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Little River Experimental Watershed, Tifton, Georgia, United States: A historical geographic database of conservation practice implementation

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[1] The Little River Experimental Watershed located in the headwaters of the Upper Suwannee River basin is one of twelve national benchmark watersheds participating in the U.S. Department of Agriculture (USDA) Conservation Effects Assessment Project–Watershed Assessment Studies (CEAP-WAS). Historical paper files and maps (circa 1980–2006) were collected and used to develop a geographic database of conservation practices supported by the USDA Natural Resource Conservation Service. The CEAP-WAS database can be queried by conservation practice, total acreages enrolled, year of implementation, and location. The CEAP-WAS database is integral to understanding the links between conservation practice implementation and placement with observed changes in hydrologic processes within a small southern Coastal Plain watershed. All associated geographic information has been provided in shapefile format and has been projected into universal transverse Mercator coordinates (zone 17), using NAD83 as the datum and GRS80 as the ellipsoid. Data may be accessed via ftp://www.tiftonars.org/, archived in a folder named ceap_data.

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1. Introduction

[2] The Little River Experimental Watershed (LREW), near Tifton, Georgia, is one of twelve national benchmark watersheds participating in the Conservation Effects Assessment Project–Watershed Assessment Studies (CEAP-WAS) [*Bosch et al.*, 2007]. A database describing historical conservation practices in the watershed provides a foundation for examining changes in watershed hydrology and water quality as they relate to the documented adoption of conservation practices through space and time.

[3] Geographical coverages are available primarily in vector data format: watershed boundary, county boundaries, tract boundaries, and field boundaries (Figure 1). Also included in this database are the associated 1999 digital orthoquads used to delineate field, tract, and watershed boundaries. This manuscript provides details on the construction of the CEAP database and associated tabular information. All data are in universal transverse Mercator coordinates (zone 17), using NAD83 as the datum and GRS80 as the ellipsoid (ftp://www.tiftonars.org/).

2. Coverages

2.1. Watershed and County Boundaries

[4] The LREW boundary was delineated using a composite of nine U.S. Geological Survey (USGS) 7.5 minute topographic quadrangle sheets (contour interval of 3 m) published between 1973 and 1977 [*U.S. Geological Survey* (*USGS*), 1972, 1973a, 1973b, 1973c, 1973d, 1973e, 1973f, 1977a, 1977b; *Sullivan et al.*, 2007]. Minor adjustments were made (on the basis of field observations) to the watershed boundary because of the effects of roadways and railways on the natural drainage system. County boundaries for Tift, Turner and Worth counties were derived from the Georgia GIS Clearinghouse (https://gis1.state.ga.us, verified 30 October 2006) and reprojected to GRS80 NAD83 UTM zone 17.

2.2. Tract Boundaries

[5] USDA tract boundaries were digitized using ArcView 3.3 (ESRI, Redlands, California). Tract boundaries are polygons derived from USDA Natural Resource Conservation Service (NRCS) field notes and maps, representing an area of ownership and may comprise several fields. Tract numbers were used whenever possible as the descriptor, however, in some cases duplicate tract numbers were noted between counties. The corresponding duplicate tract numbers in Tift county were renumbered by adding a "99" to the original tract numbers (example: Tift tract 71 becomes 9971 and Turner tract 71 remains unchanged). Occasionally the tract number was not provided. In those cases a number was assigned using a prefix of "u" to designate that the tract number is unknown. In some cases tracts have been divided, sold or renumbered complicating the geographic links between conservation practice data and tracts or field boundaries. An example of how this is manifested in the database is provided in the description of field boundaries.

