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

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University of Nebraska-Lincoln

National Drought Management Policy Workshop,
Accra, Ghana 4-7 May 2015

Presentation Outline

- **INTRODUCTION**
  - **Drought as hazard, characteristics, definition**
- The **MANY FACES OF DROUGHT**
- Breaking the **HYDRO-ILL GICAL 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 delivery 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!
  - ***"You cannot solve current problems with current thinking. Current problems are the result of current thinking." Albert Einstein***
- **Who** and **what** is at risk and **why**?
  - Issues of vulnerability and risk reduction
  - Building resilience, increasing coping capacity and institutional capacity

Defining Drought

-Hundreds of definitions—application and region specific

Drought is a deficiency of **precipitation** (**intensity**)

***Effective** drought management must be INTEGRATED across sectors and within and between levels of government as well as with NGOs.*

activities and the environment (**impacts**).

Agricultural, Hydrological and Socio-economic Drought

Drought– it sneaks up on you!

Droughts differ in terms of:

- INTENSITY
- Duration
- Spatial Extent

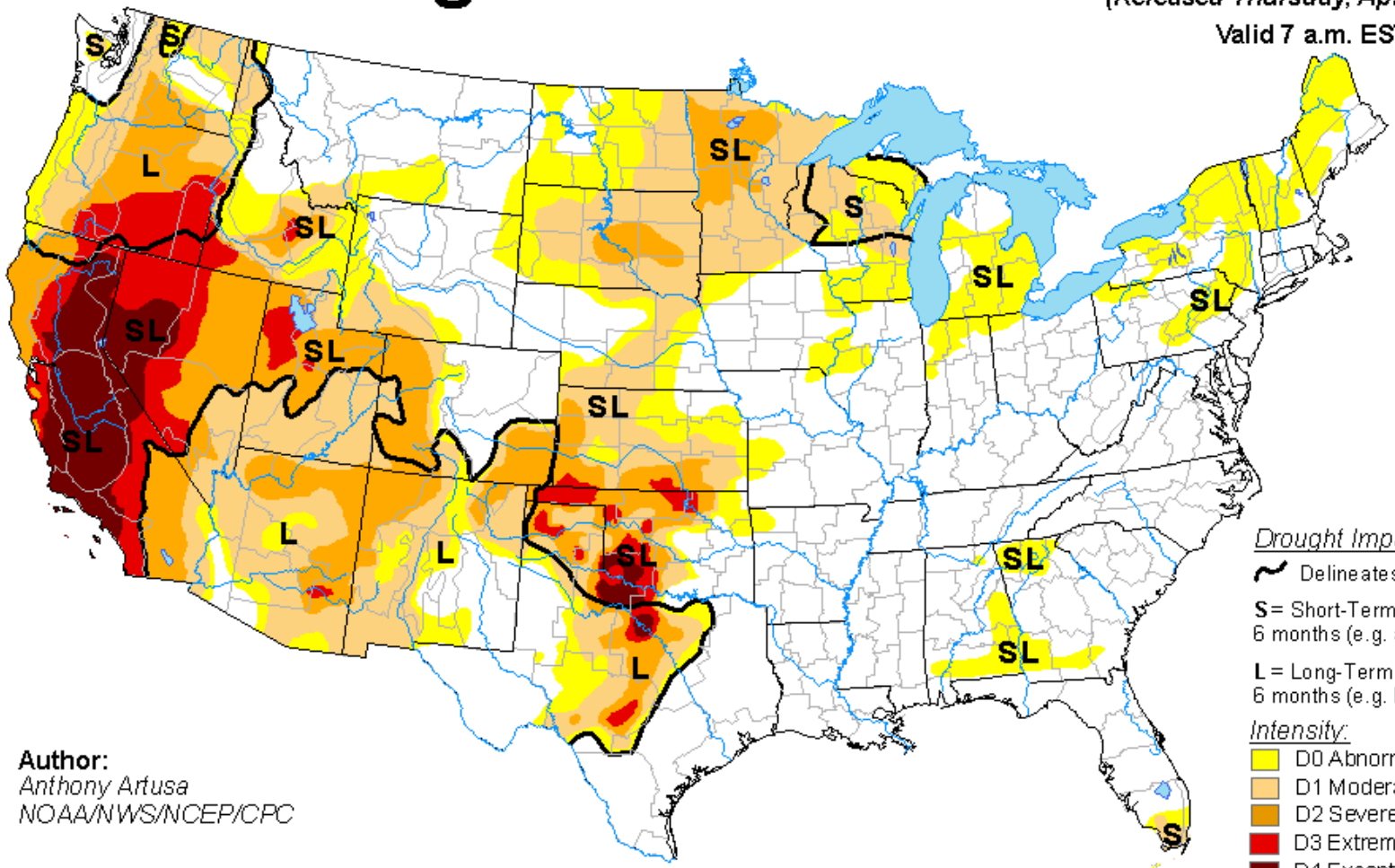
As with other natural hazards,
each drought event is unique in its physical characteristics and impacts.

U.S. Drought Monitor

April 28, 2015

(Released Thursday, Apr. 30, 2015)

Valid 7 a.m. EST



Author:
Anthony Artusa
NOAA/NWS/NCEP/CPC

Drought Impact Types:

Delineates dominant impacts

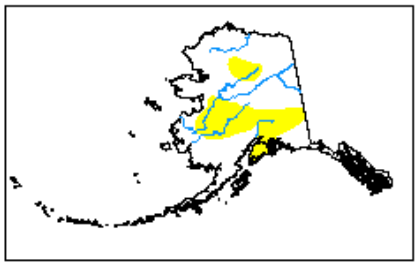
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

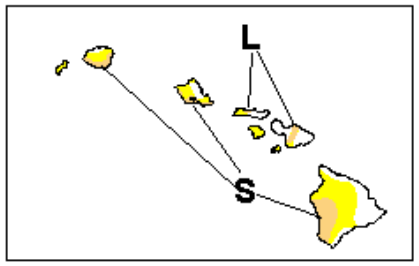
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

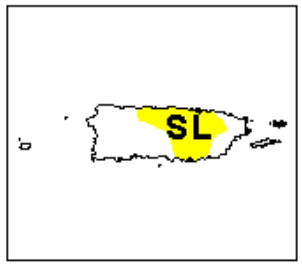
Intensity:

