

1-1988

# Changes in Rainfall Patterns in Kentucky During the 1980's

Kenneth L. Wells
*University of Kentucky*

R. E. Phillips
*University of Kentucky*

H. B. Rice
*University of Kentucky*

UNIVERSITY OF KENTUCKY
COLLEGE OF AGRICULTURE
Lexington, Kentucky 40546

COOPERATIVE EXTENSION SERVICE

Department of Agronomy

# Soil Science News & Views

Volume 9, No. 1 January, 1988

## Changes in Rainfall Patterns in Kentucky During the 1980's

K.L. Wells, R.E. Phillips, and H.B. Rice

Annual rainfall patterns in Kentucky have not been average during the 1980's. During this timespan there have been two droughts of statewide significance, and there has been wide variability within the state during most years. Because of this wide fluctuation, there has been some concern that rainfall patterns either are changing or have changed. In order to evaluate this concern, rainfall data from sites in western, south central, north central, east central, and eastern Kentucky were analyzed. An average amount of rainfall which would be predicted for these sites was calculated, using the average of that which fell annually from approximately 1960-1980. Average of that which fell annually from 1981-1986 was calculated to use for comparison with the long-term average to determine if rainfall during the 1980's has changed from that which would have been predicted. Additionally, rainfall amounts were calculated for the periods December-March and April-November. This was done in order to determine if any changes in annual distribution of rainfall had also taken place during the 1980's. The reason for selecting the period December-March is that rainfall which occurs during this period recharges groundwater and contributes greatly to streamflow throughout the year. Total rainfall averages for the 1970's were also calculated as another comparison for that of the 1980's.

### Changes Observed

Average annual deviation in rainfall patterns during the 1980's from that of the long-term average is shown for each site in Table 1. The most notable change shown is the decrease in rainfall during the period, December-March. Rainfall during this period decreased at all the sites shown, ranging from an average annual decrease of 5.68 inches at the Lexington airport to 2.33 inches at Princeton. This means that for the 6-year period,

1981-86, 34.08 fewer inches of rain (this is 925,408 gallons per acre[1/]) fell during December-March at the Lexington airport and that 13.98 fewer inches of rain (379,613 gallons per acre) fell at Princeton.

Did rainfall during April-November compensate for this deficit during December-March? It did at Princeton and Bowling Green, but not at the other sites. Even so, at these two sites, the compensation would not have been direct, because rainfall during April-November would have been depleted at a faster rate (due to evapo-transpiration) than if it had fallen during December-March. The big concern is about the decreased December-March rainfall which recharges the permanent groundwater table and contributes greatly to streamflow. Spring and summer rainfall does not contribute proportionally as much water to the permanent water table since much of it is lost from the soil by evapotranspiration.

Site-to-site variability in precipitation patterns can be quite variable. For example, rainfall at the UK College of Agriculture Weather Station at Spindletop Farm for December-March during the 1980's was about 3.8 inches greater than that recorded at the Lexington airport. Yet, the two sites are only about 9 miles apart. This points out the limitation of trying to describe very large areas by data from one or two locations within the area. In assessing whether rainfall patterns have changed during the 1980's, one needs to also consider that of the 1970's. Average annual rainfall during the 1970's at Princeton, Bowling Green, Louisville, and Lexington was 4 to 6 inches greater than the long-term average.

While it is still too soon to determine if the changes in amount and distribution of rainfall during the 1980's represents a change in Kentucky's rainfall patterns, it is apparent that on the average, the first 6 years of the 1980's were different from the previous 20-year average. The change of greatest concern is the decrease in rainfall during December-March. If this trend continues, Kentucky can look forward to more intense effects of dry soil on environmental conditions, particularly in early spring and summer.

K.L. Wells

K.L. Wells
Extension Soils Specialist

[1/] 1 acre inch of rain equals 27,154 gallons.

COOPERATIVE EXTENSION SERVICE
U.S. DEPARTMENT OF AGRICULTURE
UNIVERSITY OF KENTUCKY
COLLEGE OF AGRICULTURE
LEXINGTON, KENTUCKY 40546







Rainfall Patterns in Kentucky During the 1980's

| Location | Long-Term Average | | | 1981-1986 Deviation From Long-Term Average | | |
|---|---|---|---|---|---|---|
| | Annual Total | Dec-March | April-Nov | Annual Total | Dec-March | April-Nov |
| | inches | | | | | |
| Princeton | 49.8 | 17.9 | 31.0 | +5.5 | -2.3 | +7.8 |
| Bowling Green | 50.6 | 18.7 | 31.9 | +1.4 | -3.7 | +5.1 |
| Louisville | 43.3 | 16.2 | 27.1 | -1.4 | -5.0 | +3.6 |
| Lexington (Airport) | 46.2 | 15.1 | 31.1 | -6.3 | -5.7 | -0.6 |
| Quicksand | 47.5 | 15.2 | 32.3 | -6.8 | -2.7 | -4.1 |