

# Comprehensive Watershed Modeling for 12-digit HUC Priority Watersheds – Phase II

**PRESENTED BY:  
NARESH PAI**

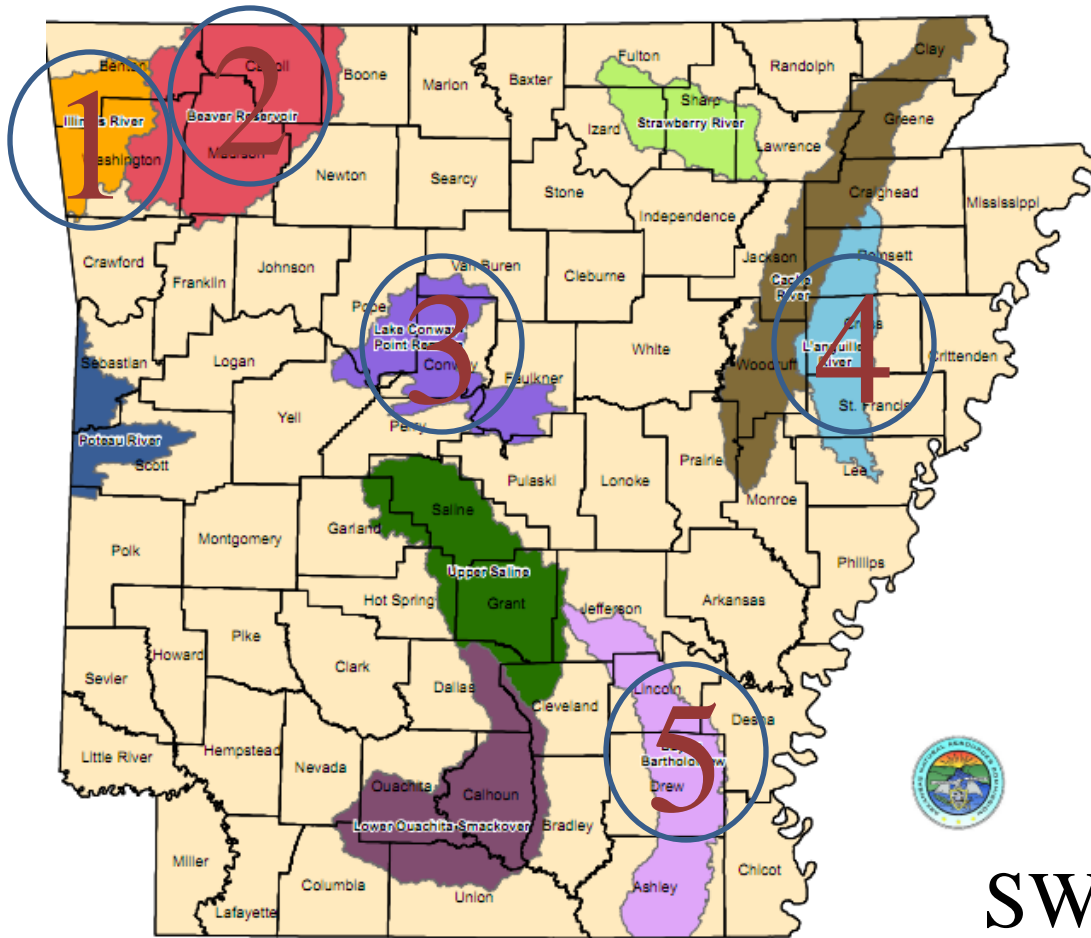
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Collaborator: Mike Daniels**

