

# Managing Drought Risk in a Changing Climate: *The Role of National Drought Policy*

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*National Drought Management Policy Workshop, Hanoi, Vietnam, 6-9 May 2014*

# Presentation Outline

- The **MANY FACES OF DROUGHT**
  - Drought as hazard, characteristics, definition
- Breaking the **HYDRO-ILLOGICAL CYCLE**
  - Crisis management → Risk management
- Our **CHANGING CLIMATE—CHANGING VULNERABILITY**
- Building **SOCIETAL RESILIENCE --**  
**What are the 'pillars' for change?**
  - Drought monitoring and prediction, early warning/information systems
  - Vulnerability/risk and impact assessment
  - Mitigation AND response measures
- Moving towards a **POLICY FRAMEWORK** that enhances preparedness and risk reduction

# Two Phrases to Remember

- If you do what you've always done, you'll get what you've always got!
- Who and what is at risk and why?

# The Many Faces of Drought

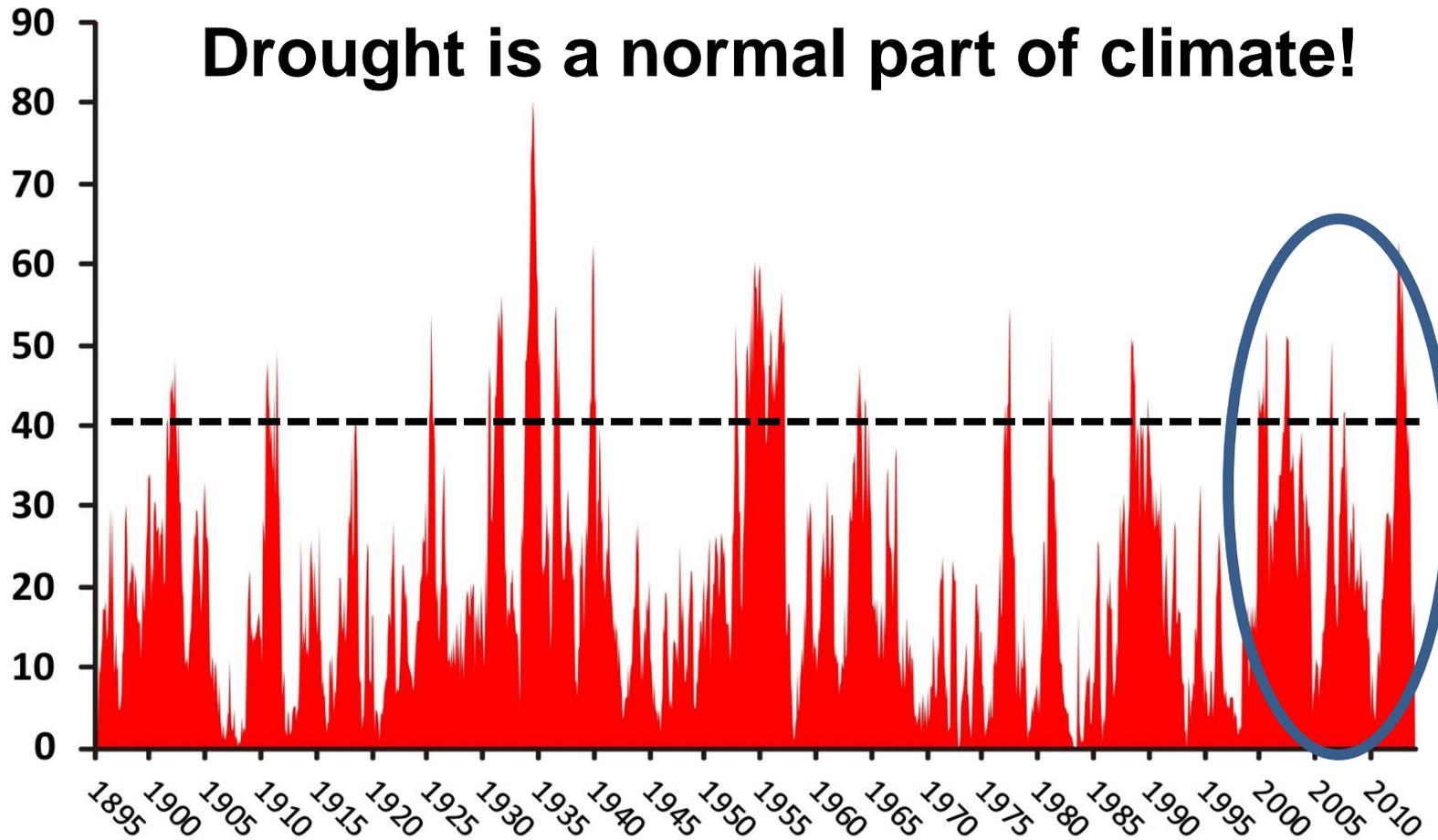


# Physical Exposure to Drought in the Asia/Pacific Region



# Percent Area of the United States in Moderate to Extreme Drought

January 1895–December 2013



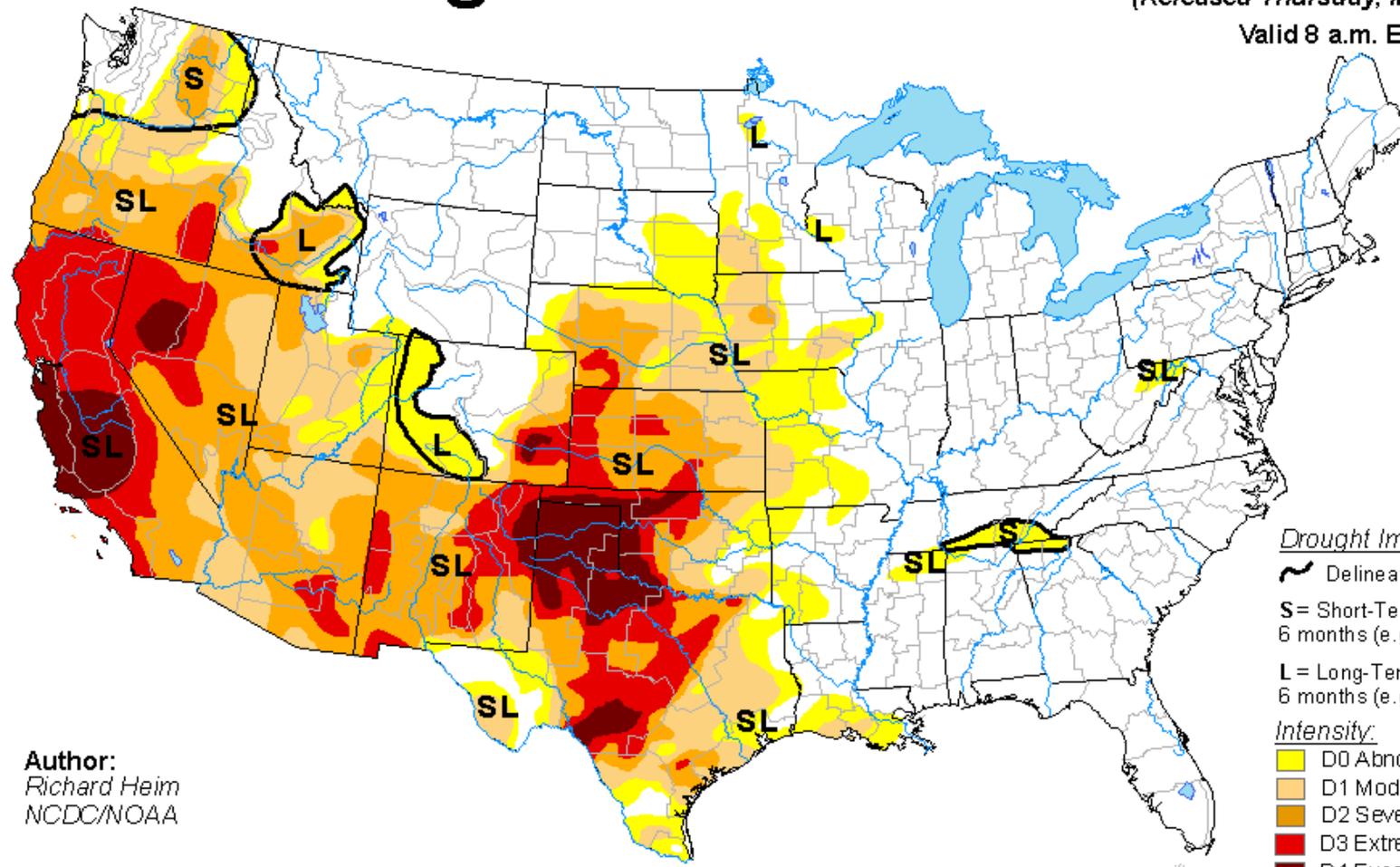
Based on data from the National Climatic Data Center/NOAA

# U.S. Drought Monitor

April 29, 2014

(Released Thursday, May 1, 2014)

Valid 8 a.m. EDT



Author:  
Richard Heim  
NCDC/NOAA

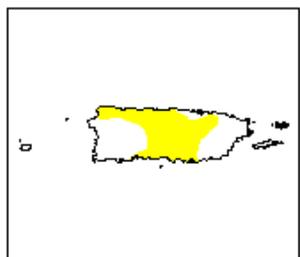
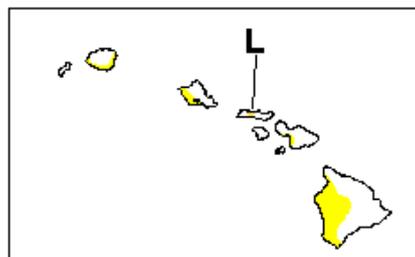
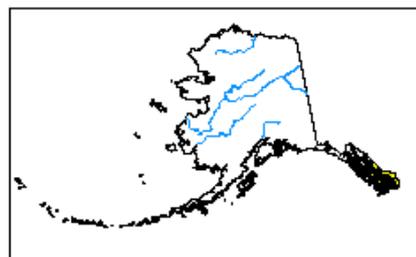
### Drought Impact Types:

- ~ Delineates dominant impacts
- S= Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L= Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

### Intensity:

- Yellow: D0 Abnormally Dry
- Light Orange: D1 Moderate Drought
- Orange: D2 Severe Drought
- Red: D3 Extreme Drought
- Dark Red: D4 Exceptional Drought

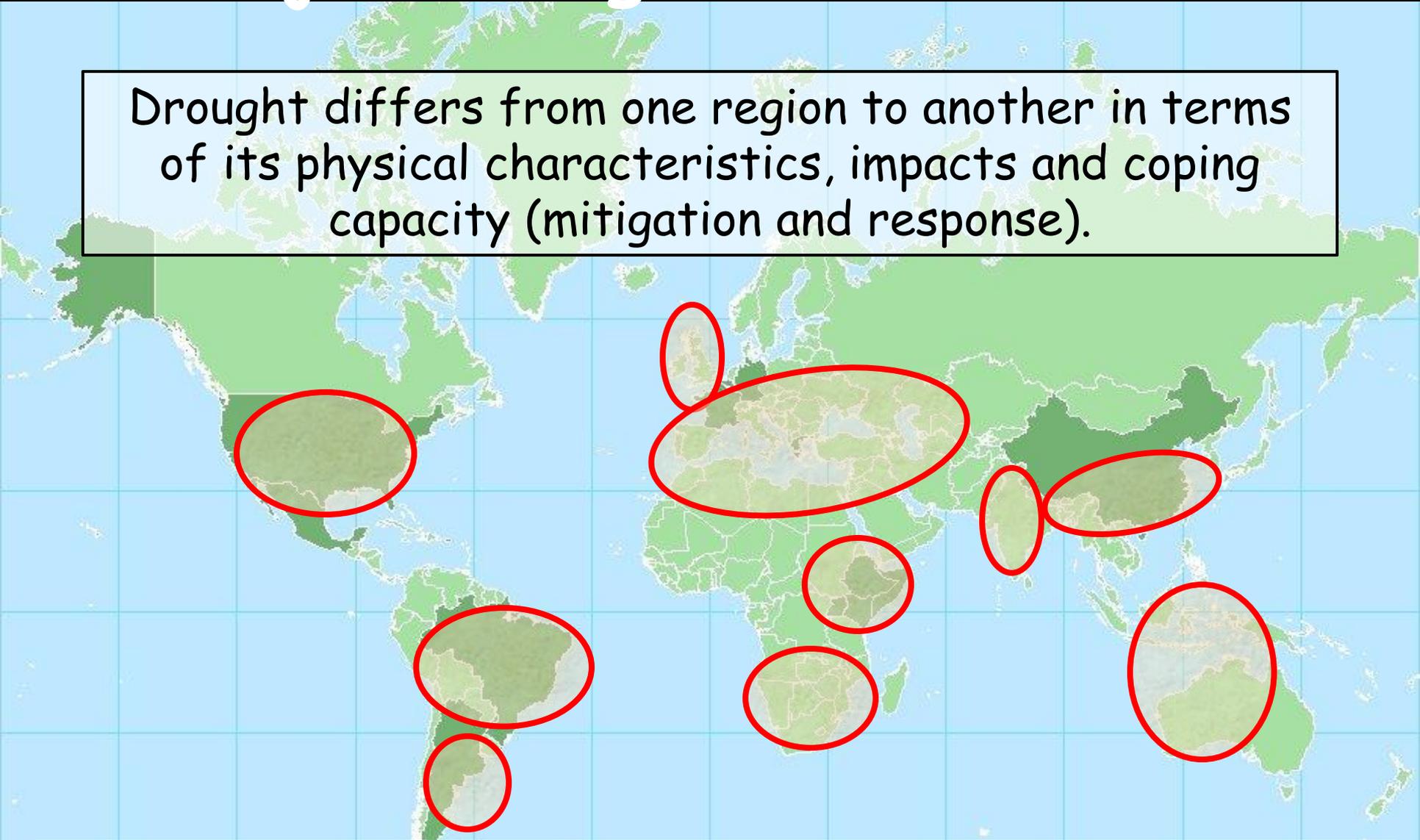
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.



<http://droughtmonitor.unl.edu/>

# Major Drought Areas—2012

Drought differs from one region to another in terms of its physical characteristics, impacts and coping capacity (mitigation and response).



Drought policies cannot be **prescriptive** since each country is unique in institutional structure, legal framework, etc.

# Defining Drought

-Hundreds of definitions—application and region specific

Drought is a deficiency of **precipitation** (intensity) from expected or “normal” that extends over a season or longer period of time (**duration**) . . . . .

## Meteorological Drought

and is insufficient to meet the demands of human activities and the environment (**impacts**).



**Agricultural,  
Hydrological and  
Socio-economic  
Drought**



**It's behind me...**

**Isn't it..?**

**Drought— it sneaks up on you!**

# Droughts differ in terms of:

- **INTENSITY**
- **Duration**
- **Spatial Extent**

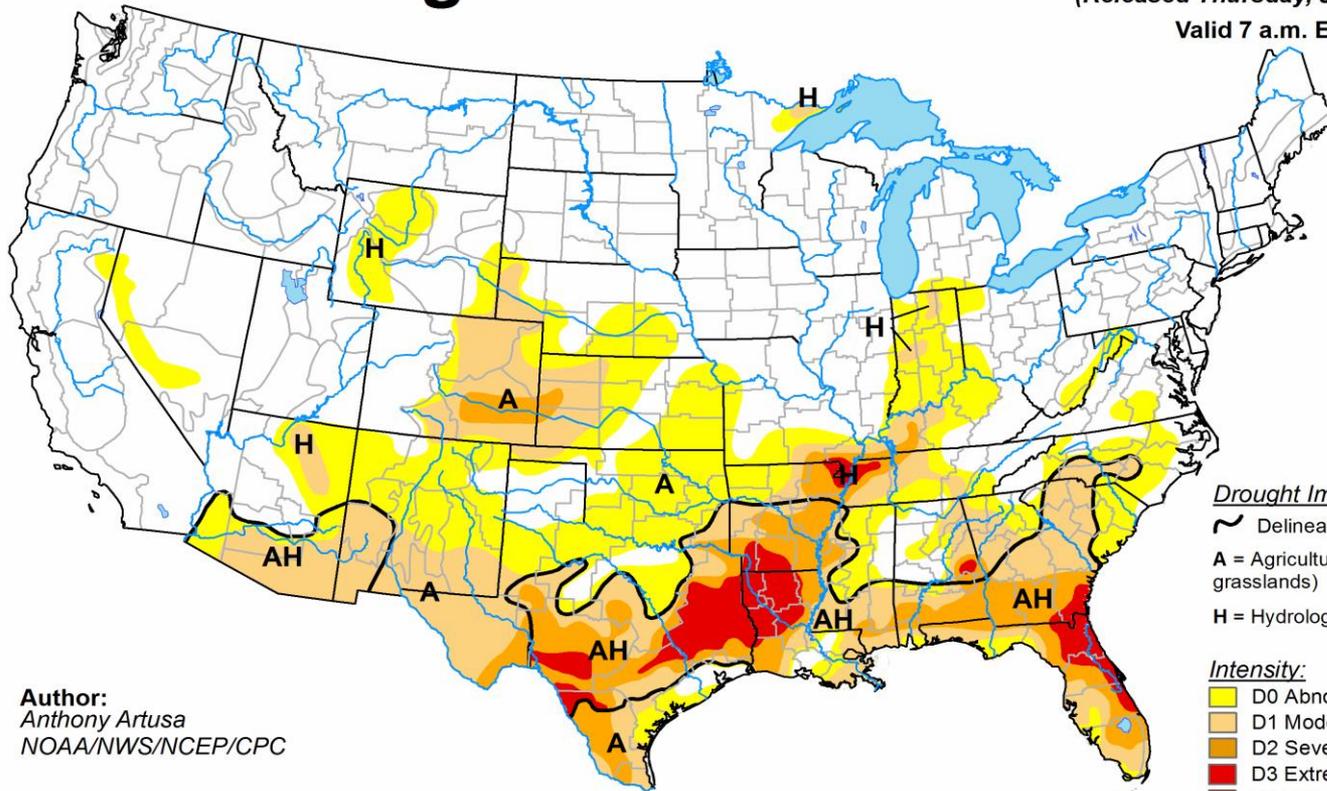
As with other natural hazards,  
each drought event is unique in its characteristics.

# USDM Animation

## January 2011 to March 2014

### U.S. Drought Monitor

January 4, 2011  
(Released Thursday, Jan. 6, 2011)  
Valid 7 a.m. EST



#### Drought Impact Types:

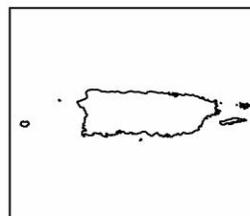
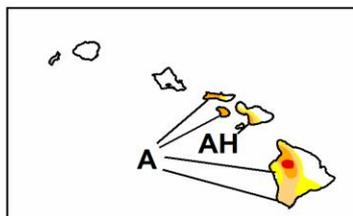
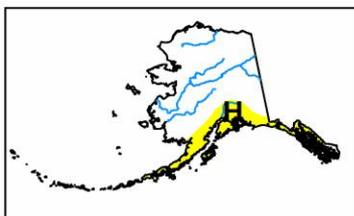
- ~ Delineates dominant impacts
- A = Agricultural (crops, pastures, grasslands)
- H = Hydrological (water)

#### Intensity:

- Yellow D0 Abnormally Dry
- Light Orange D1 Moderate Drought
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- Red D3 Extreme Drought
- Dark Red D4 Exceptional Drought

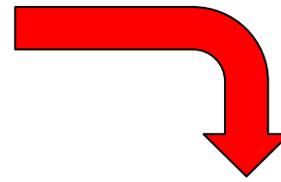
Author:  
Anthony Artusa  
NOAA/NWS/NCEP/CPC

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.