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

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

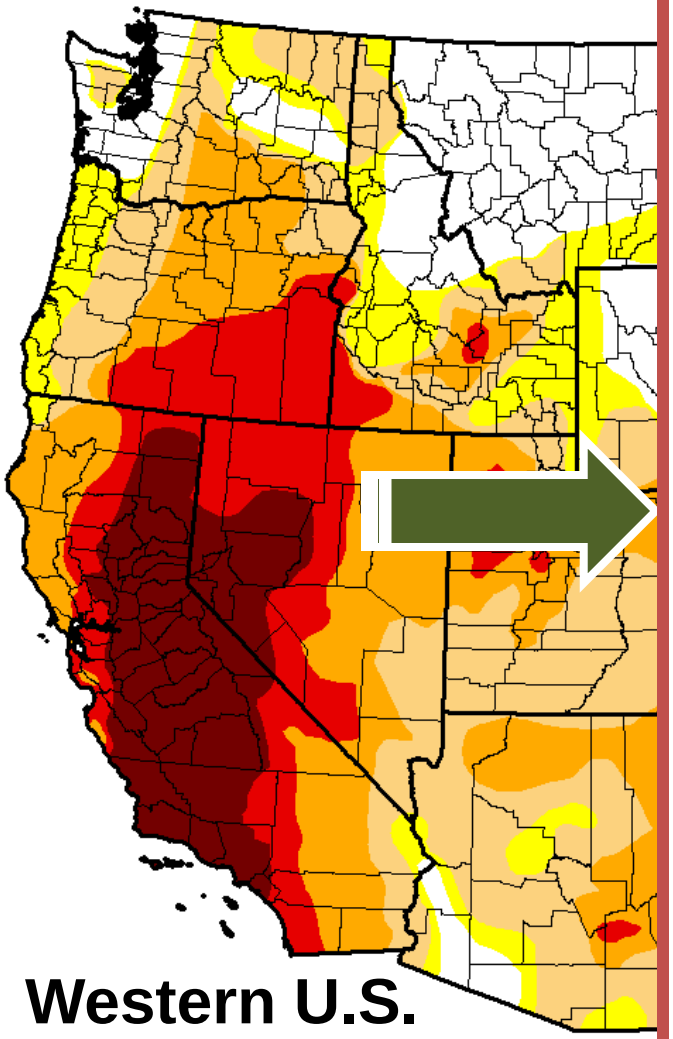




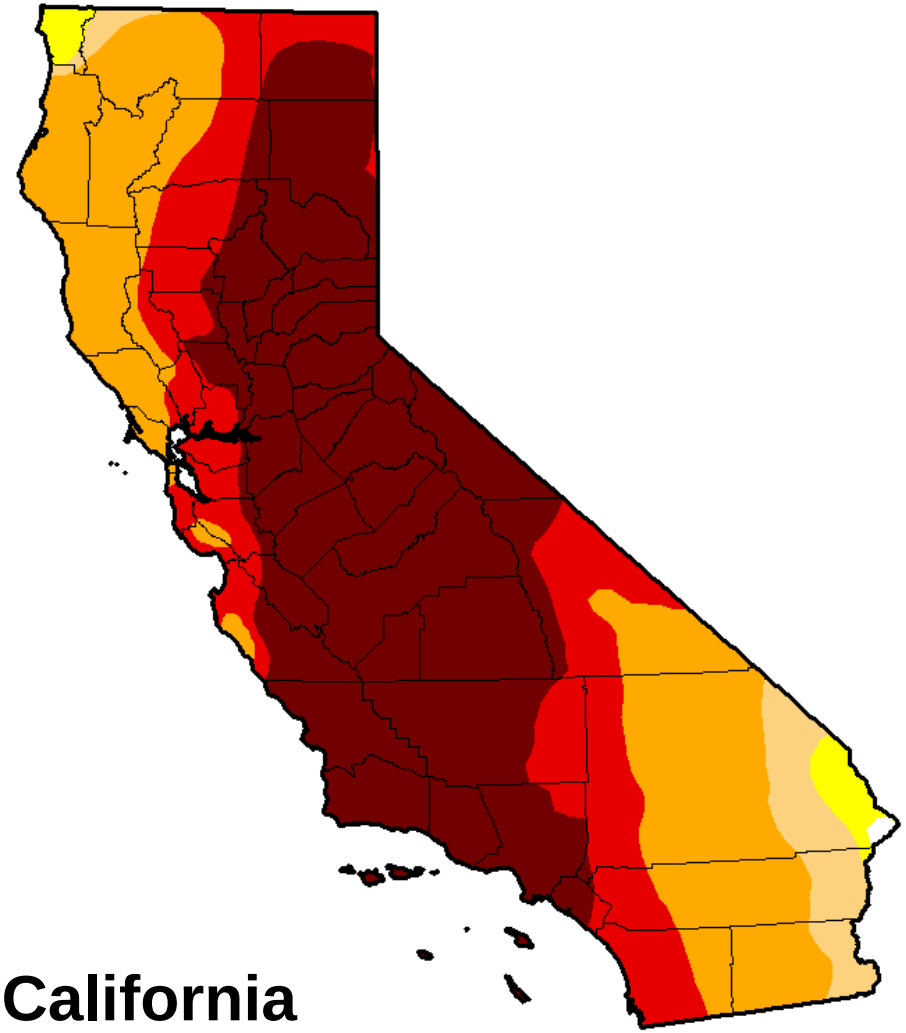


USDA National Drought Mitigation Center

http://droughtmonitor.unl.edu/

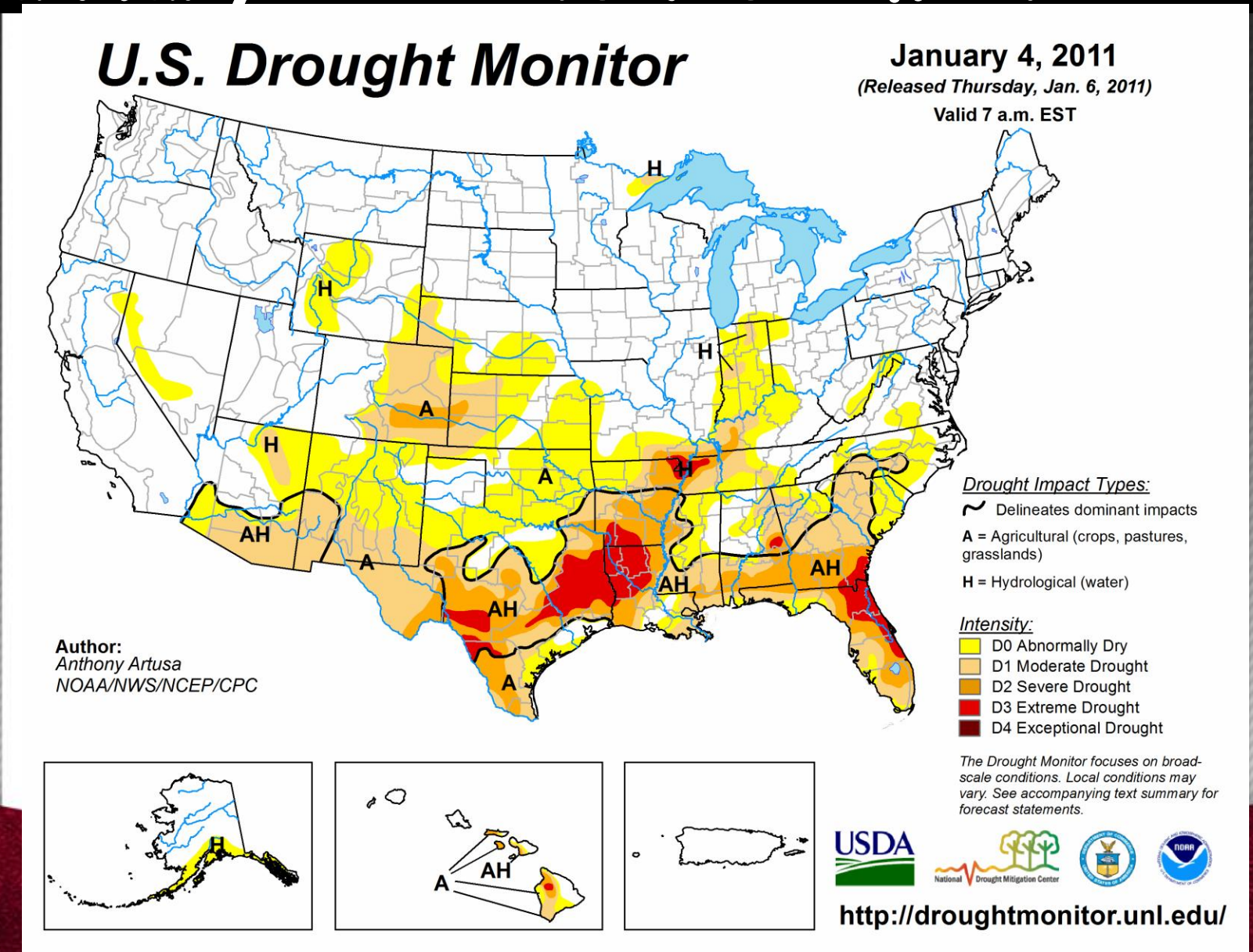


Western U.S.



California

USDM Animation
January 2011 to November 2014



North American Drought Monitor

February 28, 2015

Released: Friday, March 13, 2015

http://www.ncdc.noaa.gov/nadm.html

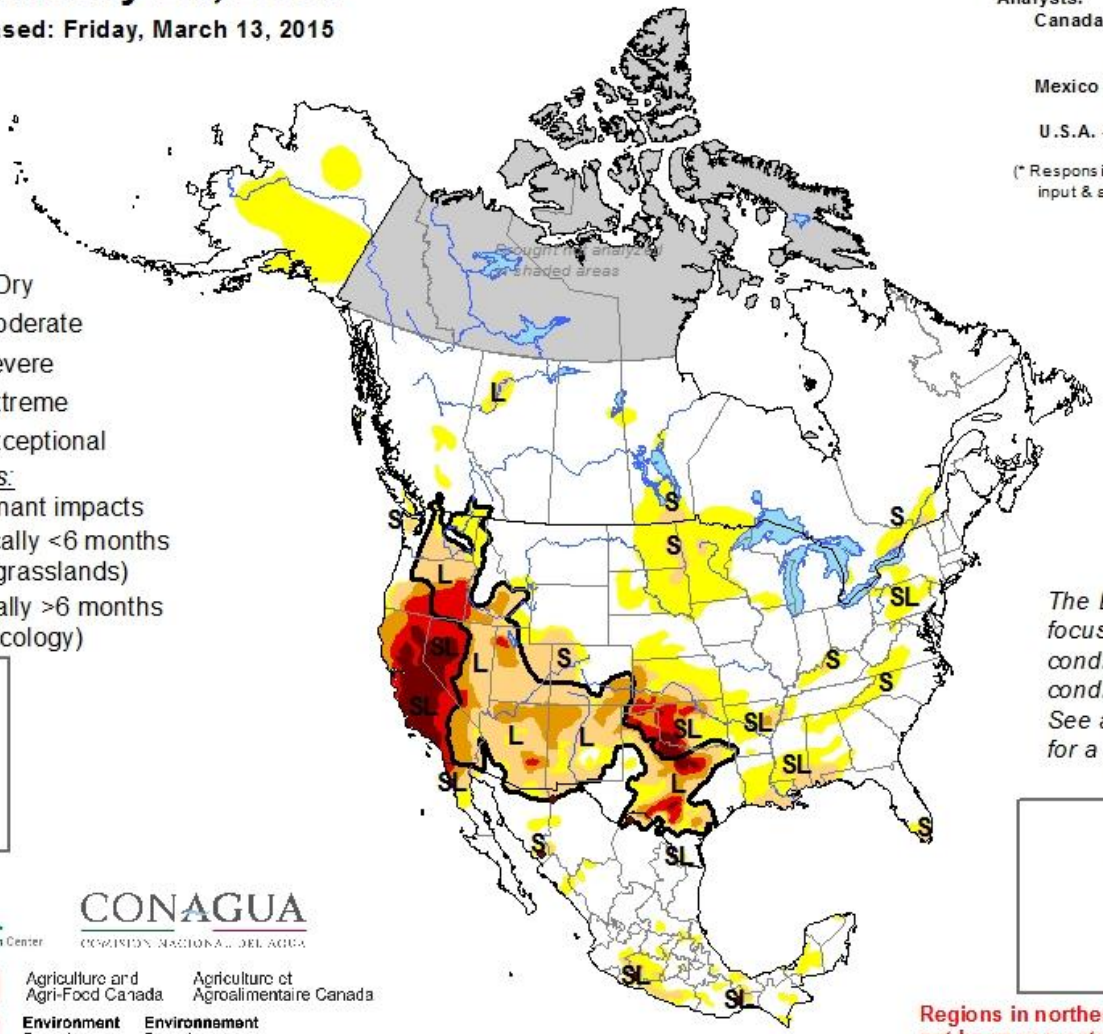
Analysts:

