The National Drought Mitigation Center: Drought Science. Planning Sense

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University of Nebraska-Lincoln

NDMC

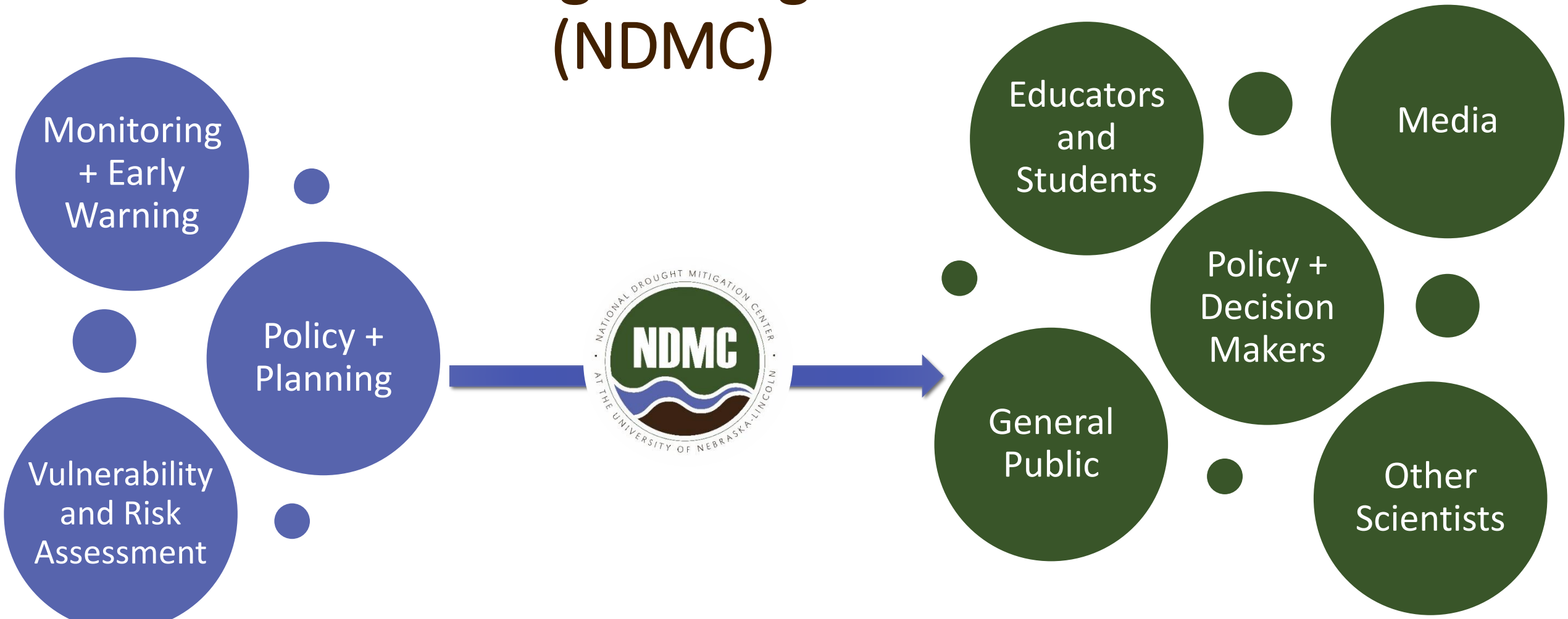
NATIONAL DROUGHT MITIGATION CENTER

UNIVERSITY OF NEBRASKA

SISSA Development of National Drought Plans and Policies in Southern South America Workshop

November 23-24, 2020

National Drought Mitigation Center (NDMC)

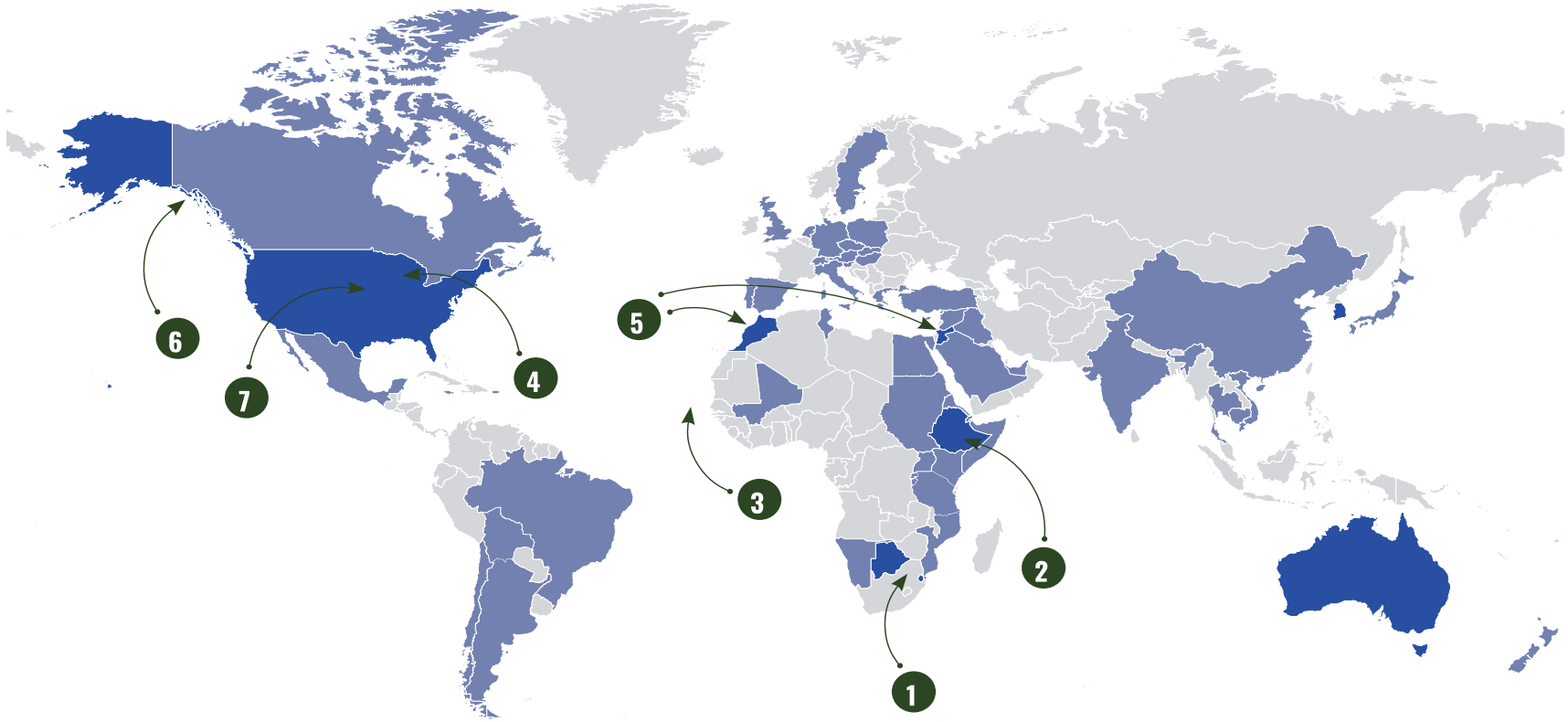


Drought Science: 3 Pillars

Education, Outreach, & Engagement

Useable, Actionable, & Policy Informing Information

Where we work



1 Botswana and Eswatini Workshop

Location: Botswana and Eswatini

In January, National Drought Mitiga
director Mark Svoboda traveled to southe
to meet with meteorological, natural reso
emergency management and planning ex
Botswana and Eswatini thanks to a partn
the World Bank. For more information, re
the experts' 2019 visit to Lincoln on page

**2 The first-ever African Initiative f
Planetary and Space Science wo**

Location: Addis Ababa, Ethiopia

In February, NDMC climatologist and rem
expert Tsegaye Tadesse participated in th
workshop, where researchers and leader
to discuss the cultural, economic and soc
impacts of space science development in
and other African nations.