<http://droughtmonitor.unl.edu/>

# Standard Rain gauge



# New U.S. Rain gauge



# The Climate Change Challenge for Drought Management

- Increasing mean temperature
- High temp. stress and heat waves/longer

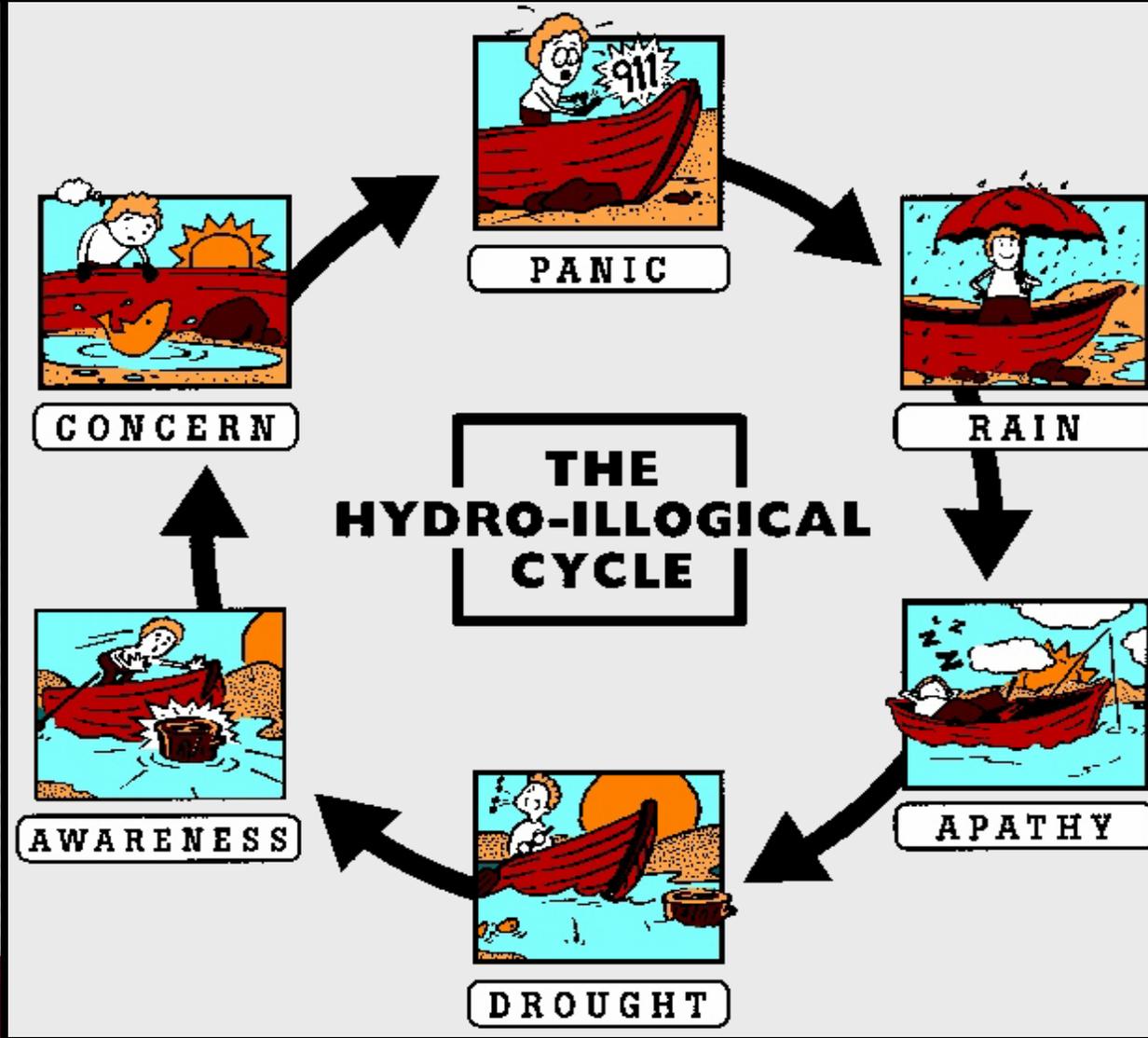
**Will droughts increase in frequency, intensity and duration?**

distribution and intensity

- Reduced soil moisture
- Changes in groundwater recharge
- Reduced runoff/stream flow resulting from reduced snowpack/sublimation

# Breaking the Hydro-illogical Cycle:

An Institutional Challenge for Drought Management



Crisis Management

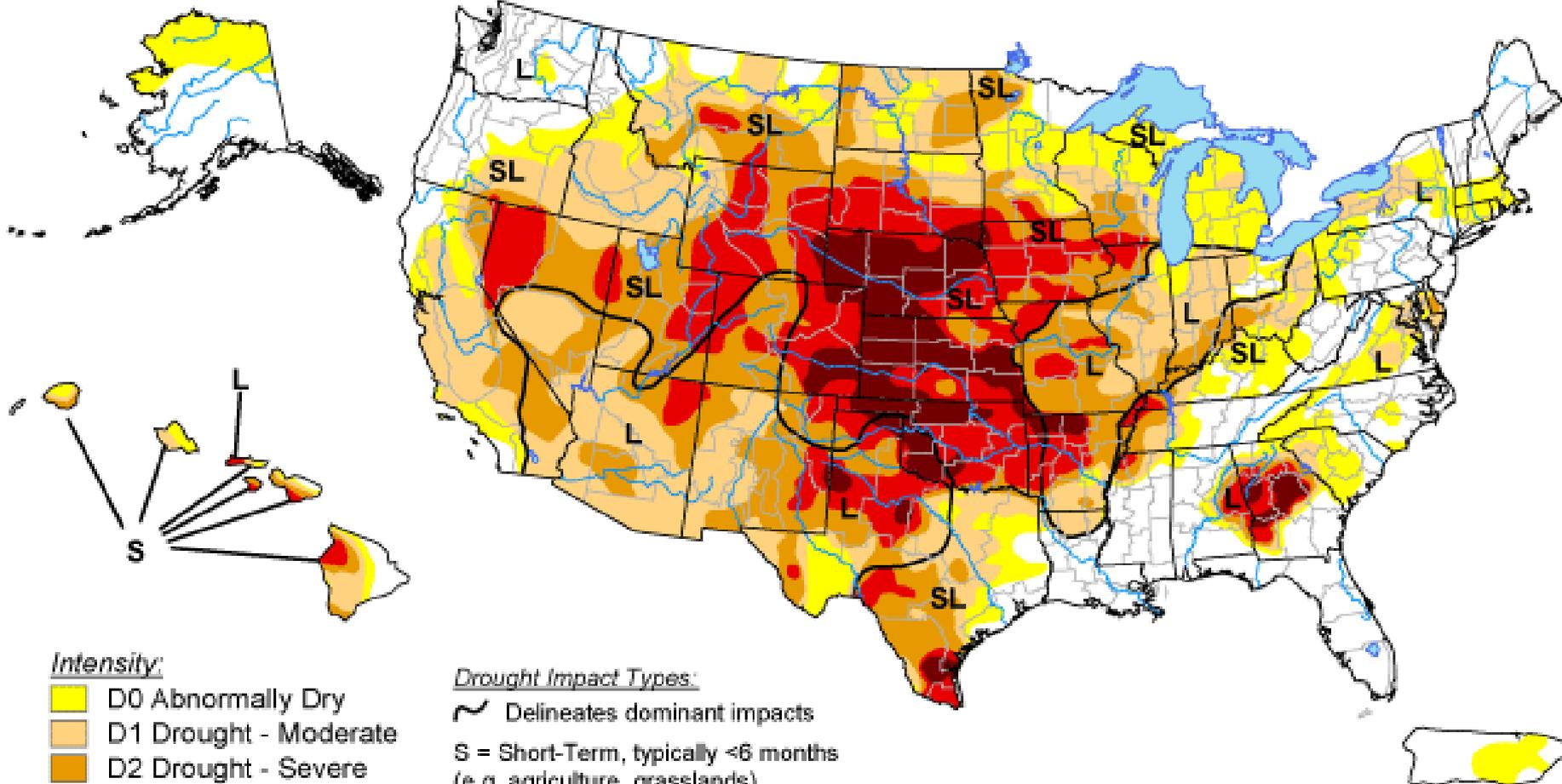
If you do what you've always done, you'll get what you've always got.

We **MUST** adopt a new paradigm for drought management!

# U.S. Drought Monitor

September 11, 2012

Valid 7 a.m. EDT



## Intensity:

-  D0 Abnormally Dry
-  D1 Drought - Moderate
-  D2 Drought - Severe
-  D3 Drought - Extreme
-  D4 Drought - Exceptional

## Drought Impact Types:

-  Delineates dominant impacts
- S = Short-Term, typically <6 months  
(e.g. agriculture, grasslands)
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<http://droughtmonitor.unl.edu/>



