An Introduction to VegDRI

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What is VegDRI?

VegDRI is a new ‘hybrid’ drought index that integrates:

- satellite-based observations of vegetation conditions
- climate-based drought index data
- biophysical characteristics of the environment

to produce 1-km spatial resolution maps that depict

‘drought-related vegetation stress’ and are regularly updated
(currently at 2-week interval) during the growing season.
What is VegDRI?

Vegetation Drought Response Index
Complete

October 20, 2008

Vegetation Condition
- Extreme Drought
- Severe Drought
- Moderate Drought
- Pre-Drought
- Near Normal
- Unusually Moist
- Very Moist
- Extremely Moist
- Out of Season
- Water

[Map showing vegetation conditions across the United States]
Goal of VegDRI Tool: **National-level monitoring** capabilities with **local-scale information** (i.e., county to sub-county level) regarding the level of drought stress on vegetation.
VegDRI - An Integrated Approach

Remote Sensing Component

Climate Component

Biophysical Component
**Role:** Satellite-based observations provide information on the *spatial distribution and general condition of vegetation*.

(+): Spatially detailed information about vegetation across large geographic areas.

(-): Difficult to discriminate drought impacted areas from locations under other types of environment stress (flooding, fire, hail, & pests) or experiencing land use change.
**Role:** Climate-based drought index maps provide a ‘broad-scale’ measure of dryness that can be used for interpretation of the vegetation stress recorded in the satellite observations.

- Drought areas typified by below average vegetation conditions recorded in the satellite data and drier than normal conditions in the climate data.
**VegDRI - An Integrated Approach**

**Remote Sensing Component**

**Climate Component**

**Biophysical Component**

**Role:** Different characteristics of the environment are considered that influence climate-vegetation interactions.

- land use/land cover type
- irrigation
- soil available water capacity
- elevation
- ecological setting
VegDRI Methodology

1. Historical Database Development

Satellite Data

- Data Input Variables
  1) Percent Annual Seasonal Greenness (PASG)
  2) Start of Season Anomaly (SOSA)

Biophysical Data

- Data Input Variables
  1) land use/cover type
  2) soil available water capacity (STATSGO)
  3) ecoregion type
  4) irrigation status
  5) elevation

Climate Data

- Data Input Variables
  1) Palmer Drought Severity Index (PDSI)
  2) Standardized Precip. Index (SPI)

2. Model Development

Regression Tree Model (*)

3. Map Generation

1-km VegDRI Map

(*) Models developed from a 18-year historical record (1989 – 2006) of bi-weekly climate and satellite observations at 2,200+ weather station locations.

Biophysical variables are static over time.
VegDRI Expansion Schedule

- Information currently available for Pacific Northwest (ID, OR, & WA):
  - 2007 & 2008 growing seasons
- Production of a 20-year historical record of VegDRI maps.
  (1989 – 2008)
- Year-round production & weekly map updates planned in 2009.

(*) Bi-weekly maps currently available.
VegDRI Website and Products

VegDRI products are available at the VegDRI page within the Monitoring section of the NDMC website.

http://www.drought.unl.edu/vegdri/VegDRI_Main.htm
1. VegDRI Quick-View Maps
(multiple spatial scales)

Regional-level

State-level

Sub-state level
1. VegDRI Quick-View Maps (cont.)

(land cover type)

Complete view

Cropland view

Rangeland view
2. VegDRI Area Statistics (% area)  
(currently available at state-level only)

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<th>Date</th>
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<th>Moderate Drought</th>
<th>Pro-Drought</th>
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- Summarize the % area of each VegDRI class for ‘current’ map and all prior dates in the growing season.
- Specific tables available for rangeland and cropland.
- Tables are currently available only at state level.
3. Change Maps

3 Types:

1) Prior period
   ex. - Sep 4, 2007 vs. Sep 10, 2007

2) Same period from the prior year or a specific year in past
   (* currently not available)
   ex. – Sep 24, 2007 vs. Sep 24, 2006

3) Historical average (* currently not available)
   ex. – Sep 24, 2007 vs. average for Sep 24 (1989 through 2006)
4. Animations

**Goal:** Visualize spatial and temporal changes in drought patterns across a specific year or multiple years for a state or sub-state region.
5. Trendlines (in development)

Plots the average VegDRI values over the growing season for a specific geographic area (e.g., county) and land cover type (e.g., cropland and rangeland). Comparisons of VegDRI could be made between specific years and/or the long-term average condition.
6. Dynamic Map Viewer (in development)

- Zoom in & pan across VegDRI maps
- Overlay multiple layers of other information
  - county boundaries, rivers, roads, and other boundaries (resource districts, section lines)
  - historical climate maps
  - land cover maps
  - U.S. Drought Monitor maps
6. Dynamic Map Viewer (in development)

The user customizes the view of the map for their specific needs and interests.

- Zoom in to Montana
- Overlay county boundaries
- View a VegDRI map for a specific date(s).
6. Dynamic Map Viewer (in development)

Capability to visualize information at the local level for a county or multiple counties.
Possible Uses of VegDRI Information by Agricultural Producers:

1. Justify sub-county declarations for the release of CRP lands for emergency grazing for parts of counties that might be severely impacted by drought.
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3. Guide to assist new ranchers better manage their grazing lands and become better land stewards during drought events.