**3 The Food and Agriculture Organiz
the United Nations' Global Frame
Water Scarcity (WASAG) Conferen**

- ***NOAA/NIDIS + USDA***
- ***UN organizations*: FAO, ISDR, UNDP and CCD**
- ***World Meteorological Organization (WMO)***
- ***USAID, World Bank***
- ***WMO/Global Water Partnership: Integrated Drought Management Program (IDMP)***
- **Various regional and national climate centers**
- **Numerous government agencies and universities in different countries**

ney and International Water
tute staff organized a workshop
Svoboda also travelled to
ed Knutson, Hayes and NDMC
tor Deborah Bathke in Jordan in
A project workshop.

ght Workshop

aau, Alaska

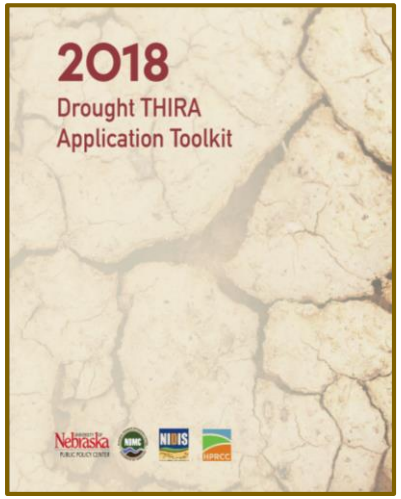
ake facilitated a drought workshop
f the center's work with the U.S.
iculture. The event was designed
olders to transition from a snow to
tem.

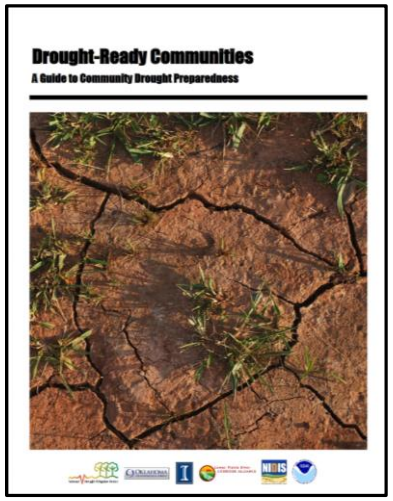
l Workshop

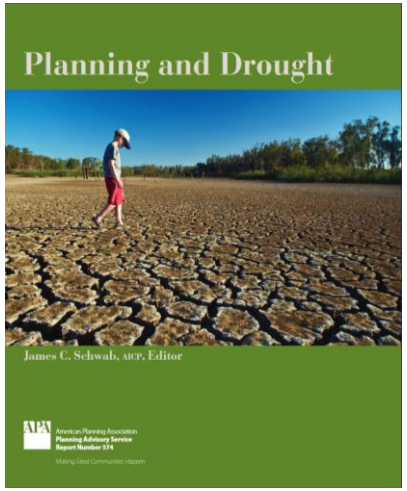
rara, Nebraska

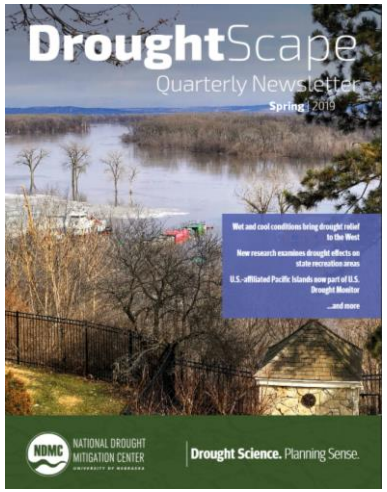
, Knutson and Hayes facilitated
i River Tribes Adaptation Planning
by the Santee Nation.

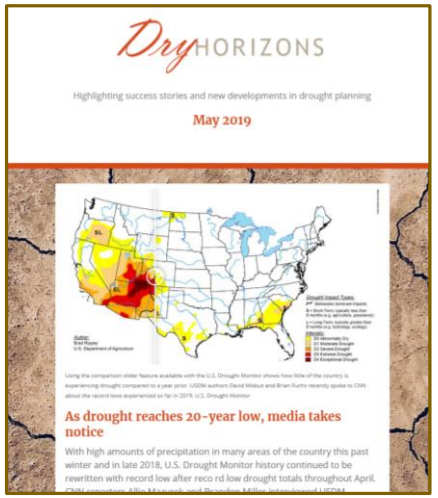
How We Do It: Partners

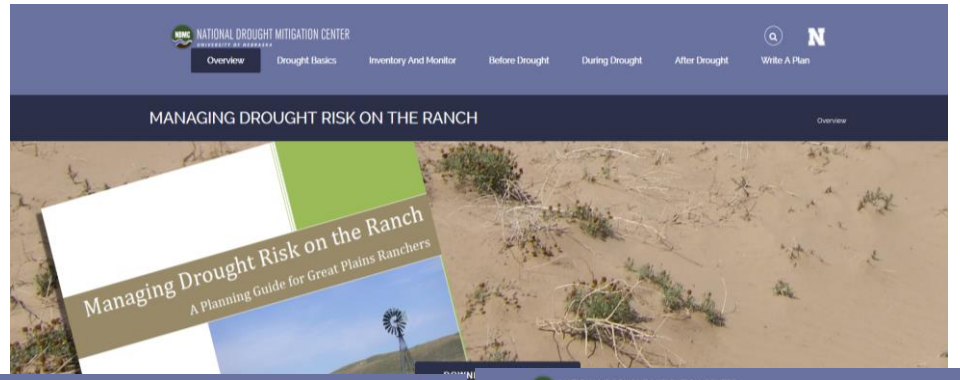


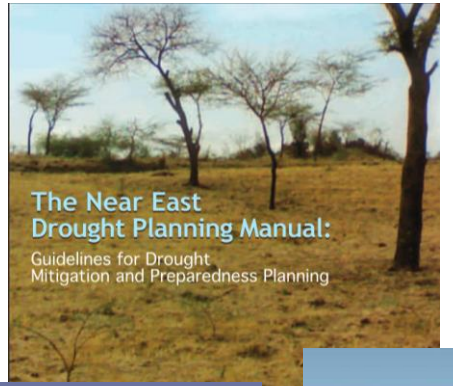


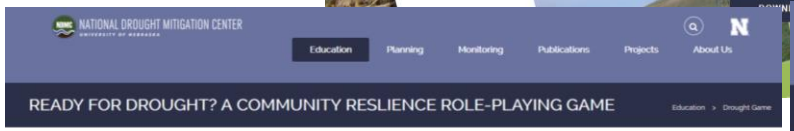


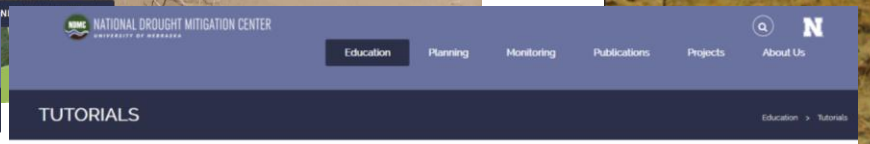


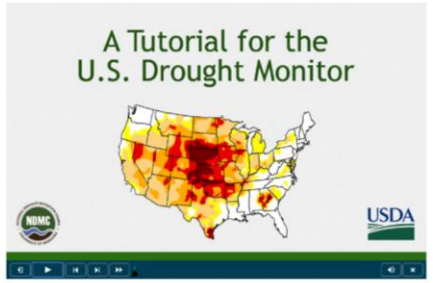


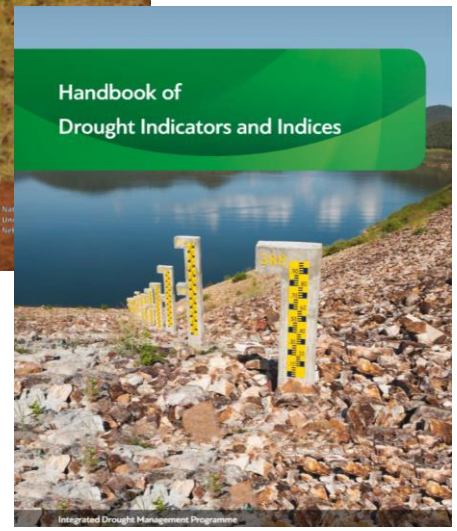












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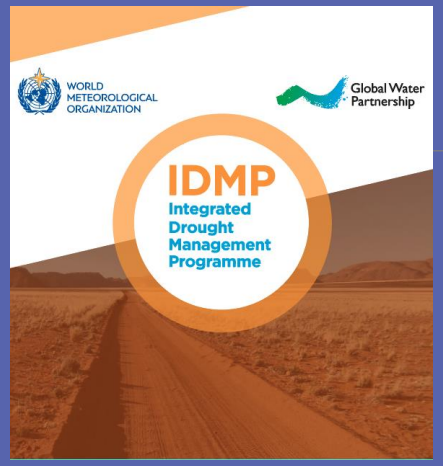
SCHOOL OF NATURAL RESOURCES