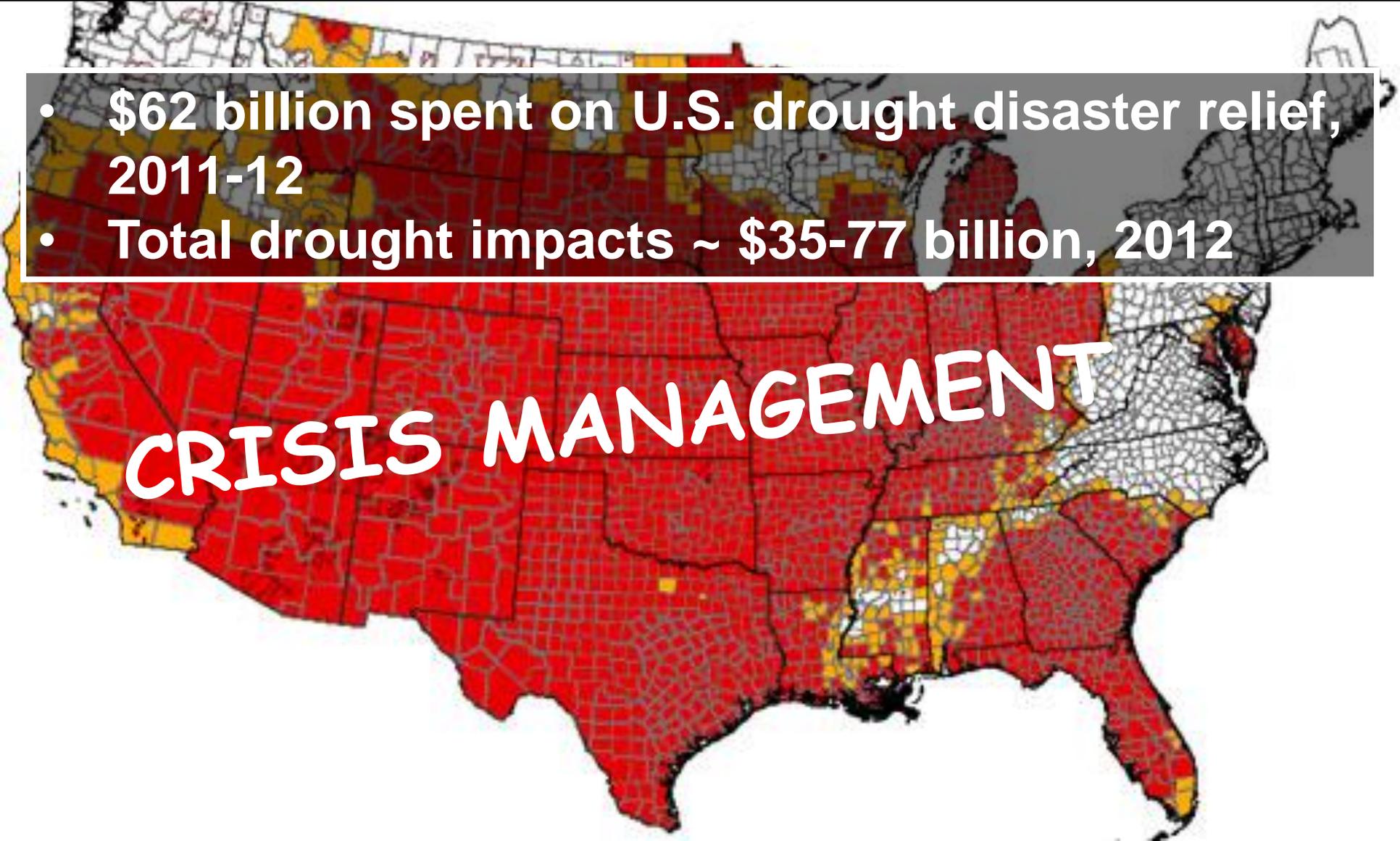
Released Thursday, September 13, 2012

Author: David Simeral, Western Regional Climate Center

# Drought Disaster Designations

October 10, 2012

- \$62 billion spent on U.S. drought disaster relief, 2011-12
- Total drought impacts ~ \$35-77 billion, 2012



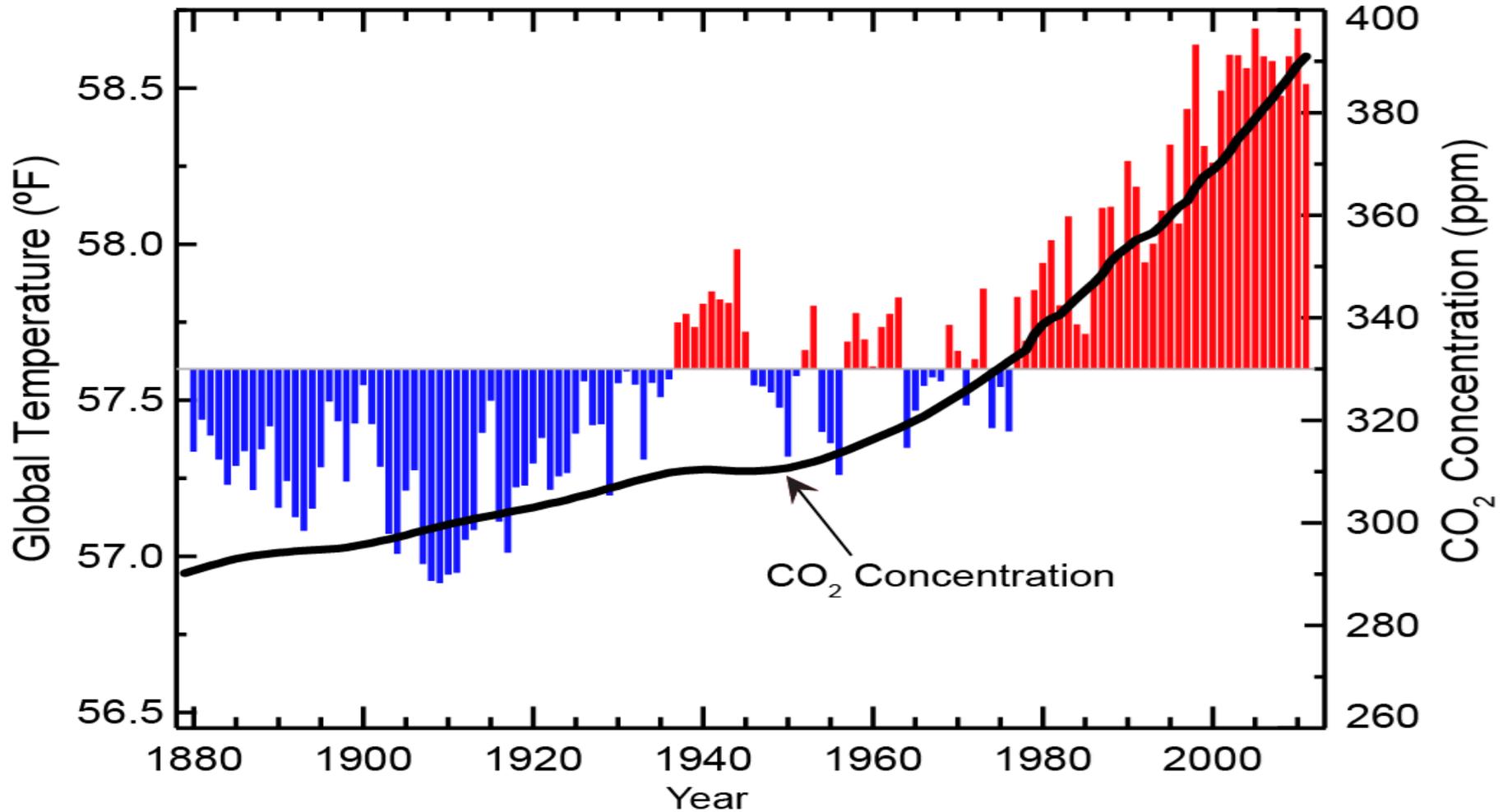
**CRISIS MANAGEMENT**

# Incentives for Changing the Paradigm

- Addresses spiraling impacts → multiple sectors
- Reduces conflicts between water users
- Promotes wise stewardship of natural resources—sustainable development
- Reduces need for governmental assistance—allows for resources to be invested more wisely
- Supports climate change adaptation and mitigation action plans and disaster risk management plans

# Our Changing Climate

## Global Temperature and Carbon Dioxide



There is a close correlation between CO<sub>2</sub> and temperature that has been verified through many lines of research . This graph shows the relationship of temperature and CO<sub>2</sub> over the last 130 years.

# Natural Catastrophes Worldwide 1980-2012

Number

500

400

300

200

100

1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012



Source: Munich Re

# Changes in Societal Vulnerability

Drought impacts are more complex today as more economic sectors are affected, creating more conflicts between water users, i.e., *societal vulnerability is dramatically different and changing.*

- Agricultural production
- Food security
- Energy
- Transportation
- Tourism/Recreation
- Forest/rangeland fires
- Municipal water
- Water quality/quantity
- Environment
- Ecosystem services
- Health



# Needed Actions for Change: Reducing Societal Vulnerability

- Improve **drought awareness**
- Develop/improve monitoring, seasonal forecasts, early warning and **information delivery** systems
- Improve **decision support** tools
- Complete **risk assessments** of vulnerable sectors, population groups, regions
- Improve understanding and quantification of **drought impacts vs. mitigation costs**
- Develop and implement **drought preparedness plans**
- Create **national drought policies** based on the principles of risk reduction

**Building Societal  
Resilience  
through National  
Drought Policies  
and Preparedness  
Plans: The Way  
Forward**



# Types of Policy Responses

- Post-impact government interventions—relief measures (i.e., **crisis management**)
- Pre-impact government programs—mitigation measures to reduce vulnerability and impacts, including insurance programs
- Risk-based drought policies and preparedness plans, organizational frameworks and operational arrangements



