Droughts

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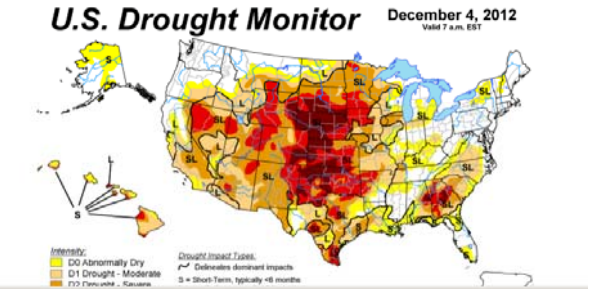
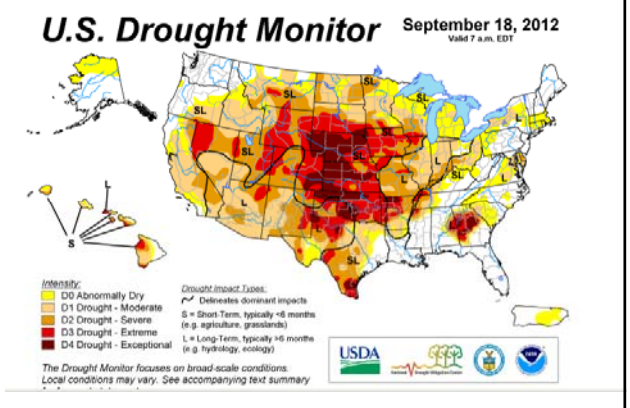
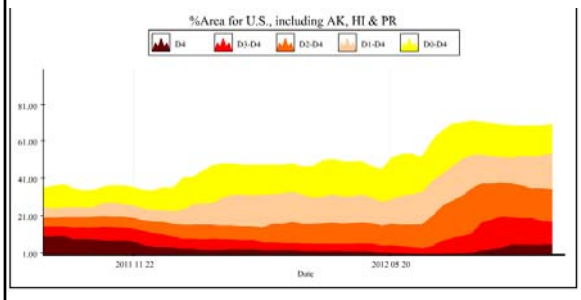
US Drought Status





Percent land area affected by Drought across US (2011- 2012)



3 April 2012

10 April 2012

17 April 2012

1 May 2012

8 May 2012

15 May 2012

22 May 2012

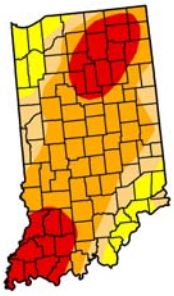
29 May 2012

5 June 2012

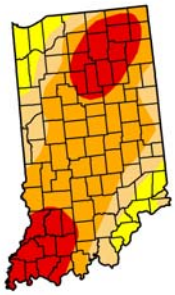
12 June 2012

19 June 2012

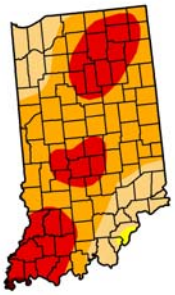
26 June 2012



3 July 2012



10 July 2012



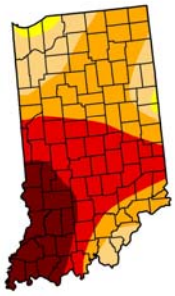
17 July 2012

24 July 2012

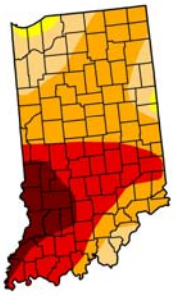
31 July 2012

7 August 2012

14 August 2012



21 August 2012



28 August 2012

4 September 2012

11 September 2012

1 July 2012

Northern Indiana

15 July 2012

Northern Indiana

Southern Indiana

22 July 2012

Northern Indiana

Southern Indiana

29 July 2012

5 August 2012

Southern Indiana

Northern Indiana

12 August 2012

Northern Indiana

19 August 2012

Southern Indiana

Northern Indiana

26 August 2012

Northern Indiana

9 September 2012

Southern Indiana

Impact of drought on crop futures/ index funds

http://www.indexuniverse.com/sections/blog/13045-the-droughts-effect-on-etfs-.html

drought stats end of growing season(September 2012 courtesy USDA)