Drought Risk Management: The Three Pillars



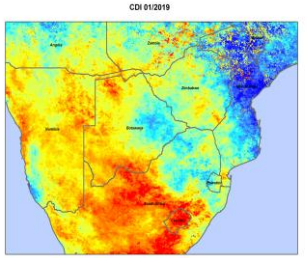
Successful Drought Policy

Monitoring & Early Warning	Vulnerability & Impact Assessment	Mitigation & Response
(I)	(II)	(III)

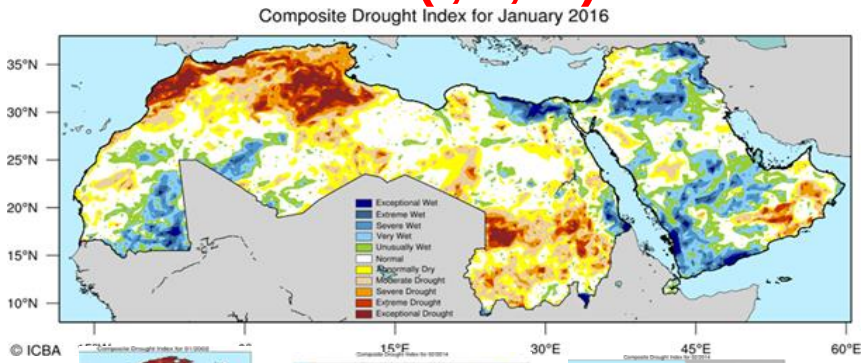
Overall purpose: preparedness planning based on these pillars of risk reduction.

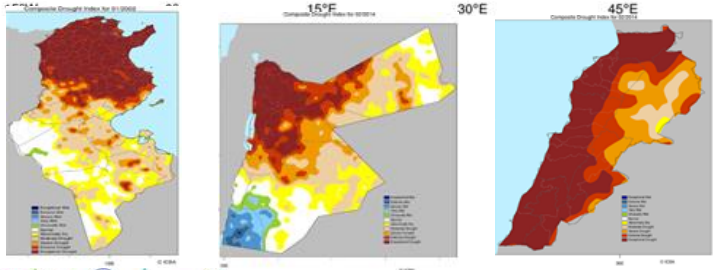
NDMC International DRMS Activities

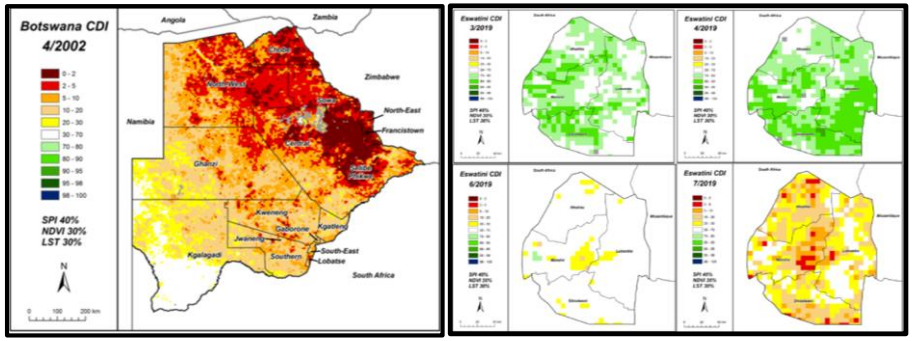
Caribbean (I, II, III)



MENA (I, II, *III*)

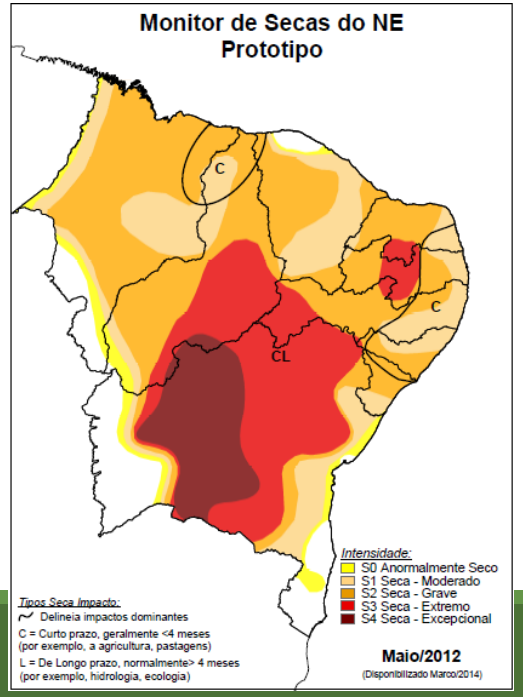




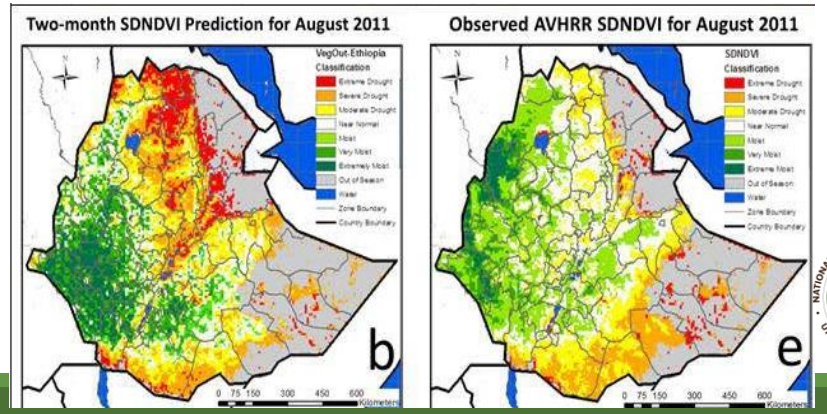


Southern Africa (I, II, III)

Brazil (I)



Greater Horn of Africa (I)



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North American Drought Monitor

October 31, 2020

(Released Friday, Nov. 13, 2020)