**ANRC 2012 NPS Project Review Meeting, Sept. 27**

## Project Objective

Prioritize 12-digit HUCs using SWAT model output

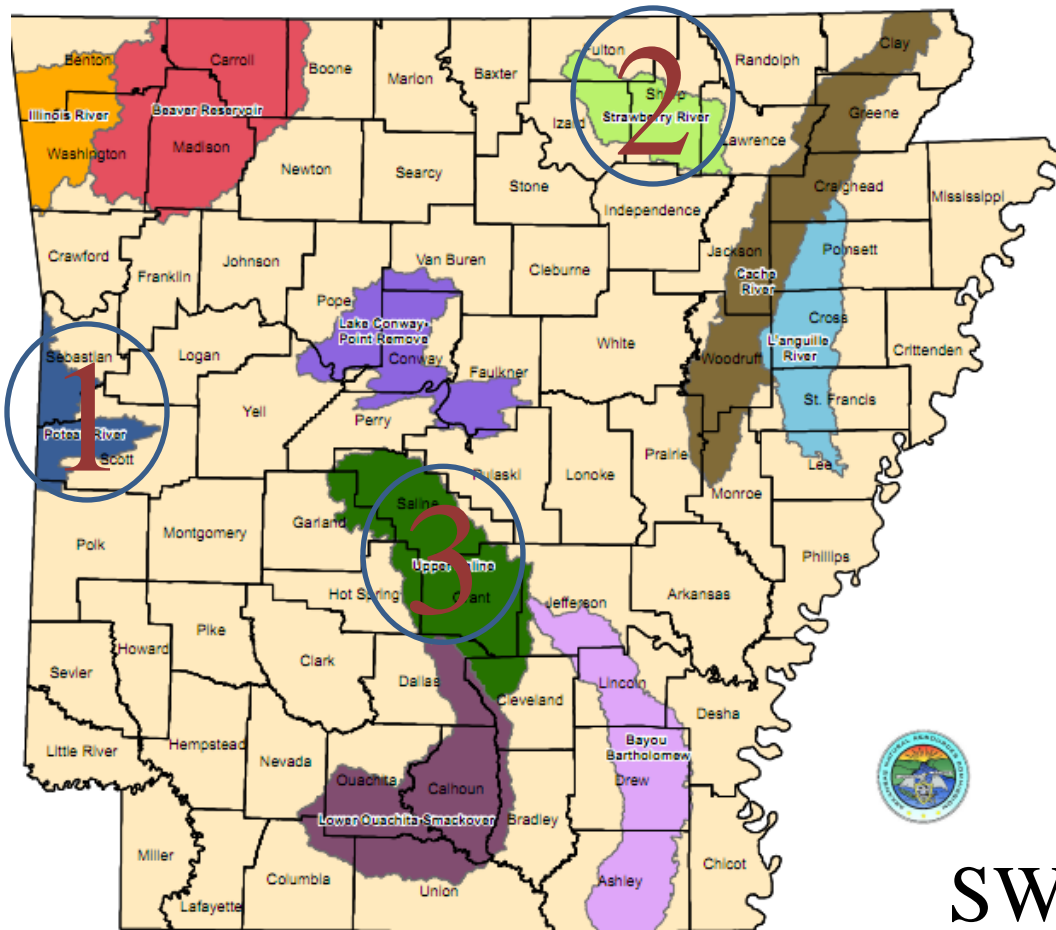
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Phase I  
(2008 – 2010)

## SWAT Modeling Project 12-digit HUC Prioritization

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Phase II  
(2011 – 2013)



## SWAT Modeling Project 12-digit HUC Prioritization

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# SWAT MODEL NEW FEATURE

Soil & Water  
Assessment Tool | **SWAT**



SWAT2009: Integrates land-use changes during simulation

## Headwater Poteau

1999

2006



Urban (1.8%)

Urban (6%)

## Bens Creek

1999

2006



Urban (3.8%)

Urban (13.7%)

