Managing Drought Risk in a Changing Climate: *Breaking the Hydro-illogical Cycle*

Dr. Donald A. Wilhite
School of Natural Resources
University of Nebraska-Lincoln

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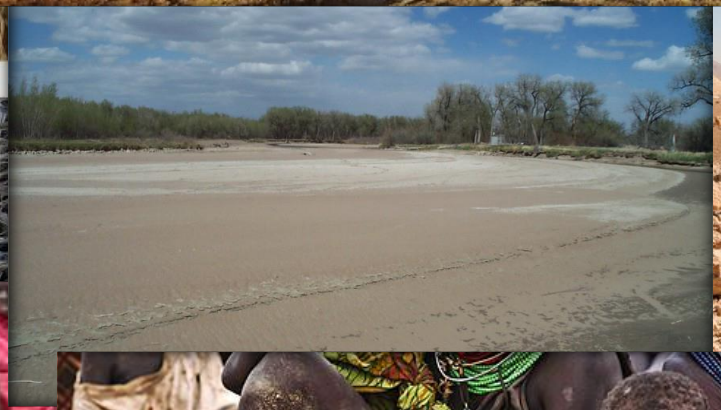
Presentation Outline

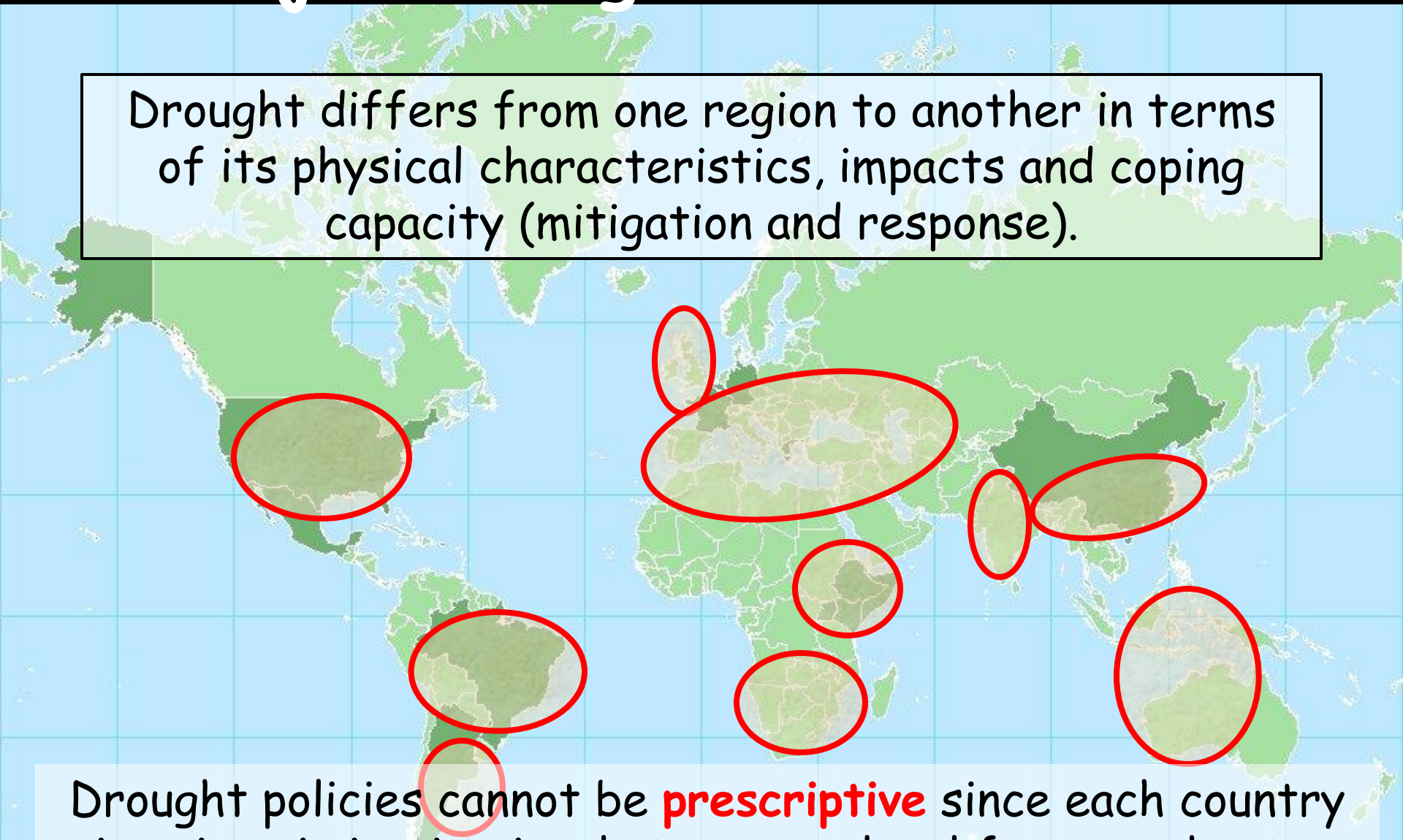
- The **MANY FACES OF DROUGHT**
  - **Drought as hazard, characteristics, definition**
- Breaking the **HYDRO-ILL  GICAL CYCLE**
  - **Crisis management**
- Our **CHANGING CLIMATE—CHANGING VULNERABILITY**
- Building **SOCIETAL RESILIENCE -- What are the 'pillars' for change?**
  - **Drought monitoring 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

The Many Faces of Drought



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 in 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**) . . . . .

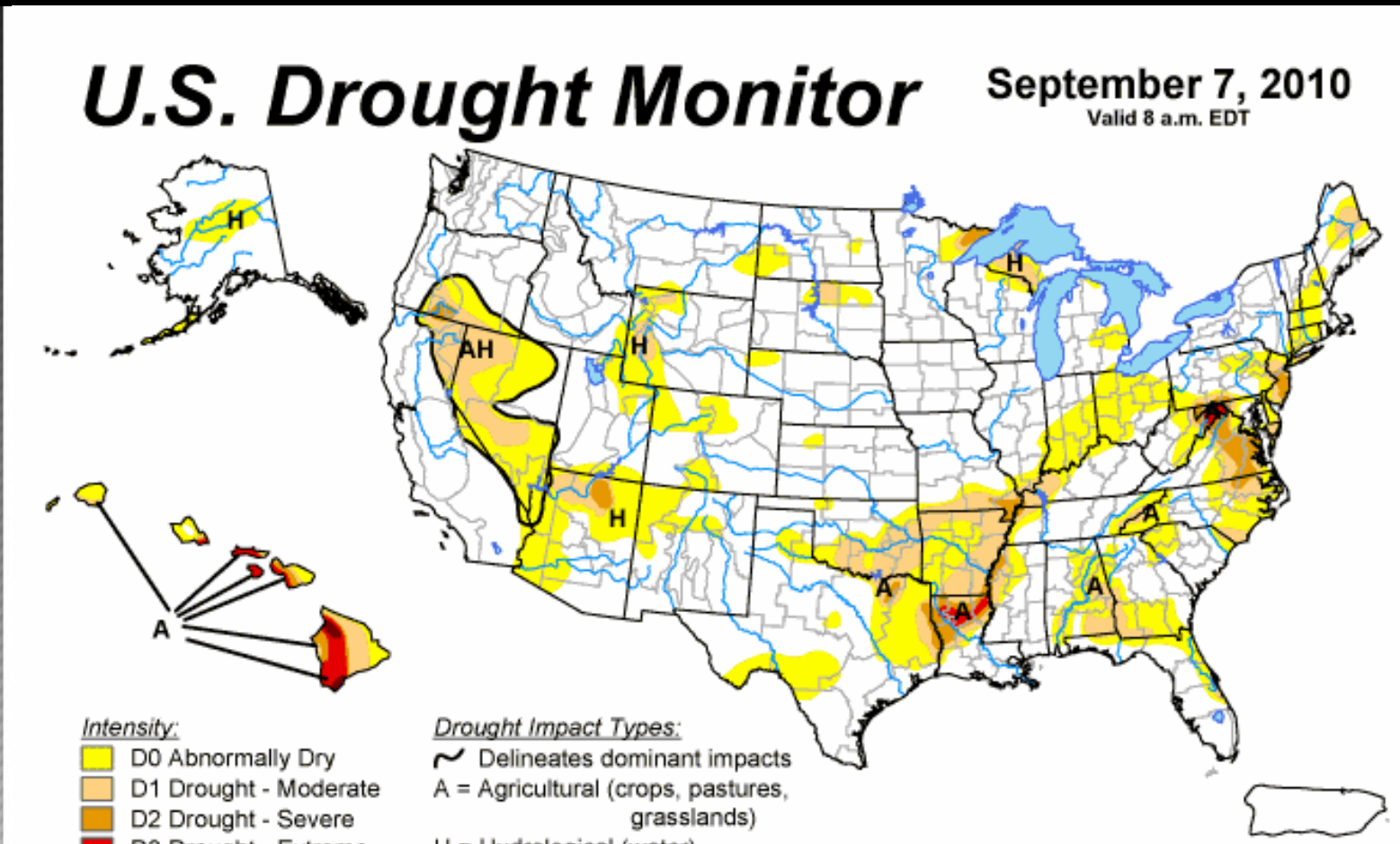
Meteorological Drought

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

Agricultural, Hydrological and Socio-economic Drought

Drought– it sneaks up on you!