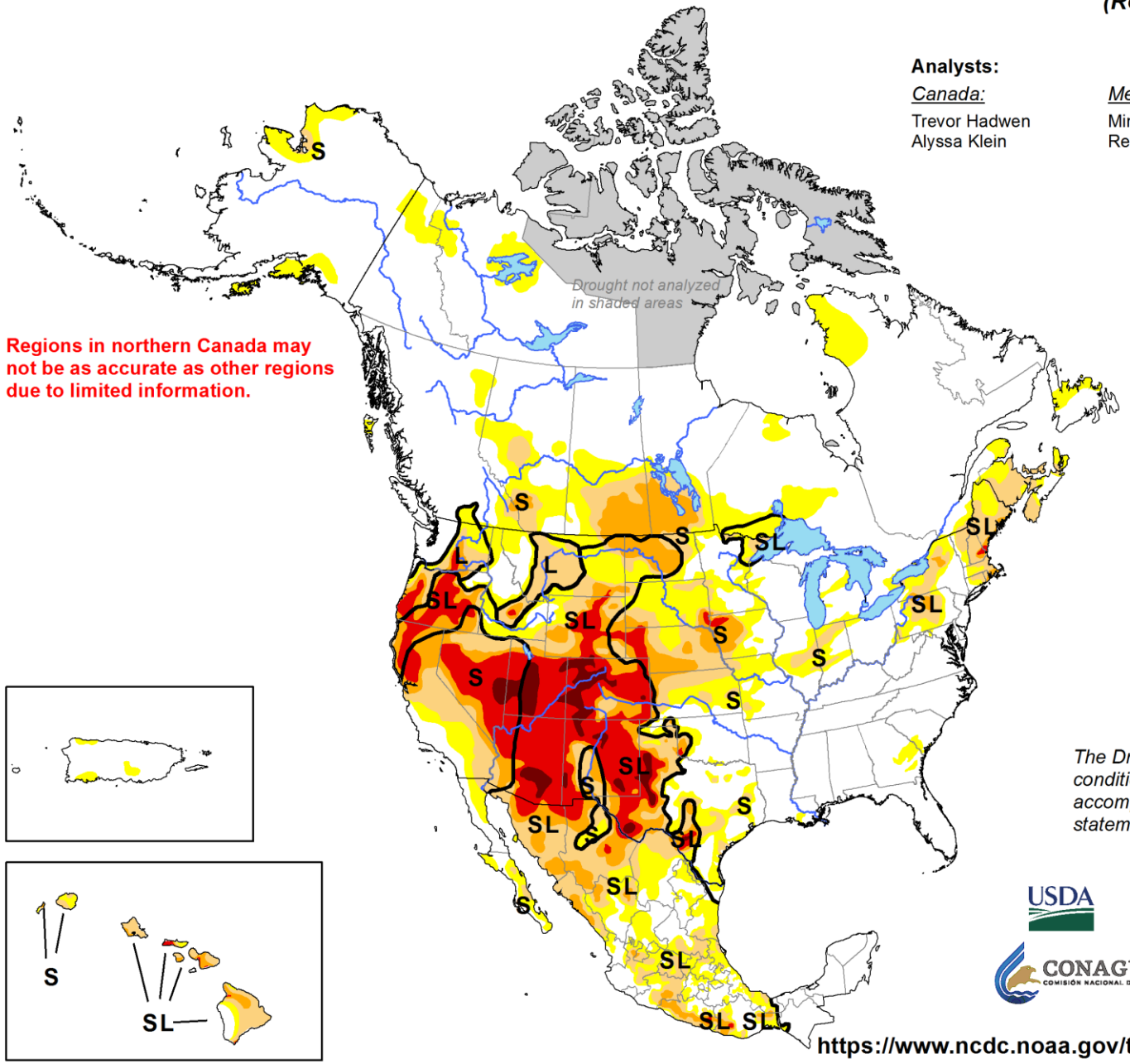
Analysts:

Canada:
Trevor Hadwen
Alyssa Klein

Mexico:
Minerva Lopez
Reynaldo Pascual

USA:
David Miskus
Richard Heim*

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



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

Intensity

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

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)

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

https://www.ncdc.noaa.gov/temp-and-precip/drought/nadm/

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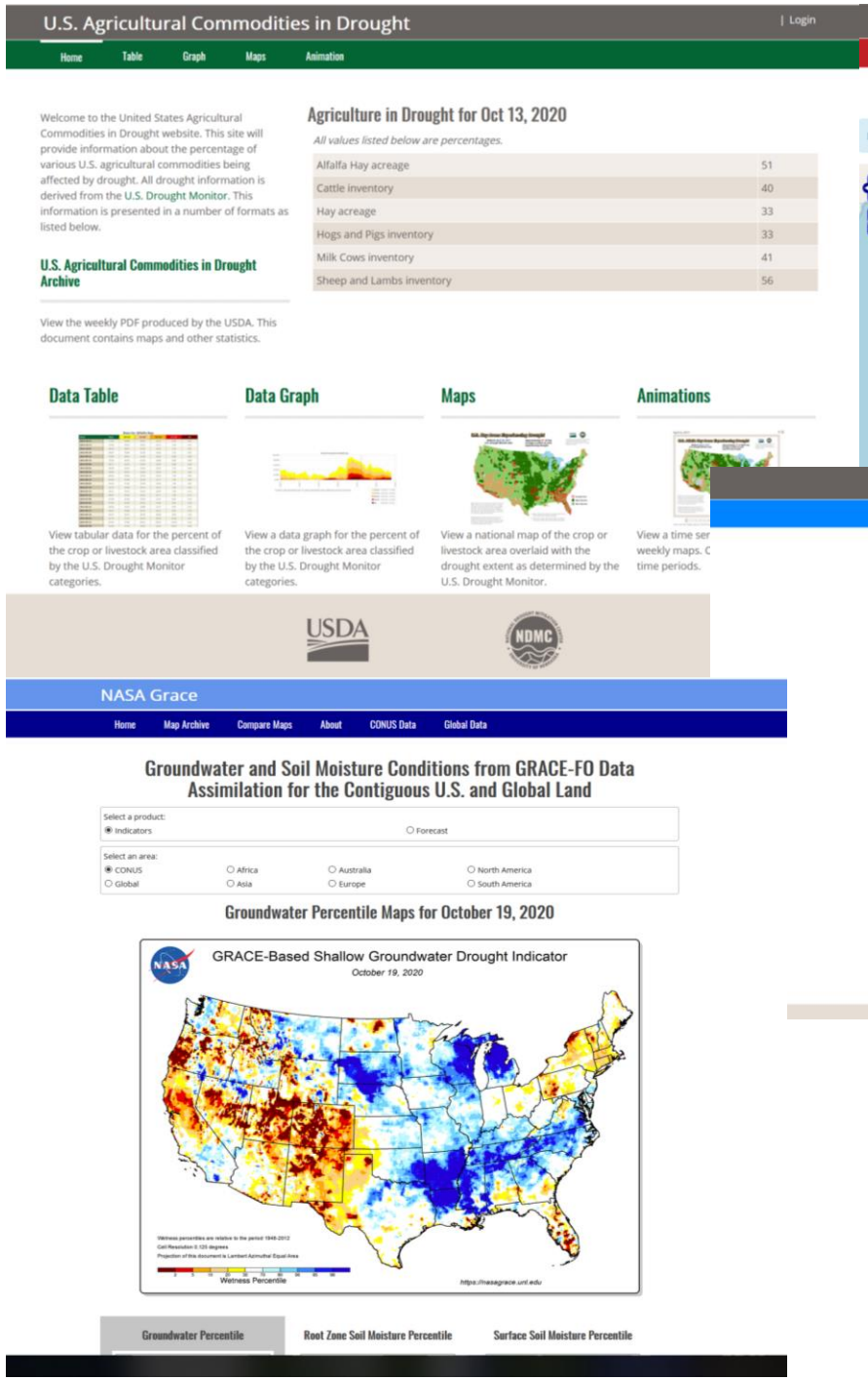
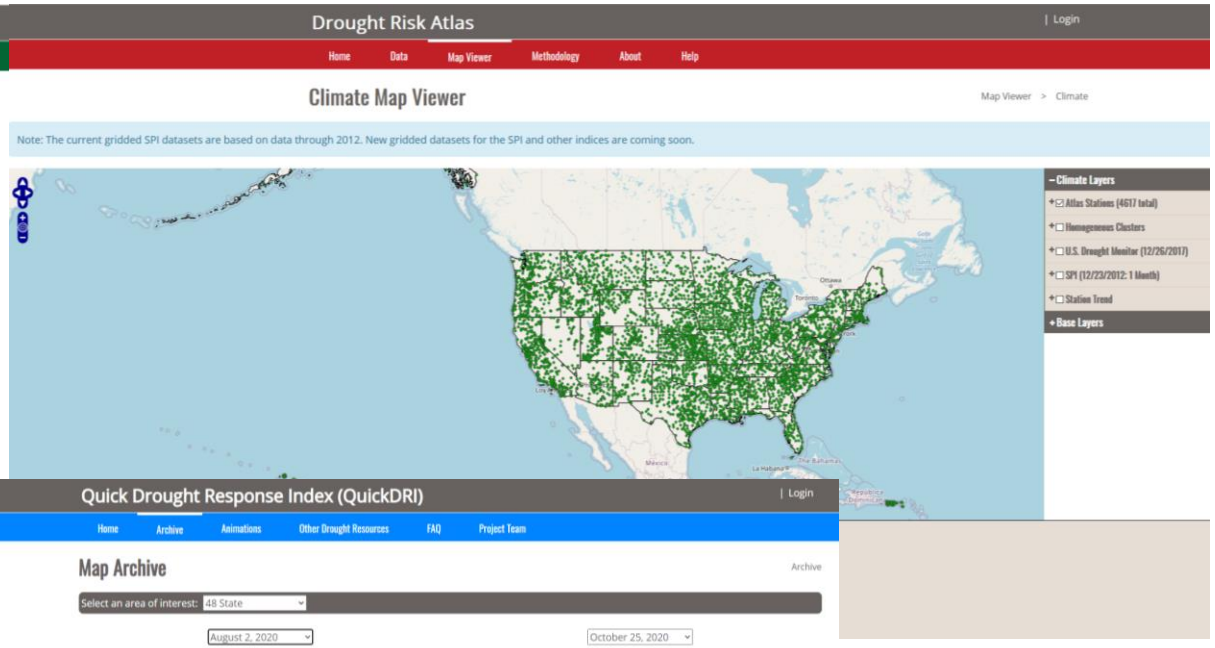
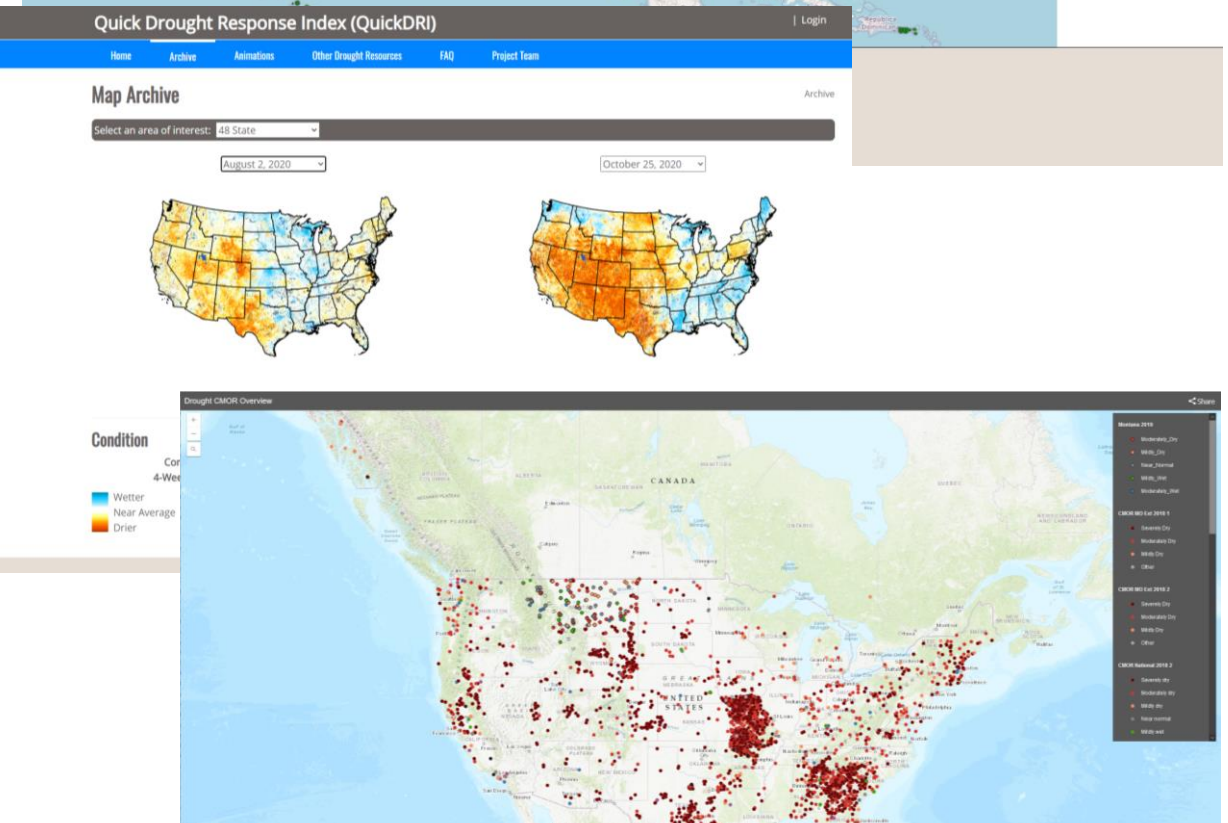
How We Do It: Decision Support