## Cedar Creek

1999

2006

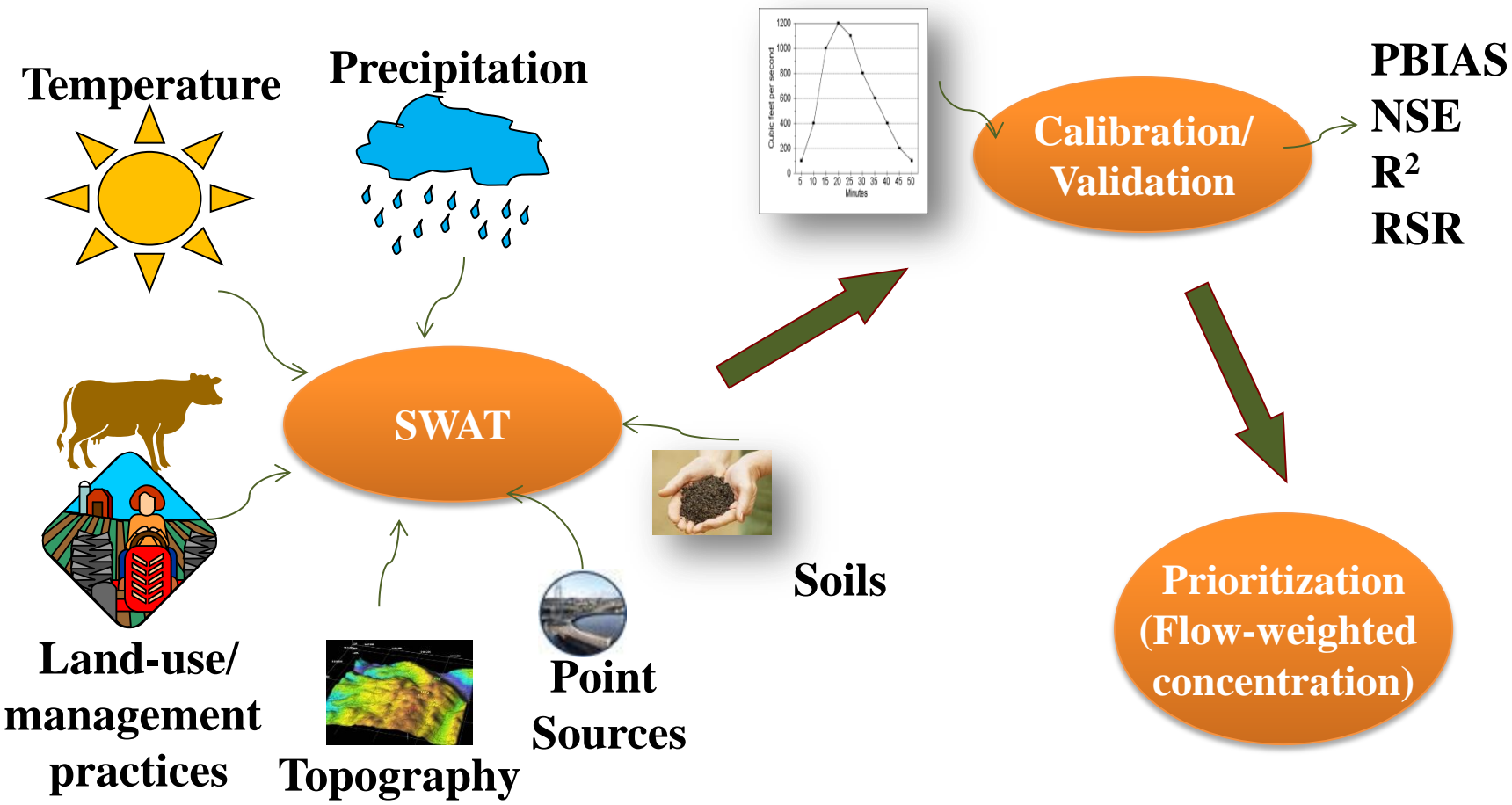


Urban (8.3%)

Urban (29.1%)

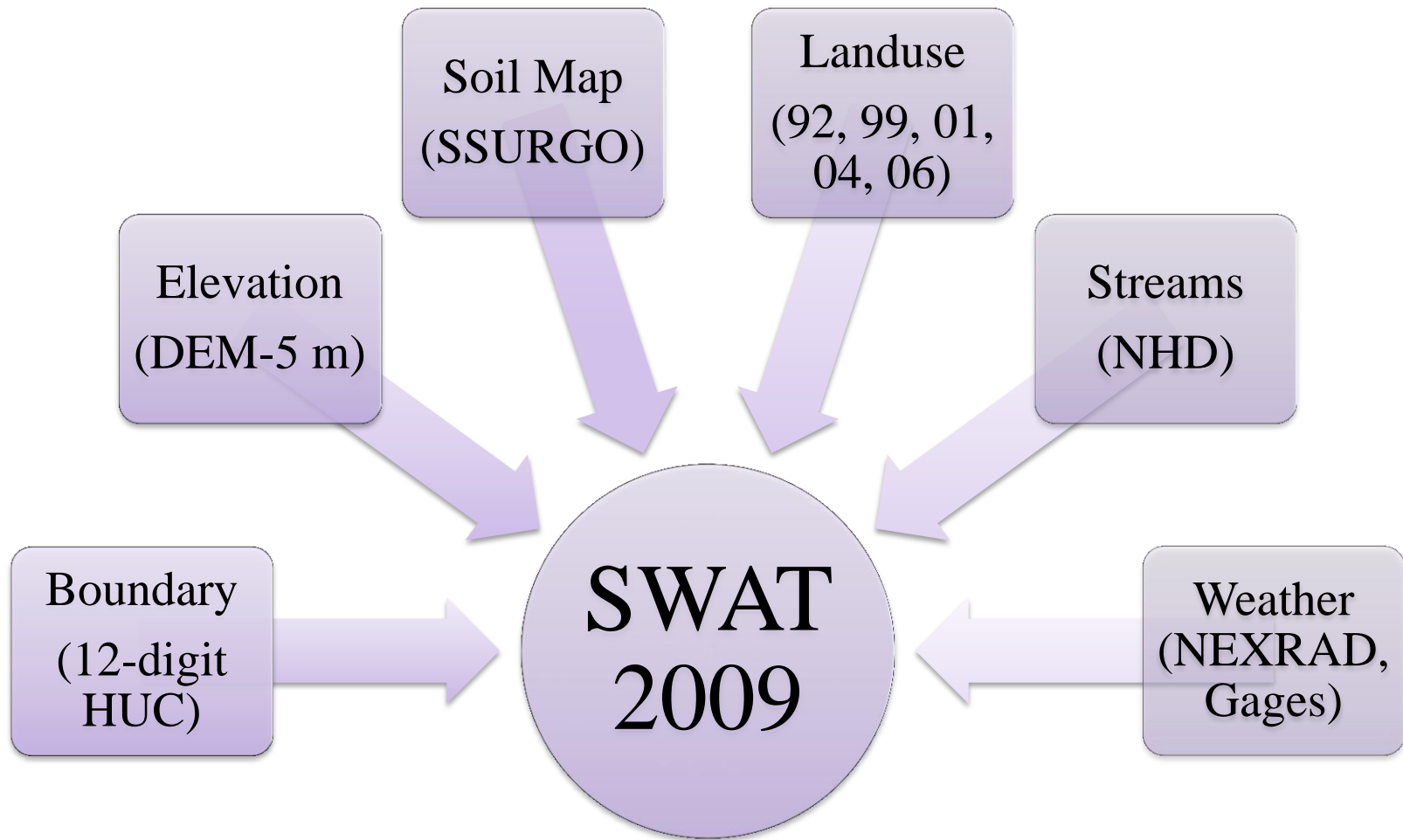
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# OVERALL PROJECT APPROACH



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# SWAT MODEL SETUP: SPATIAL DATA