Canada - Trevor Hadwen
Dwayne Chobanik
Mackenzie Costabile

Mexico - Reynaldo Pascual
Adelina Albanil

U.S.A. - David Simeral
Michael Brewer*

(* Responsible for collecting analysts' input & assembling the NA-DM map)



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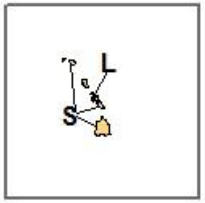


The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text for a general summary.

Regions in northern Canada may not be as accurate as other regions due to limited information.

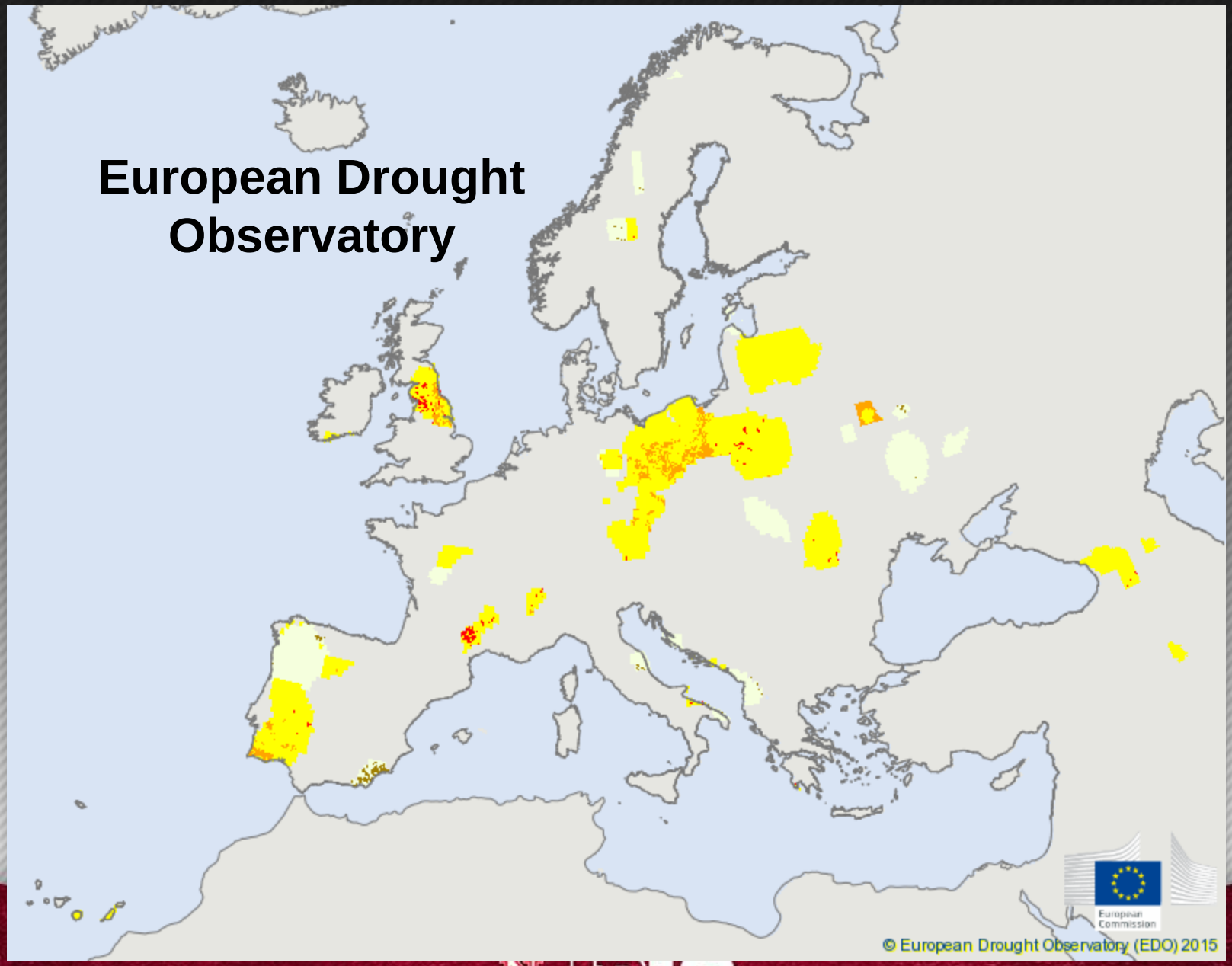
USDA | National Drought Mitigation Center | CONAGUA (Comisión Nacional del Agua)

Agriculture and Agri-Food Canada / Agriculture et Agroalimentaire Canada

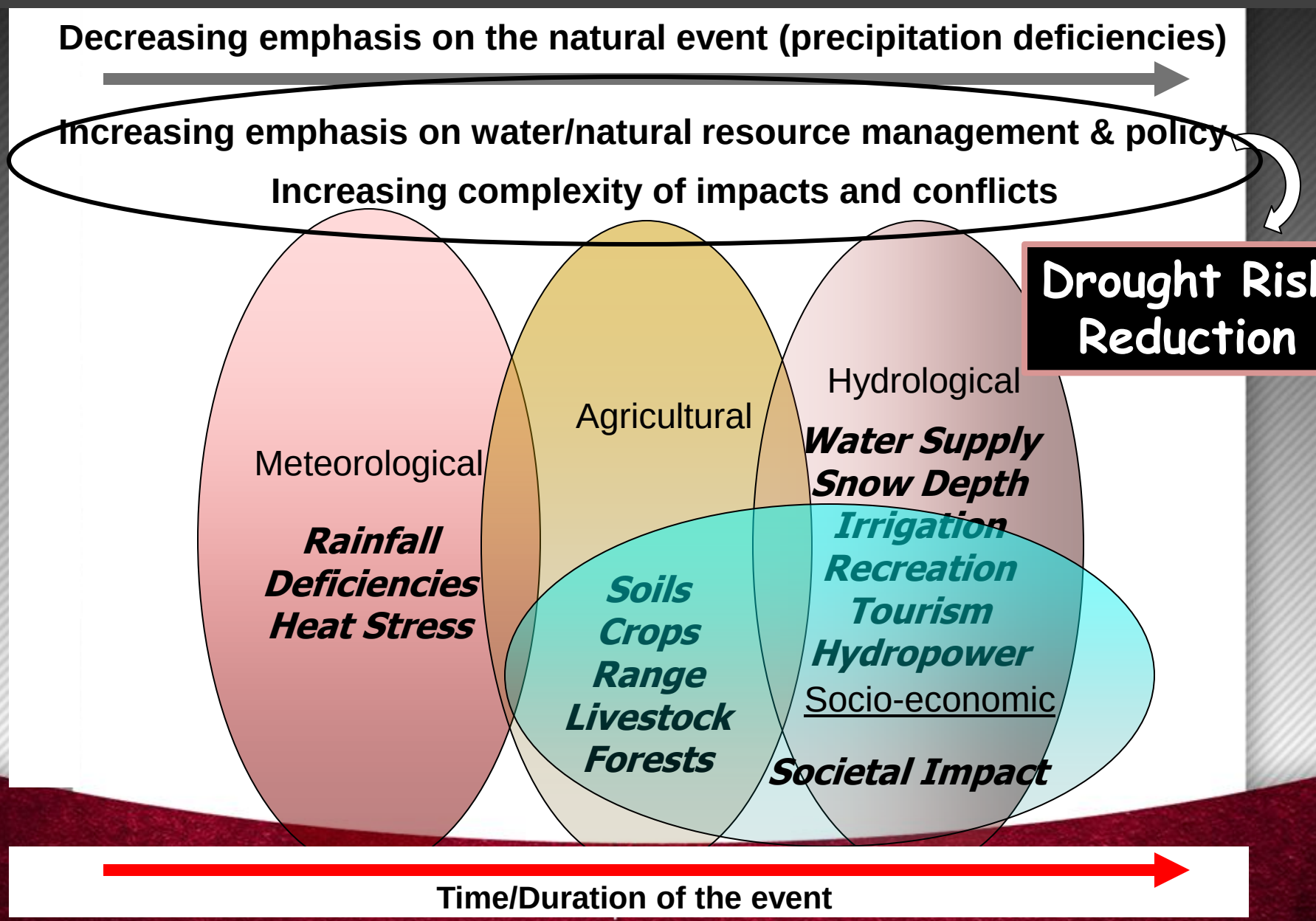
Environment Canada / Environnement Canada

