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Spring 2007

### DroughtScape- Spring 2007

the National Drought Mitigation Center

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# DROUGHTSCAPE

The Newsletter of the National Drought Mitigation Center

Spring 2007

*US Drought Monitor Forum 2007: October 10-11, Portland, Oregon*

Mark your calendar and reserve your spot if you're able to come help refine the US Drought Monitor. [read more on page 11](#)

## Did You Know ...

Drought is one of the most expensive natural disasters, costing the United States an estimated \$6 to \$8 billion a year on average, the Federal Emergency Management Agency estimated in 1995. This is still one of the most reliable estimates available, although the National Drought Mitigation Center and others are working on systematic methods to quantify the economic impacts of drought.

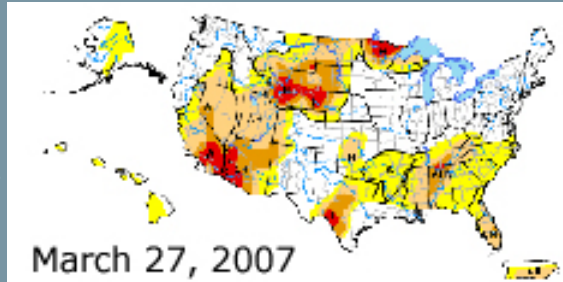
## DroughtScape

DroughtScape is the quarterly newsletter of the National Drought Mitigation Center (NDMC). If you've got ideas or questions you'd like to see addressed in upcoming editions, please email the editor: [droughtscape@unl.edu](mailto:droughtscape@unl.edu).

## 2007 Spring Drought Outlook & Winter Summary

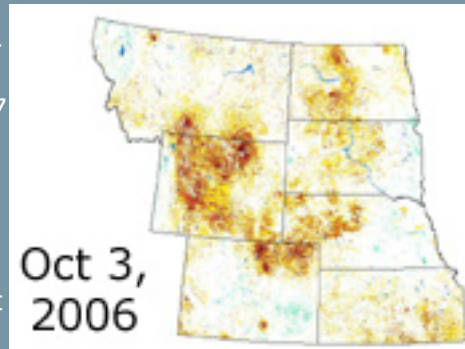
**Expanding:** Existing conditions, forecasts and seasonal patterns make it likely that the following states will continue in various degrees of drought: California, Nevada, Arizona, much of Utah, western Colorado, Wyoming, western Nebraska and western South Dakota, and Florida.

**Improving:** Drought conditions are improving in Texas, Oklahoma, Kansas, Minnesota, North Dakota and Wisconsin. [read more on page 3](#)



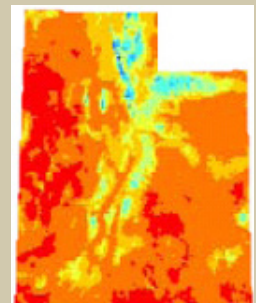
## VegDRI Expands to 15 States, Refines Views

VegDRI, a satellite-based drought monitoring product, is expanding its coverage in 2007 to include 15 states. Users will also be able to isolate views based on land uses such as farming or ranching, making it easier to spot patterns. [read more on page 5](#)



## State Spotlight: Utah

The National Drought Mitigation Center recently had the pleasure of reviewing a comprehensive drought planning document for the Utah Division of Water Resources. The result is expected to be available on the web in April. It's an excellent example of a comprehensive assessment of vulnerability and mitigation options. [read more on page 7](#)





# ***DROUGHTSCAPE***

*The Newsletter of the National Drought Mitigation Center*

Spring 2007

## ***About the NDMC***

The National Drought Mitigation Center, established in 1995 with sponsorship from agencies such as the U.S. Department of Agriculture and the National Oceanic and Atmospheric Administration, has a national mandate to help reduce vulnerability to drought. We are based at the University of Nebraska-Lincoln in the School of Natural Resources

For more information about happenings at the NDMC, please check the monthly What's New updates on our website.