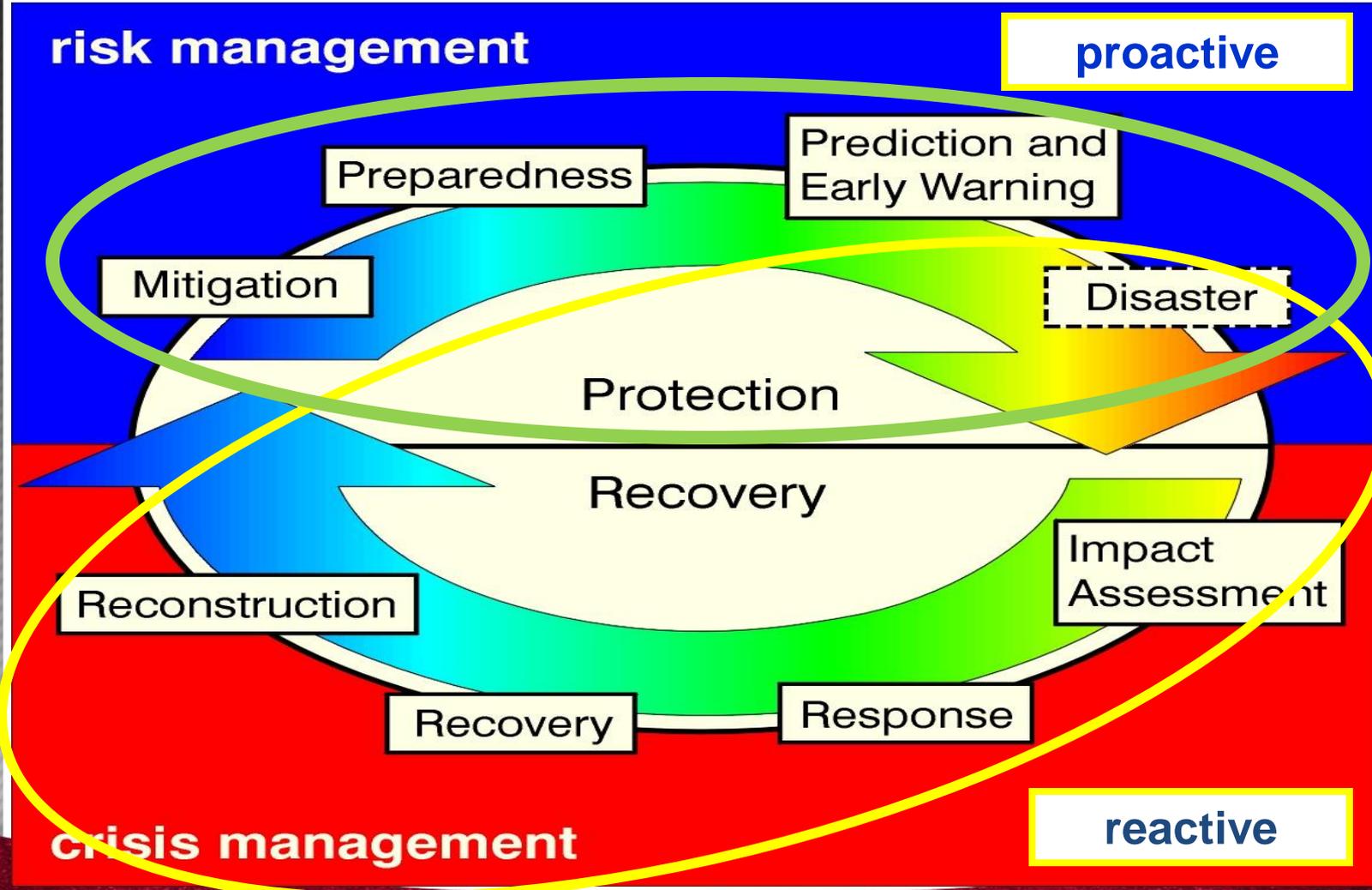
**Emergency response has a place in drought risk management, but it can also lead to:**

- greater vulnerability/decreased resilience to future drought events**
- increased reliance on government and donor interventions.**



# The Cycle of Disaster Management

Risk management increases coping capacity, builds resilience.



Crisis management treats the symptoms, not the causes.

# Hazard x Vulnerability = Risk

## EXPOSURE

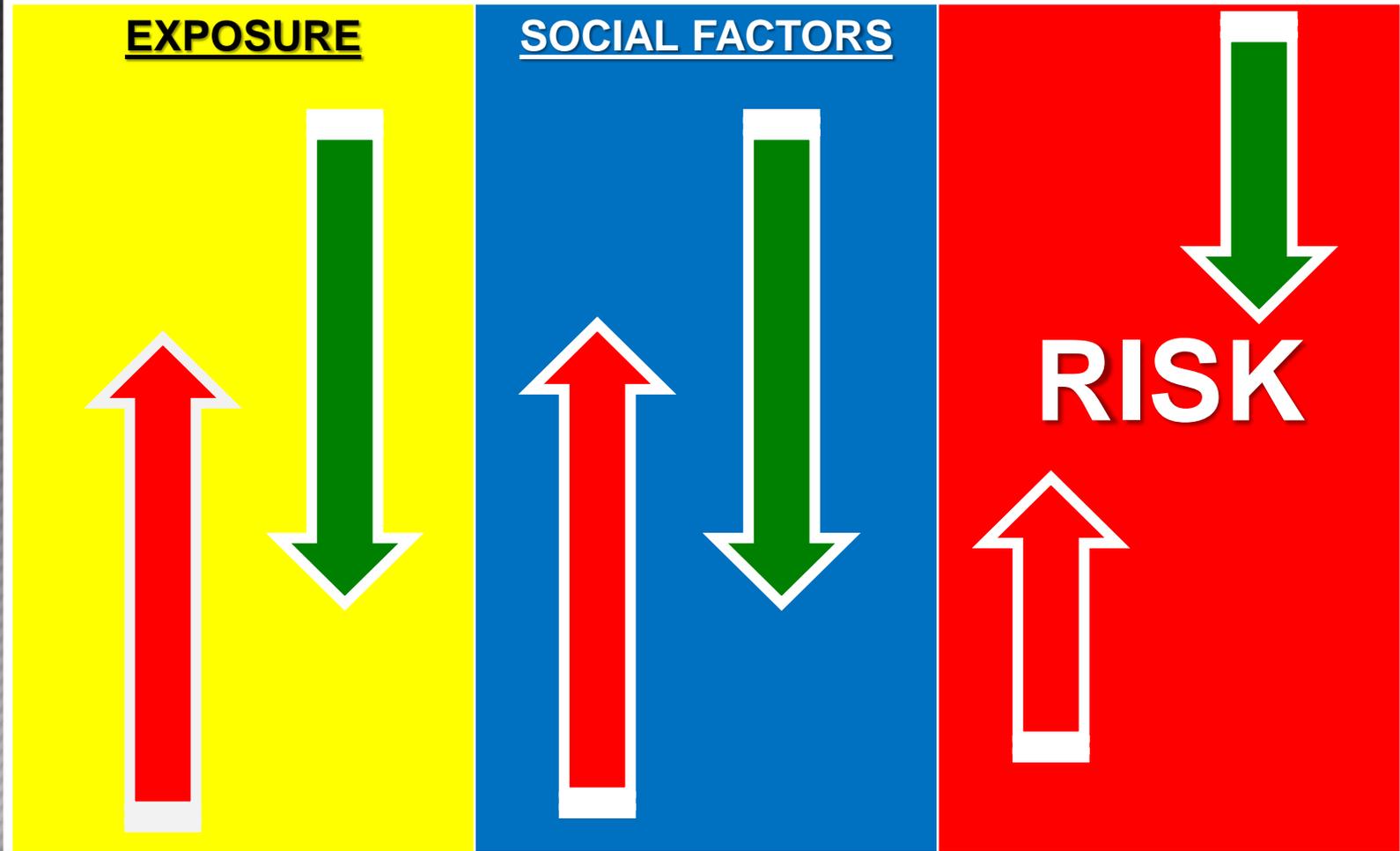
- **Severity/Magnitude**
  - Intensity/Duration
- **Frequency**
- **Spatial extent**
- **Trends**
  - Historical
  - Future
- **Impacts**
- **Early warning**

## SOCIAL FACTORS

- **Population growth**
- **Population shifts**
- **Urbanization**
- **Technology**
- **Land use changes**
- **Environmental degradation**
- **Water use trends**
- **Government policies**
- **Environmental awareness**

**RISK**

# Hazard **x** Vulnerability = Risk





National Drought Policy

Preparedness Plans based  
on the principles of risk  
reduction

How do we prepare for and mitigate the impacts of drought?

Why have nations made so little progress on drought policy and preparedness?

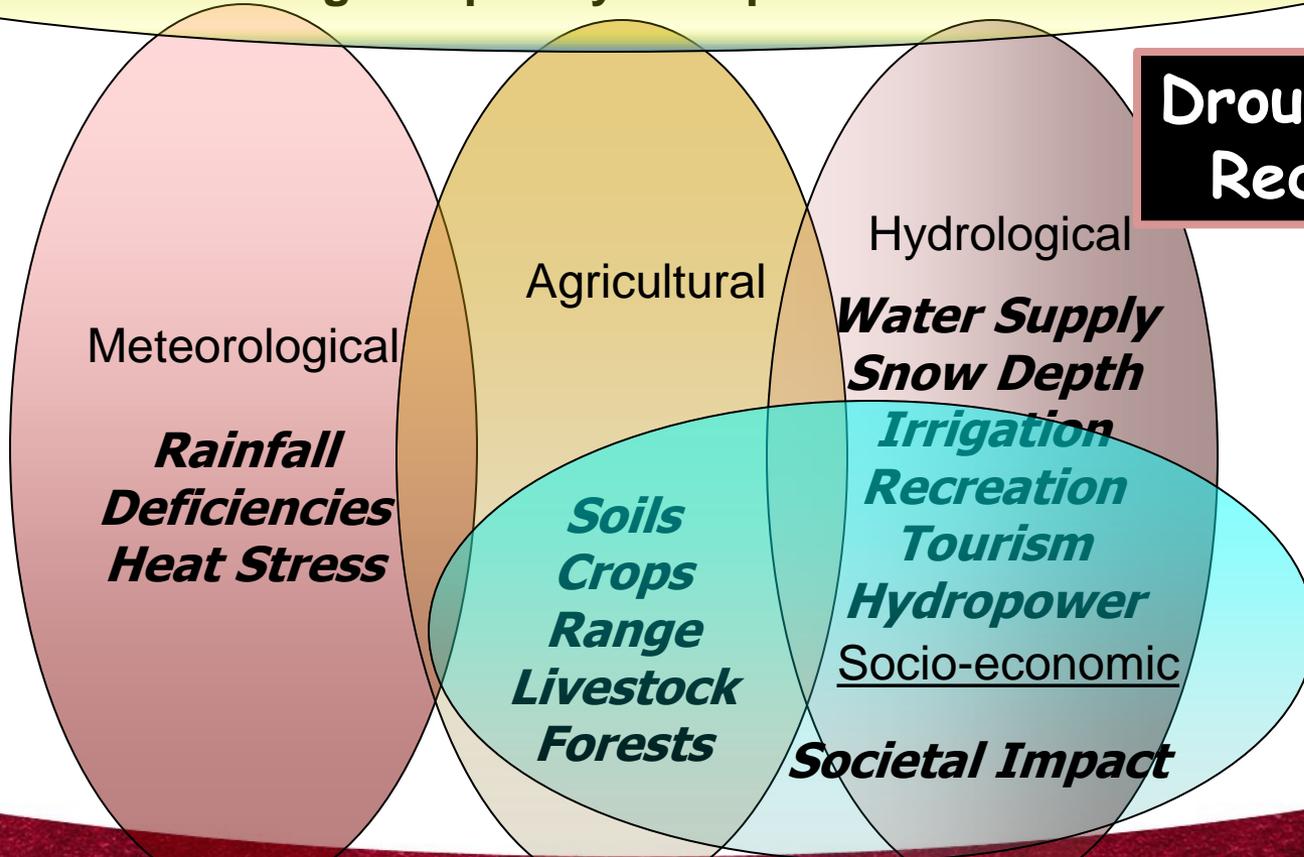
# Natural and Social Dimensions of Drought