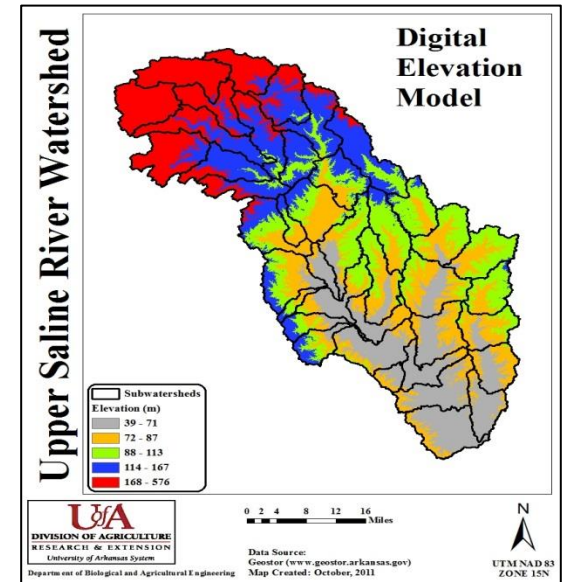
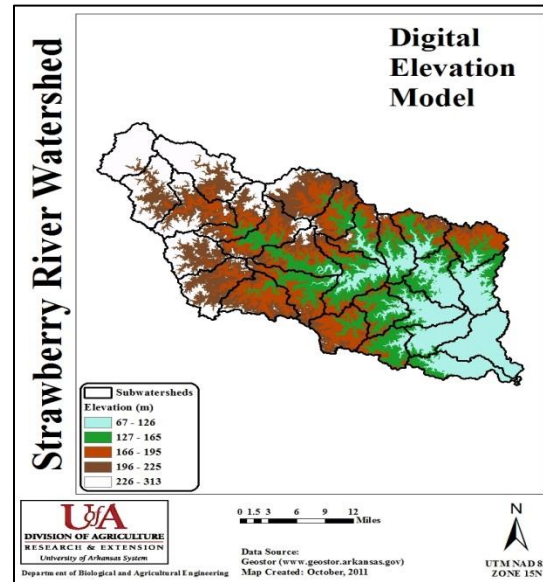
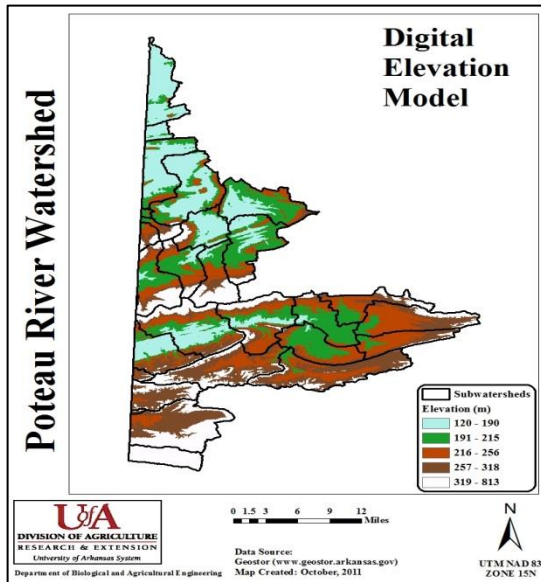


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# SWAT DATA PROCESSING

## Elevation:

- ✓ Download DEM from Geostor
- ✓ Clip to watershed boundary



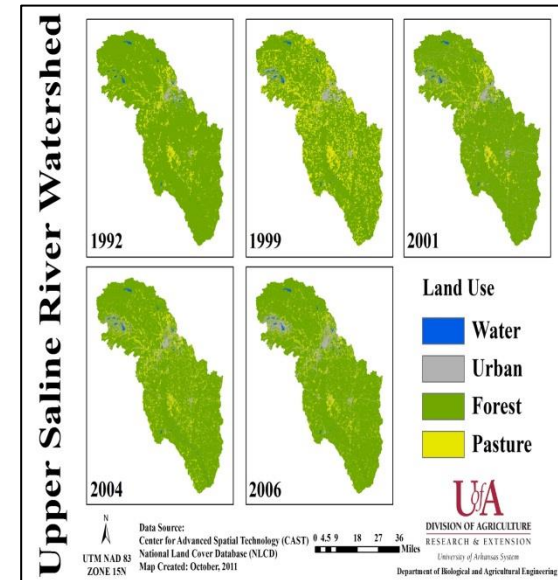
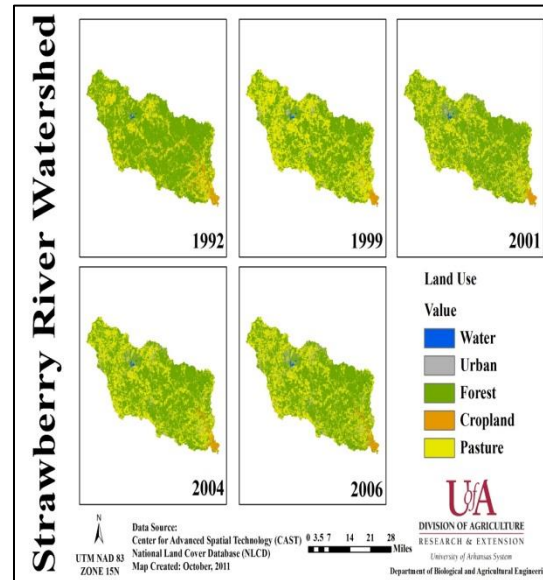
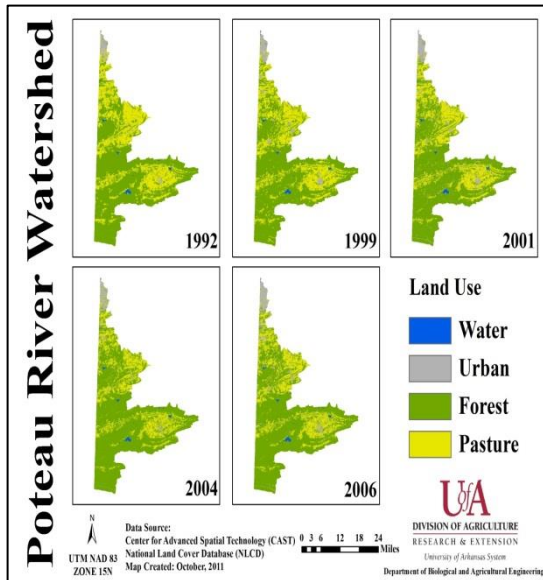
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# SWAT DATA PROCESSING