## *NIDIS Portal Advancing*

The vision for a National Integrated Drought Information Systems Portal is moving ahead. As it comes on-line later this year, it will be a starting point for anyone seeking information about drought in the United States. It will incorporate a variety of information products and monitoring tools.  
[read more on page 8](#)

## *International Panel Foresees Drought as Part of Climate Change*

Planning for climatic variability, including drought, will be increasingly vital to ensure food and water supplies, particularly for people in equatorial regions, based on the scenarios developed by the Intergovernmental Panel on Climate Change.  
[read more on page 9](#)

## *Spring 2007 U.S. Drought Outlook and January to March Summary*

*By Brian Fuchs, Climatologist, National Drought Mitigation Center*

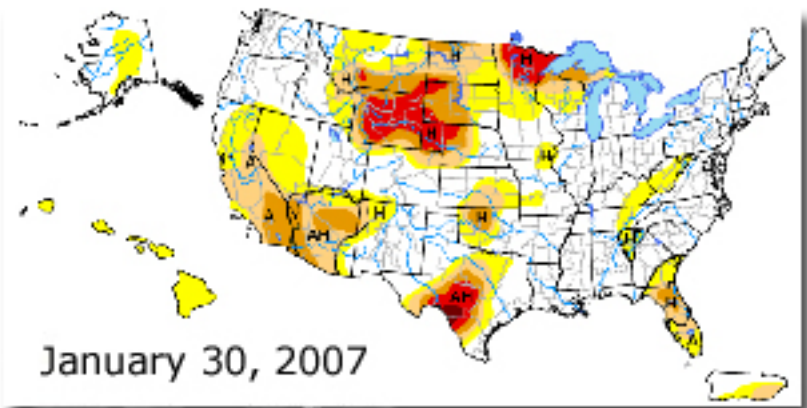
*Drought classifications are based on the US Drought Monitor. For a detailed explanation, please visit <http://drought.unl.edu/dm/classify.htm>. The outlook integrates existing conditions with forecasts from the National Oceanic and Atmospheric Administration's [Climate Prediction Center](#).*

**Outlook:** The drought outlook for the western United States looks grim for the next several months. Warm temperatures leading to early snow melt will hurt many locations in the West. Drought will continue over much of California, Nevada, and Arizona, and could expand to include much of Utah and western Colorado. Drought will continue over the High Plains as well, with Wyoming, western Nebraska, and western South Dakota showing little improvement. Drought conditions in Florida are also likely to persist. The good news is that conditions should continue to improve over the southern Plains, with Texas, Oklahoma and Kansas seeing the most improvement. Improvements should also occur over much of Minnesota, reaching into North Dakota and Wisconsin.

**January:** During the month of January, there was a general improvement of drought conditions in the United States. At the end of January, 43.68 percent of the country was experiencing some level of drought, compared to 49.99 percent at the beginning of the month. All categories of drought improved except for a slight expansion in the D2-D4 range. The southern Plains and Midwest were the two regions showing the most improvement during January, as wet conditions continued from December.

D3 status was removed from Oklahoma, and D2 and D3 were eliminated from northeast Texas. D1 conditions were eliminated from Missouri and Iowa as well. Florida and California were exceptions, each having one of the driest Januaries on record, which led to expansions of D1 and D2 conditions in each state.

**February:** February saw an expansion of drought in the United States. It started off with 43.68 percent of the country designated abnormally dry or worse, and expanded to 45.30 percent by the end of the month. Drought expanded over two general regions during February. There was a large expansion of D0 and D1 conditions over much of the Appalachians as winter dryness impacted the region. In the western United States, D0 was expanded to include all of Nevada and Utah, reaching into Idaho and Oregon. D1 and D2 conditions were also expanded in California and Arizona as the dry winter season continued. Further expansion of drought