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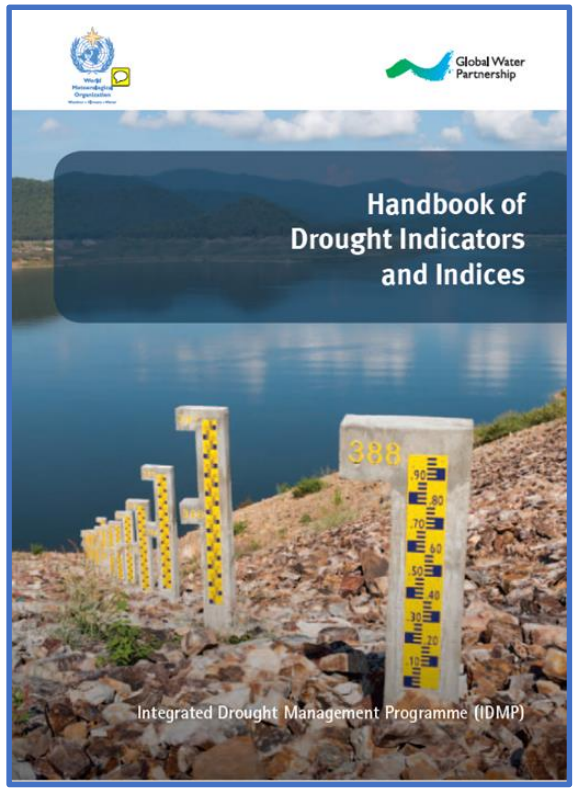
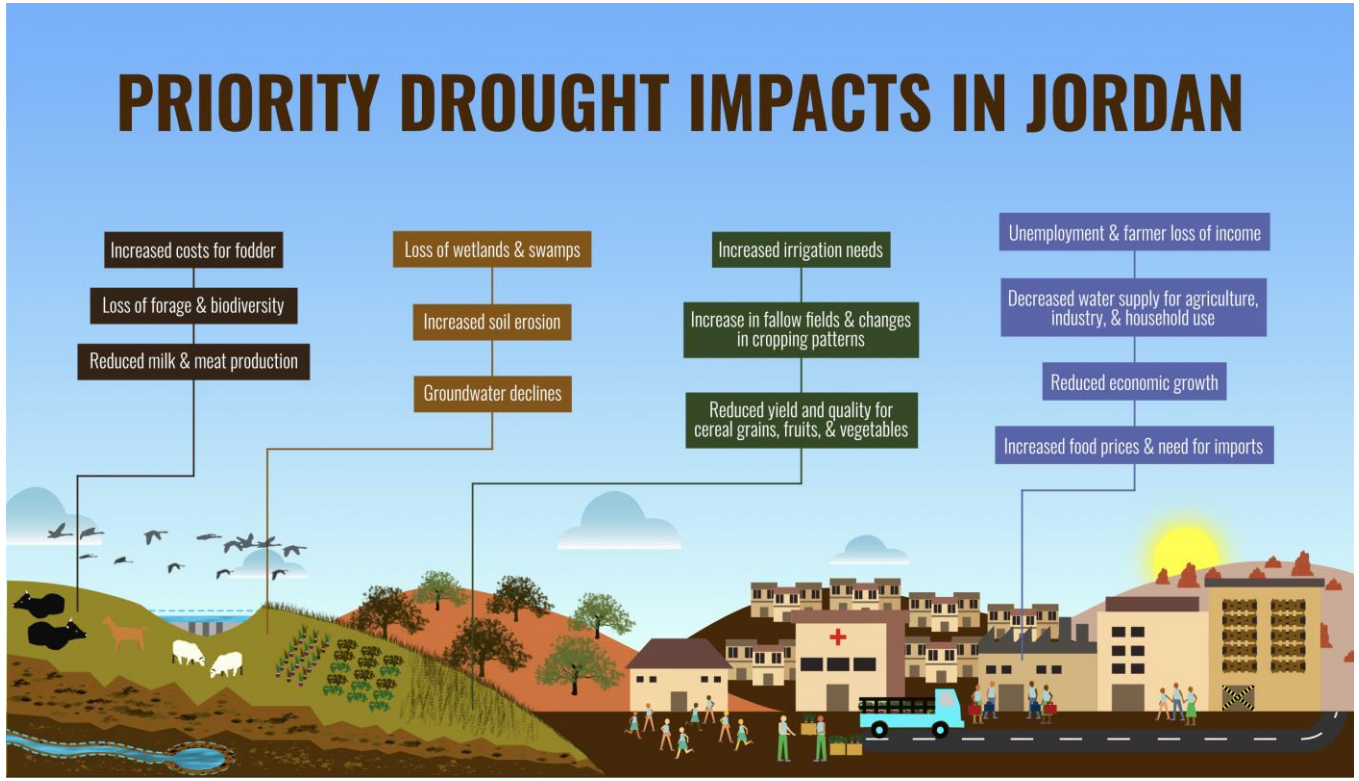
Linking impacts with indicators