3 Year Animation—USDM, 2010-2013



The Climate Change Challenge for Drought Management

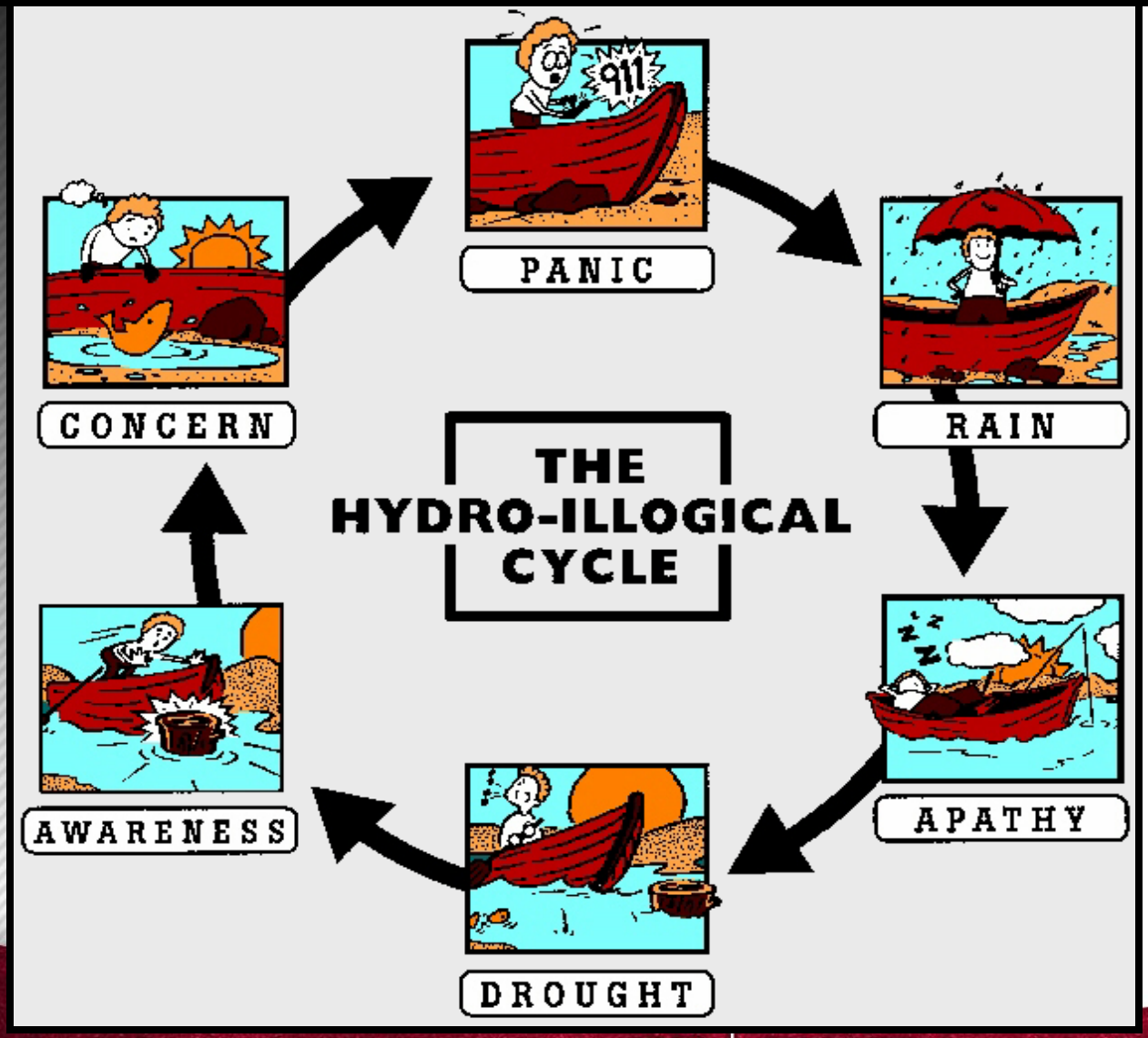
- Increasing mean temperature
- High temp. stress and heat waves/longer

Are droughts increasing 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.

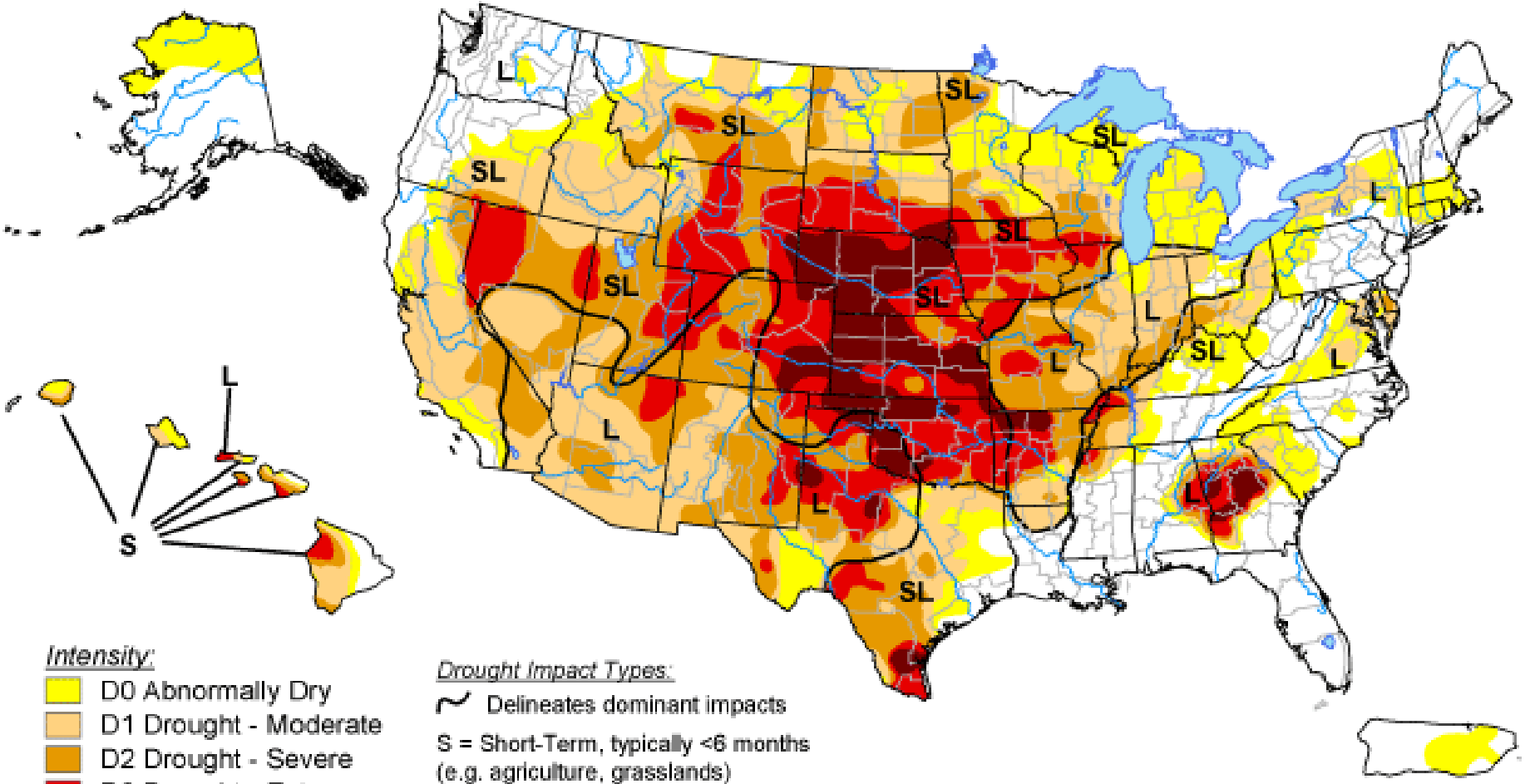
We MUST adopt a new paradigm for drought management!