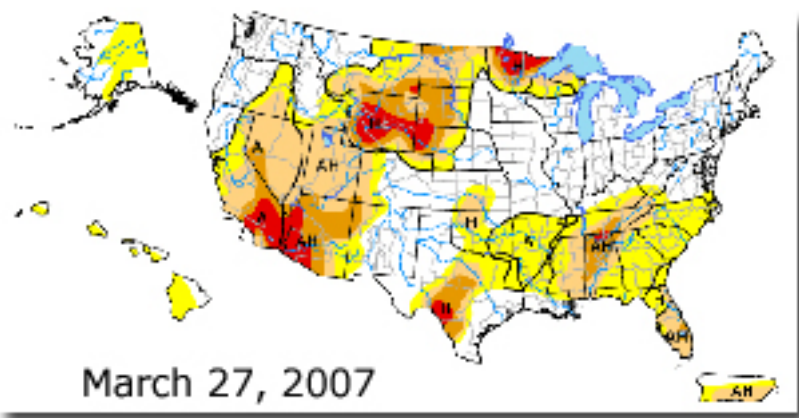
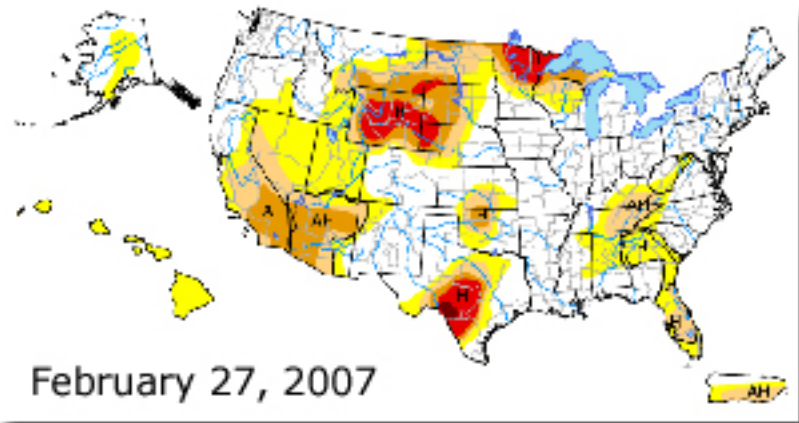
## *2007 January to March Summary, continued*

was prevented by the better than normal storage of water in the states' reservoir systems due to a very good Water Year in 2005-06. The Midwest continued to see improvements. All drought designation was eliminated from Missouri and Iowa during February as wet winter conditions continued. Much of southern Minnesota, eastern South Dakota, Montana and Wyoming also saw improved drought conditions as a series of winter storms impacted the region.

**March:** Warm temperatures over much of the western United States brought a rapid end to snowpack accumulation for most locations. A poor snow season coupled with an early onset to snowpack reduction due to warm temperatures has worsened conditions and allowed for further expansion of drought designations. As of March 27, 55 percent of the United States was classified with some level of dryness and drought. Almost 5

percent of the country was experiencing extreme drought while almost 33 percent had at least moderate drought conditions. In Arizona and California, D3 conditions were introduced, and D2 conditions were also expanded. D0, D1, and D2 conditions were expanded in the Southeast and Appalachian regions with an introduction of D3 in Alabama and Tennessee as short-term and long-term drought situations continue. Texas and Oklahoma saw significant improvements as heavy rains continued to push the drought designations towards the west. D4 was completely eliminated in Texas, leaving just a small area of D3. Oklahoma saw the removal of all D2 conditions. This is the first time since November 2006 that there are no areas of D4 in either Oklahoma or Texas.

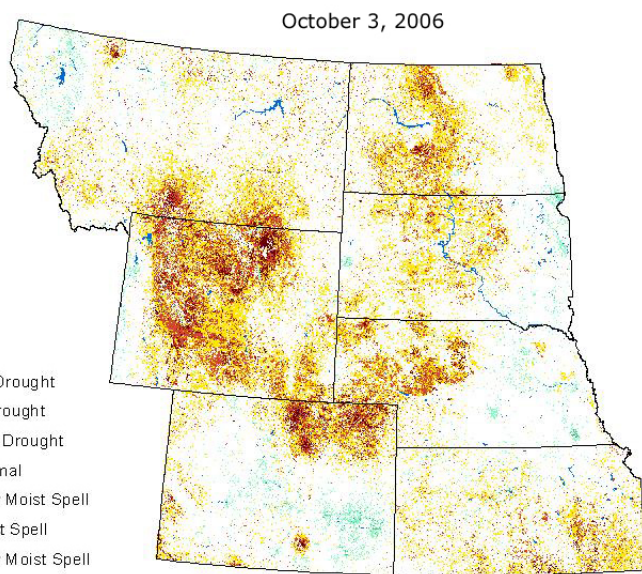
For more information on the Drought Monitor maps, please visit <http://drought.unl.edu/dm/monitor.html>.



## VegDRI to Expand Coverage and Refine Views

This year VegDRI map coverage will expand to 15 states and new quick-view options will allow users to see cropland or rangeland conditions separately at both state and regional levels. Researchers are also testing new data inputs and calculations and incorporating user input.