IANR | B1G

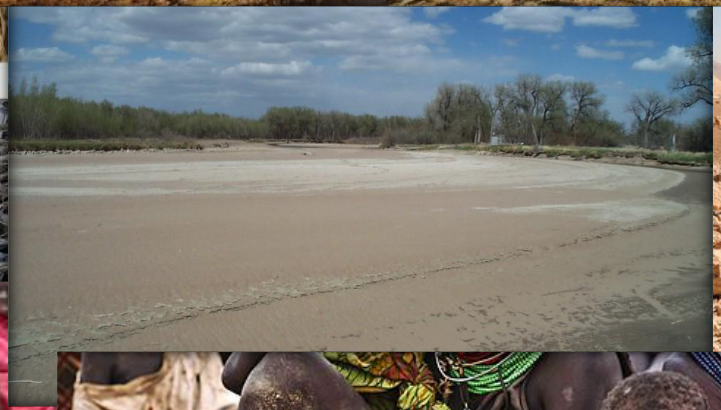
European Drought Observatory



Natural and Social Dimensions of Drought

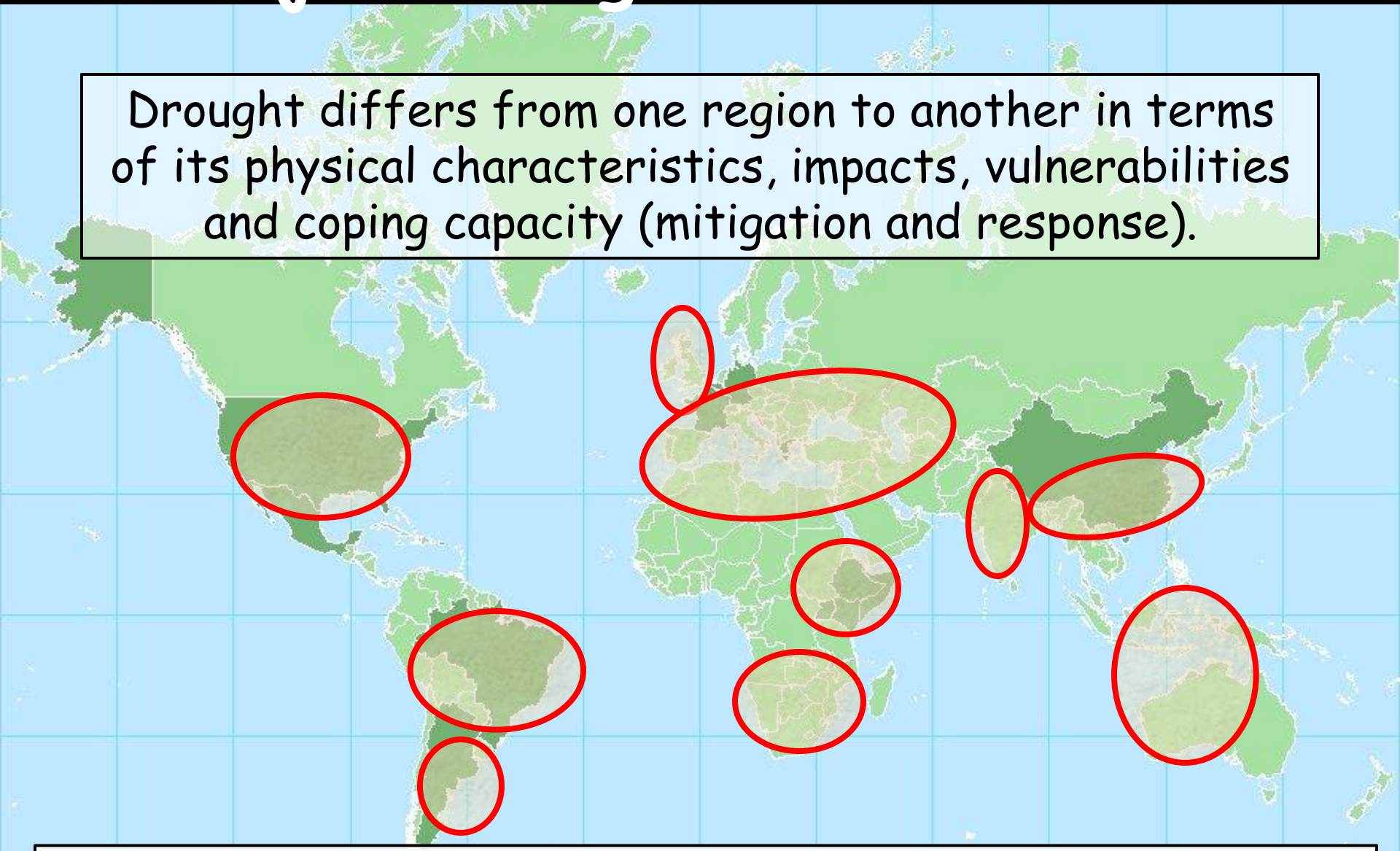


The Many Faces of Drought



Major Drought Areas—2012

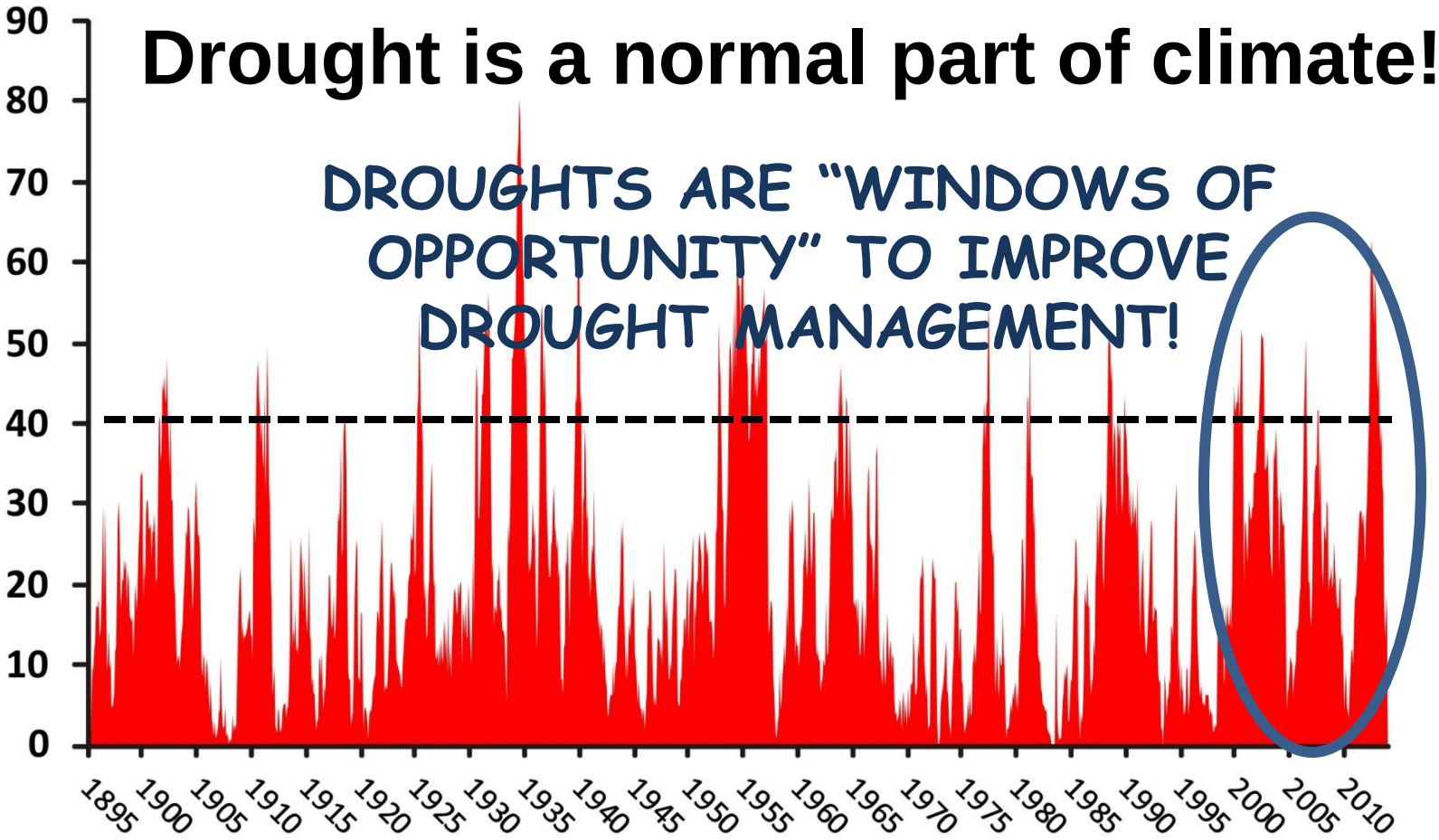
Drought differs from one region to another in terms of its physical characteristics, impacts, vulnerabilities and coping capacity (mitigation and response).



