

## Understanding Drought

Kimberly B. Henken, M.S., Extension Associate for Environmental Issues

Drought - it's a term we hear from time to time, but it can be a challenge to figure out exactly what it means. Drought may best be defined as a persistent and abnormal moisture deficiency that has an adverse impact on plants, animals or people<sup>1</sup>. Generally, we associate the term drought with a time of below normal precipitation.

### Measuring Drought Levels

The severity of prolonged droughts is measured through the *Palmer Drought Severity Index*. The index measures how far a specific region is below normal precipitation. Precipitation and temperature data, as well as soil moisture data, are used in calculating the index value for a given region. There are four basic categories of drought – mild, moderate, severe and extreme. Following is a breakdown of the Palmer values for each category<sup>2</sup>:

Mild :	-1.0 to -1.99
Moderate:	-2.0 to -2.99
Severe:	-3.0 to -3.99
Extreme:	-4.0 and below

Regional Palmer numbers are calculated and released weekly, typically on Monday evenings. The state of Kentucky is divided into four regions – west, central, bluegrass and east.

The *Crop Moisture Index (CMI)* gives the short-term or current status of purely

agricultural drought (or moisture surplus). The index will indicate if moisture levels are adequate for present agricultural needs, if levels are excessive and fields are too wet, or if moisture levels are below normal and rain is needed. Like the Palmer Index, the CMI is calculated and released weekly for the four regions in Kentucky.

The interpretation of the CMI numbers varies somewhat depending upon whether the index has increased or decreased since the previous week. In general, a CMI number between 0 and 1.0 indicates that moisture levels are adequate. If the value is above 1.0, excess moisture is found in at least some areas. Values above 3.0 indicate that the particular region is excessively wet. Conversely, CMI values below 1.0 are associated with dry conditions. If the level is -3.0 or less, conditions are extremely dry and crop yields will be significantly reduced.

The *Palmer Drought Index* and the *Crop Moisture Index* are both available via the Internet through the University of Kentucky Agricultural Weather Center web site at: [http://www.wagwx.ca.uky.edu/latest\\_drought.txt](http://www.wagwx.ca.uky.edu/latest_drought.txt). The numbers are updated each Monday.

### Drought and Water Supplies

During periods of drought, the Kentucky Natural Resources and Environmental Protection Cabinet monitors data and issues advisories for water shortages. There are two

levels of advisories. A **water shortage watch** is issued when rainfall levels, reservoir levels, stream flow and the Palmer Drought Index indicate the potential for water shortages. **Water shortage warnings** are issued when water shortages are actually occurring in a given area.

When the Natural Resource Cabinet has issued either a water shortage watch or warning for a given area, water systems are asked to monitor their supplies on a daily basis. Local officials use “trigger points” to decide when to initiate a local response to the situation. These “trigger points” are set and determined by reservoir levels and/or stream flow. Through county water supply plans, each county has established both long-term planning and water shortage response. There are four phases of water shortage response, each described in general terms below<sup>3</sup>.

**Advisory** - voluntary conservation requested.

**Alert** - non-essential water use is banned or restricted, such as watering lawns and washing cars; systems continue to request voluntary conservation.

**Critical** - non-essential water use is banned; socially and economically important uses are banned or restricted (i.e. Laundromats, commercial car washes, restaurants, irrigation, etc.).

**Rationing** - bans for non-essential water use and socially and economically important uses continue; water is allocated to essential uses (i.e. sustaining human life and pets, maintaining a minimum level of hygiene and sanitation, patient care, firefighting, etc.)

The Kentucky Division of Water maintains a drought status and water shortage web page. This site gives current information about water shortage advisory areas and local response phases. The web page is accessible at <http://www.water.ky.gov/wateruse/drought/>.

### **Declaring a Water Emergency**

During times when the drought situation is severe, more drastic actions may be taken. In certain cases, the Governor may declare a water emergency as Governor Paul Patton did in 1999. When an emergency is declared, additional steps may be taken to insure that drinking water is available. These measures could include:

- mandating local officials and water systems implement the appropriate phase of their water shortage response plan,
- directing the modification or removal of unpermitted dams which block stream flow, and
- encouraging or mandating that treated water not be hauled and used for livestock watering.

Emergency declarations are rare, and are only issued when the conditions are severe. Nevertheless, we all should be alert to continuing drought conditions when they occur so that we can be prepared to take appropriate actions. Every water consumer has a part to play in making sure adequate supplies continue to be available.

### **References Cited**

1. National Drought Policy Commission. 2000. *Preparing for Drought in the 21<sup>st</sup> Century*. U.S. Department of Agriculture, Washington, D.C.
2. University of Kentucky Agricultural Weather Center. 2000. *Drought Status for Kentucky*. <[http://www.wagwx.ca.uky.edu/latest\\_drought.txt](http://www.wagwx.ca.uky.edu/latest_drought.txt)> Accessed January 3, 2001.
3. Kentucky Division of Water. 2000. *Local Response Phases*. <<http://water.nr.state.ky.us/wsp/wsp10b.htm>> Accessed January 3, 2001.