



NATIONAL DROUGHT
MITIGATION CENTER
AT THE UNIVERSITY OF NEBRASKA-LINCOLN

DROUGHTSCAPE

QUARTERLY NEWSLETTER

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About the photo

Richland County in northeast Montana visibly shows extreme drought conditions in this photo taken Aug. 25, 2017. Over 98 percent of Montana was experiencing some level of drought, according to the U.S. Drought Monitor, at the time the picture was taken.

Photo by USDA

DIRECTOR'S REPORT

It's hard to believe we are already putting 2017 in the rearview mirror and looking toward 2018! My first year as director of the National Drought



Mark Svoboda

Mitigation Center has flown by, and I can honestly say I've enjoyed every minute of it. I am looking forward to what the next year brings.

Did you know that roughly a third of our center's activities are international in nature? Indeed, we are engaged on many fronts, including in Africa, South America, Asia and the Middle East. We currently are working hard to strengthen the NDMC's collaborations with the Korean Water Resources Corporation. Informal exchanges have occurred over the past several years, but recent droughts in Korea have led to increased efforts aimed at helping advise K-water on building drought early warning systems under the umbrella of drought risk management. You can find out more about our interaction with K-water on [page 9](#).

Moving from global to local, have you heard the saying "All droughts are local"? I'm a big believer in this concept, as this is where the brunt of drought impacts are felt. Sometimes we get too caught up with how drought is affecting a country's economy, but the truth is droughts and their impacts

can cripple a locality, state or region. A story on [page 8](#) describes one local community's efforts to become more "drought ready."

In my opinion, you can't spell drought without an "e". What am I talking about? I have been a long-time advocate of having the U.S. Drought Monitor account for "ecological" drought. Back when we had agriculture (A), hydrological (H) and fire (F) labels on the map, it always bothered me that we weren't accounting for impacts on ecological services. I pushed for an "E" label to address this important feature. Eventually, we removed the F, A and H and went with "S" for short-term impacts to capture others besides those on agriculture. Perhaps this isn't a perfect solution, but it does allow the USDM to adapt and capture ecological impacts when they are identified. In the immortal words of Austin Powers, "What does it all mean Basil?" Well, check out the great story within ([pages 6-7](#)) on the efforts of the Science for Nature and People Partnership, known as SNAPP, to address this key void by working to define "ecological" drought.

Let me be the first to wish you all a very safe and happy holiday season and a great new year! We'll be back in touch next year with the winter edition of DroughtScape.

Drought worsens in northern Great Plains region

BY BRIAN FUCHS

NATIONAL DROUGHT MITIGATION CENTER CLIMATOLOGIST

Drought classifications are based on the U.S. Drought Monitor. Details on the extent and severity of drought are online: droughtmonitor.unl.edu.

The outlook integrates existing conditions with forecasts from the National Oceanic and Atmospheric Administration's Climate Prediction Center: www.cpc.ncep.noaa.gov.

Drought

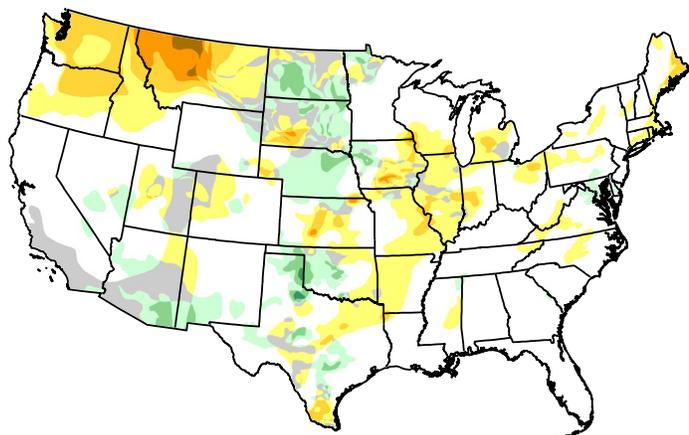
Drought conditions worsened during the quarter. The area affected by drought increased from 8.04 to 14.36 percent of the continental United States. Severe drought increased from 3.26 to 4.73 percent, extreme drought from 0.97 to 1.39 percent, and exceptional drought from 0 to 0.5 percent as exceptional drought was introduced in Montana.