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

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

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!

Crisis Management Characteristics

- Ineffective, treats symptoms of drought
- Untimely, response actions
- Increases reliance on government/donors
- Poorly coordinated, national to local level actions
- Expensive, large expenditures from numerous government agencies (and donors)
- Increases vulnerability?

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.**

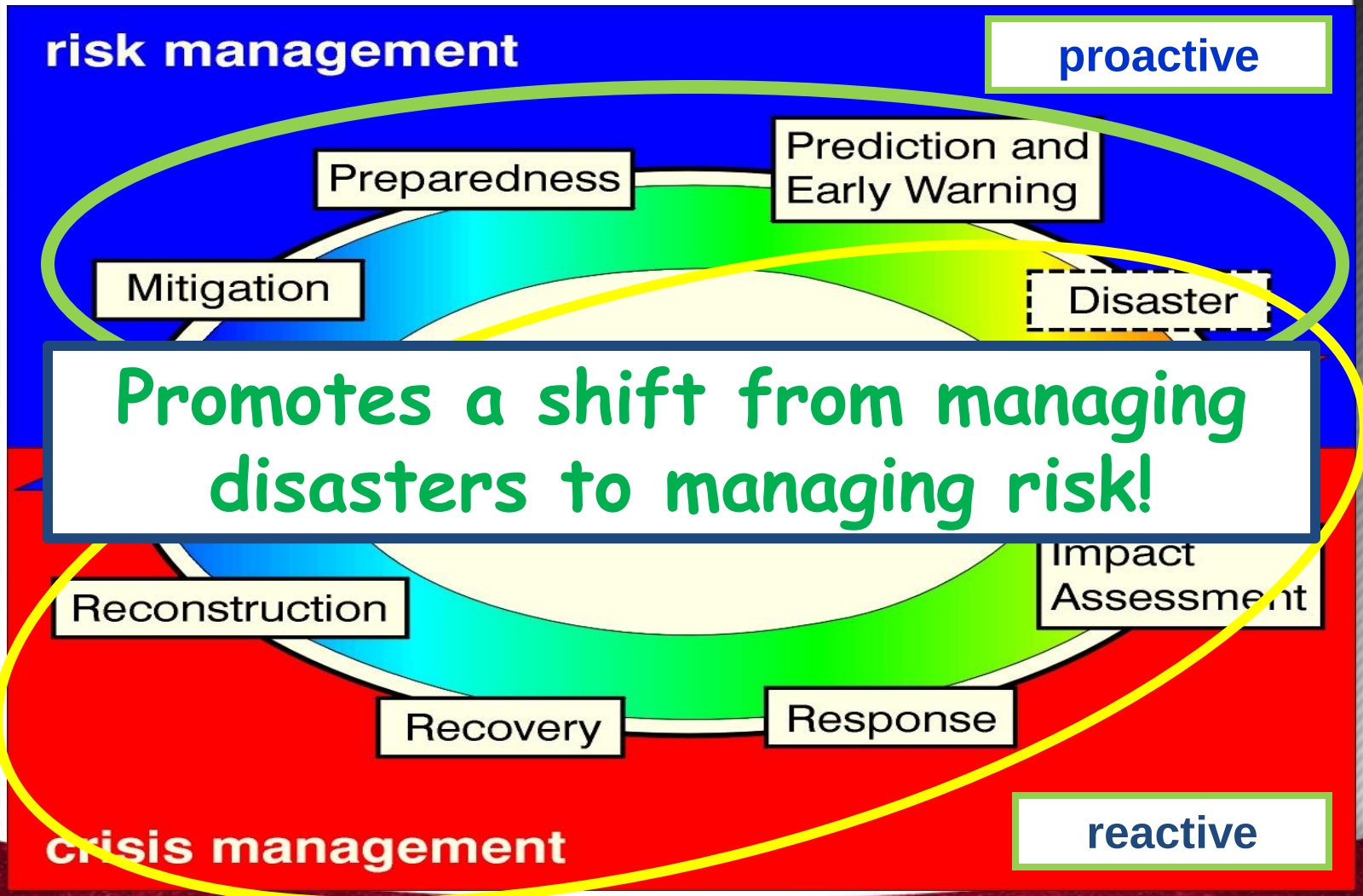
The *CHALLENGE* is to identify emergency response options that will also promote 'risk reduction'.

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.

Drought Risk Management

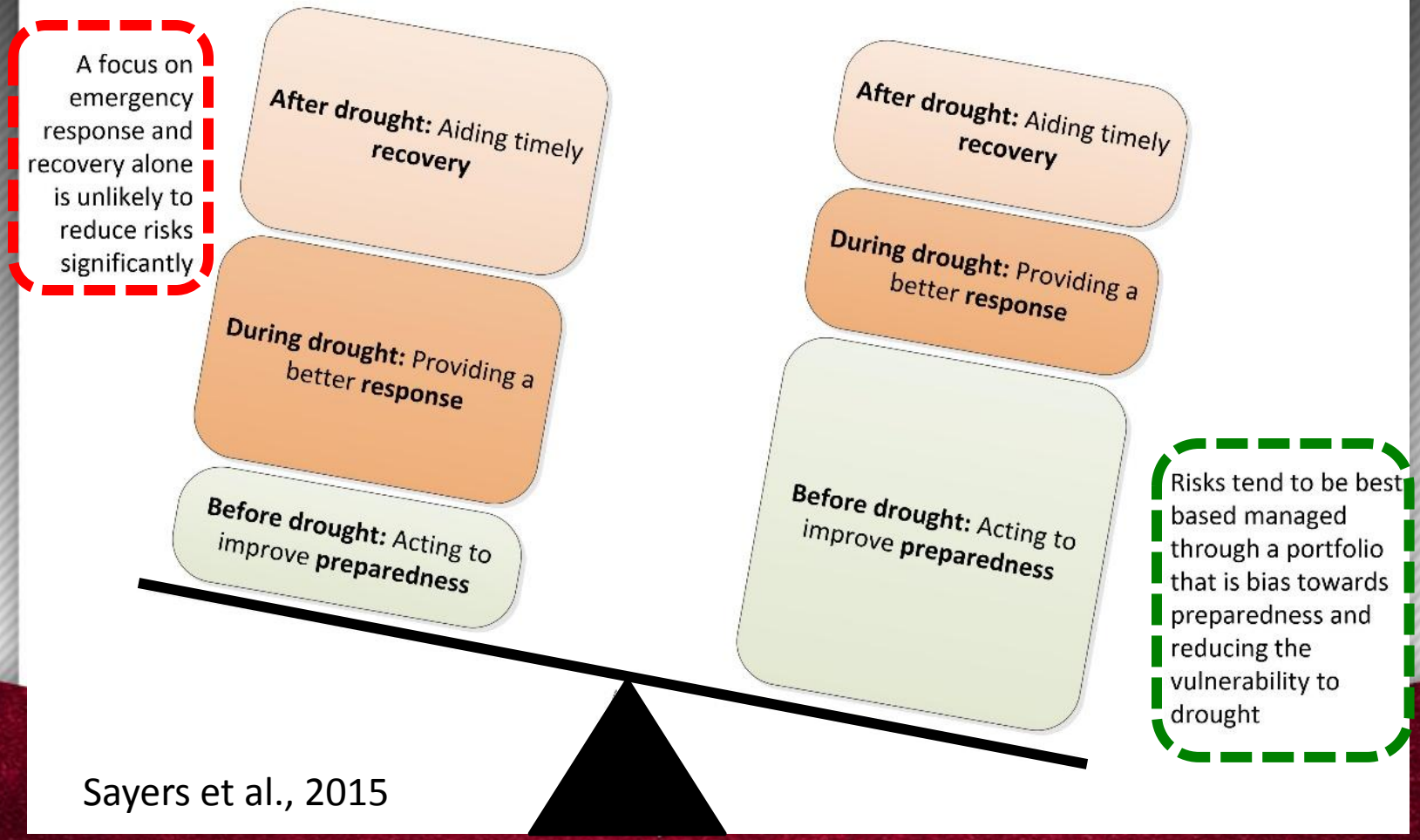
The role of Drought Risk Management Planning is to promote **resilience** to drought episodes based upon:

- **(i)** An appropriate understanding the drivers of the drought risk and associated uncertainties (present and future). **Who and what is at risk and why?**
- **ii)** Integrated action across multiple sectors and from policy to practice.
- **(ii)** Identifying and implementing 'win-win' actions that promote healthy ecosystems and reduce the vulnerability of human systems.
- **iv)** Using limited resource (monetary and non-monetary) to efficiently reduce risk and maximise opportunities.
- **(v)** Robust and flexible solutions that are capable of adapting to the reality of the future as it becomes known.