Decreasing emphasis on the natural event (precipitation deficiencies)

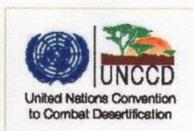
Increasing emphasis on water/natural resource management & policy

Increasing complexity of impacts and conflicts

**Drought Risk  
Reduction**



Time/Duration of the event



# HIGH-LEVEL MEETING ON NATIONAL DROUGHT POLICY

(HMNDP)  
TOWARDS MORE DROUGHT RESILIENT SOCIETIES

11-15 March 2013  
CICG, Geneva

**Final Report**



# A drought policy should be broadly stated and . . .

- Establish a clear set of risk-based principles or guidelines to govern drought management.
- Policy could be part of a disaster risk reduction or climate change adaptation framework
- Consistent and equitable for all regions, population groups, and economic/social sectors.
- Consistent with the goals of sustainable development.
- Reflect regional differences in drought characteristics, vulnerability and impacts.

# A drought policy should

(continued)

- Promote the principles of risk management by encouraging development of
  - **Early warning and delivery systems**;
    - Reliable seasonal forecasts;
  - **Preparedness plans** at all levels of government, within river basins, and the private sector;
  - **Vulnerability assessments** —who and what is at risk and why.
  - **Mitigation actions** that reduce drought impacts and the need for government intervention;
  - **Coordinated emergency response** that ensures targeted and timely relief, consistent with drought policy goals, during drought emergencies.

# Key Elements/Pillars of a Drought Preparedness Plan

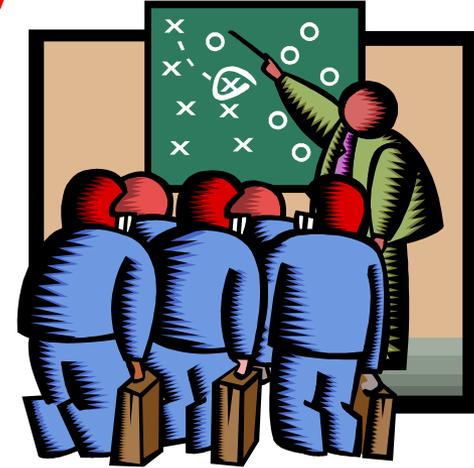
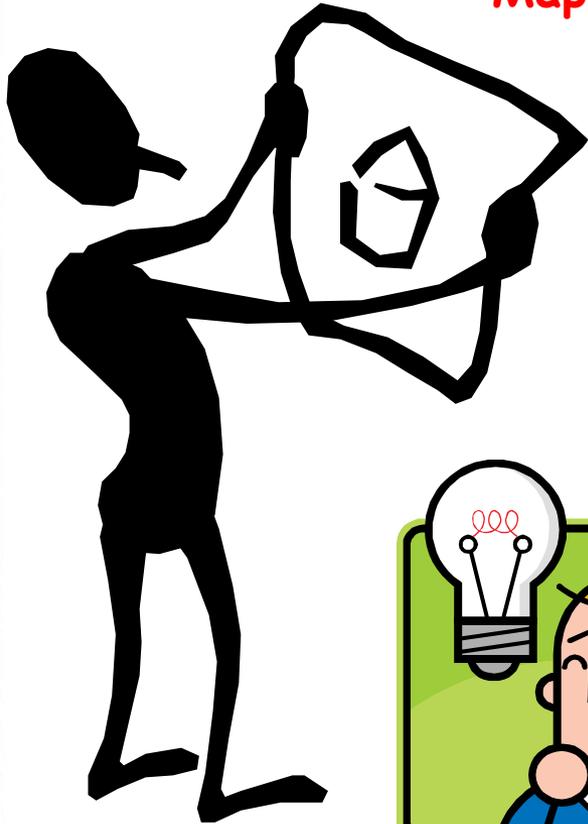
- **Monitoring/early warning, prediction and information delivery systems**
  - Integrated monitoring of key indicators
    - Precipitation, temperature, soil moisture, streamflow, snowpack, groundwater, etc.
  - Use of appropriate indices
  - Reliable seasonal forecasts
  - Development/delivery of information and decision-support tools

# Key Elements/Pillars of a Drought Preparedness Plan

- **Risk and impact assessment**
  - Conduct of risk/vulnerability assessments
  - Monitoring/archiving of impacts/losses
- **Mitigation and response**
  - Proactive measures to increase coping capacity
  - Response measures that support the principles of drought risk reduction

# Where do we start?

Mapping out a strategy!



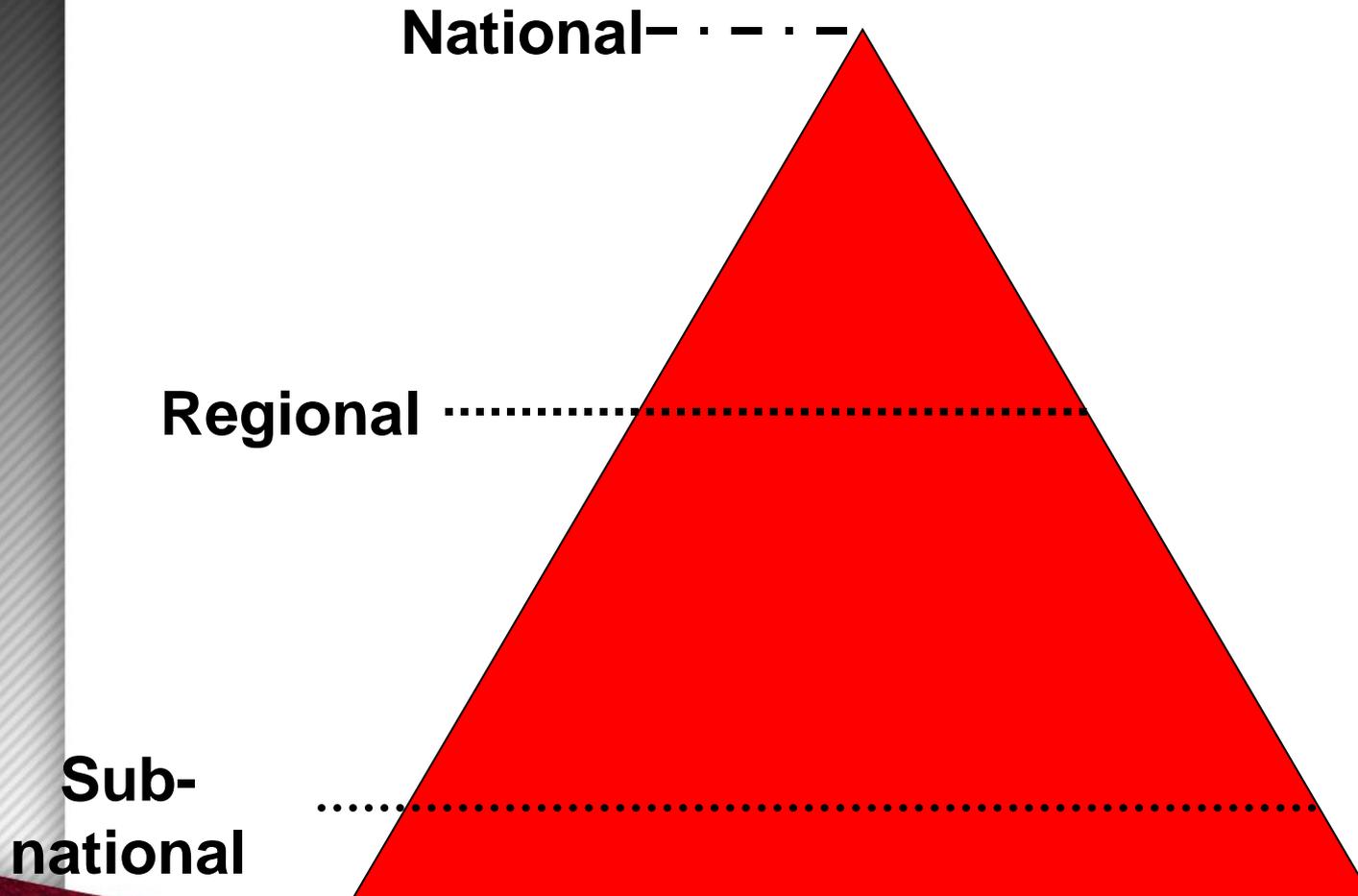
Leadership!



Financial Resources Required?  
Cost?