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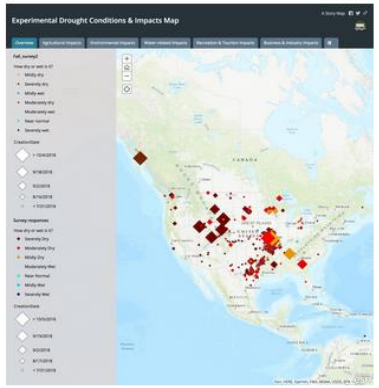
Drought Impacts Toolkit

| Login

Home | Condition Monitoring Observations | Drought Impact Reporter | Visual Drought Atlas | Emerging Impacts | Impact Assessments

CONDITION MONITORING OBSERVATIONS

Different systems collect condition monitoring observations using a common seven-point dry-to-wet scale to capture what they see at a specific place and time.



DROUGHT IMPACT REPORTER

We systematically scan news stories, looking for "a loss or change at a specific place and time due to drought," providing a preliminary historic record and sometimes insight on emerging conditions.

VISUAL DROUGHT ATLAS

The Visual Drought Atlas is a way to compare the appearance of different landscapes over time, in dry, wet and normal years.

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NDMC USDA NOAA NIDIS

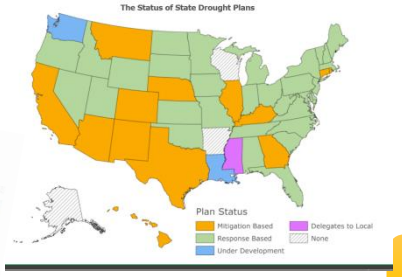
How We Do It: Planning

Planning Tools

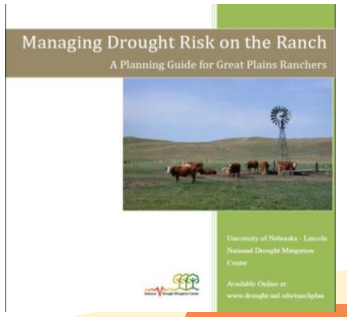
- Planning at ***all scales***
- Planning should start local and involve the ***"locals"***
- Planning is a ***"living"*** process

Nation

Basin



Tribal/ State



Community

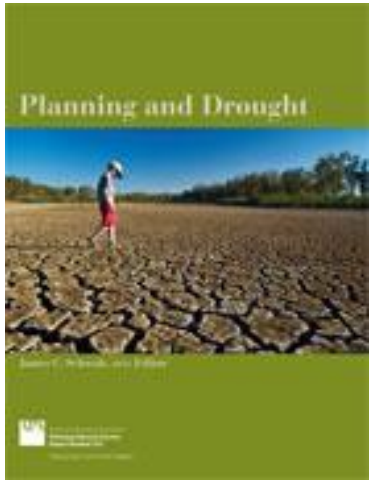
Individual

Drought Planning Lessons Learned

- Drought Preparedness Plans can either be:
  - ***Stand alone,*** or
  - ***Integrated*** into a variety of other existing plans, which may be ***more efficient and avoid duplication of effort*** between all hazards.
  - ***Not a prescriptive process***, must do what works best for your situation. ***Context matters!***

Some examples of these are:

- Comprehensive/Master
- Water/Conservation
- Multi-hazard
- Climate Change/Adaptation



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Drought Early Warning Information System (DEWIS)

From science to action: integrating DEWIS into policy

1

Research and develop a DEWIS

2

Receive operational DEWIS platform

3

Evaluate the DEWIS

to determine if the DEWIS meets decision-making and stakeholder needs

4

Produce the DEWIS operationally

to ensure that the process is realistic given the available resources

5

Develop triggers based upon the DEWIS

to initiate drought management actions based on severity levels

6

Make it official

by documenting the monitoring process and triggers in a drought plan

7

Publicize the drought plan

to increase awareness and create consensus

Local Collaborations → **National Applications**

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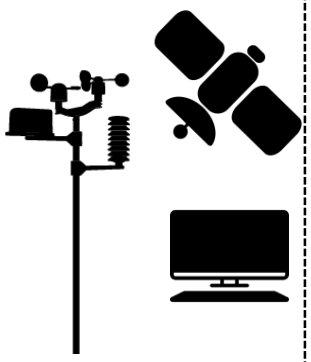
Composite Drought Indicator

Developing the CDI

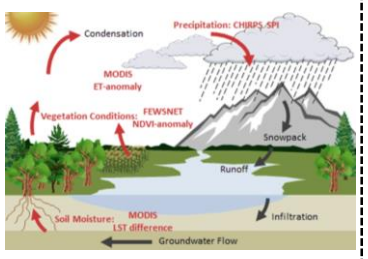
1



Collect climate data

from satellites, surface observations, or computer models

2



Select drought indicators

based on data availability, quality, and decision-making needs

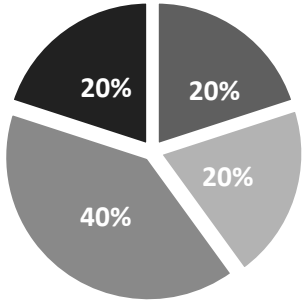
3

100	99	98	97	96	95	94	93	92	91
90	89	88	87	86	85	84	83	82	81
80	79	78	77	76	75	74	73	72	71
70	69	68	67	66	65	64	63	62	61
60	59	58	57	56	55	54	53	52	51
50	49	48	47	46	45	44	43	42	41
40	39	38	37	36	35	34	33	32	31
30	29	28	27	26	25	24	23	22	21
20	19	18	17	16	15	14	13	12	11
10	9	8	7	6	5	4	3	2	1

Put data in historical context

percentile method is used to rank data and assign severity

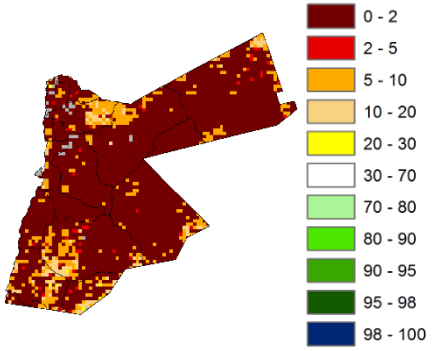
4



Assign relative weights

by expert judgement of project scientists and in-country consultants

5

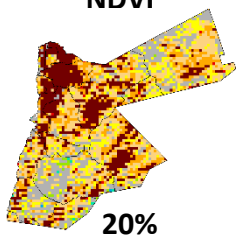


Blend data and create map

into a single product with relevant information for drought management

Calculation

Vegetation Health NDVI



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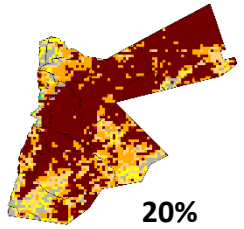
Evapotranspiration LST



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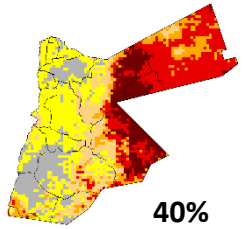
Precipitation SPI



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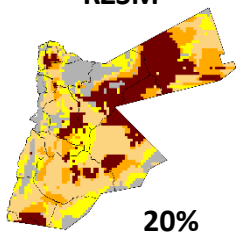
Soil Moisture RZSM