Standard Rain gauge

New Brazilian Rain gauge

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)

L = Long-Term, typically >6 months (e.g. hydrology, ecology)

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

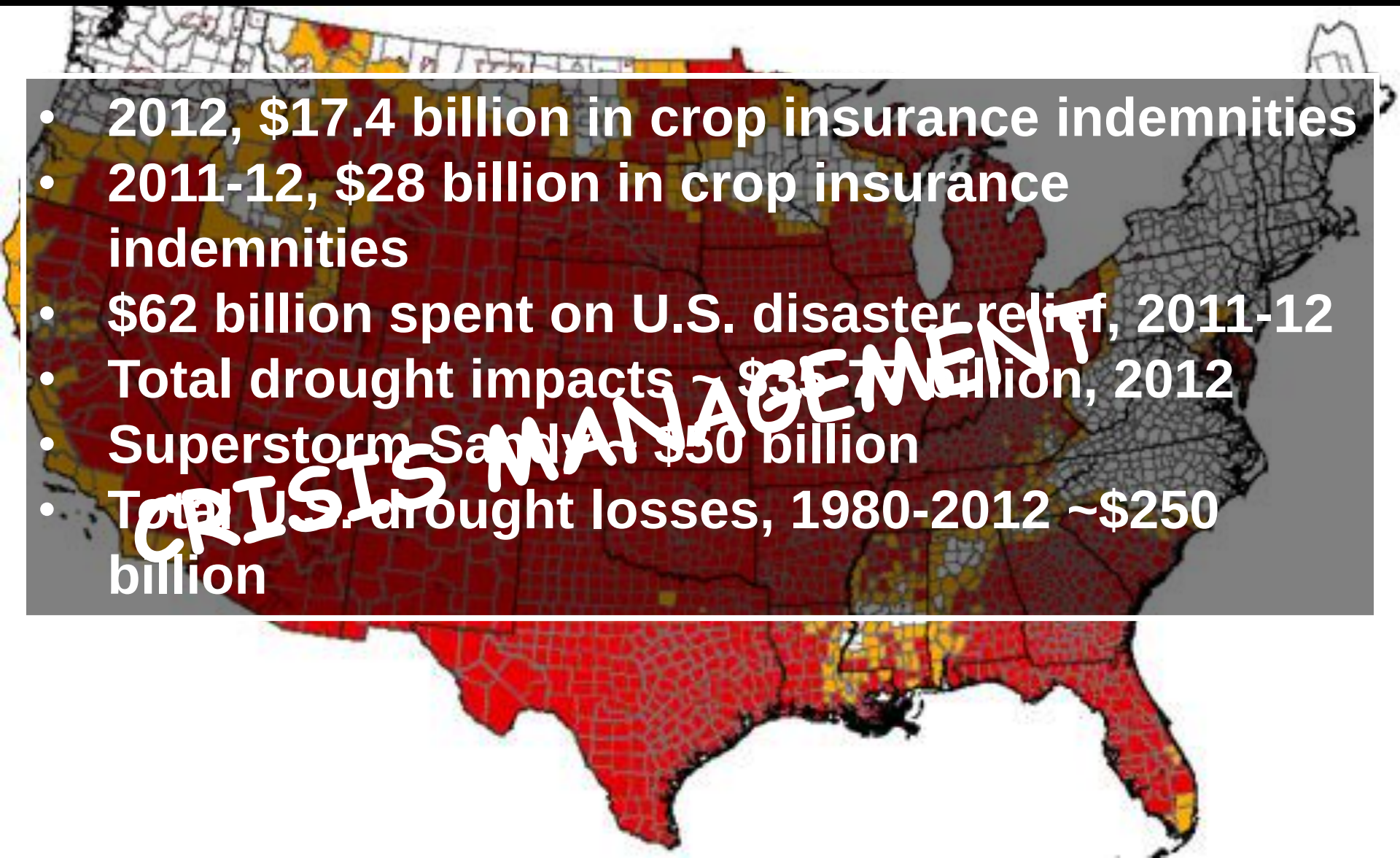
http://droughtmonitor.unl.edu/

Released Thursday, September 13, 2012

Author: David Simeral, Western Regional Climate Center

Drought Disaster Designations

October 10, 2012



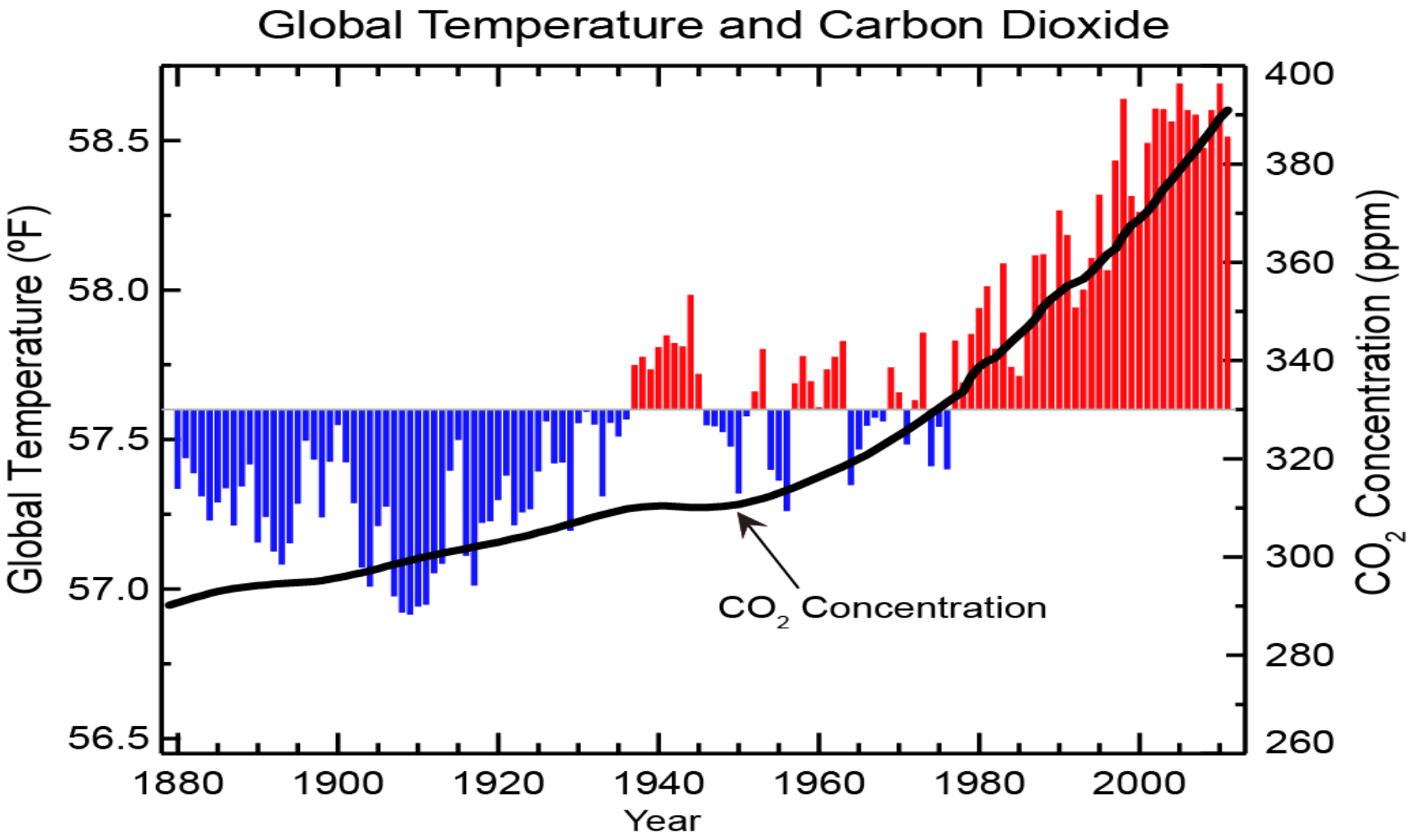
- 2012, $17.4 billion in crop insurance indemnities
- 2011-12, $28 billion in crop insurance indemnities
- $62 billion spent on U.S. disaster relief, 2011-12
- Total drought impacts ~ $35 billion, 2012
- Superstorm Sandy ~ $50 billion
- Total U.S. drought losses, 1980-2012 ~$250 billion

