Drought...I’ll Know It
When I See It

Bill Bland
UWEX & Dept. Soil Science, UW-Madison
Hydroclimate

- Climate is a description of the long-term nature of weather at a location
- Assume that there is average, battered by annual departures
- Today will discuss ways of expressing precipitation variability and the extreme of drought
Variability

- No two years quite same
- Many ways to describe
- Usual assumption is that last 30 years of observations best describe the current climate--the “normals”
Annual total

Annual Precipitation
Green Bay, WI

Average = 714 mm
Percentiles

- Gather all totals together for “period of record”
- Sort from small to large
- Find amounts that reveal 10% larger (or smaller), etc.
Urbana deciles

Monthly Precipitation (mm)

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Urbana July probabilities

Urbana, USA
July, 1970-1999
When to cry “DROUGHT!”?

- A “creeping phenomenon”
- Rain-free ➔➔ Dry spell ➔➔ Drought
Drought Classification

- Meteorological, Agricultural, Hydrological...
- reminds us of variety of effects of drought
- Mostly for something to teach and test on?
Drought Indexes

- Ways to summarize precipitation records into simple #
- Standardized Precipitation Index
- Palmer Drought Severity Index
- Crop Moisture Index
SPI - Standardized Precipitation Index

- www.wrcc.dri.edu/spi/spi.html
- summary of precipitation history at a location
- express as % exceedence or -3 to +3 index
- Fig 6 of “Hydroclimatology” handout
  - note durations, prior to 10/2003
SPI map-Fig. 6

6-month Standardized Precipitation Index through the end of October 2005

- +3.00 and above (know how to swim?)
- +2.00 to +1.99 (extremely wet)
- +1.25 to +1.99 (very wet)
- +0.75 to +1.24 (moderately wet)
- +0.74 to +0.74 (near normal)
- -1.24 to -0.75 (moderately dry)
- -1.99 to -1.25 (very dry)
- -2.00 to -2.00 (extremely dry)
- -3.00 and below (where's the nearest oasis?)
SPI—see Fig 5 of Hydroclimatology

- location
- duration
- time

![Graph](Southwest)

- Probability of exceedence (%)
- Months prior to Oct. 2003

Southwest
SPI-pause to think...

- Study graph of a region for 1 minute
  - How does it jibe with your memory??
- Compare with neighbor...
PDSI - Palmer Drought Severity Index

- www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/palmer.gif
- Scale of -4 (dry) to +4 (wet)
- Widely used for relief decisions
PDSI

- estimates soil water holding capacity and evaporation (yeah, right!)
- duration is not clearly defined
- losing ground to newer indexes
PDSI in WI last seasons

- Figure 7 in Hydroclimatology
- Snipped out WI from map in 1st week of month
- See drought evolve, as recognized by PDSI
PDSI August 2003

8/2

8/9

8/16

8/23

8/30
The future?

- Federal government folks experimenting with “blends” of indices and additional data to create drought maps

- drought.unl.edu/dm/current.html

- predictions? not possible in Mid-West
  - climatology as good as it gets
Will there be big droughts?

- drought indexes are created with relatively recent hydroclimate in mind
- what does 100s and 1000s of years ago suggest about drought?
- “paleoclimatology” makes use of “proxies”
  - lake sediments, tree rings
PDSI from tree-rings

- for Missouri
- drought of 30s exceeded in 16th century
Summary

- precipitation variation can be described by various statistics
- drought is difficult to define
  - start, severity, end
- various “Index” calculations in use, with newer “blends,” all on the WWW
Study of past hydroclimate by proxies reveals megadroughts.

No reason to assume we are not at risk...