- **Crops and cattle in drought continued to rise. Overall, drought has shifted toward the north and west in recent weeks.**
- - **U.S. corn in drought stands at 85%,** up a percentage point from a week ago. The corn harvest is underway, 26% complete nationally by September 16.
- - **Soybeans in drought also rose a point to 82%.** The soybean harvest has accelerated, and stood at 10% complete nationally as of September 16.
- - **Hay in drought likewise rose 1 point to 67%,** eclipsing the 66% high set on July 17 and 24.
- - **Cattle in drought reached a new high, rising 1 point to 75%.**
- - Winter wheat in drought was added last week, as planting is underway (11% complete). **Nearly three-quarters (74%) of winter wheat areas are in drought.**
- - **Due to expansion of drought in the nation's mid-section, contiguous U.S. drought coverage reached a record-high 64.82% on September 11, eclipsing last week's mark of 64.16%. The former record of 63.86% had been set earlier in the summer on July 24.**
- - The forecast features little if any rain over the next 5 to 7 days in most of the severe-to-extreme drought areas, particularly the Great Plains.

Concepts

- What is a drought?
- What are the characteristics of a drought?
- How will you know a region is in a drought?
- How will you know a region is out of drought?
- How is drought monitoring and prediction done?

Droughts are natural hazards
Droughts can affect our day to day life and the socioeconomic impacts can last for years

Drought?

Some characteristics of Drought

- Recurring temporary event, i.e. not rare, nor random (predictable?), or a permanent feature
- Characteristics and impacts vary from region to region
- Natural hazard (but human decisions could contribute to the impacts)
- Deviation from normal when the regional water budget goes in the deficit

In simplest terms, drought originates from a deficiency of precipitation over an extended period of time….

Droughts differ in terms of:

- INTENSITY
- Duration
- Spatial Extent
- Timing

So what is a 'Drought'?

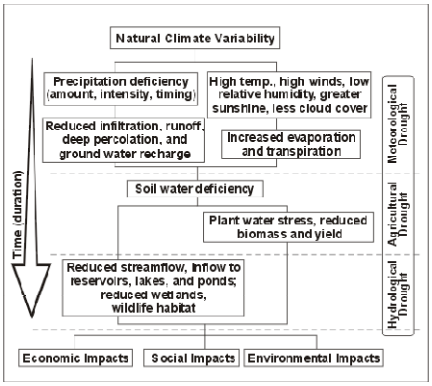
- Drought is a normal, recurrent feature of climate. It occurs almost everywhere, although its features vary from region to region.
- In the most general sense, drought originates from a deficiency of precipitation over an extended period of time, resulting in a water shortage for some activity, group, or environmental sector.
- Whatever the definition, it is clear that drought cannot be viewed solely as a physical phenomenon.

Drought Differs From Other Natural Hazards

- slow onset or "creeping phenomenon"
- absence of a precise, universal definition
- impacts are nonstructural and spread over large areas--makes assessment and response difficult
- impacts are complex and affect many people

Therefore, monitoring, planning, and mitigation difficult

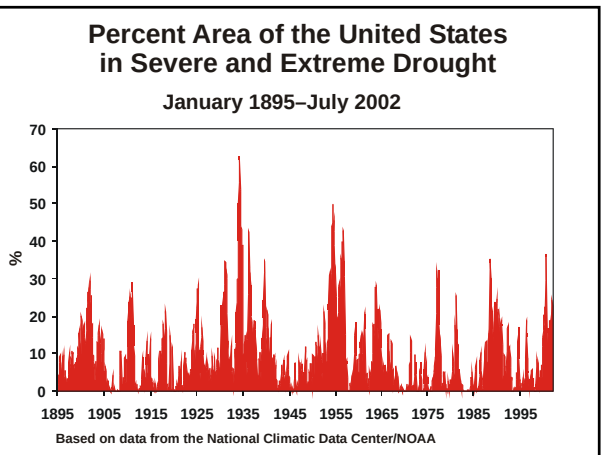
World Meteorological Organization (WMO) Perspective

