularly center pivot systems.

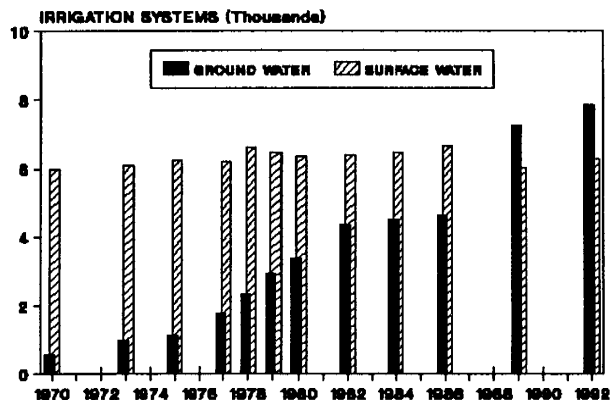


Figure 4. Trends in irrigation water sources in Georgia. (Georgia Irrigation Survey).

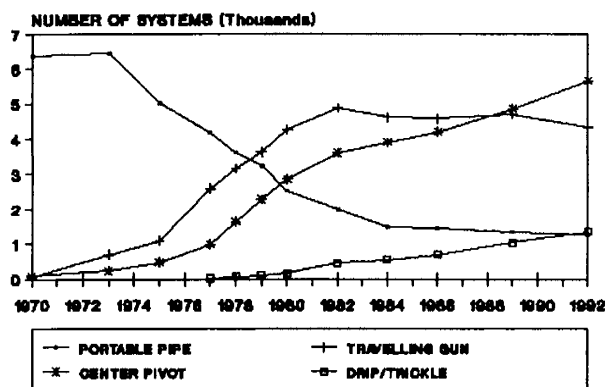


Figure 5. Trends in the use of the most predominant irrigation methods in Georgia.

Figure 5 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 travelling 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 systems and drip irrigation has 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.

CONCLUSIONS

Even though Georgia receives a relatively abundant amount of annual rainfall, 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.

Irrigation in the state has increased more than eight-fold since 1970, but indications are that future growth will occur at a much slower pace. Increasingly, farmers are 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 from the Georgia Irrigation Survey indicate that annual irrigation water use fluctuates between 100 and 250 billion gallons. 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. Thus far, relatively few conflicts have occurred, and where they have it has typically been isolated incidences during extremely dry years.

LITERATURE CITED

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Table 1. Completion of Georgia Irrigation Survey

For Years: 1970, 1973, 1975, 1978, 1980, 1982, 1984, 1986, 1989, 1992

	1970	1973	1975	1978	1980	1982	1984	1986	1989	1992
Total acres of systems in Georgia	144,629	193,857	307,416	722,075	988,356	1,104,992	1,069,221	1,128,584	1,223,835	1,286,707
Irrigated acreage by crop:										
Corn	30,418	39,267	76,996	284,069	410,241	319,713	342,185	341,296	281,135	290,505
Cotton	2,627	1,440	1,116	10,630	17,655	35,307	55,705	69,554	109,868	178,818
Peanuts	38,227	63,982	91,334	222,059	271,323	290,455	301,483	375,160	374,398	365,221
Tobacco	42,402	48,304	54,518	51,234	46,522	47,970	37,198	31,605	33,725	36,926
Soybeans	795	3,338	4,725	61,851	133,695	219,628	155,257	94,349	105,240	63,504
Grain Sorghum	--	--	--	--	--	--	--	12,758	36,006	21,933
Vegetables-Sprinkler	20,061	28,009	26,223	49,443	49,005	92,832	80,865	97,890	124,737	123,053*
-Drip										9,596*
Pastures	5,440	3,217	4,613	12,255	13,991	22,241	18,151	24,216	18,442	29,617
Apples	--	525	152	1,212	1,378	1,243	719	677	514	365
Blueberries	--	--	--	--	--	--	--	1,130	1,936	2,201
Peaches	1,542	1,269	721	4,412	4,594	5,730	4,288	5,343	5,083	3,807
Pecan - Sprinkler	485	1,089	1,356	8,332	16,266	34,353	35,590	48,538	69,335	22,269*
- Drip										45,668*
Nursery	1,453	742	424	1,033	1,115	2,409	2,029	3,013	4,567	4,307
Vineyards	--	70	145	379	1,581	522	446	517	604	5,608
Turf Nursery	--	1,650	1,557	2,127	2,252	2,597	8,128	5,409	9,195	11,411
All Other Crops	1,179	955	2,121	6,132	7,665	20,180	16,579	10,163	5,014	9,507
Golf Courses	--	--	--	6,907	7,638	8,655	9,218	--**	--**	--**
Athlete Fields	--	--	--	--	614	1,157	1,380	6,966**	15,111**	18,795**
Total number of irrigation systems in Ga.	6,572	7,718	7,038	9,145	10,599	11,782	11,345	11,886	13,283	14,159
Number of irrigation systems by type:										
Portable pipe (hand-move)	6,365	6,440	5,026	3,613	2,517	1,990	1,475	1,452	1,352	1,250
Cable-tow	69	694	1,090	3,157	3,825	4,060	3,804	3,618	3,554	3,135
Hose Reel (hose pull)	--	--	--	--	429	808	807	955	1,132	1,198
Center Pivot	87	238	478	1,636	2,858	3,597	3,794	4,191	4,855	5,660
Side Roll (side wheel line)	3	8	11	39	37	18	6	4	--	--
Lateral Move (linear move)	--	--	--	--	7	12	25	28	29	23
Drip/Trickle	--	--	--	60	159	454	545	687	1,040	1,356
Solid Set Sprinkler	32	46	122	201	211	303	279	288	429	764
Golf Courses	--	179	291	239	250	229	238	257	--	--
Athletic Fields	--	113	120	200	256	311	372	405	892	766
Number of irrigation systems by type of power:										
Gasoline Engine	2,985	2,991	2,009	1,233	885	835	628	658	617	506
L.P. Gas Engine	1,116	1,045	1,377	1,066	822	795	879	788	781	876
Diesel Engine	2,292	2,629	3,434	5,802	6,794	7,452	7,278	7,485	7,950	7,769
Electric Motor	179	327	329	592	919	1,472	2,003	2,420	3,014	4,206
Undesignated Sources	--	--	--	--	1,179	1,228	95	5	316	4
Number of systems by source of water:										
Ground Water	582	972	1,118	2,342	3,387	4,357	4,514	4,628	7,260	7,876
Surface Water	5,990	6,084	6,258	6,614	6,378	6,392	6,467	6,666	6,018	6,283
City Water	--	--	--	--	834	192	286	354	542	115
Waste Water	--	--	--	--	--	--	--	--	--	11
Number of acres under chemigation										
Fertilizer	--	--	--	--	--	128,927	155,485	136,618	133,285	155,749
Herbicide	--	--	--	--	--	27,766	19,701	31,958	20,077	15,810
Fungicide	--	--	--	--	--	14,039	4,901	6,617	9,200	12,026
Nematicide	--	--	--	--	--	0	548	1,200	700	1,587
Insecticide	--	--	--	--	--	8,308	5,547	4,819	7,615	4,112

*Drip and Sprinkler acreage separated beginning 1992.

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

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

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