VegDRI – the Vegetation Drought Response Index – integrates satellite, climate, and biophysical data to map the impact of drought on vegetation conditions across a spectrum ranging from very dry to very lush. The diverse set of environmental information used to calculate the VegDRI allows this indicator to tune in to drought-related vegetation stress. The 2007 VegDRI season will begin on May 8, with maps generated every two weeks throughout the growing season that classify patterns at a one-square-kilometer spatial resolution.



The National Drought Mitigation Center produces VegDRI in collaboration with the US Geological Survey's (USGS) Center for Earth Resources Observation and Science (EROS), and the High Plains Regional Climate Center (HPRCC), with sponsorship from the US Department of Agriculture's (USDA) Risk Management Agency (RMA).

Main researchers working on VegDRI are Dr. Brian Wardlow and Dr. Tsegaye Tadesse at the NDMC, and Jesslyn Brown with Science Applications International Corporation (SAIC) at EROS.

New quick-view options include maps of conditions over specific land use types such as cropland and rangeland, maps for individual states, and tables summarizing percentages of areas in different categories of dryness. This information will be provided in a convenient pdf format via the Monitoring section of the NDMC's web site – <http://www.drought.unl.edu/monitor/monitor.htm>.

The new ability to view VegDRI results over different land uses should make the maps more meaningful for users with specific interests in rangeland and cropland conditions. "The ability for a rancher or range scientist to look at VegDRI over only rangeland areas allows them to more easily focus on a specific area of interest and more effectively assess spatial patterns of drought stress on rangeland over time," Wardlow said. "The development of these types of value-added features is important for presenting the VegDRI information in a useful form to agricultural producers, policymakers, and the general public. We hope to produce other value-

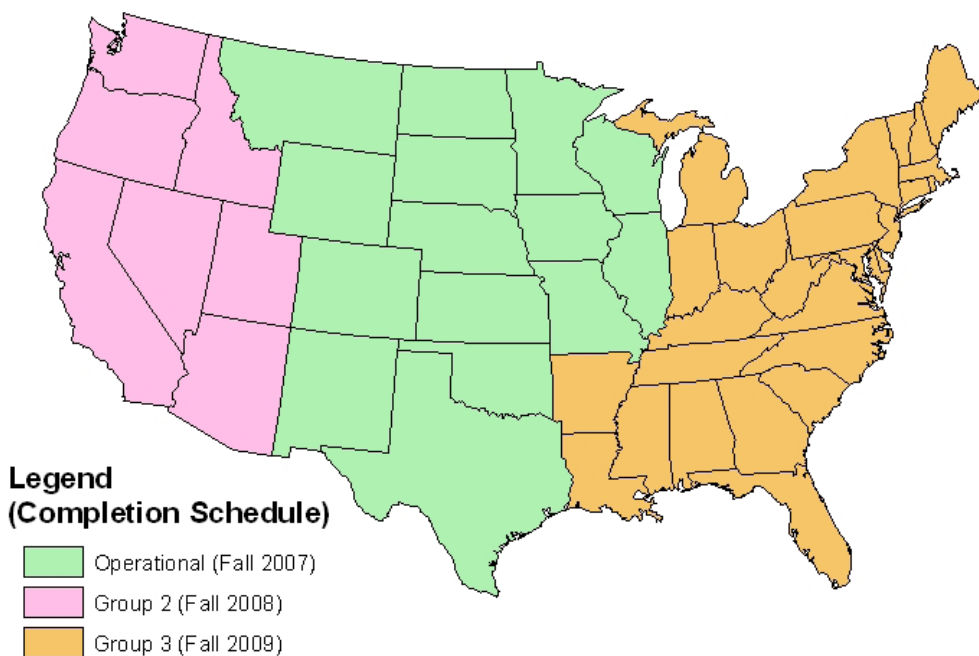
## ***VegDRI, continued***

added VegDRI products in the near future and encourage users to provide feedback on what types of features they would like to see developed in these new products.”

Dynamic VegDRI maps will still be accessible through the USGS viewer at [http://gisdata.usgs.gov/website/Drought\\_Monitoring/](http://gisdata.usgs.gov/website/Drought_Monitoring/). The dynamic USGS drought viewer allows users to zoom to a local, sub-county scale in the VegDRI map, to develop customized views of the VegDRI map by overlaying administrative boundaries, rivers, and road networks, and to compare the VegDRI with other drought indicators such as the US Drought Monitor (USDM) (<http://www.drought.unl.edu/dm/>). “Our new quick-view map options are a great complement to the more intensive and comprehensive interactive USGS drought viewer,” said Brown. “If you see drought patterns that interest you in the quick state views, then you can investigate them further in the USGS viewer.”