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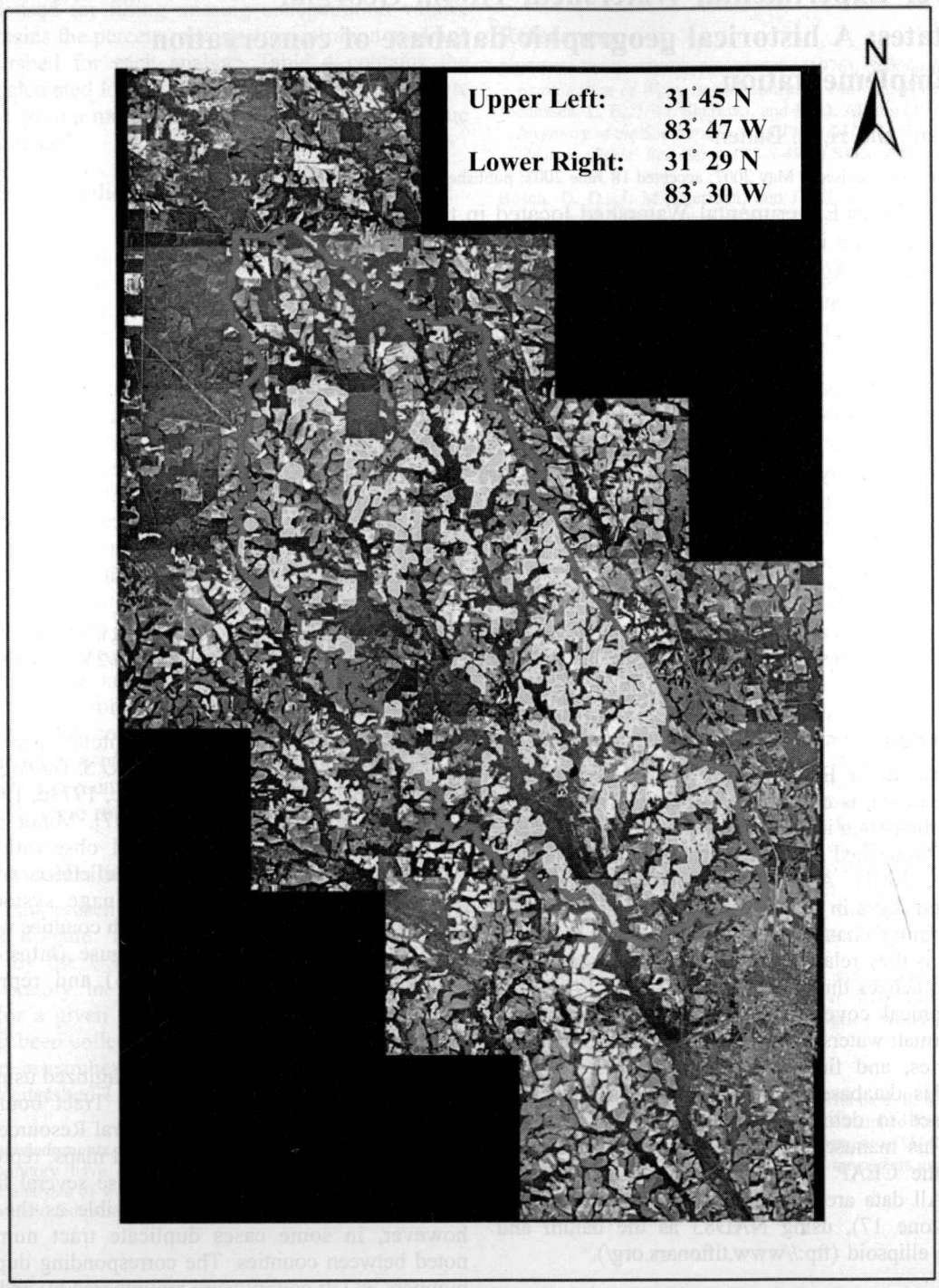

Fields With Conservation

Little River Experimental Watershed Boundary

0 1.5 3 6 9 12 Kilometers

Figure 1. Overview of the historic conservation effects assessment (CEAP) database. Watershed and conservation practice field boundaries are shown overlaying the corresponding 1999 digital orthoquadrangle. Color appears in back of the print issue.

Table 1. All Data Available in the CEAP Database Listed by File Name[a]

File Name	Description	File Type	File Format
	Raster		
ne_ashbu	DOQQ	raster	Image
ne_chula	DOQQ	raster	Image
ne_cuffie	DOQQ	raster	Image
ne_sumner	DOQQ	raster	Image
ne_sylves	DOQQ	raster	Image
ne_tiftonw	DOQQ	raster	Image
ne_tyty	DOQQ	raster	Image
nw_ashbu	DOQQ	raster	Image
nw_chula	DOQQ	raster	Image
nw_sumner	DOQQ	raster	Image
nw_tiftonw	DOQQ	raster	Image
se_ashbu	DOQQ	raster	Image
se_chula	DOQQ	raster	Image
se_cuffie	DOQQ	raster	Image
se_patev	DOQQ	raster	Image
se_sumner	DOQQ	raster	Image
sw_arabi	DOQQ	raster	Image
sw_ashbu	DOQQ	raster	Image
sw_bethel	DOQQ	raster	Image
sw_chula	DOQQ	raster	Image
sw_sumner	DOQQ	raster	Image
	Vector		
b_basin	LREW Boundary	polygon	Shape
ceap_fields_clip	field boundaries located within LREW	polygon	Shape
ceap_tracts	tract boundaries	polygon	Shape
utm_tift	Tift County Boundary	polygon	Shape
utm_turner	Turner County Boundary	polygon	Shape
utm_worth	Worth County Boundary	polygon	Shape
	Tabular		
lrew_pratice_data2	information table describing the conservation practices being used in the LREW	database	DBF
Readme for Arcmap v9.1	creating and operating CEAP data projects	text	Word Document
Readme for Arcmap v3.2 or v3.3	creating and operating CEAP data projects	text	Word Document
CEAP DATA SUMMARY	CEAP database fact sheet	text	Word Document
	Metadata		
ceap_tracts_metadata	data generation file	metadata	Word Document
lrew_pratice_data2_metadata	data generation file	metadata	Word Document
orthophoto_metadata	data generation file	metadata	Word Document
utm_tift_metadata	data generation file	metadata	Word Document
utm_turner_metadata	data generation file	metadata	Word Document
utm_worth_metadata	data generation file	metadata	Word Document

[a]A brief file description along with file type and format is also provided.