CRISIS MANAGEMENT

Incentives for Changing the Paradigm

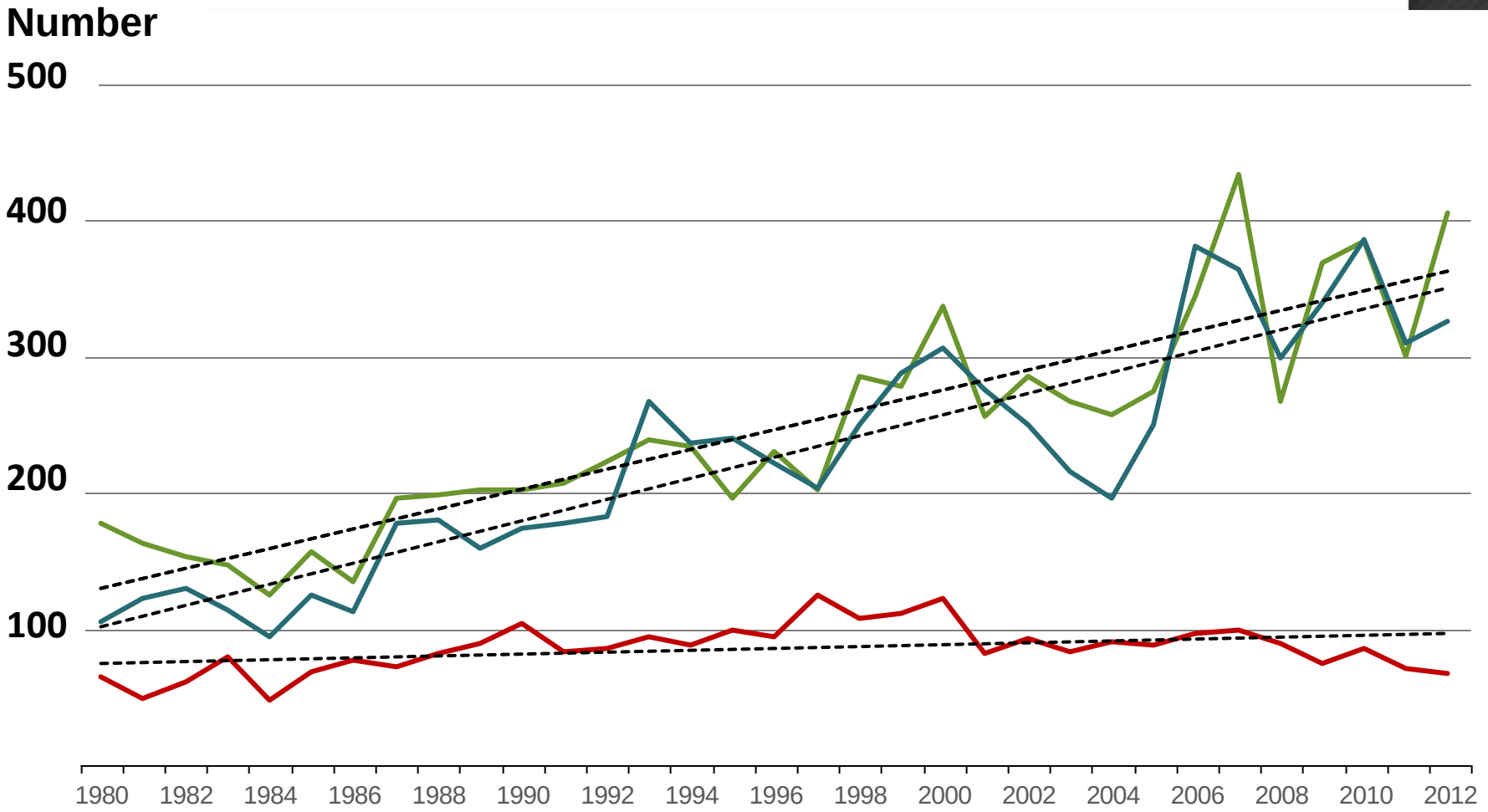
- Addresses spiraling impacts → multiple sectors
- Reduces conflicts between water users
- Promotes wise stewardship of natural resources—sustainable development
- Reduces need for governmental assistance—allows for resources to be invested more wisely
- Supports climate change adaptation and mitigation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

Our Changing Climate



There is a close correlation between CO_2 and temperature that has been verified through many lines of research . This graph shows the relationship of temperature and CO_2 over the last 130 years.

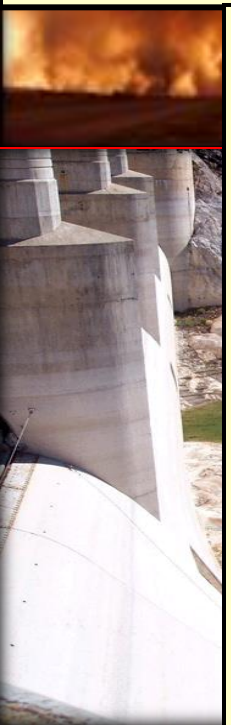
Natural Catastrophes Worldwide
1980-2012



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

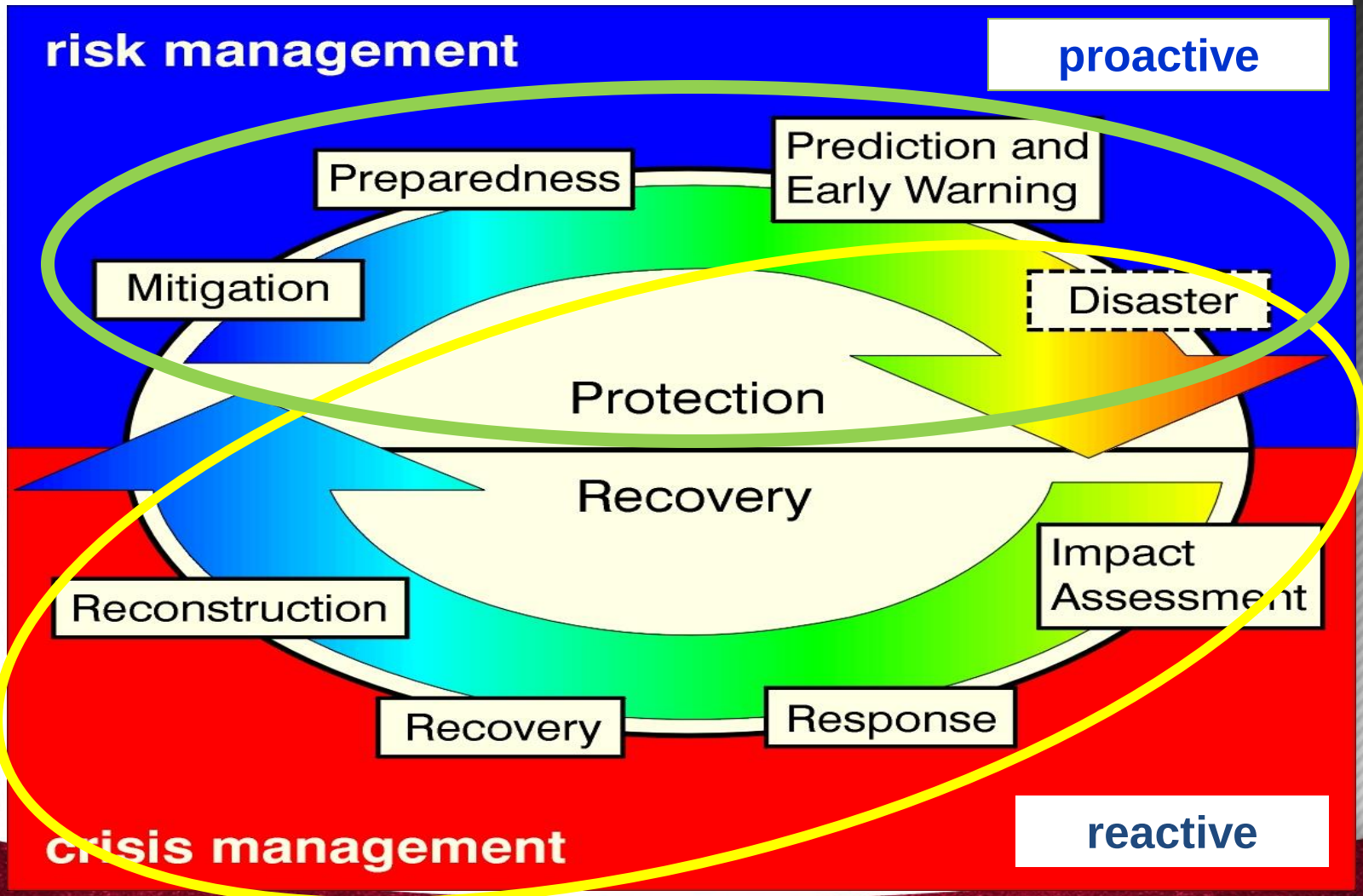
Building Societal Resilience through National Drought Policies and Preparedness Plans: The Way Forward

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

The Cycle of Disaster Management

Risk management increases coping capacity, builds resilience.