# The process for RISK-BASED DROUGHT MANAGEMENT POLICY & PLANNING

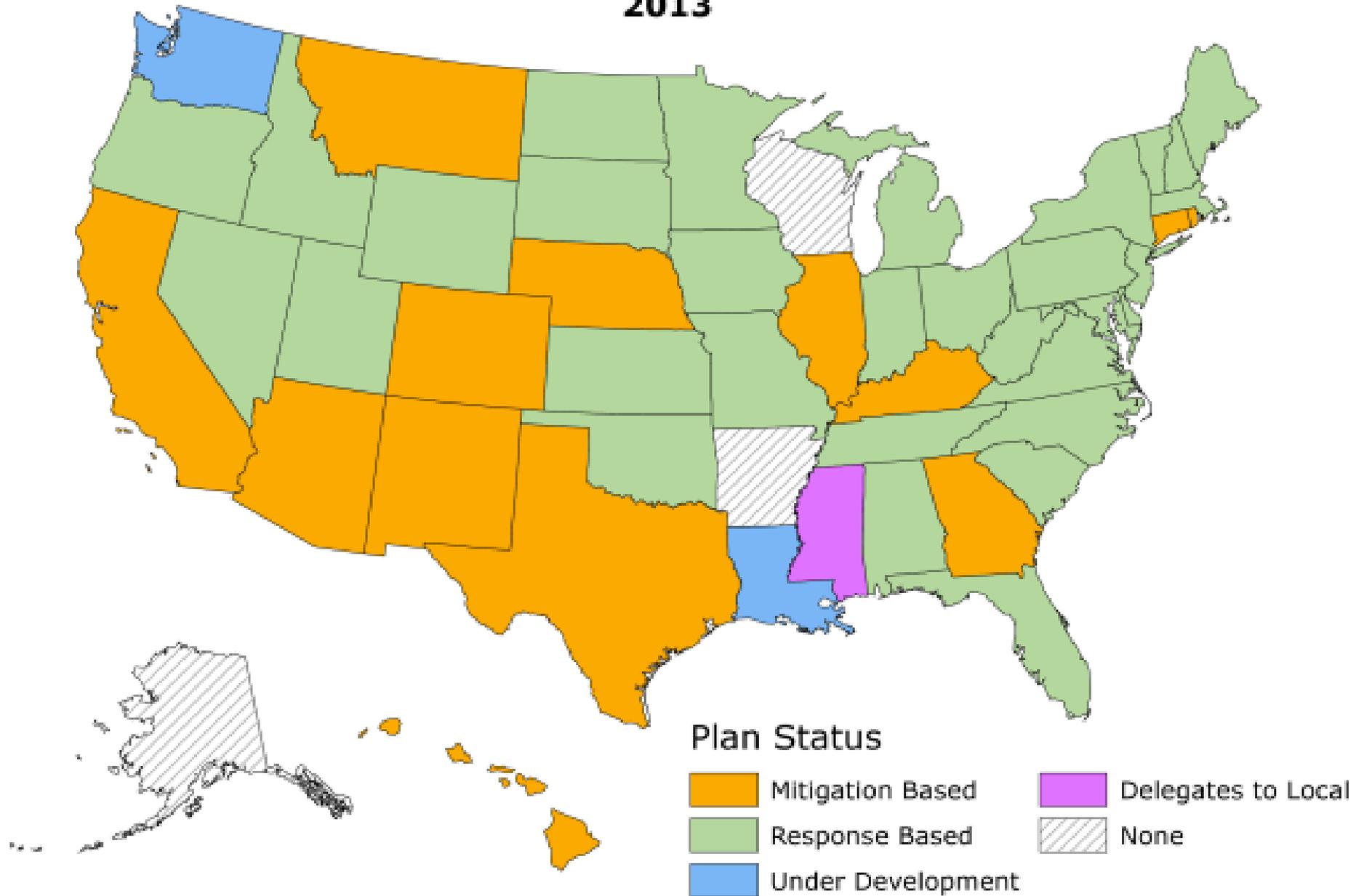
was from the TOP DOWN in Australia!



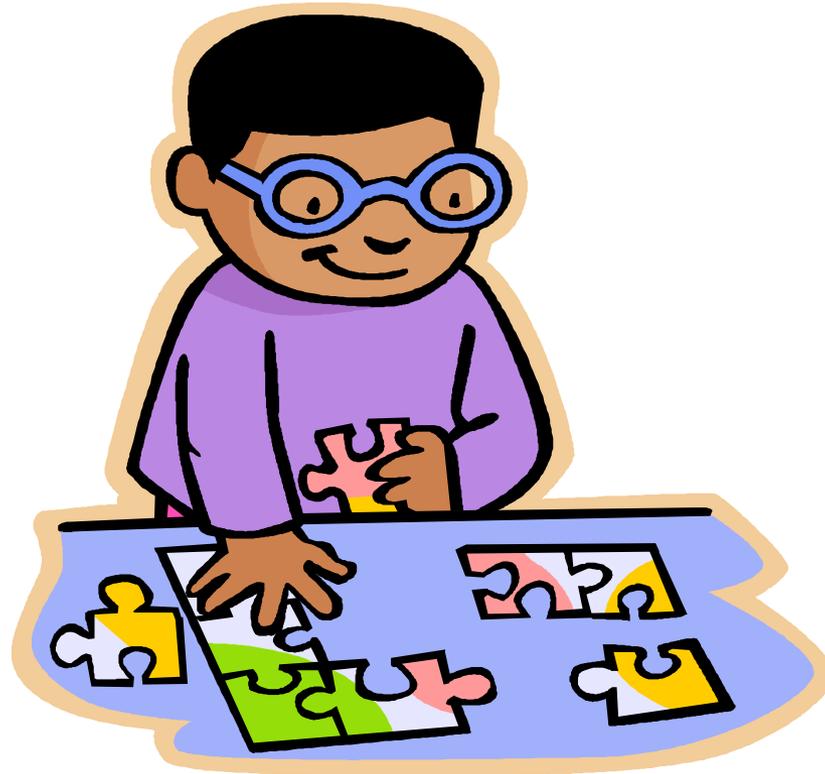
has been from the BOTTOM UP in the U.S.!

# Status of State Drought Plans

2013



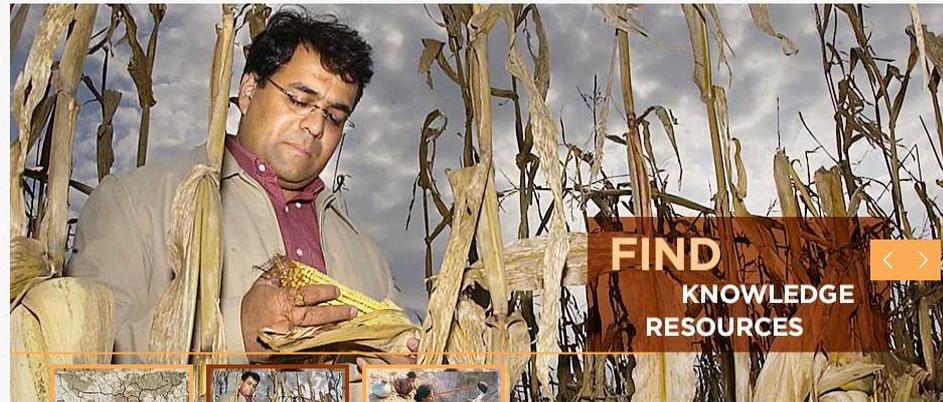
Building an effective **national drought management policy and supporting preparedness plans** is like assembling the pieces of a puzzle.

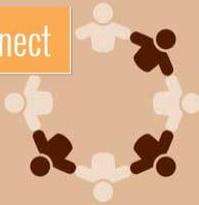


We must include all relevant agencies/ministries, stakeholder groups, sectors, and regions in the policy and planning process. We do not see the full picture until all pieces are in place.