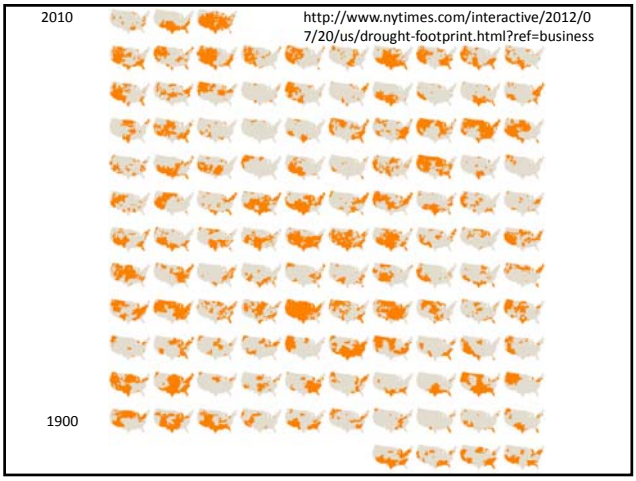


How are drought conditions monitored and studied across the United States?

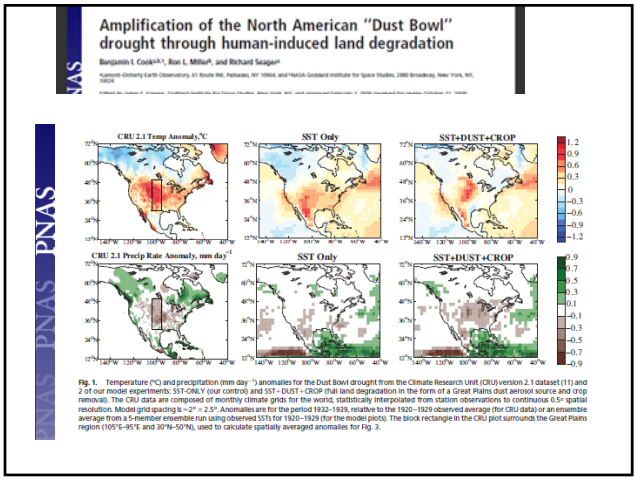
US Drought Monitor

- http://www.drought.unl.edu/dm/monitor.html





http://www.nytimes.com/interactive/2012/07/20/us/drought-footprint.html?ref=business



Current Drought Actions In Indiana

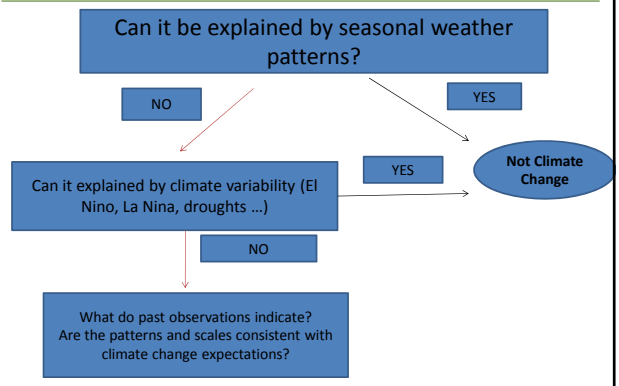
Table 1. Criteria to Identify Drought Conditions and Water Shortage Stages

Water Shortage Stages	1-Month Standardized Precipitation Index[1]	U.S. Drought Monitor[2] (Conditions)	Streamflow As Percentile Of Normal[3] (Average Streamflow)
Normal (White and Yellow)	+0.99 to -0.99	None to D0	Greater than or equal to 25
Watch (Tan)	-1.00 to -1.49	D1	10 to 24
Warning (Orange)	-1.50 to -1.99	D2	6 to 9
Emergency (Red)	-2.00 or less	D3 to D4	5 or less