Crisis management treats the symptoms, not the causes.

Hazard + Vulnerability = Risk

EXPOSURE

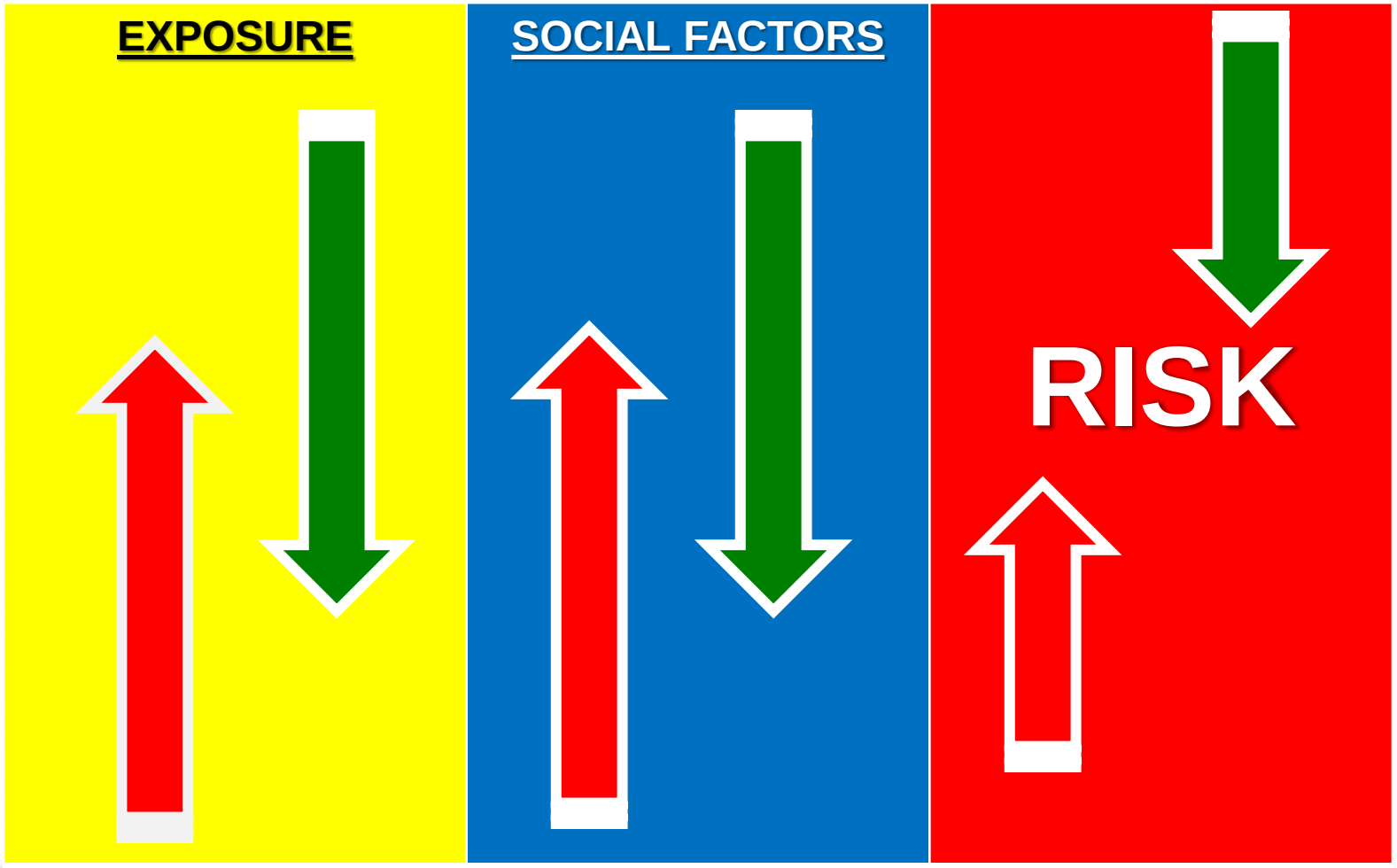
- Severity/Magnitude
  - Intensity/Duration
- Frequency
- Spatial extent
- Trends
  - Historical
  - Future
- Impacts
- Early warning

SOCIAL FACTORS

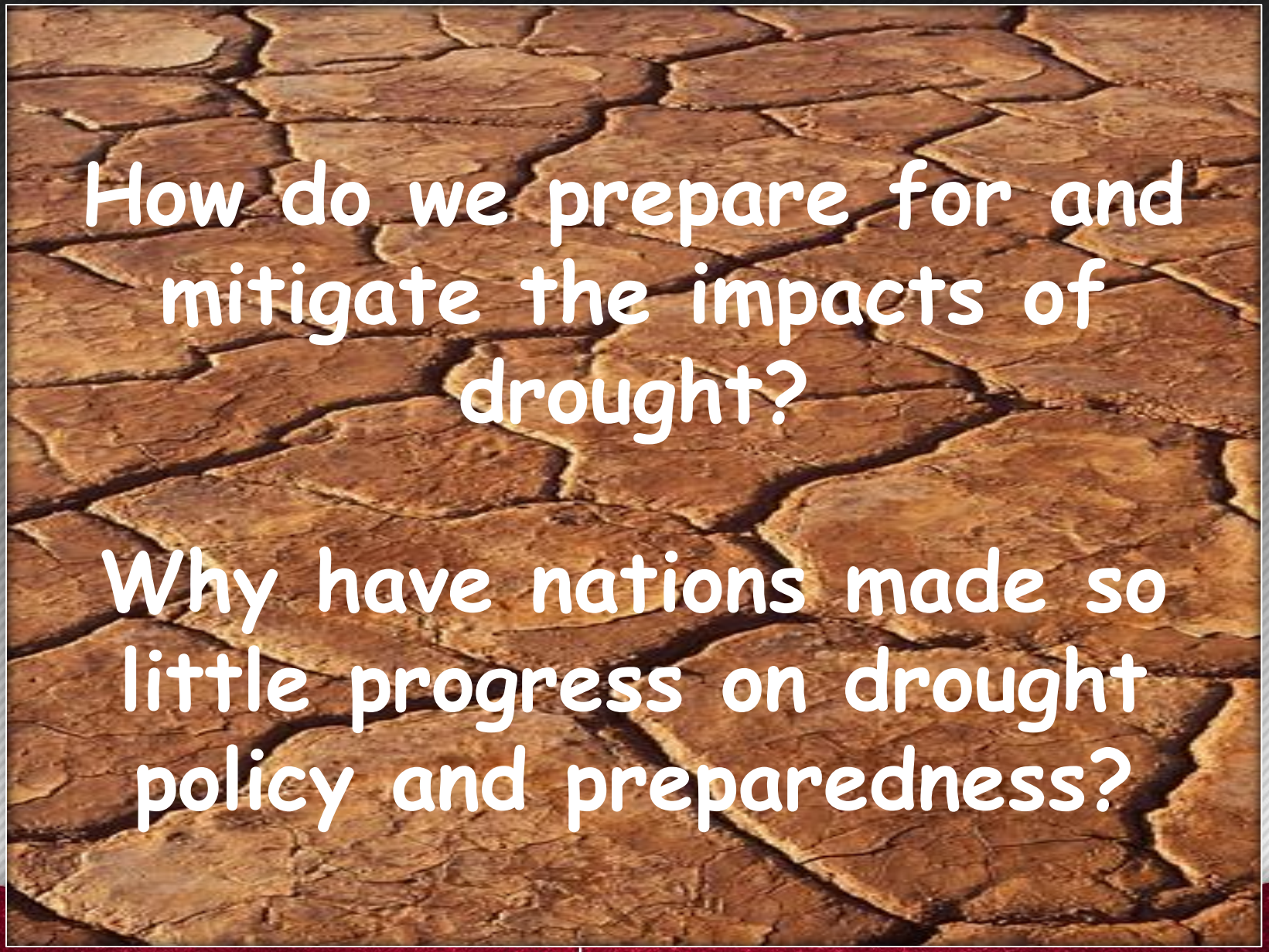
- Population growth
- Population shifts
- Urbanization
- Technology
- Land use changes
- Environmental degradation
- Water use trends
- Government policies
- Environmental awareness