(Sayers et al., 2015)

Strategic Risk-based Approach for Building Drought Resilience

Determining the right *balance* of measures: A portfolio approach



Sayers et al., 2015

Hazard x Vulnerability = Risk

EXPOSURE

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

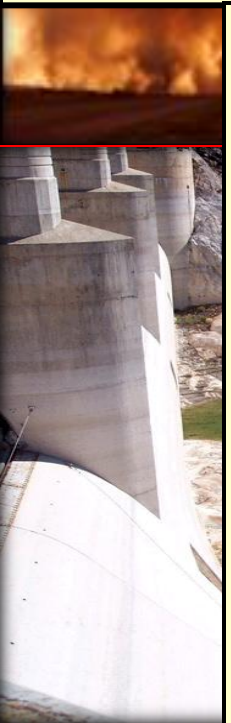
SOCIAL FACTORS

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

RISK

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

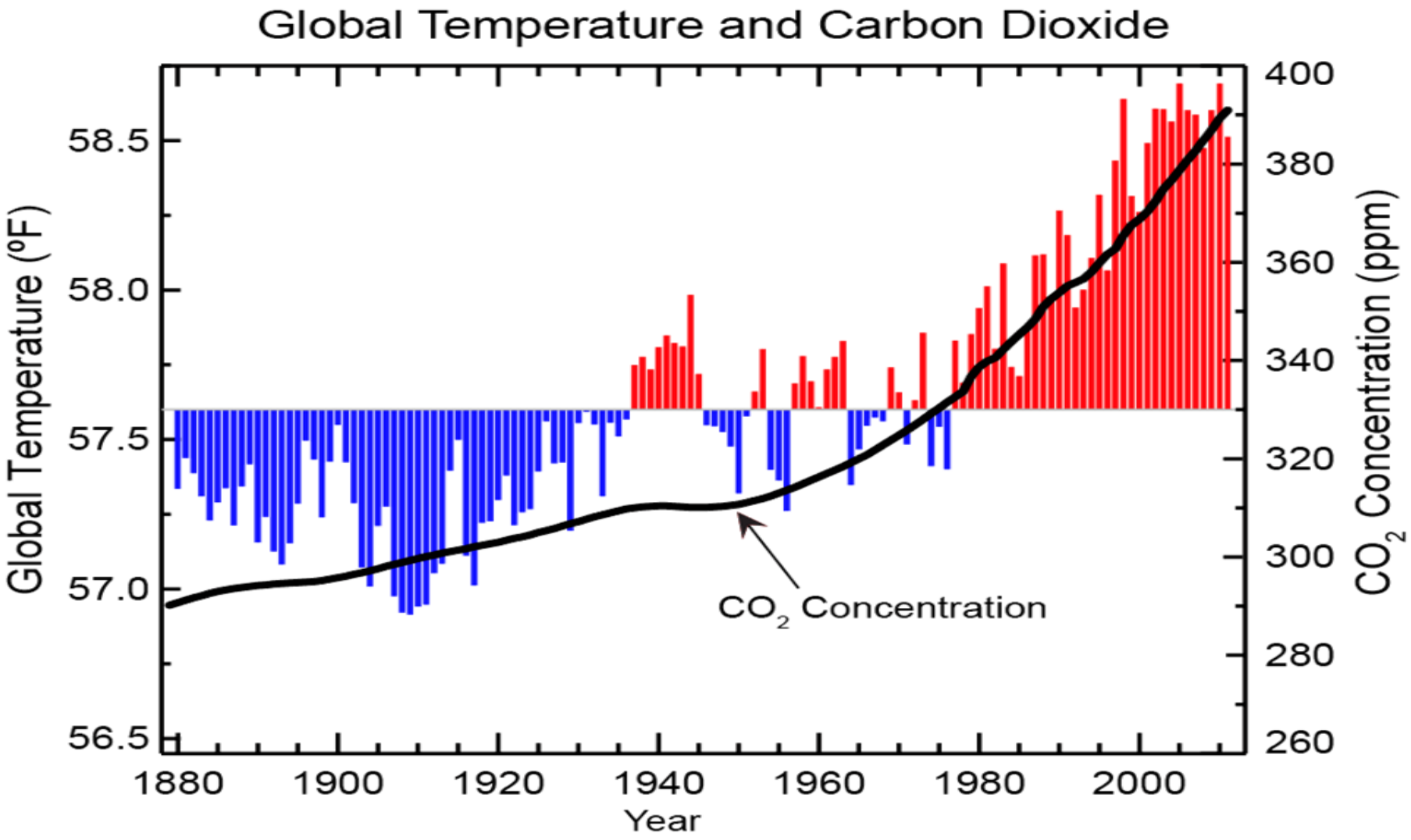
Incentives for Changing the Paradigm

- 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
- More frequent and severe droughts (increased duration?) in association with climate change.
- What is the ***cost of inaction*****?**

Needed Actions for Change: Reducing Societal Vulnerability

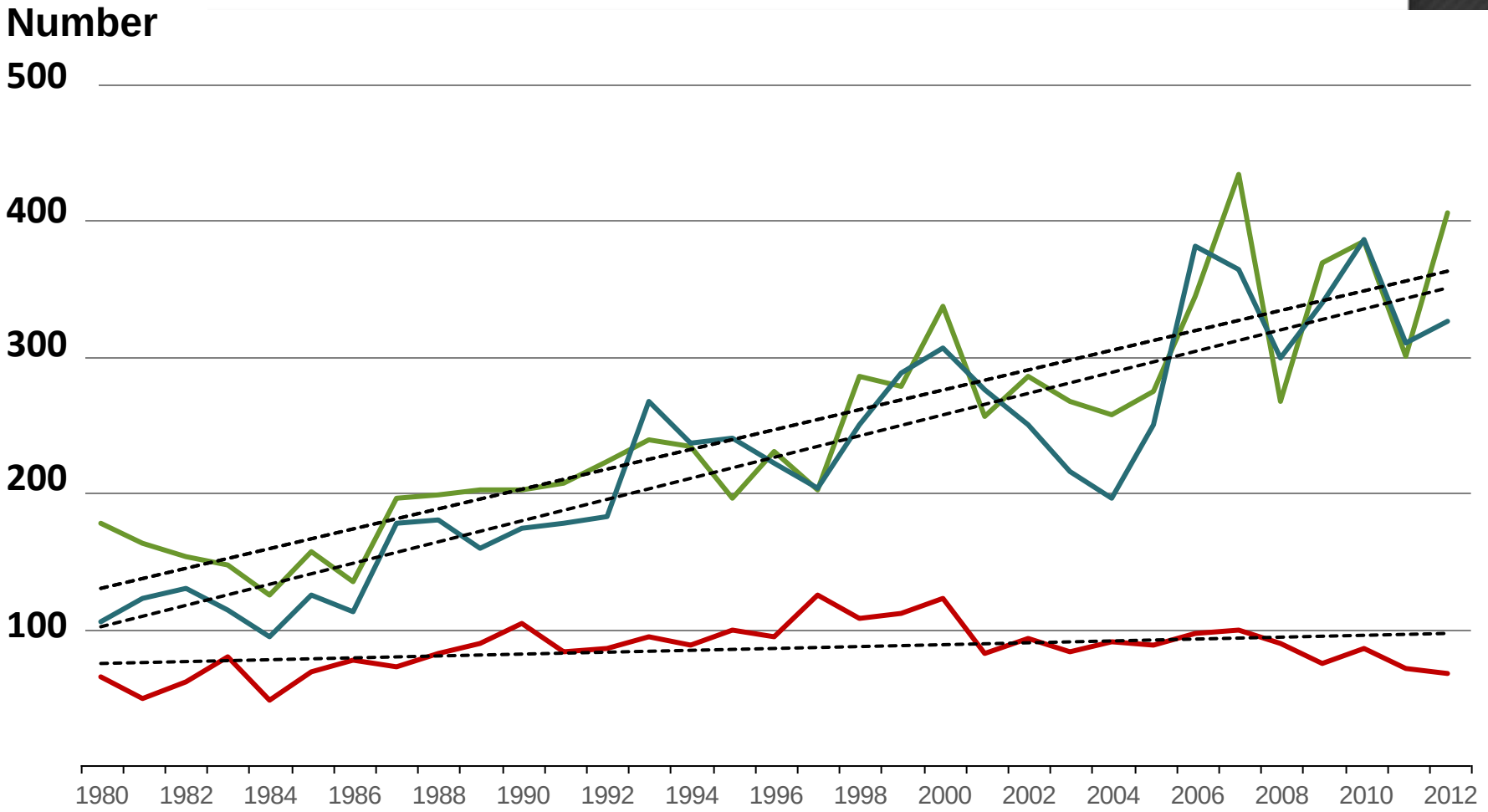
- Improve **drought awareness**
- Develop/improve monitoring, seasonal forecasts, early warning and **information delivery** systems
- Improve **decision support** tools
- Complete **risk assessments** of vulnerable sectors, population groups, regions
- Improve understanding and quantification of **drought impacts vs. mitigation costs (4:1 ratio)**
- Develop and implement **drought preparedness plans**
- Create **national drought policies** based on the principles of risk reduction

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

The Climate Change Challenge for Drought Management

- Increasing mean temperature
- High temp. stress and heat waves/longer growing seasons
- Increased evapotranspiration
- Changes in precipitation amount, distribution, intensity and form
- Reduced soil moisture
- Changes in groundwater recharge
- Reduced runoff/stream flow resulting from reduced snowpack/sublimation

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

WMO

UNCCD
United Nations Convention to Combat Desertification

FAO
FIAT PANIS

HIGH-LEVEL MEETING ON NATIONAL DROUGHT POLICY

(HMNDP)