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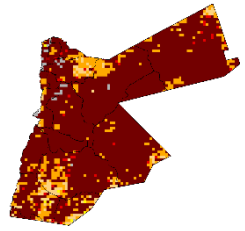
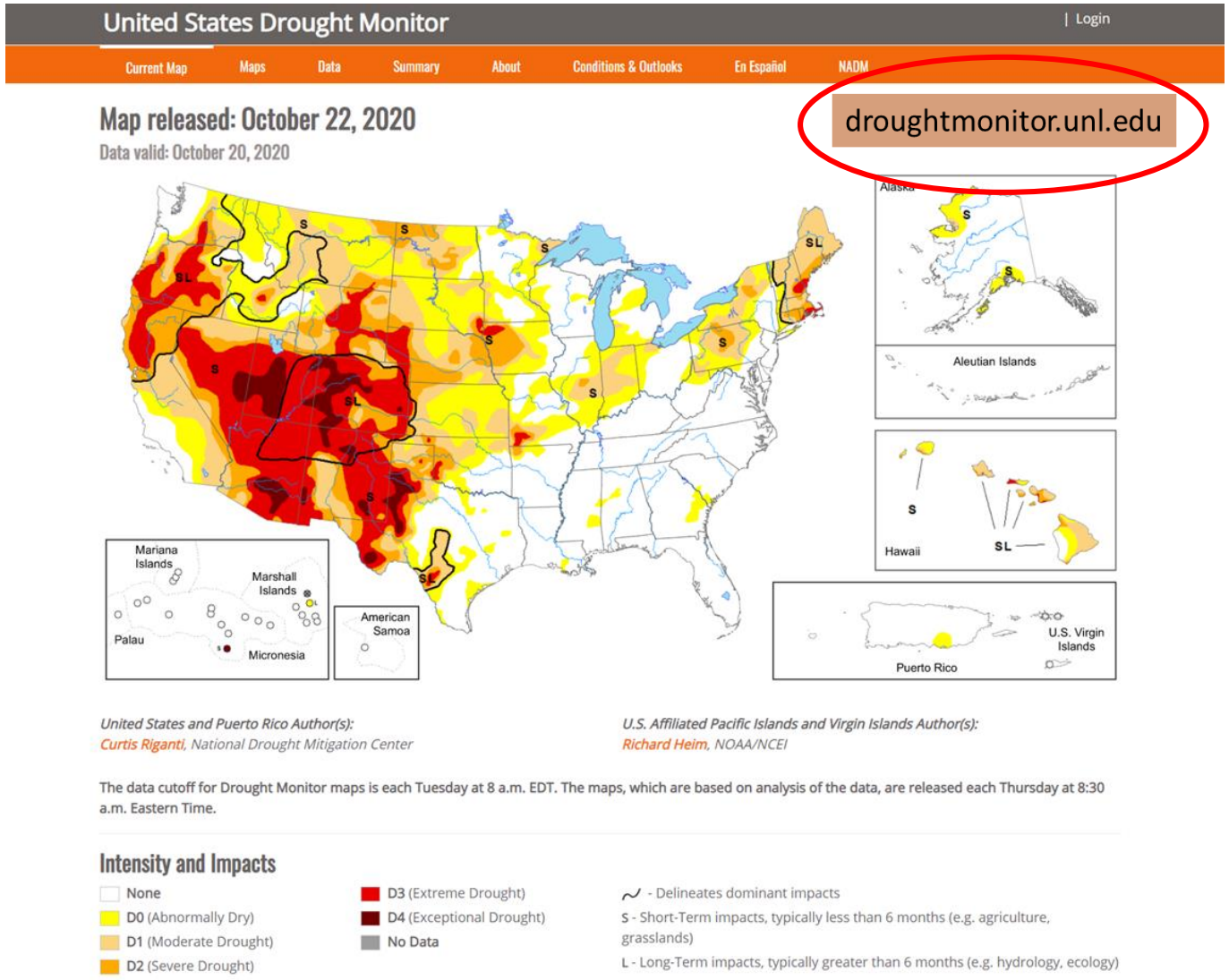
CDI



U.S. Drought Monitor (USDM):

(Science before Policy)

- **State-of-the-science** drought assessment in the U.S. since 1999
  - ***Collaborative effort between NOAA, USDA and NDMC***
- Composite indicator blends objective indicators and indices with field input from over ~450 experts
- **"Convergence of Evidence"** approach
- Policy implications in Farm Bill (USDA), IRS, CDC, NOAA-NWS and several state drought plans and task forces
- **"Go to source"** for media and the public
  - 12 million page views annually

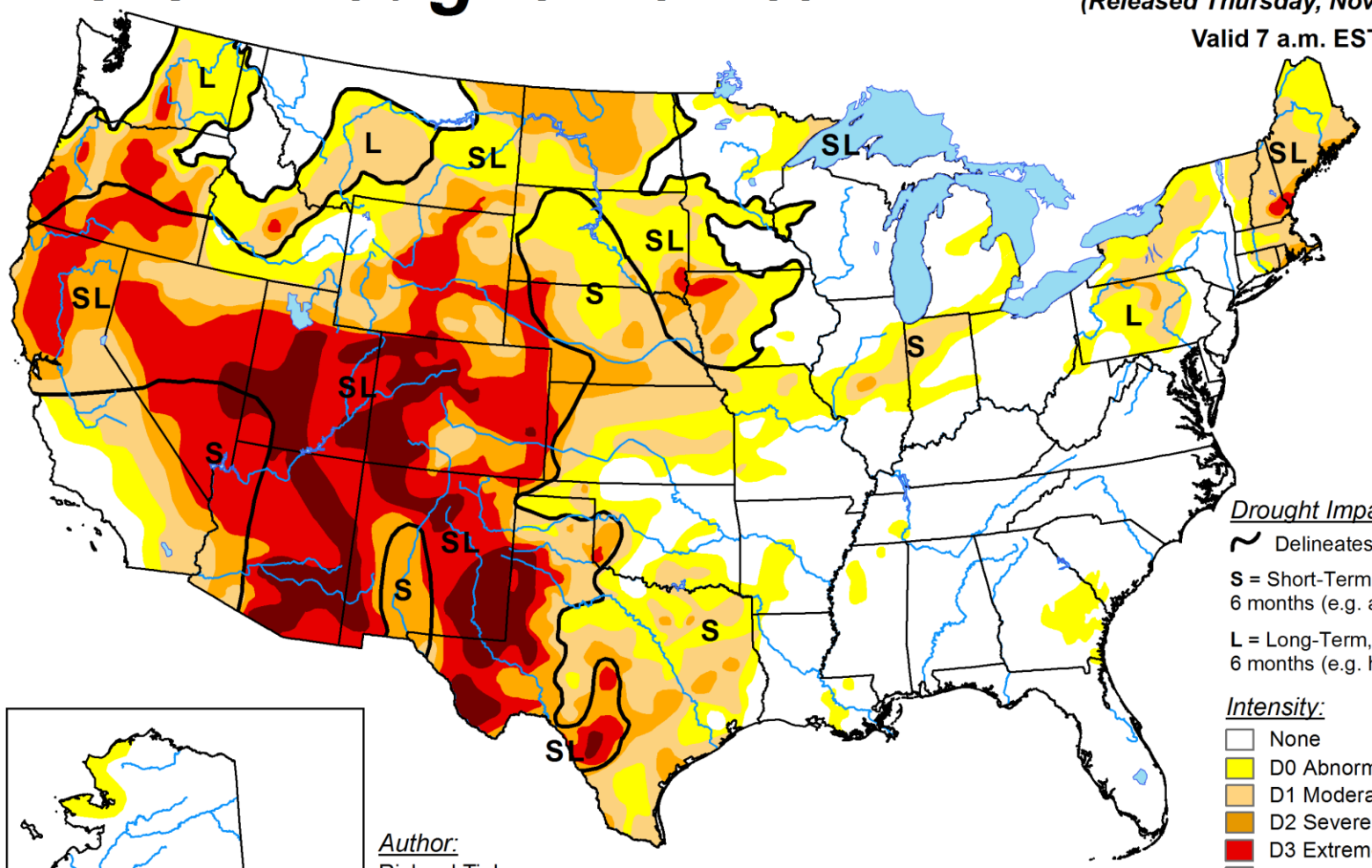


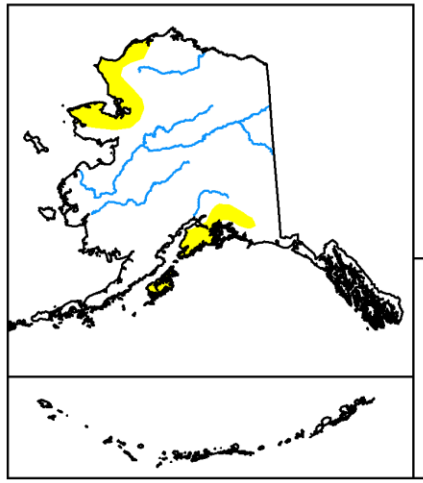
U.S. Drought Monitor

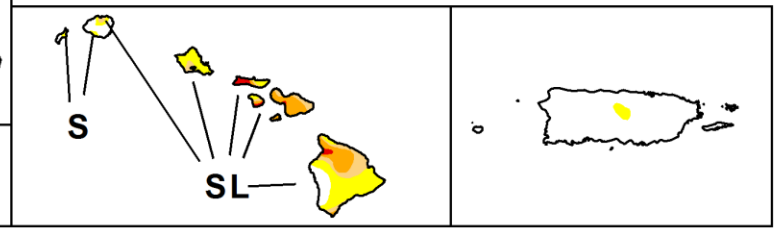
November 17, 2020

(Released Thursday, Nov. 19, 2020)