Most of the drought increase

Continued on page 3

U.S. Drought Monitor Class Change - CONUS

3 months



September 26, 2017 compared to July 4, 2017

<http://droughtmonitor.unl.edu>

droughtmonitor.unl.edu

MONTHLY DROUGHT AND IMPACT SUMMARIES



For a more detailed review of conditions, please visit drought.unl.edu/newsoutreach/monthlysummary.aspx

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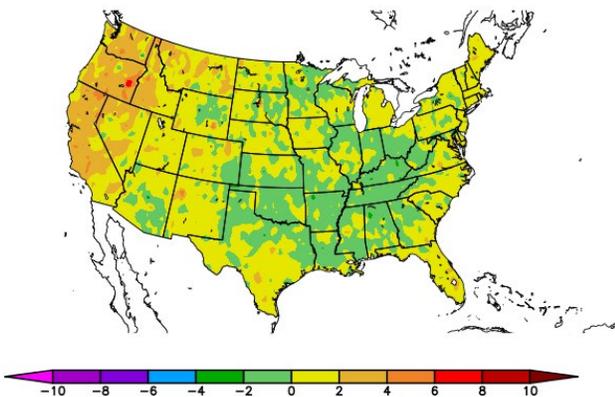
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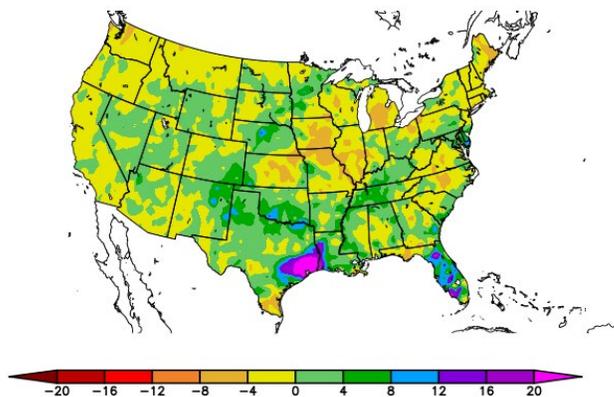
Departure from Normal Temperature (F)

July 1 to Sept. 30, 2017



Departure from Normal Precipitation (F)

July 1 to Sept. 30, 2017



Source: High Plains Regional Climate Center

Continued from page 3

was due to expansion of drought conditions in the northern Plains and northern Rocky Mountains. Last year at this time, 19.44 percent of the country was in drought with exceptional drought in California and the Southeast.

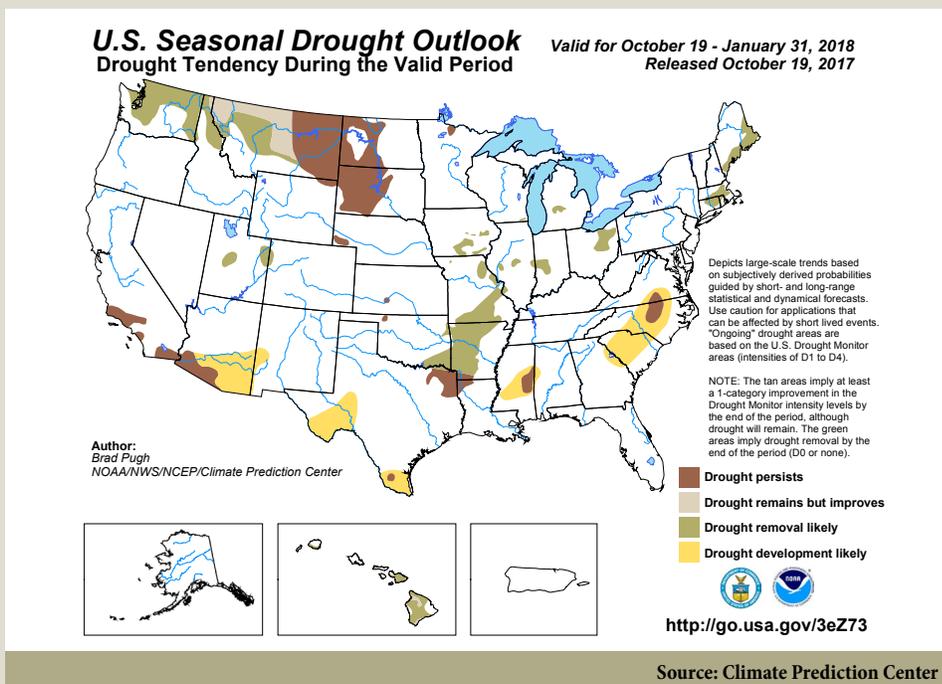
Approximately 30.5 million people were being affected by drought in October compared to 16 million people at the beginning of July.