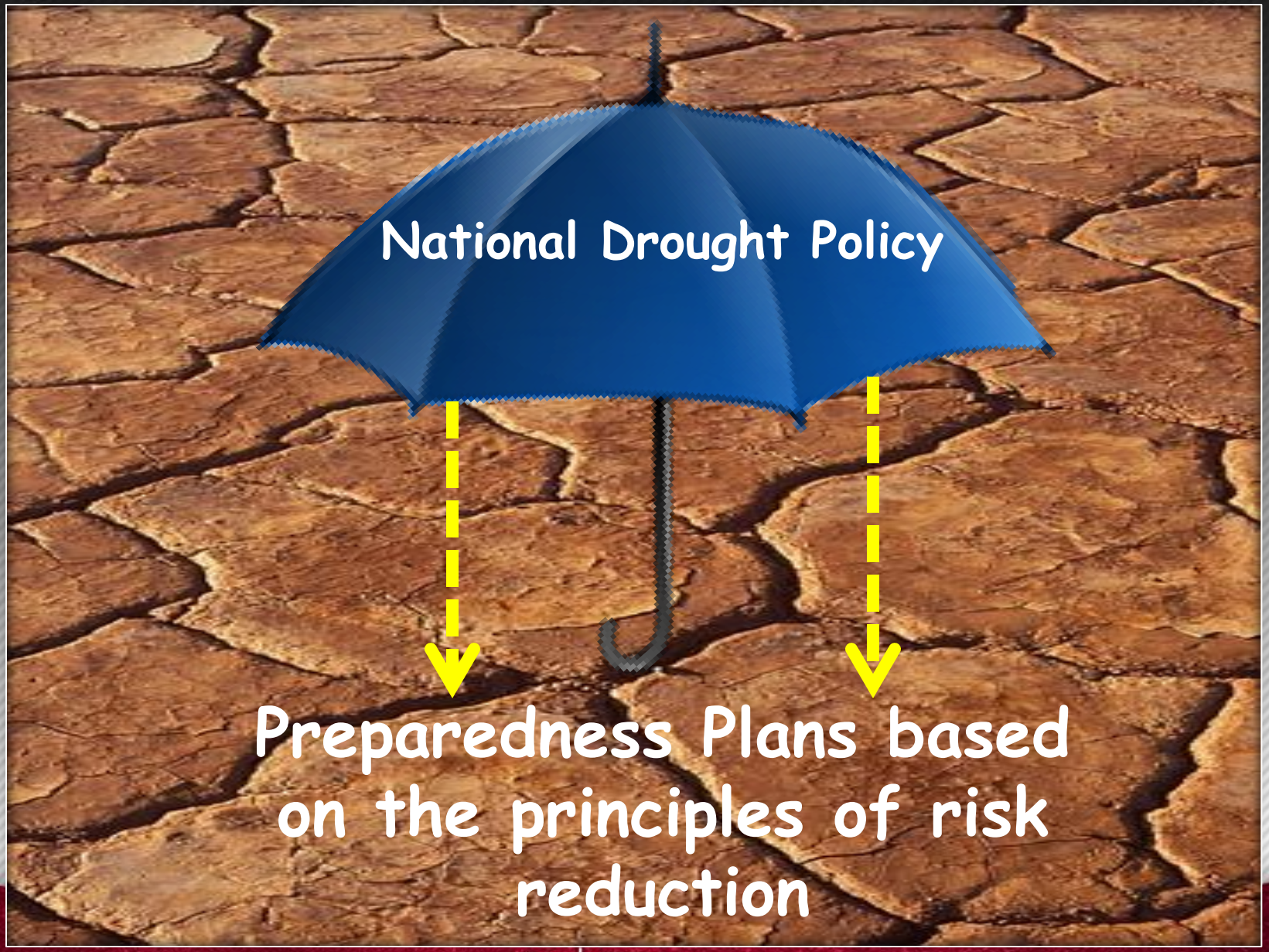
TOWARDS MORE DROUGHT RESILIENT SOCIETIES

11-15 March 2013
CICG, Geneva

Final Report

Necessary Ingredients for National Drought Policy Development

- Political will and leadership!
- Initial investment in building greater institutional capacity
- Collaborative environment that supports and encourages coordination within and between levels of government/private sector
- Engaged and supportive stakeholders
- Engaged research community
- Strong outreach and media program


National Drought Policy
Preparedness Plans based on the principles of risk reduction

A drought policy should be broadly stated and . . .

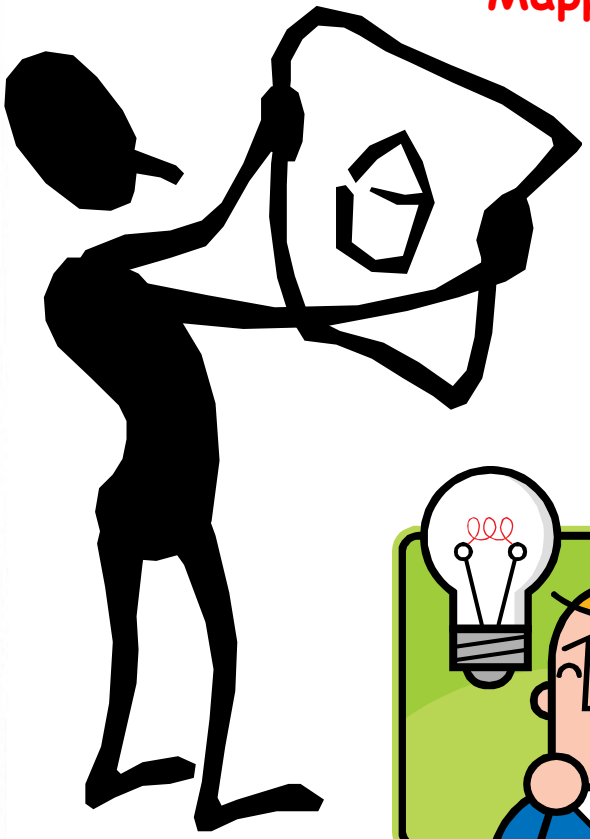
- Establish a clear set of risk-based principles or guidelines to govern drought management.
- Policy could be part of a disaster risk reduction or climate change adaptation framework
- Consistent and equitable for all regions, population groups, and economic/social sectors.
- Consistent with the goals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

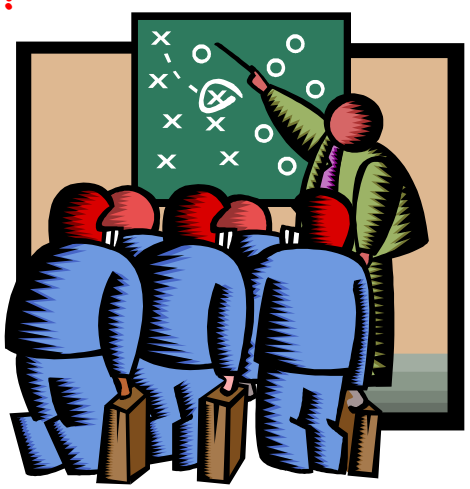
A drought policy should (continued)

- Promote the principles of risk management by encouraging an **integrated drought management approach** at all levels
  - **Early warning and delivery systems**;
    - Monitoring, 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 and interventions** 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.

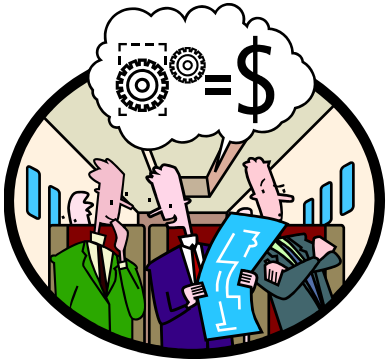
Where do we start?

Mapping out a strategy!





Leadership!



Human and Financial Resources Required?

Cost?

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, **impacts**, etc.
  - Use of appropriate indices
  - Reliable seasonal forecasts
  - Development/delivery of information and sector-specific decision-support tools

Key Elements/Pillars of a Drought Preparedness Plan

- **Risk/Vulnerability and impact assessment**
  - Conduct of risk/vulnerability assessments
  - Monitoring/archiving of impacts/losses
    - Critical for evaluating progress in risk reduction and also for vulnerability assessment
- **Mitigation and response**
  - Proactive measures to increase coping capacity
  - Response measures that support the principles of drought risk reduction
    - Examples

3 Pillars of Drought Policy & Preparedness with Linkages

Monitoring/Early Warning & Info. Delivery

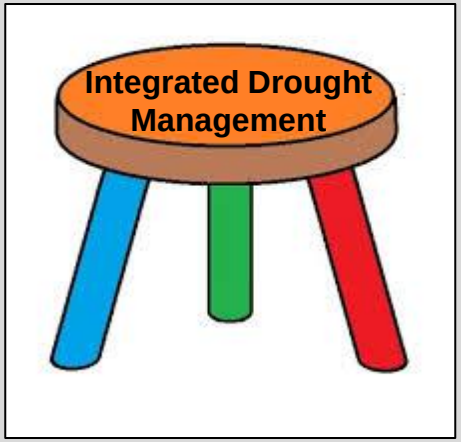
Drought status (Met., Agric., Hydro. & Socio-economic)

Feedback

Drought characterization studies

Vulnerability and Impact Assessment

Who/What is at RISK & Why? Prioritization/Ranking



Feedback

Feedback

Mitigation and Response

Actions and measures to mitigate drought impacts and respond to drought emergencies (short-, medium- & long-term)

Monitoring, Early Warning & Information Delivery Systems

Indicators/Indices	Agencies/Ministries/Organizations

• Precipitation
• Temperature
• Surface water supplies
  – Stream flow
  – Soil Moisture
  – Reservoir levels
  – Snow pack
  – Water use
• Ground water
• Remotely-sensed data (e.g., plant water stress)
• **Impacts**
  – By sector, area
	• Water
	• Meteorological & Hydrological Services
	• Agriculture, Forestry & Fisheries
	• Environment
	• Health
	• Energy
	• Transportation
	• Commerce
	• Social Services
	• NGOs
	• Others

Vulnerability/Impact Assessment, Mitigation and Response

Who and What is at RISK and Why?