RISK

Hazard + Vulnerability = Risk

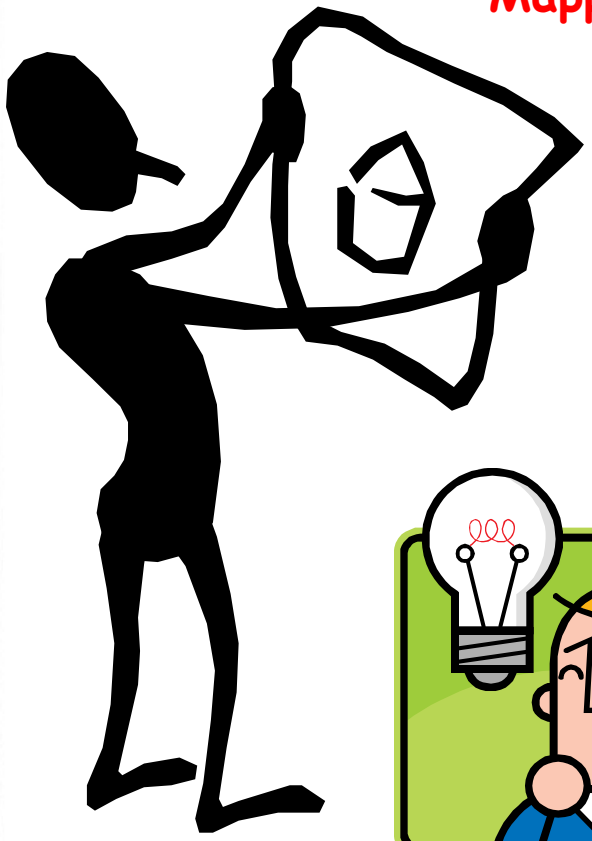


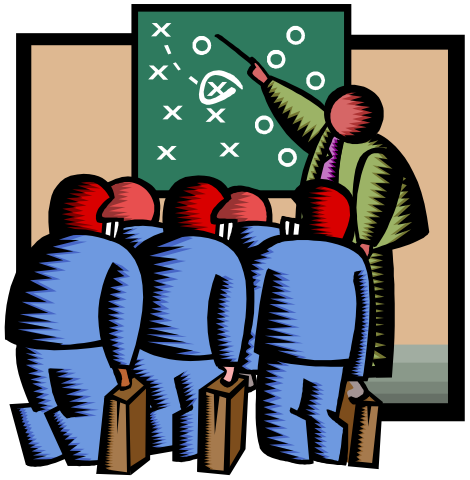
Preparedness Plans based on the principles of risk reduction


How do we prepare for and mitigate the impacts of drought?
Why have nations made so little progress on drought policy and preparedness?

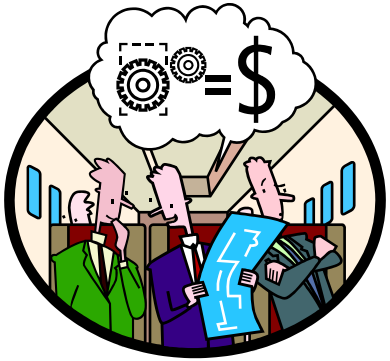
How to start the process?

Mapping out a strategy!





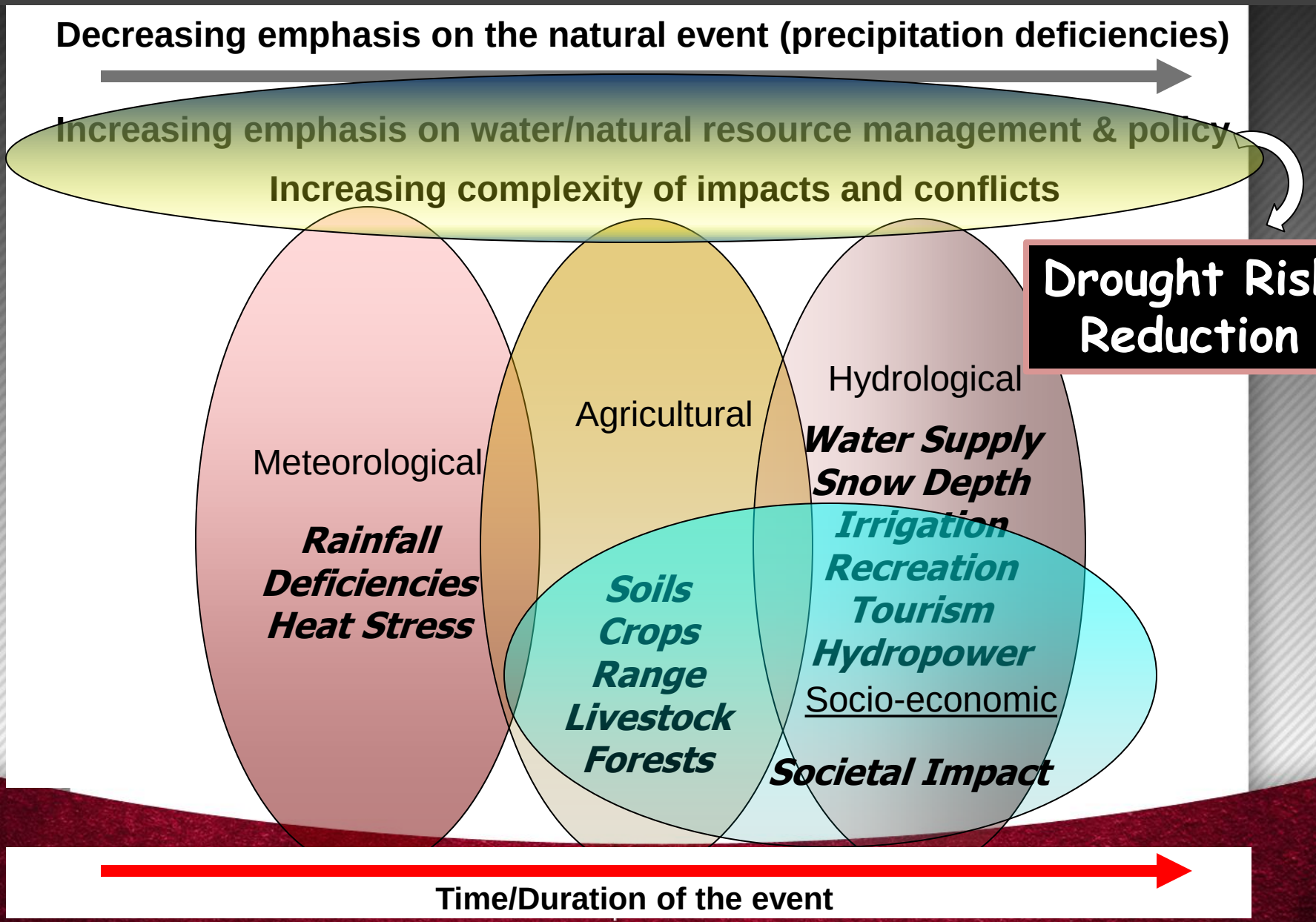
Leadership!



Financial Resources Required?

Cost?

Natural and Social Dimensions of Drought



WMO

UNCCD
United Nations Convention to Combat Desertification

FAO
FIAT PANIS

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.
- 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