[6] Tract boundaries and all associated practice information were derived from field records circa 1980 through 2006 under the supervision of local USDA-NRCS personnel. These data represent the best available information. All personal identifiers and references to the specific land owner have been purposefully omitted.

2.3. Field Boundaries

[7] Field boundaries were digitized from USGS 1999 orthoquadrangles, using USDA-NRCS field notes and maps as a reference. There were a number of fields located along the basin boundary that did not fall completely within the basin. The polygons for those fields were clipped by the LREW boundary in ArcView 3.3. There were also a few fields located along the county boundaries within the basin, thus the county in which a majority of the field was located was assigned. When the data are displayed within the geographic information system, the results of subdivision are manifested as overlapping field boundaries. One example is the installation of a center pivot irrigation system in a portion of a field.

[8] All corresponding metadata files have been provided to document associated shapefiles. Table 1 details the file name, type and brief description of all files within the database (Table 1).

3. Attributes

[9] An associated database file was created containing county names, tract and field numbers, NRCS program under which the practice was granted, NRCS practice number, NRCS practice description, NRCS estimated acreage covered by the practice, the completion date, and whether the practice was of cost or no cost to NRCS. The listed NRCS program acronyms represent the name of the program at the time the conservation practice was completed. Because programs have changed over the past

Table 2. USDA Natural Resource Conservation Practice Programs and Corresponding Acronyms[a]

Conservation Program	ACRONYM	Description
Conservation Reserve Program	CP20	Farm service agency -designation for particular practice signup period.
Conservation Reserve Program	CPA	Form code
Conservation Reserve Program	CRP	Program started in 1986: contractors plant trees on cropland and maintain stands for 10–15 years
Conservation Reserve Program	CRP20	Program sign-up form: even numbers, start up forms; odd numbers, special initiative start up forms
Conservation Reserve Program	CRP33	Bobwhite quail initiative: long leaf pine
Conservation Security Program	CSP	CSP supports conservation practices on working and tribal lands; it is the first conservation program designed to reward good environmental stewardship
Conservation Technical Assistance	CTA	Previously referred to as Conservation Operations (noncost shared)
Environmental Quality Incentives Program	EQIP	EQIP is a voluntary cost share conservation program for farmers and ranchers designed to enhance environmental quality
Farm Incentives Program	FIP	USDA tree planting program provides cost share incentives to plant trees on cropland, pasturland, cut over woodland. Cancelled FIP program with 2002 Farm Bill
Highly Erodible Land	HEL	Established disincentives to limit/discourage agricultural commodity production from highly erodible lands without adequate erosion protection
Little River Watershed	LRWS	Little River Watershed PL-566 cost share program that began in 1986 and closed out in 2003. For cropland only, most work completed from 1986–1999. Eligible fields must have erosion greater than 2 tons per acre and be located within the Little River Watershed.
Southeast Agricultural Water	SEAW	Irrigation ponds
Wildlife Habitat Incentives Program	WHIP	The Wildlife Habitat Incentives Program (WHIP) is a voluntary program designated to the improvement of wildlife habitat primarily on private land
Agricultural Conservation Program	ACP	Replaced by EQIP in 1996: Erosion Control on Cropland
Grazing Lands Incentive Program	GLIC	USDA cost share program began in 1996. Used to improve grazing animal habitats, primarily beef cattle. Used to improve forages, water quality, and animal management. Used on few farms in the watershed to fence cattle out of the Little River and it's tributaries, install better watering systems for cattle from wells, plant improved grasses etc.

[a]Natural Resource Conservation Service conservation programs, U.S. Department of Agriculture, 2006, http://www.nrcs.usda.gov/programs/.

30 years, practices may be listed under different program names. A complete listing of program acronyms is provided in Table 2.

[10] Please note that the areas listed for the grassed waterways and terraces relate to the acreage of the field rather than the actual area of the individual practice. Also, note that this data set may not include all conservation practices implemented by NRCS in the basin.