By Sector

- **Agriculture**
- **Energy**
- **Environment, Recreation & Tourism**
- **Transportation**
- **Health**
- **Commerce**
- **Others**

By Area/Region

- Drought management areas (provinces, river basins)
- Communities (rural, urban)
- Indigenous population

Agencies, Organizations & Stakeholder Groups

- Reps from Ministries and non-governmental organizations
- Communities & regional organizations
- Stakeholder groups representing all impact sectors
- Others

Defining and Characterizing Vulnerability

- **Vulnerability** refers to the inability to withstand the effects of a hostile environment (drought).
- Vulnerability is the diminished capacity of an individual or group to anticipate, cope with, resist and recover from the impact of a natural or man-made hazard. **(Resilience)**
- Vulnerability is dynamic.
- Vulnerability arises when people are at risk through their exposure to a shock or stress associated with a natural hazard.
- People, sectors, communities and institutions differ in their exposure and vulnerability to risk (coping capacity).

Addressing Vulnerability

- To determine people's vulnerability, two questions need to be asked:
  - **Who and what** is **vulnerable**?
  - **Why are they vulnerable?**
- Addressing vulnerability requires:
  - reducing the impact of the hazard itself where possible (through **mitigation, prediction and early warning, preparedness, education, etc.**);
  - **building capacity** to withstand and cope with hazards;
  - tackling the **root causes of vulnerability**, such as poverty, poor management of natural resources, government policies, inadequate training or management skills, access to resources.

Coping Capacity and Resiliency

Coping Capacity: The ability of people, organizations and systems, using available skills and resources, to face and manage adverse conditions, emergencies or disasters. Improving coping capacity contributes to the reduction of risk (*managing risk vs. managing disasters*)

Resiliency: The ability to recover quickly when exposed to a stressor or shock.

- Climate change → increased frequency of drought → policies & preparedness → reduced impacts and recovery time

A UN-WATER INITIATIVE

UN WATER

ORGANIZED BY:

WMO

UNCCD
United Nations Convention to Combat Desertification

FAO FIAT PANIS

LOCAL ORGANIZER

METEO ROMÂNIA

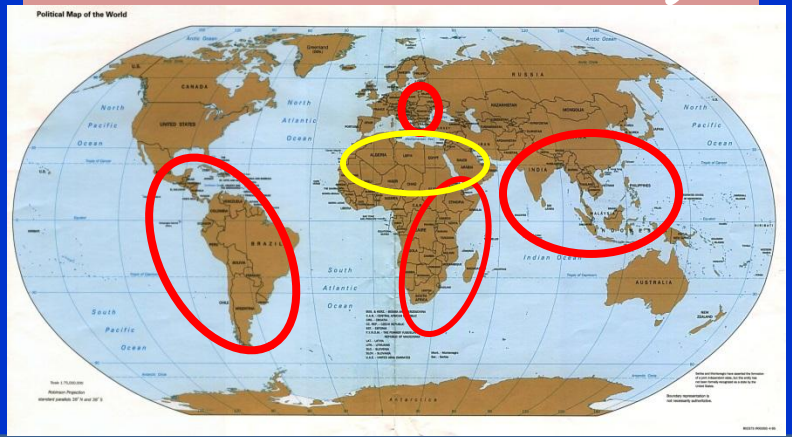
1st Regional Workshop | Bucharest, Romania

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

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



Framework for IDMP's work on Drought Policies: National Drought Management Policy Guidelines

- Adapting of 10-step planning process by Don Wilhite to national drought policy development
- Response to a need articulated at High-level Meeting on National Drought Policy (HMNDP)
- Template that can be adapted to national realities and needs
- Building on existing risk management capacities

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.

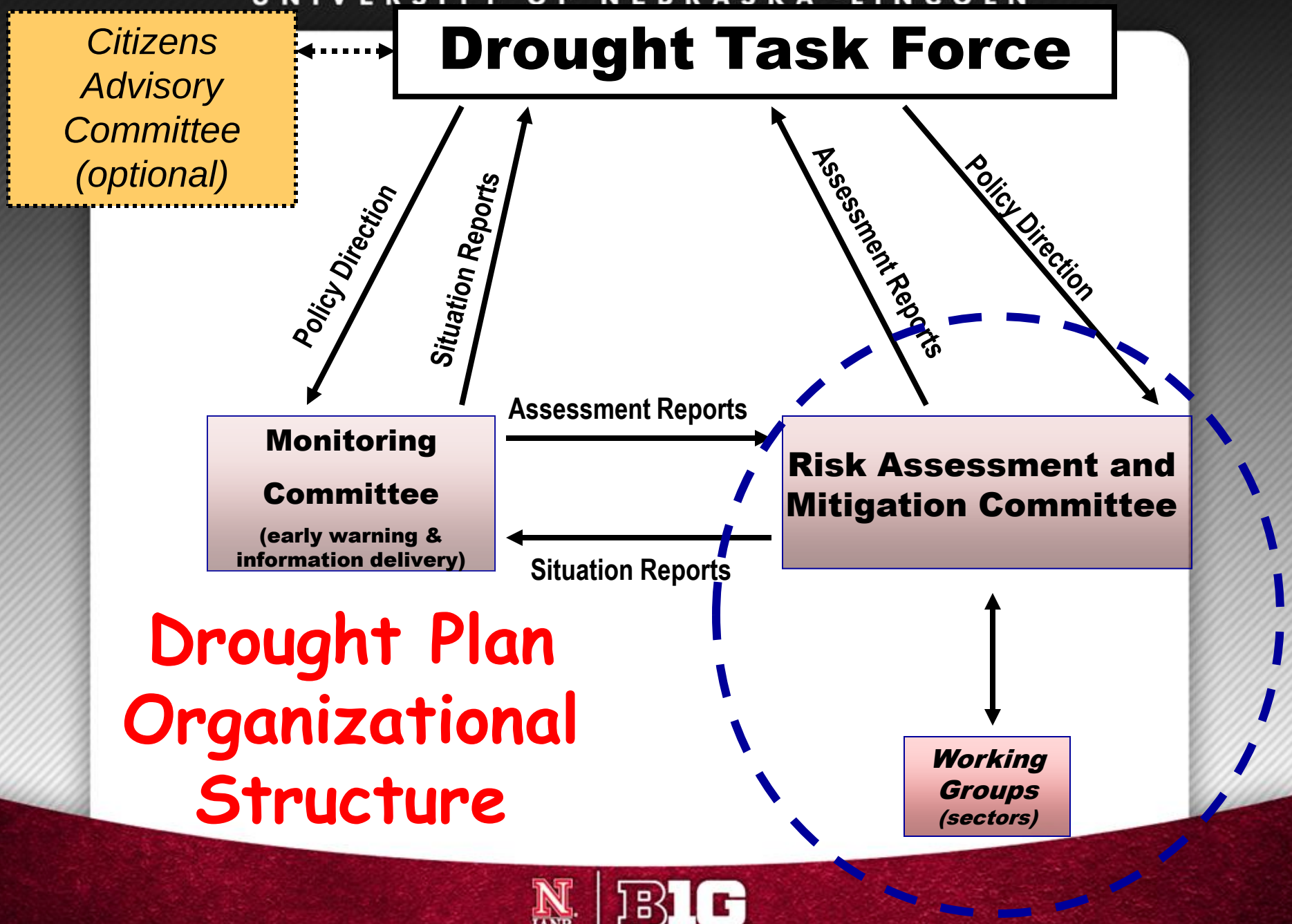
Who and what is at risk and why?

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

Takeaway Messages

- Drought is a ***normal*** part of climate.
- ***Changing precipitation*** amounts, seasonal distribution, form
- ***Increasing temperatures*** will increase ET and drought severity, frequency and duration.
- Past drought management efforts have been ***reactive***—ineffective, poorly coordinated & poorly targeted **(crisis management).**
- Managing sector impacts—***increase resilience*** to drought.
- ***Integrated drought management*** requires a collaborative approach **within and between levels** of government and the private sector for monitoring and early warning, risk/vulnerability assessment and mitigation and response.
- Time is ***NOW*** to change the ***paradigm*** from crisis to ***drought risk management*** through *integrated drought management*.
- The '***cost of inaction***'!

Thanks for your attention!

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