## Land-use:

- ✓ LULC: 1992, 1999, 2001, 2004, 2006
- ✓ Activate land-use update module

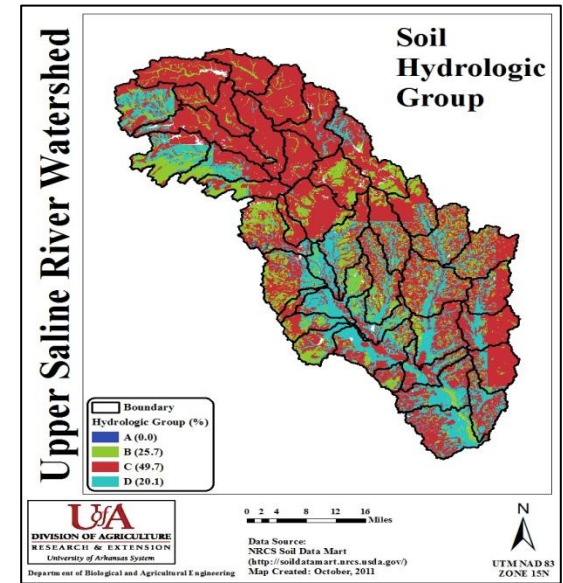
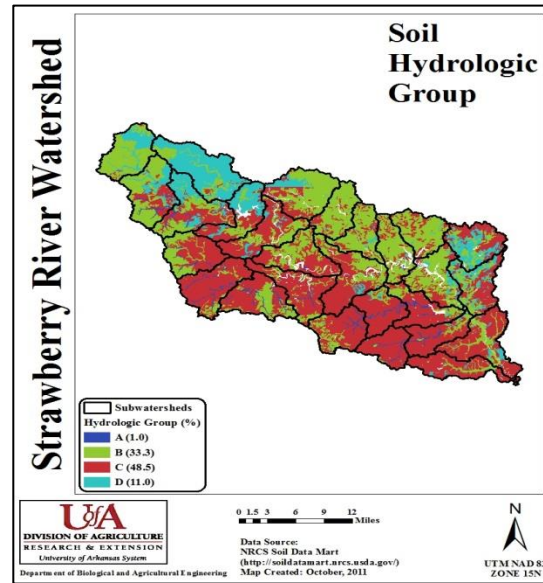
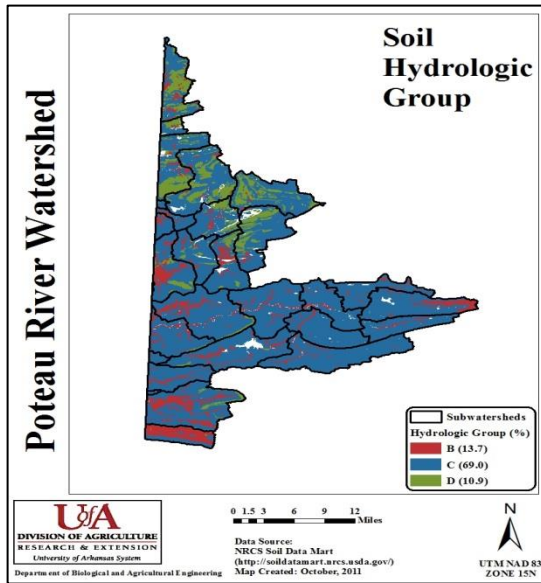