When VegDRI production resumes in May, coverage will be expanded to include Minnesota, Wisconsin, Iowa, Illinois, Missouri, New Mexico, Texas, and Oklahoma, in addition to the initial states (Montana, Wyoming, Colorado, North Dakota, South Dakota, Nebraska, and Kansas). Researchers anticipate adding the western states next year, with expansion across the eastern U.S. to follow in 2009.

A new experimental product called VegOUT (Vegetation Outlook) will also make its debut in 2007, offering outlooks on general vegetation conditions based on climate and ocean data, satellite-based observations of current vegetation conditions, and other environmental information. The Summer 2007 issue of *DroughtScope* will offer an in-depth look at VegOUT.



## ***Utah Releases Drought Assessment***

*By Todd Stonely, Section Chief, River Basin Planning, Utah Division of Water Resources*

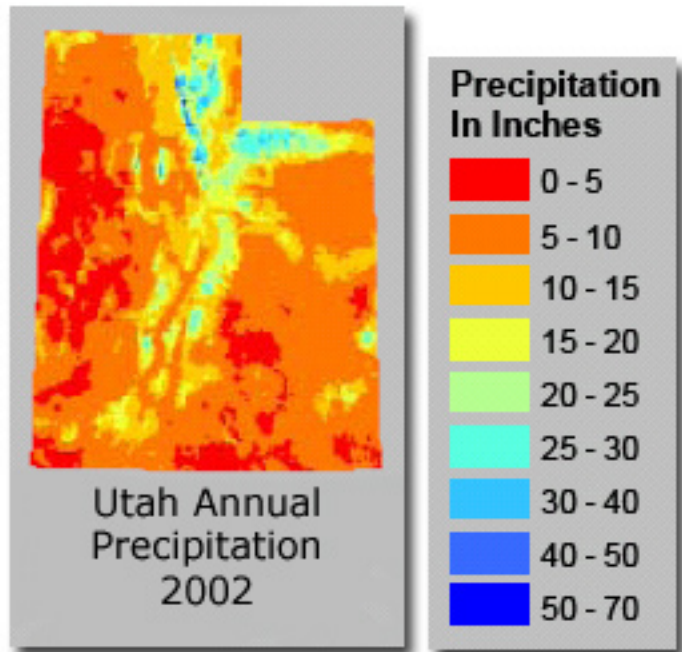
The Utah Division of Water Resources is pleased to announce the completion of the latest in the series of reports under the title of "Utah State Water Plan." The report, entitled *Drought in Utah: Learning from the Past — Preparing for the Future*, is a ground-breaking document. For the first time, a comprehensive view of drought in Utah has been provided under the same cover. The document is expected to be available online in mid-April.

The report addresses several important issues related to drought. It: (1) emphasizes the significance of drought and its impacts to society from a historical perspective and how projected growth can potentially make Utah more vulnerable; (2) warns about the likelihood of more severe and longer-term droughts in the future based on reconstructed climate and proxy records as well as climate change; (3) explores various strategies to mitigate, prepare for and respond to future drought events; and (4) makes recommendations for future action at the state and local level.

Put simply, the report is a word of warning about drought and a strategy for mitigation and preparedness.

The Utah Division of Water Resources hopes that this report will encourage water suppliers in the state to fully assess their vulnerability to drought and better prepare for future events.

The report will be posted in mid-April on the Utah Division of Water Resources web site: <http://www.water.utah.gov/>.



***The Utah planning document identifies 2002 as the most recent peak drought period. Please refer to the complete document to see how this compares with normal and with other drought years.***





Spring 2007

## ***Drought Info Conduit Moving Ahead***

A one-stop drought monitoring portal is moving ahead, on schedule to be on-line by this fall, say implementers of the National Integrated Drought Information System. Resources within the National Oceanic and Atmospheric Administration, the lead federal agency, have been dedicated to get the project off the ground.