Valid 7 a.m. EST







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:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

Author:
Richard Tinker
CPC/NOAA/NWS/NCEP

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

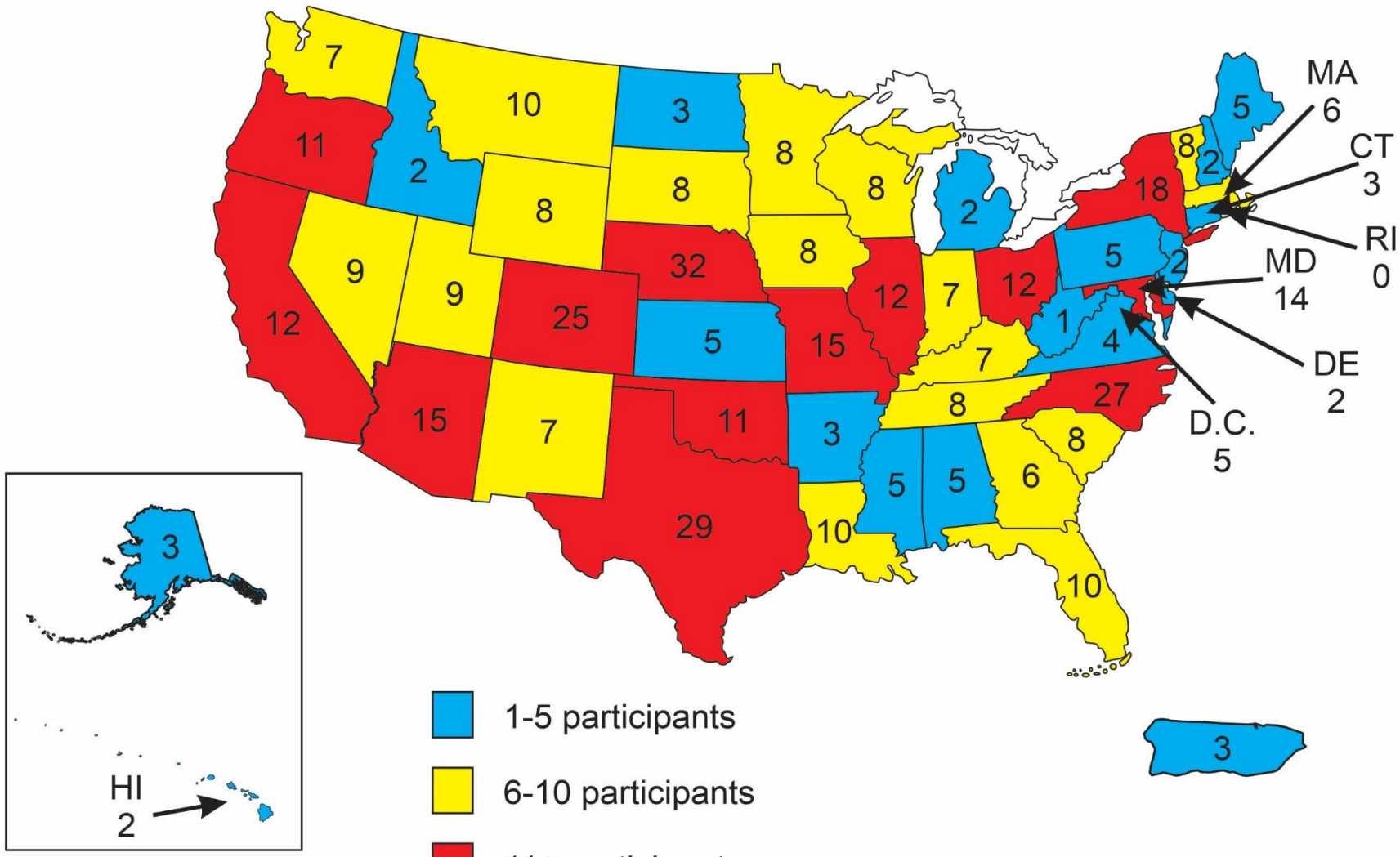
droughtmonitor.unl.edu

NATIONAL DROUGHT MITIGATION CENTER NDMC UNIVERSITY OF NEBRASKA

University of Nebraska Lincoln

USDM Listserv Subscribers

(as of October 2020)



Total: 451 (does not include 2 participants from Canada and 2 participants from Brazil)

NATIONAL DROUGHT MITIGATION CENTER NDMC UNIVERSITY OF NEBRASKA

University of Nebraska Lincoln

Some Examples of Decision Making and Policy Using the USDM

(Science before Policy)

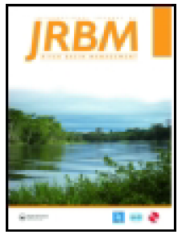
***Policy*:**

- **2008/2014 Farm Bill**
  - USDA Farm Service Agency, Natural Resources Conservation Service, Risk Management Agency
    - ***~$6.5 billion in payments*** **disbursed (through 2015) via the Livestock Forage Disaster Program (LFP) between 2011-2015**
- **Internal Revenue Service**
  - Livestock tax deferral program
- **U.S. Department of Agriculture**
  - Secretarial *"Fast Track"* Drought Designations (USDM trigger since 2012)
- **NOAA National Weather Service**
  - Drought Information Statements
- **Environmental Protection Agency**
  - Water quality monitoring
- **Centers for Disease Control and Prevention**
  - Public health
- **Bureau of Land Management**
- **Several States use the USDM in their monitoring/early warning and in drought plans**

Drought Management Exercises

A GUIDE TO DROUGHT MANAGEMENT EXERCISES

May 2018



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Serious Gaming for Participatory Planning of Multi-Hazard Mitigation

Andrea Carson, Mary Windsor, Harvey Hill, Tonya Haigh, Nicole Wall, Jason Smith, Rolf Olsen, Deborah Bathke, Ibrahim Demir & Marian Muste

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To link to this article: https://doi.org/10.1080/15715124.2018.1481079

Lessons Learned…

- **Drought Early Warning and Risk Management Relationship: *A cycle forms…***
  - As **monitoring and early warning systems improve**, **the need** for better drought risk management strategies (planning and mitigation) and services increases
  - As **planning and mitigation strategies are implemented and customized services are provided**, **the need** for improved drought monitoring and early warning increases
  - **Information (value added)** and a need for decision making triggers drives this cycle

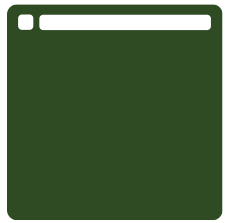
Final Thoughts

- The NDMC is dedicated to developing ***usable*** information and services
  - Involve a variety of networks and incorporate ***user feedback*** at all times in what we do!
- Strong partners and ***collaborations on the ground*** with our stakeholders at all scales (personal, local, watershed, state, regional to national + international) has been the key to our success
- Goal is to ***link scientific knowledge w/ the actions*** needed to reduce impacts and future risk through a sound drought risk management process

Thank You!
Questions?

Contact: Mark Svoboda
msvoboda2@unl.edu

ON THE WEB



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