[1]For the purposes of Indiana's Water Shortage Plan, a monthly SPI value is computed for each of the State's nine climatic regions. For more detail, see the Standardized Precipitation discussion.
[2]The data cutoff for Drought Monitor maps is Tuesday at 7 a.m. Eastern Standard Time. The maps,

Watch – voluntary 5% reduction (irrigation, lawn…)
Warning – 10 – 15% reduction (mostly voluntary, coordinated)
Emergency – at least 15% reduction (voluntary and enforced)

Climate Change? A two – step "test"



Definitions and Terminologies

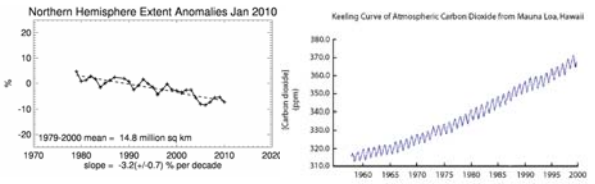
Weather & Climate

Weather refers to the atmospheric conditions at a specific time and place. This includes: temperature, humidity, rainfall, and wind.

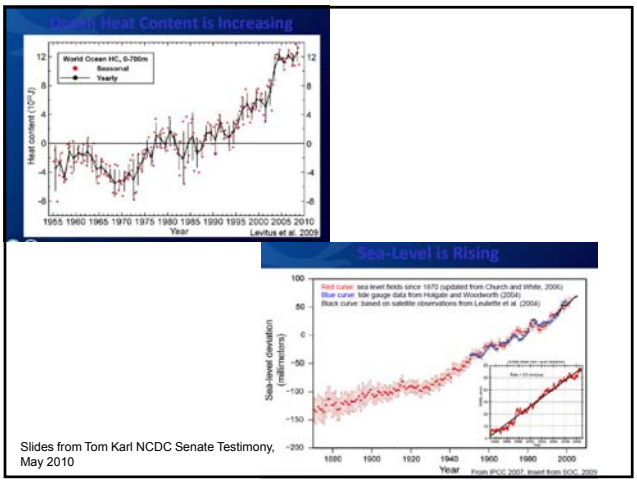
- **Climate** refers to the general weather patterns expected in some region. Often these expectation are based on 30 year or longer averages.
- Climate may also be applied more generally to large scale weather patterns in time or space, i.e. a tropical climate.

Climate Change versus Climate Variability

- Climate Change:
  Any systematic change in the state of the atmosphere (temperature, humidity, rainfall or winds) sustained over several decades or longer.