The NIDIS team is envisioning four "showcase features," which are all existing products, as well as a refined set of links and access tools to information about drought on the national, state and local level, said Tim Owen, a climatologist with the National Climatic Data Center and co-chair of the Portal Development Team. The four features will be:

- The US Drought Monitor, a weekly product produced by a rotating group of nine authors, incorporates data from dozens of sources and input from more than 200 climatologists, meteorologists, hydrologists and other specialists with federal, state and local agencies. The National Drought Mitigation Center (NDMC) has been a main partner in the Drought Monitor since it was established in 1999. It is online at <http://drought.unl.edu/dm/monitor.html>.
- The US Seasonal Drought Outlook, issued monthly by the Climate Prediction Center of the National Oceanic and Atmospheric Administration (NOAA): <http://www.cpc.noaa.gov/>.
- The Drought Impact Reporter, currently available as a prototype at the NDMC: <http://droughtreporter.unl.edu>. It graphs media reports of drought's impacts and is the only national database or archive of drought impacts in the United States. The next version will look better, will emphasize a greater variety of information sources, and will include an easy-to-find list of current drought-related disaster declarations and relief and mitigation programs.
- A fourth product, possibly rotating, such as streamflow information.

Four specialized teams are working on the portal, Owen said: Web Information Technology, Geographic Information Systems, Outreach & Education, and Conceptual and Social Design. Development of the NIDIS portal and monitoring effort is expected to be a multi-agency, multi-year effort, with separate products such as the four showcase features gradually becoming "interoperable," available through the same GIS interface.

Paralleling developing of the NIDIS portal, NOAA is installing 121 soil moisture and temperature sensors, which will augment the US Department of Agriculture's Soil Climate Analysis Network soil moisture monitoring network.

Mark Svoboda, an NDMC climatologist who is also a co-chair of the NIDIS Portal Development Team and a member of the external NIDIS Implementation Team, said that the portal will be a conduit of drought early warning information for the public. He noted that to the extent that drought forecasts are possible, they will be available via the portal, but that equally important parts of the effort will be monitoring precipitation and other indicators of water supply, and education and planning information that will highlight best practices to promote drought-resilience.



Spring 2007

## ***Climate Change Panel Foresees Longer, Drier Droughts***

*by Meghan Sittler, NDMC Research & Outreach Specialist*

Drought is likely to intensify in both duration and severity, according to the recently released "Summary for Policymakers" of the Intergovernmental Panel on Climate Change (IPCC) report: *Climate Change 2007: the Physical Science Basis*. Using language such as "virtually certain, extremely likely, very likely," and "likely," the report's authors conclude that human activities such as emission of greenhouse gases and land use practices are having a significant impact on the global climate.

The report highlights paleoclimatic, historic and more recent trends to validate the claim that the global climate is changing at an unprecedented rate. The following observed phenomena are believed to have been "likely" or "more likely than not" to have occurred in the past because of human activities:

- Intensified droughts have occurred over wider geographical areas, especially the tropics and sub-tropics, since 1970. The severity of drought as measured by the Palmer Drought Severity Index (PDSI) rapidly increased from 1980 through 2002.
- Droughts have also been influenced by increased sea surface temperatures, changed and strengthened wind patterns particularly in the mid-latitudes and decreased snow pack and snow cover.
- There have been widespread changes in extreme temperatures with an increased number of hot days, hot nights and heat waves.
- Increased global surface temperatures.
- Increased drying (or evapotranspiration) as a result of the increased temperatures and decreased precipitation.
- A decrease in the total area of seasonally frozen ground in the Northern Hemisphere and increased temperature of the permafrost layer in the Arctic since the 1980s.

So what can we expect to see in the next 100 years? Unfortunately, we can expect to see many of the above trends continue or accelerate unless technological and social initiatives are carried out to curb emissions, provide more sustainable land and resource use, and increase economic security throughout the regions of the world. The IPCC used a variety of scenarios to project future impacts and trends. The scenarios differ in the assumed rate of population growth and expansion, rate of implementation of cleaner and more efficient energy, and levels of economic development. The scenarios also factor whether the loci of control for the implementation of the social, economic and environmental policies are global, regional, or local.

For example, a scenario with a peak in global population at mid-century and then an ensuing decline, with a global introduction of "clean and resource efficient technologies," reduced material consumption and a focus on global solutions, resulted in a "best estimate" projected surface temperature change of 1.8 degrees by the last decade of this century. An alternative scenario that maintained the intensity of use of fossil fuels, with mid-century achievement of maximum global population and ensuing decline, rapid economic growth and increased social and cultural interaction and capacity building could result in a "best estimate" increase of 4.0 degrees by 2090.