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# SWAT DATA PROCESSING

## Soil:

- ✓ Download and clip SSURGO soil layer
- ✓ Update SWAT soil database

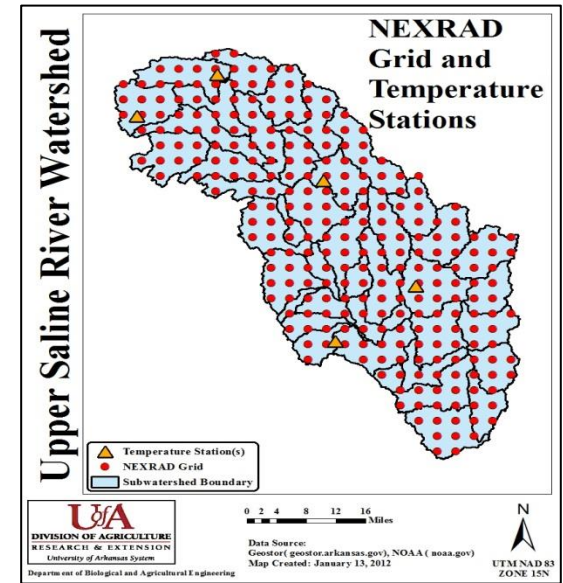
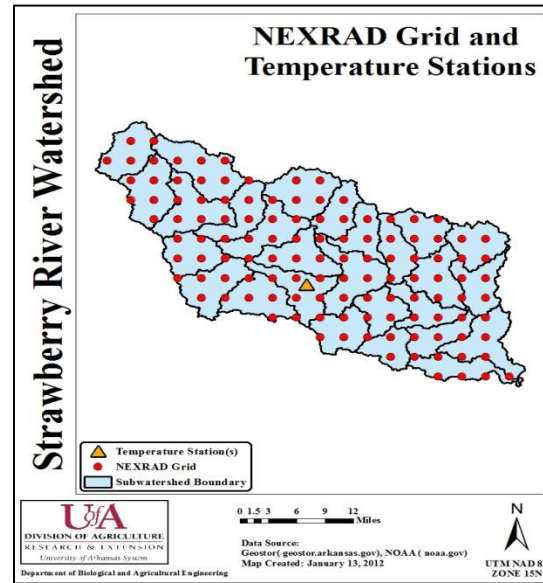
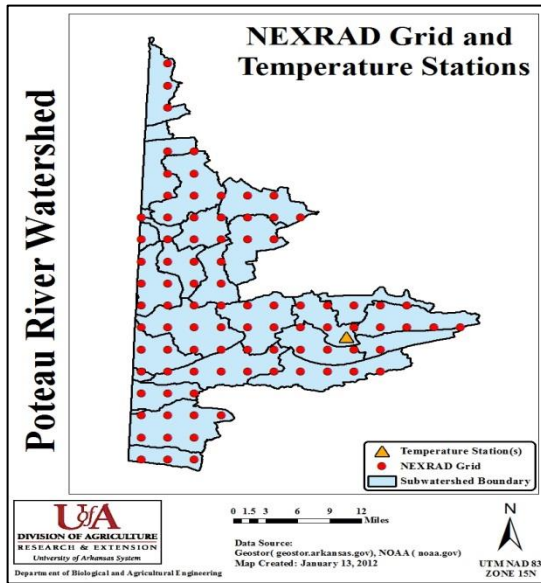


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# SWAT DATA PROCESSING

## Weather:

- ✓ **Precipitation: Aggregate NEXRAD to daily scale for each subwatershed**
- ✓ **Temperature: daily data from gages**



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## User-defined subwatershed boundaries:

- ✓ Download certified 12-digit HUC boundaries and post-process to make it SWAT compatible

## Streams:

- ✓ Download NHD data and post-process to make it compatible with user-defined subwatershed boundaries

# SWAT MODEL SETUP: TABULAR DATA

## Management Data

- Crop rotation
- Timing & frequency of tillage
- Planting date
- Harvesting date
- Timing and rate of fertilizer application
- Irrigation
- Pesticides

Cropping practices for each county

Point source discharge (ADEQ)

SWAT  
2009

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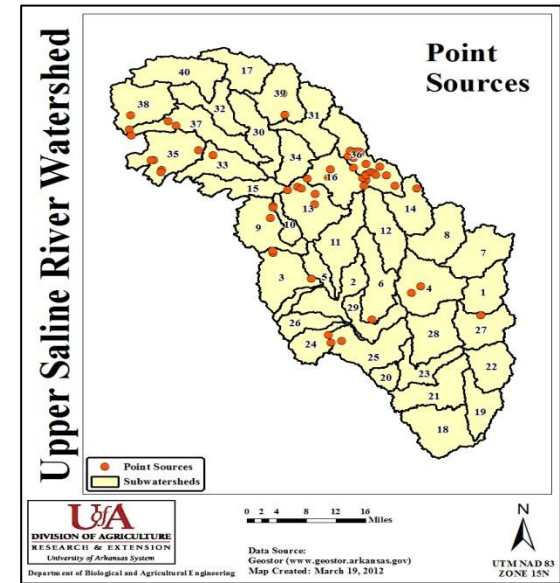
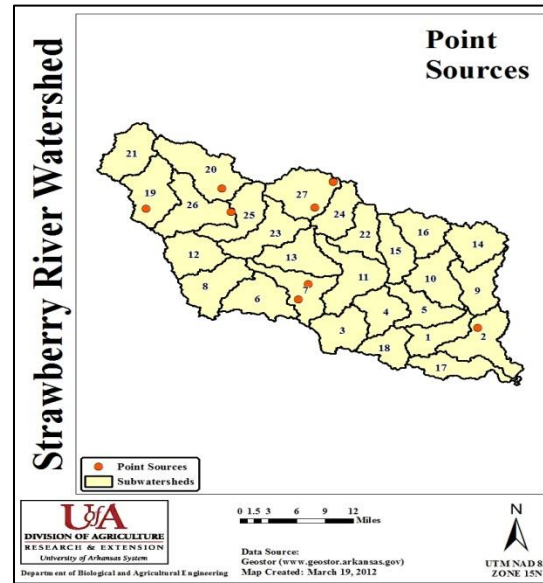
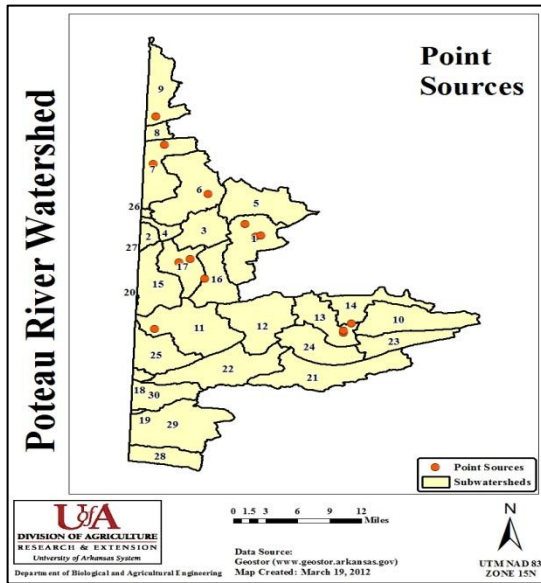
Cooperative Extension Service