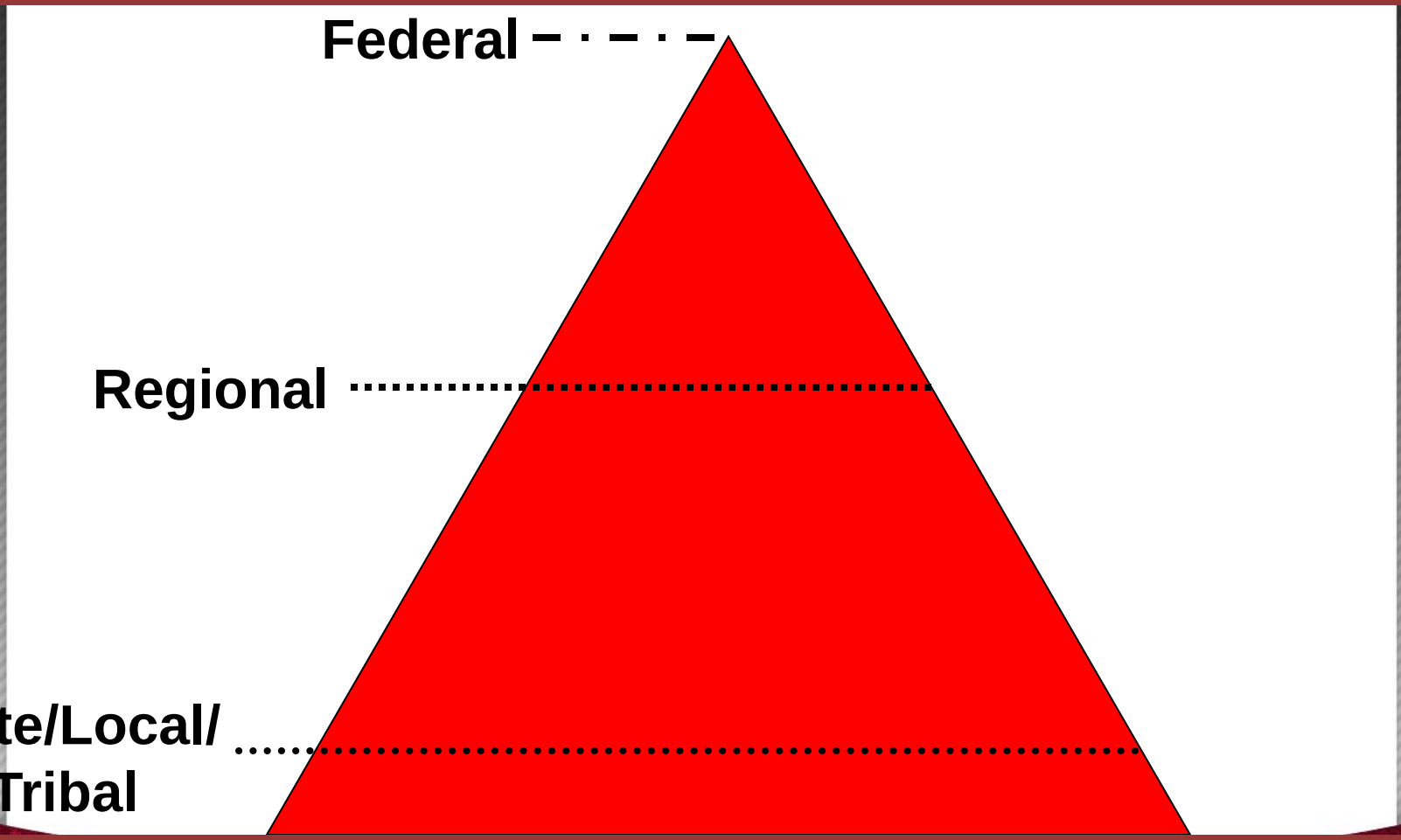
- **Monitoring/early warning, prediction and information delivery systems**
  - Integrated monitoring of key indicators
    - Precipitation, temperature, soil moisture, streamflow, snowpack, groundwater, etc.
  - Use of appropriate indices
  - Reliable seasonal forecasts
  - Development/delivery of information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

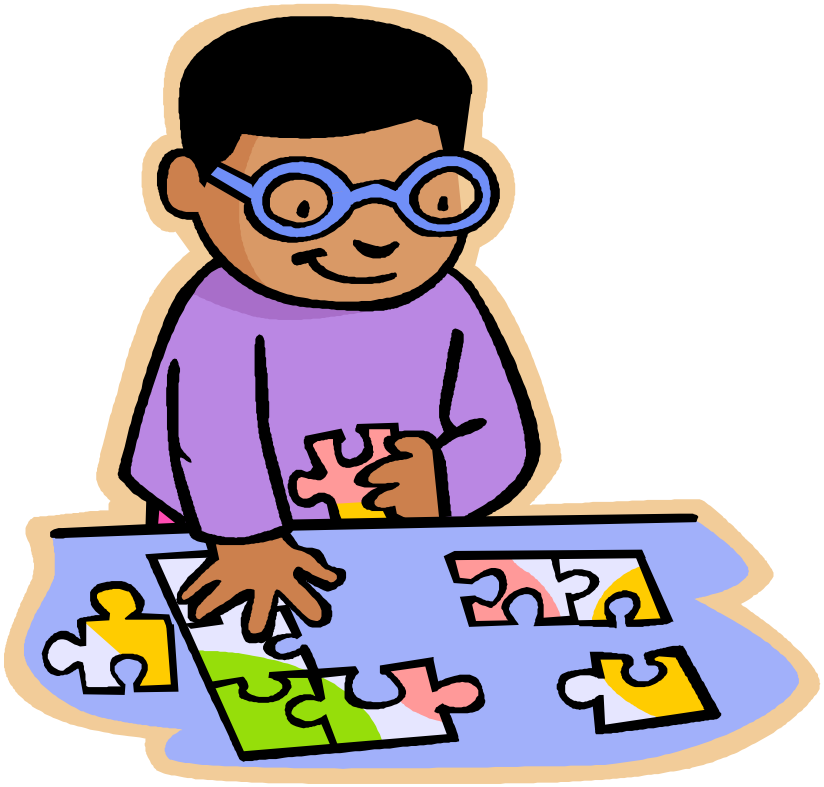
The process for RISK-BASED DROUGHT MANAGEMENT POLICY & PLANNING

was been from the TOP DOWN in Australia!

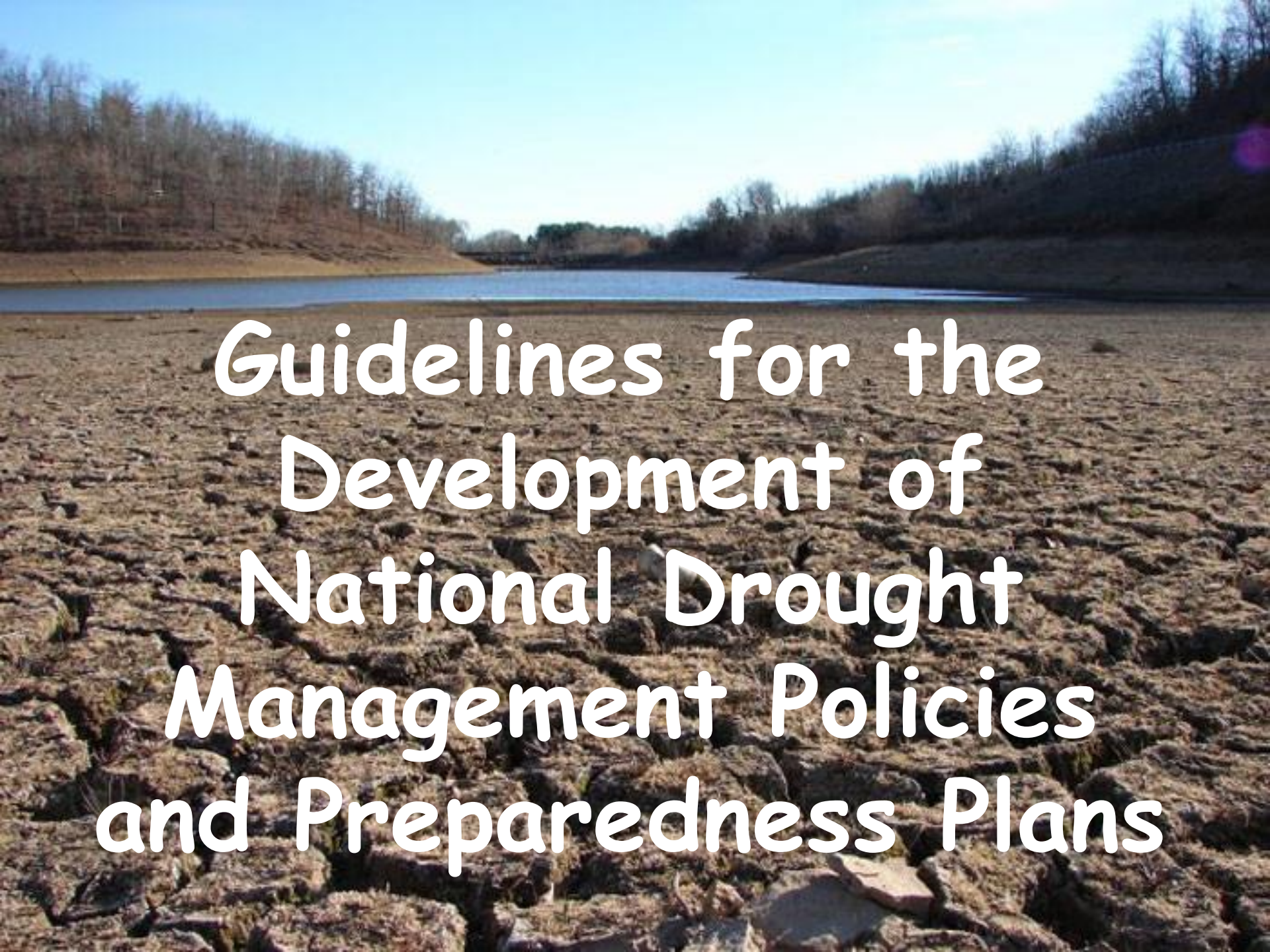


has been from the BOTTOM UP in the U.S.!