## IPCC Projections, continued

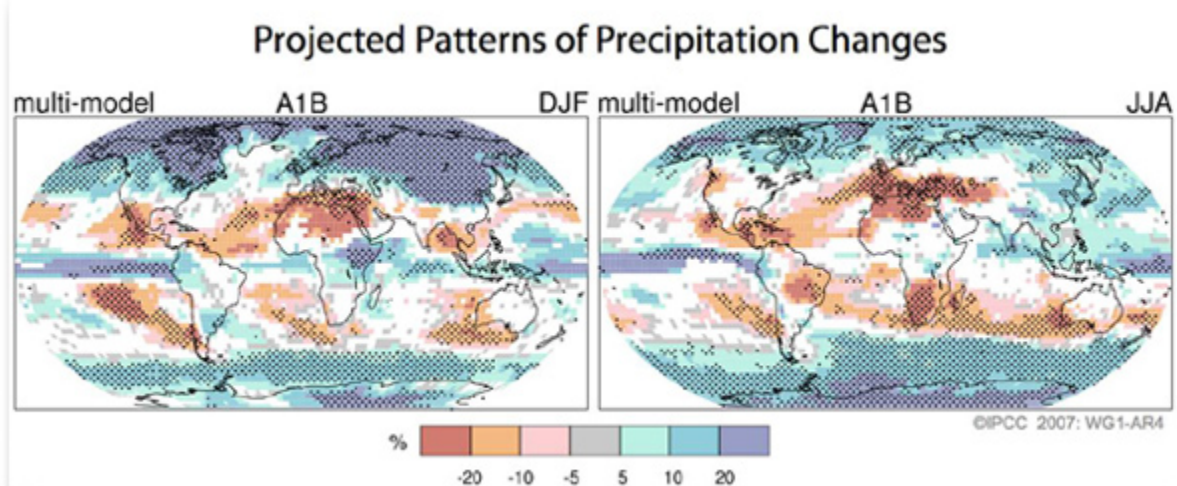
Regardless of the specific scenario, IPCC projects that many of the observed trends are likely to continue. Specific projections related to drought include:

- Decreased precipitation in tropical and subtropical land regions.
- Increased hot nights, hot days and heat waves.
- Increased evapotranspiration as a result of increased temperature and decreased precipitation.
- Significant decrease in precipitation in the Sahel, Mediterranean, Southern Africa and Southern Asia.
- Decline in mountain glaciers, snowpack and snow cover, particularly in the Northern Hemisphere.
- Continued decrease in the total area of seasonally frozen ground.
- A pole-ward movement of extratropical storm tracks resulting in continued changes in wind, temperature and precipitation patterns.

The IPCC's projections demonstrate the need for actions to be taken on all levels to offset and mitigate the impacts of climate change. The panel projected more widespread and intense droughts in regions where the world is currently seeing high levels of population growth, economic development and social conflict, which will jeopardize food security, access to safe drinking water and economic stability for a high percentage of the world's population.

The National Drought Mitigation Center anticipates that the newly acknowledged danger of climate change will prompt vigorous, constructive dialog between scientists, policy makers and communities about the appropriate technologies and strategies that are needed to meet these challenges. Dialogue about desalinization, water banking, alternative energy sources, "cap and trade" emission policies, and many other issues has already begun. Whatever the outcome of the scientific and political debate, the NDMC anticipates planning and preparedness being more essential now than ever.

To read the Summary for Policymakers visit: <http://www.ipcc.ch/>. The second volume of the IPCC report, "Impacts, Adaptation and Vulnerability," is due to be released on April 6, 2007.





Spring 2007

## ***US Drought Monitor Forum to be in Portland, Oregon, October 10-11***

Authors and users of the US Drought Monitor — <http://drought.unl.edu/dm/monitor.html> — will convene in Portland, Oregon, October 10-11, to discuss user needs and modifications to the tool. The US Drought Monitor Forum is held every other year. Although the scope of the tool is national, the venue can provide an opportunity to bring an extra focus to drought-monitoring needs in the Pacific Northwest.

Registration is free, but facilities are limited, so please sign up early to ensure that there will be room. On-line registration will be available soon, but until then, you can reserve a spot by e-mailing Ann Fiedler, [afiedler2@unl.edu](mailto:afiedler2@unl.edu), with "Drought Monitor Forum" in the subject line, expressing your intent to attend, and including your name and full contact information. Details on the location will be available in the near future.