# SWAT DATA PROCESSING

## Point Sources:

- ✓ Process ADEQ data into SWAT compatible format

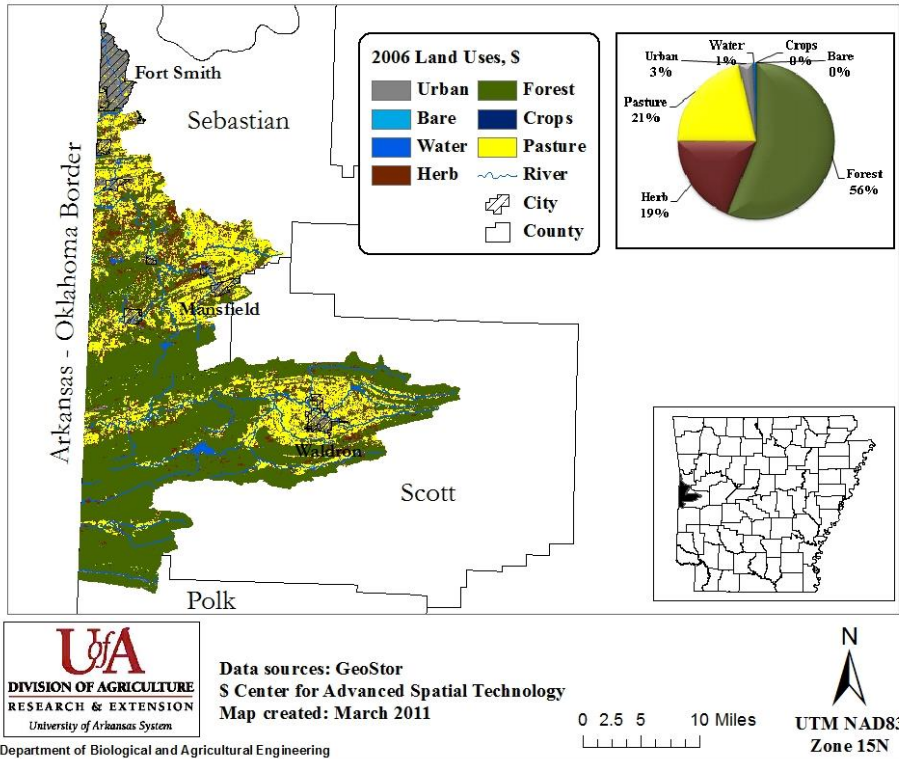


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# WATERSHED PROFILE

## Poteau River Watershed

### Poteau River Watershed



**Area:** 556 sq. mi.

**Land-use:** Forest (56%)  
Pasture (21%)  
Urban (3%)

**Elevation:** 865 ft. (mean)

**Slope:** 46% area under >8% slope

**Soil:** 80% area under group C/D

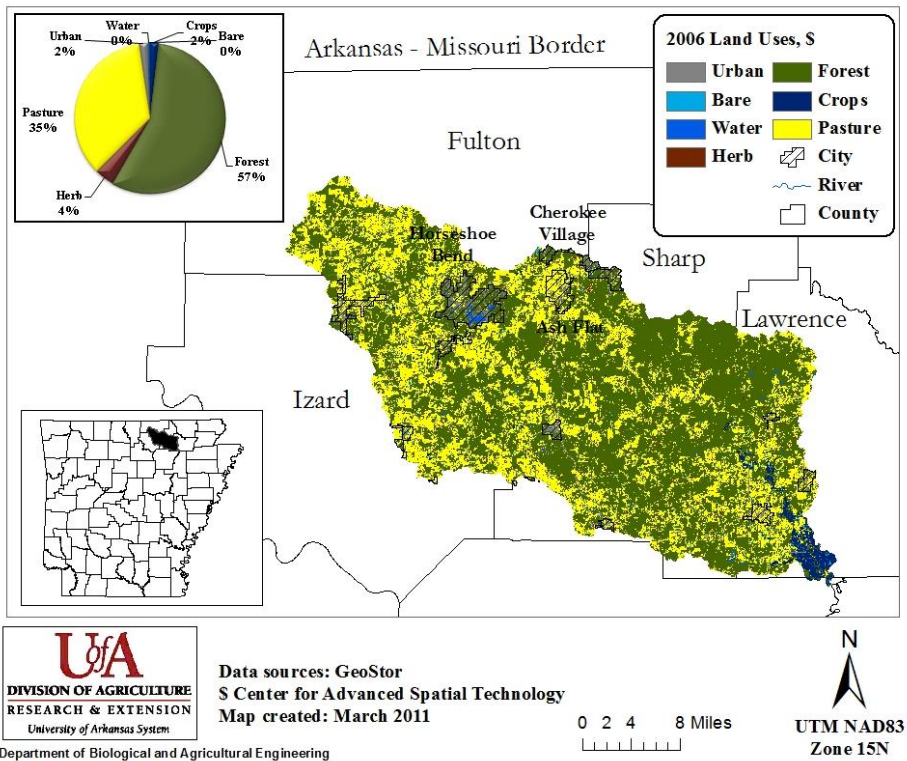
**Precipitation:** 40 inch (mean)

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# WATERSHED PROFILE

## Strawberry River Watershed

Strawberry River Watershed



**Area:** 761 sq. mi.

**Land-use:** Forest (58%)  
Pasture (33%)  
Urban (3%)

**Elevation:** 574 ft. (mean)

**Slope:** 39% area under >8% slope

**Soil:** 60% area under group C/D

**Precipitation:** 43 inch (mean)

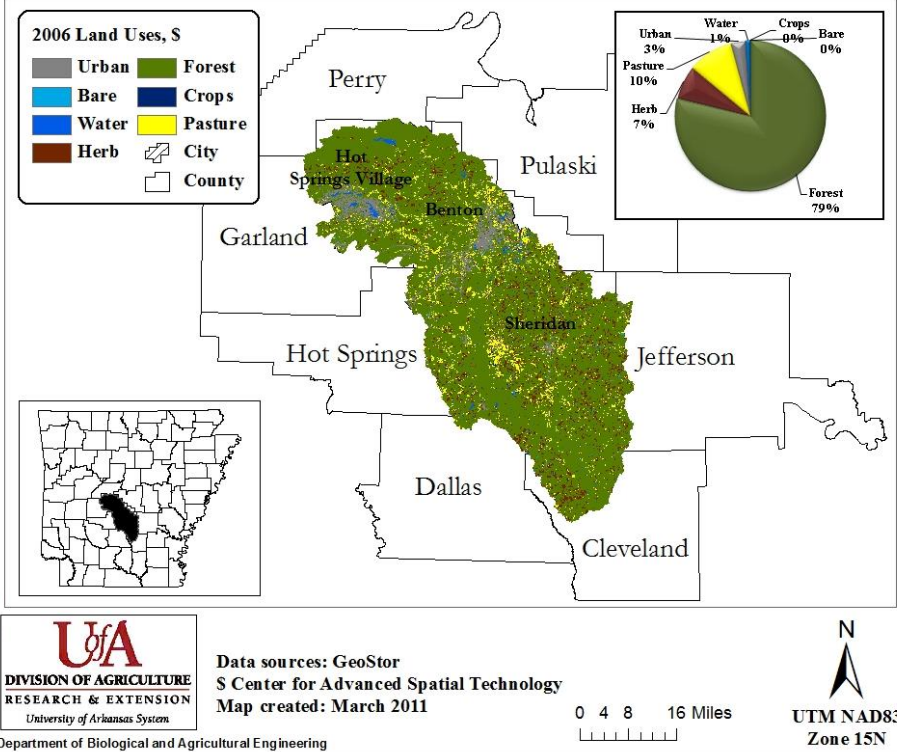
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# WATERSHED PROFILE

## Upper Saline Watershed

### Upper Saline Watershed



**Area:** 1715 sq. mi.

**Land-use:** Forest (79%)  
Pasture (10%)  
Urban (3%)

**Elevation:** 390 ft. (mean)

**Slope:** 26% area under >8% slope

**Soil:** 70% area under group C/D

**Precipitation:** 45 inch (mean)

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# REMAINING TASKS

- ✓ **Sensitivity analysis**
- ✓ **Check potential model problems using SWAT Check\***
- ✓ **Annual calibration**
- ✓ **Monthly calibration/validation**
- ✓ **Qualitative comparison with AWRC data (2011-2012)**
- ✓ **Uncertainty analysis**
- ✓ **Subwatershed prioritization**

\*White et al., 2012

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## Arkansas Natural Resources Commission



- ✓ **Mike White, Jeff Arnold, Nancy Sammons, USDA-ARS**
- ✓ **Raghavan Srinivasan, Texas A&M University**

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