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



All relevant agencies/ministries, stakeholder groups, sectors, and regions must be included in the policy and planning process. This approach will lead to a successful outcome.


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

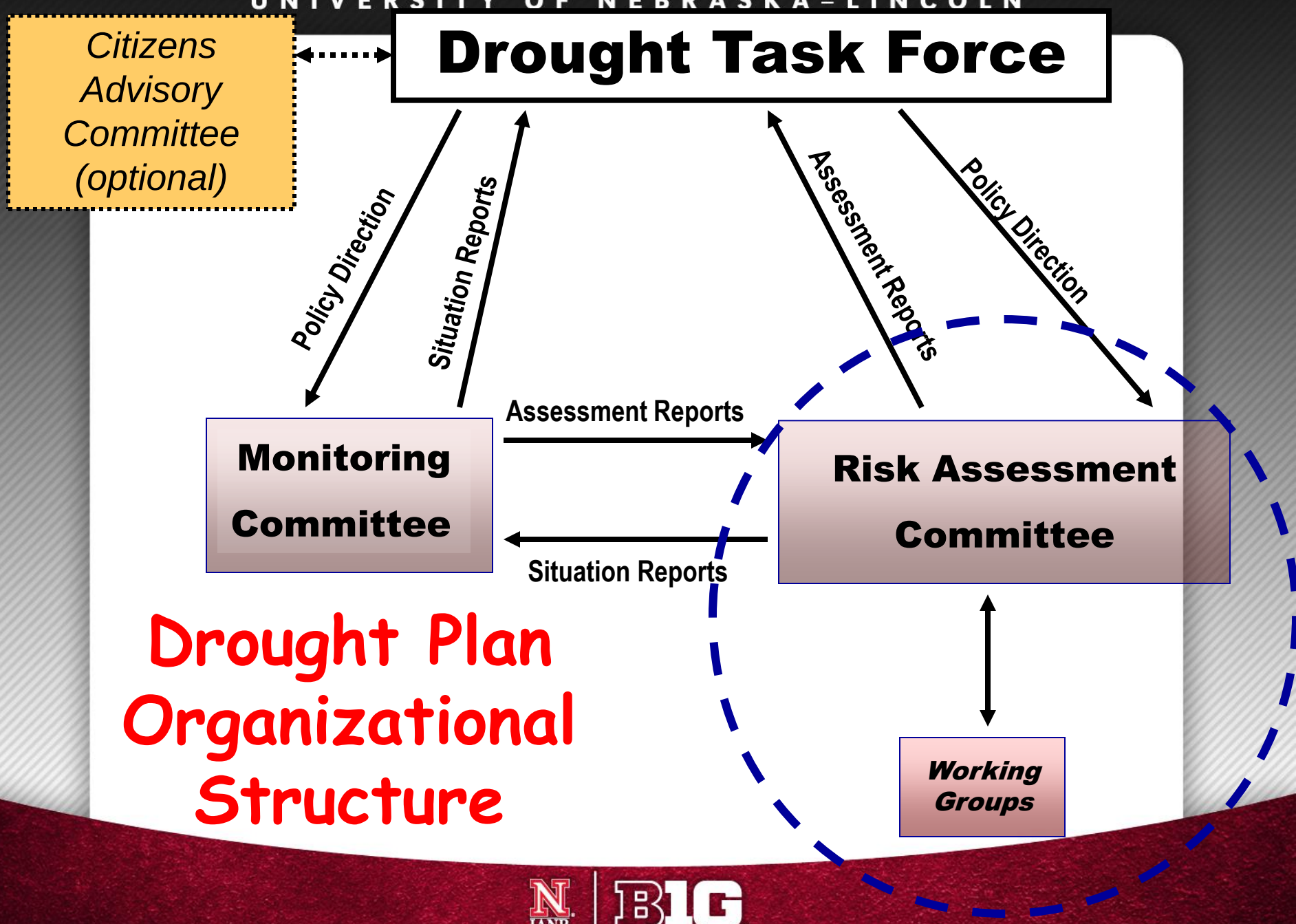
National Drought Policy: A 10-Step Process

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 **resolve** conflicts between key water use sectors
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)

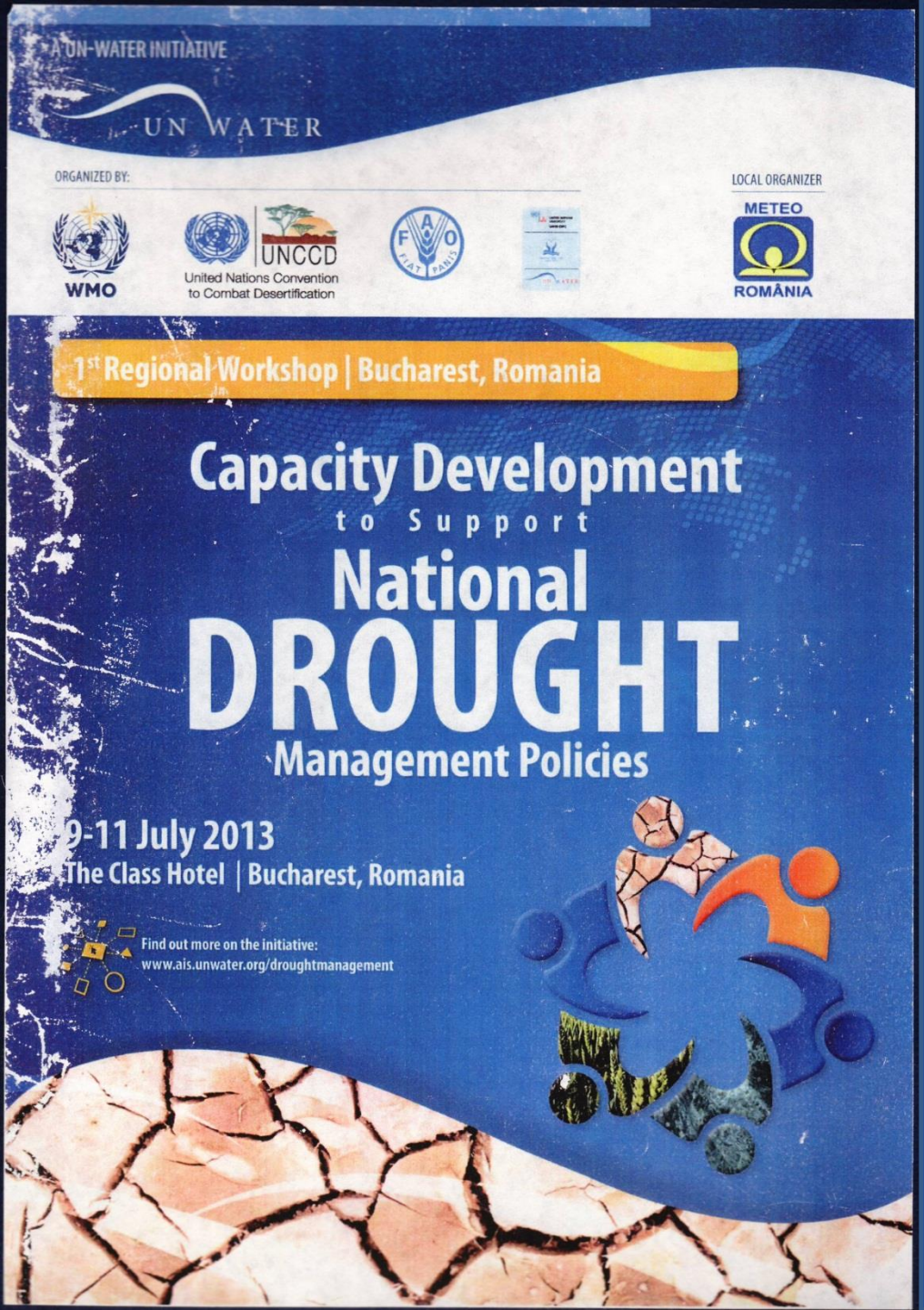
National Drought Policy: A 10-Step Process

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

Progress toward National Drought Policies

Takeaway Messages

- Climate is changing—climate state and climate variability.
- Extreme climate events are increasing in frequency globally and locally, ***managing impacts critically important—we must increase our resilience to drought***.
- 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:
School of Natural Resources
University of Nebraska-Lincoln
dwilhite2@unl.edu