4. Data Summary

[11] Nearly 16% of the land area in the LREW has implemented one or more USDA-NRCS recommended conservation programs within the last 30 years. Forty-seven different conservation practices were observed within the LREW, ranging from fish pond management (<1% of the total land area in conservation) to grassed waterways (13.1% of the total land area in conservation). The most predominant conservation practices observed consisted of: nutrient management (13.1%), pest management (12.9%), grassed waterways (9.6%), contour farming (9.5%), seasonal residue management (8.9%), and terraces (8.8%).

[12] Conservation practices were established in one of two ways: (1) as a component of a federally funded conservation program (cost) or (2) the individual paid for the cost of implementation and was provided some technical assistance by NRCS field staff (no cost). Approximately

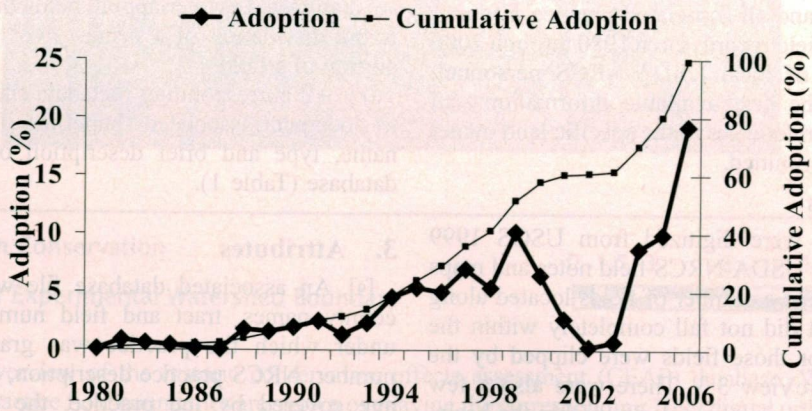

Figure 2. Overall trends in USDA-NRCS assisted conservation practice adoption from circa 1980 through 2006. Data along the primary *y* axis depict conservation practice adoption as a percentage of the total acreage in conservation practice. Data along the secondary *y* axis depict the cumulative trend in conservation adoption over time.

54% of the conservation programs were implemented as a component of a federal cost share program and 46% were implemented voluntarily with technical assistance provided by NRCS field staff. Cost share programs predominantly funded the establishment of grassed waterways, terraces, nutrient management, and pest management. Voluntarily implemented practices consisted primarily of contour farming, residue management and nutrient management.

[13] Perhaps a more informative assessment of conservation practice adoption is an assessment of adoption over time (Figure 2). Using the cumulative acreage of conservation practices as a baseline, the following assessments were made:

[14] 1. Adoption was generally <2% per year from 1980 through 1990.

[15] 2. A steady increase in adoption was observed between 1990 and 1999.

[16] 3. Adoption diminished to <1% per year from 2002 to 2003 during the authorization of the 2002 Farm Bill.

[17] 4. Adoption has increased rapidly in the past 5 years, accounting for 20% of the total land area in conservation practices in 2006.

5. Data Availability

[18] The CEAP database for the LREW includes 37 data layers, with corresponding metadata files and instructions for linking the attribute table with geographic information Metadata include the projection system, dates of creation, originating source of the file, and pertinent information regarding how the file was created. The CEAP database may be accessed via ftp://www.tiftonars.org/under the main folder heading "LREW" and subfolder "ceap_data". A complete listing of file names has been provided in Table 1.

[19] **Acknowledgments.** The historical information contained within this database could not have been completed without the assistance of the local USDA NRCS district conservationists. A special thanks to Mary Leidner, whose time, expertise, and diligence made this possible.

References

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U.S. Geological Survey (USGS) (1973a), Ashburn, Georgia, 7.5 minute series (topographic maps), scale 1:24,000 scale, Reston, Va.

U.S. Geological Survey (USGS) (1973b), Bethel, Georgia, 7.5 minute series (topographic maps), scale 1:24,000 scale, Reston, Va.

U.S. Geological Survey (USGS) (1973c), Chula, Georgia, 7.5 minute series (topographic maps), scale 1:24,000 scale, Reston, Va.

U.S. Geological Survey (USGS) (1973d), Sumner, Georgia, 7.5 minute series (topographic maps), scale 1:24,000 scale, Reston, Va.

U.S. Geological Survey (USGS) (1973e), Sylvester, Georgia, 7.5 minute series (topographic maps), scale 1:24,000 scale, Reston, Va.

U.S. Geological Survey (USGS) (1973f), Tifton West, Georgia, 7.5 minute series (topographic maps), scale 1:24,000 scale, Reston, Va.

U.S. Geological Survey (USGS) (1977a), Arabi, Georgia, 7.5 minute series (topographic maps), scale 1:24,000 scale, Reston, Va.

U.S. Geological Survey (USGS) (1977b), Pateville, Georgia, 7.5 minute series (topographic maps), scale 1:24,000 scale, Reston, Va.

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