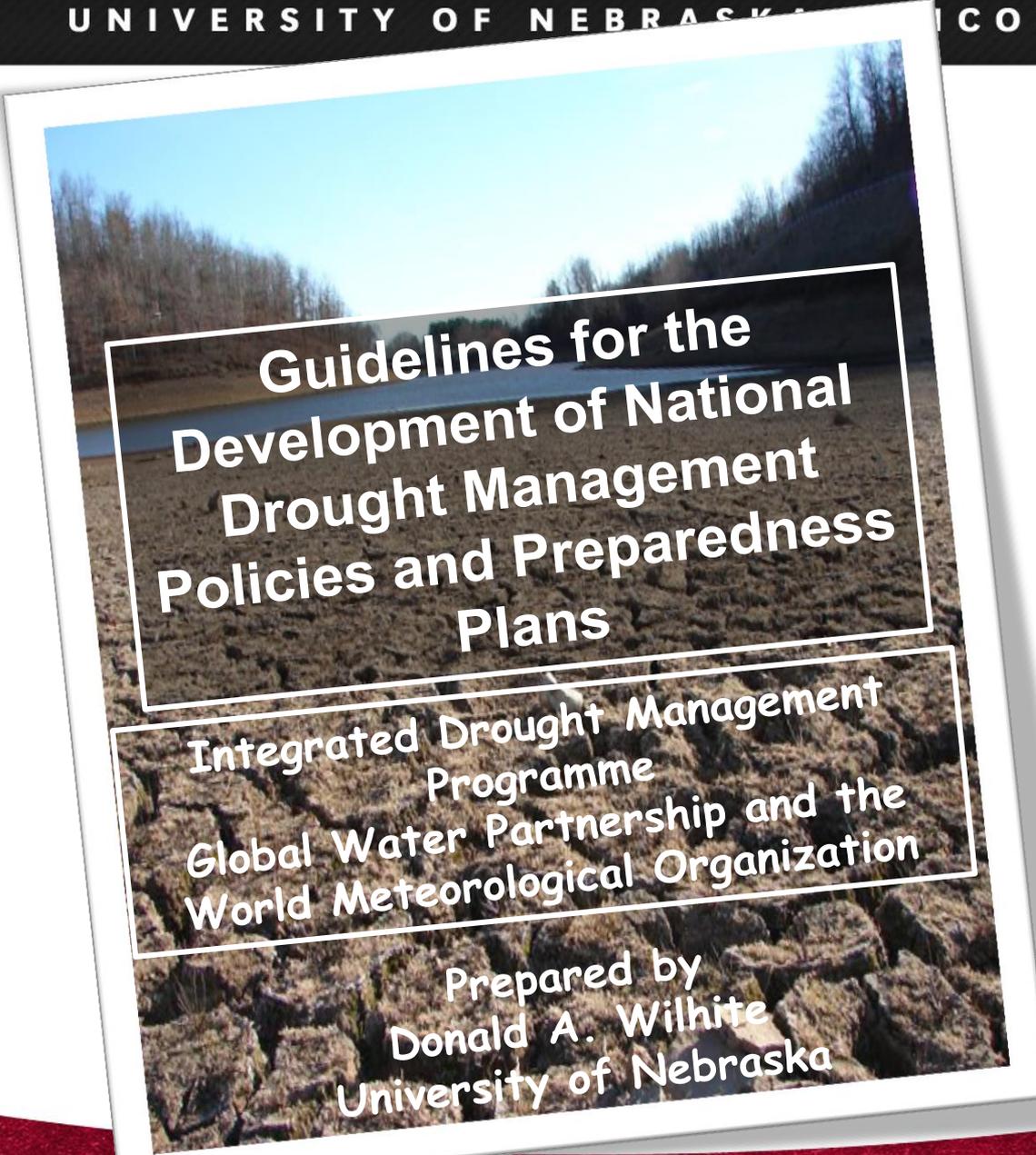


## Integrated Drought Management Programme (IDMP)



<p>About</p> 	<p>Find</p> 	<p>Connect</p> 
<p>Find out more about the Integrated Drought Management Programme (IDMP)</p> 	<p>Find knowledge resources on integrated drought management</p> 	<p>Learn about the activities of IDMP and connect to them</p> 

The IDMP works with a wide range of partners with the objective of supporting stakeholders at all levels by providing them with policy and management guidance through globally coordinated generation of scientific information and sharing best practices and knowledge for integrated drought management. The IDMP is a contribution to the *Global Framework for Climate Services (GFCS)* especially with regards to GFCS priority areas of disaster risk reduction, water, agriculture and food security. It especially seeks to support regions and countries to develop more proactive drought policies and better predictive mechanisms and these guidelines are a contribution to this end.

The image shows the cover of a report. The background is a photograph of a dry, cracked landscape with a line of trees in the distance under a clear blue sky. The text is overlaid on this image in white, bold, sans-serif font. The title is in the largest font, followed by the subtitle and the author's name in smaller fonts. The entire cover is tilted slightly to the right.

**Guidelines for the  
Development of National  
Drought Management  
Policies and Preparedness  
Plans**

**Integrated Drought Management  
Programme  
Global Water Partnership and the  
World Meteorological Organization**

**Prepared by  
Donald A. Wilhite  
University of Nebraska**

# National Drought Policy: A 10-Step Process

## Step 1

**Appoint** a national drought policy commission

## Step 2

**State or define** the goals and objectives of a risk-based national drought management policy

## Step 3

**Seek** stakeholder participation and **define/resolve** conflicts between key water use sectors, considering transboundary implications.

## Step 4

**Inventory** data and financial resources available and **identify** groups at risk

## Step 5

**Prepare/write** the key tenets of a national drought management policy and preparedness plans  
*(monitoring, early warning and prediction; risk and impact assessment; mitigation and response)*

# *Risk Assessment: Purpose*

- 
- To identify those sectors, population groups, or regions most at risk from drought, most probable impacts, and mitigation actions that will reduce impacts to future events.



**Who and what is at risk and why.**

**Vulnerability Profile**

# National Drought Policy: A 10-Step Process

(continued)

## Step 6

**Identify** research needs and **fill** institutional gaps

## Step 7

**Integrate** science and policy aspects of drought management

## Step 8

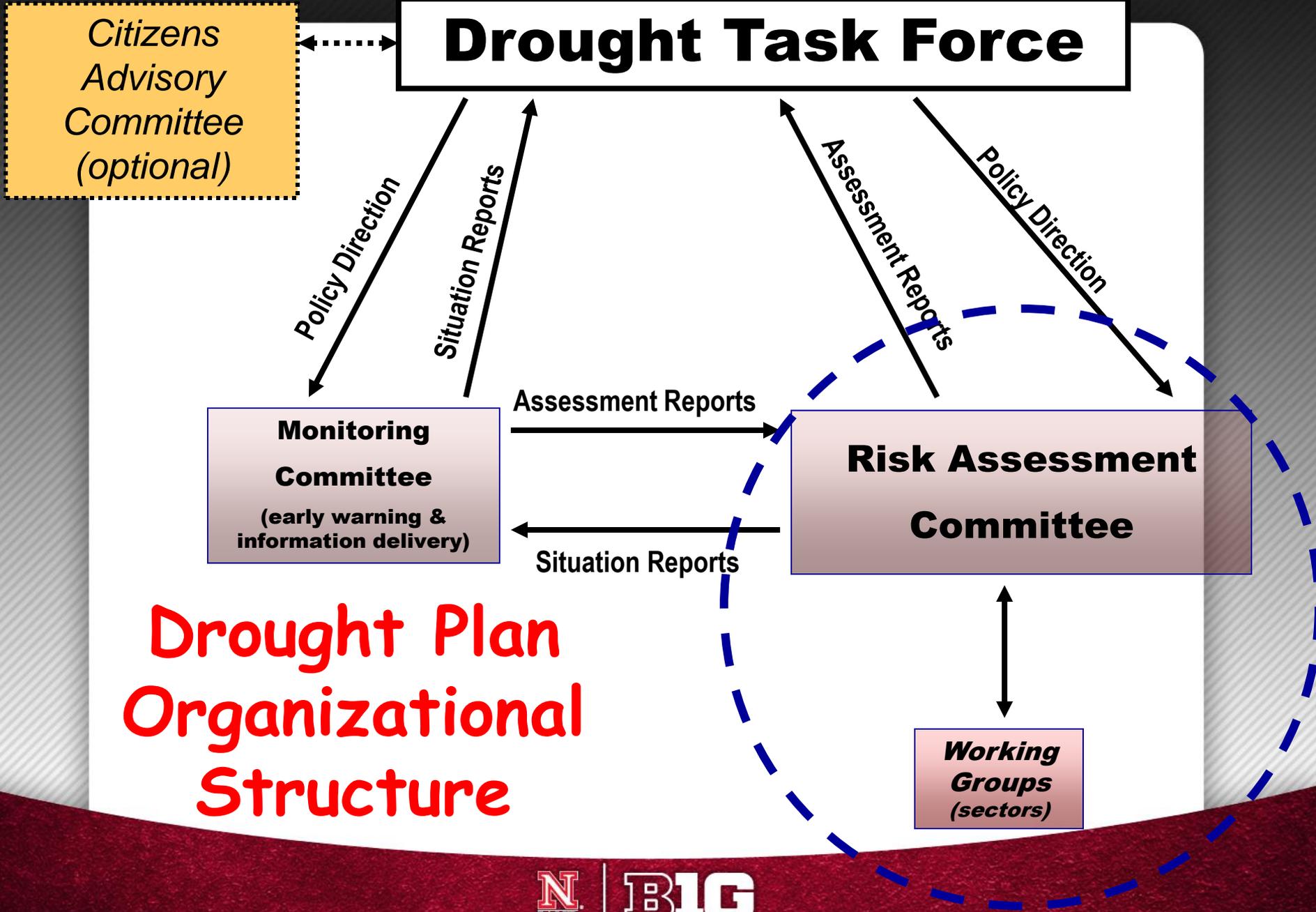
**Publicize** the national drought management policy and preparedness plans, **build** public awareness and consensus

## Step 9

**Develop** education programs for all age and stakeholder groups

## Step 10

**Evaluate, test** and **revise** drought management policy and supporting preparedness plans



# Drought Plan Organizational Structure

A UN-WATER INITIATIVE

UN WATER

ORGANIZED BY:



United Nations Convention  
to Combat Desertification

LOCAL ORGANIZER



1<sup>st</sup> Regional Workshop | Bucharest, Romania

# Capacity Development to Support National DROUGHT Management Policies

9-11 July 2013

The Class Hotel | Bucharest, Romania

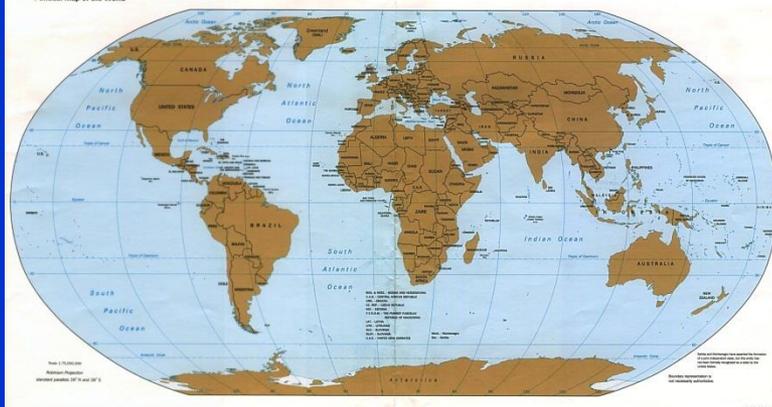
Find out more on the initiative:

[www.ais.unwater.org/droughtmanagement](http://www.ais.unwater.org/droughtmanagement)



A series of 4-5 workshops sponsored by WMO, FAO, UNCCD, UN-Water and the Convention on Biological Diversity (Eastern Europe, Latin America, Asia and Africa)

Political Map of the World



# Takeaway Messages

- Climate is changing—climate state/variability.
- Extreme climate events are increasing in frequency globally and locally, ***managing impacts critically important—we must increase our resilience to drought.***
- Past drought management has been reactive—ineffective, poorly coordinated & poorly targeted.
- Time is **NOW** to change the **paradigm** from crisis to **drought risk management**.
- Time is **NOW** for all drought-prone nations to adopt **appropriate** drought policies to reduce the impacts of future drought episodes through risk-based management.

# Thanks for your attention!



## **Contact Information:**

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