Source: National Snow Ice Data Center and http://earthguide.ucsd.edu/

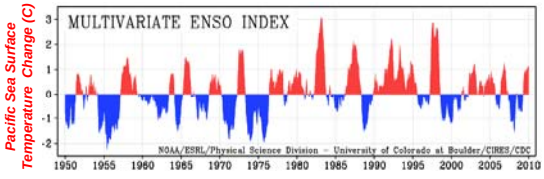


Slides from Tom Karl NCDC Senate Testimony, May 2010

Climate Variability

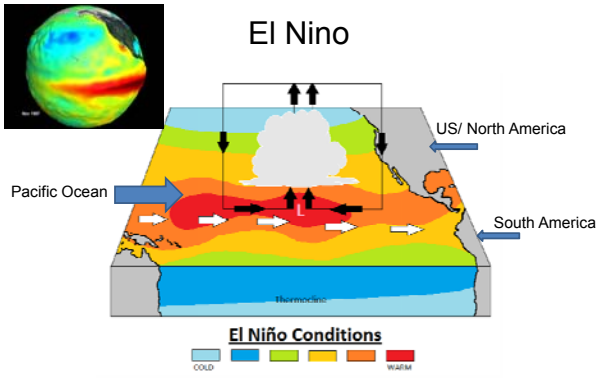
Time

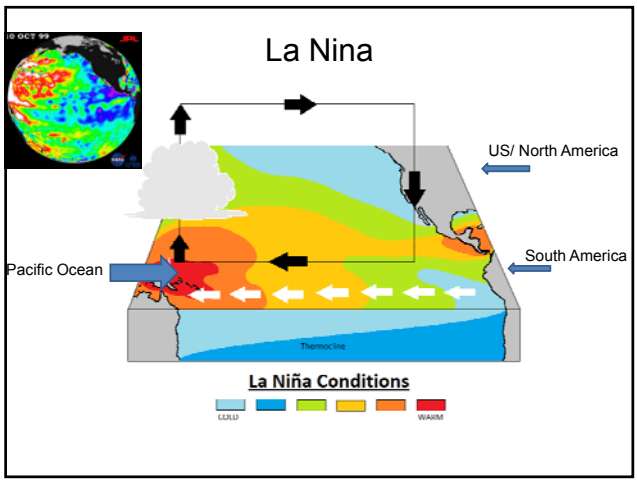
variations of the atmosphere– ocean system around a mean state (typically months and longer, often natural e.g. El Nino, La Nina, Arctic Oscillations, North Atlantic Oscillations etc).

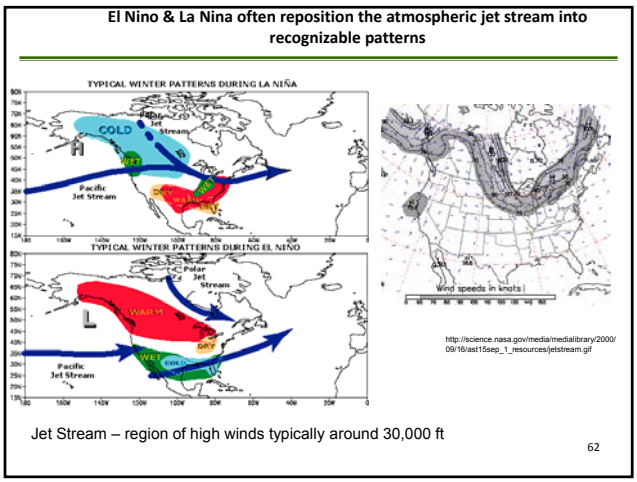


Variability in Pacific Sea Surface Temperature from 1950.

If the SSTs in the region rise 0.5°C above normal for five consecutive three-month seasons then the event is considered an El Niño. If they fall 0.5°C or more below normal then it is classified as a La Niña.





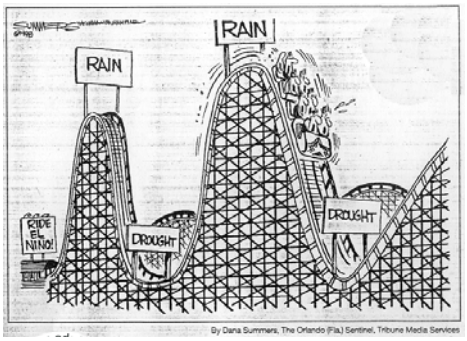


Effects of El Nino/ La Nina on Indiana Temperatures

Month	El Nino	La Nina
Jan	Warmer	Warmer
Feb	Cooler	–
Mar	Cooler	cooler
Apr	–	–
May	–	–
Jun	Warmer	warmer
Jul	Cooler	warmer
Aug	Warmer	warmer
Sep	–	–
Oct	–	warmer
Nov	Warmer	–
Dec	cooler	–

Effects of El Nino / La Nina on Indiana Precipitation

Month	El Nino	La Nina
Jan	Drier	Drier
Feb	Wetter	Wetter
Mar	Wetter	Wetter
Apr	Drier	Drier
May	–	Drier
Jun	Drier	Drier
Jul	Wetter	Drier
Aug	–	–
Sep		Drier
Oct	–	Drier
Nov	Wetter	
Dec	drier	Drier



What to expect for the future

- Change is coming (already here)
- Shifts in "seasonal climatology"
- More extremes is the new normal
- Higher Variability -→ Change?
- Expect to have higher risks/ vulnerability
- Need to have adaptive, mitigative strategies in place for increasing resilience.
- Climate can be the "ace" if used wisely with good decision making.