Precipitation

The three-month period was ranked as the 32nd wettest since 1895 for the continental United States by the National Centers for Environmental Information (NCEI). The southern Plains was especially wet with the landfall of Hurricane Harvey bringing record setting rains along the Texas coastline.

Dry pockets existed in Kansas, Iowa, northern Missouri, Illinois, Michigan, central Virginia, central North Carolina, the panhandle of Florida, eastern Maine, western Washington, far south Texas, and northeast Ohio, where departures were 4 to 8 inches below normal.

Other areas were 4 to 8 inches or more above normal. These included include north Texas, southern



Oklahoma, southeast Texas, the Florida peninsula, Tennessee, central Nebraska, northeastern New Mexico, southeastern Colorado, western Louisiana, and western Minnesota.

Temperatures

According to NCEI, July to September 2017 was the 23rd warmest July to September since 1895. The western United States was well above normal with most areas, especially along the coast, 2 to 4 degrees above normal during the period. Much of the Midwest,

central Plains, and South were cooler than normal with departures of 1 to 3 degrees below normal common. Most other areas were near normal.

Outlook

Drought conditions are expected to persist over the High Plains, with drought development likely over the Southwest, west and southern Texas, Mississippi, and the Carolinas. Drought should improve or be removed over the Midwest and Northeast and northern Rocky Mountains.

Drought takes toll on livestock, ag

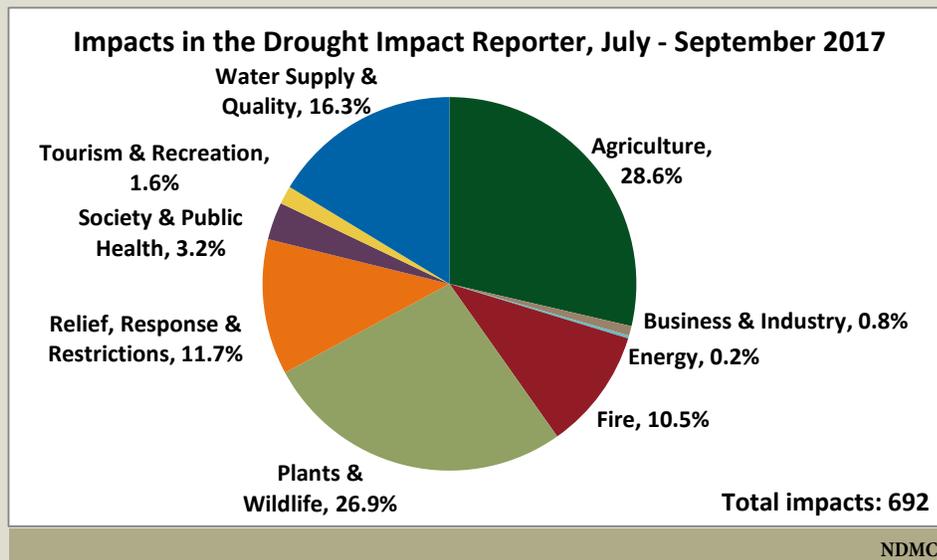
BY DENISE GUTZMER

NATIONAL DROUGHT MITIGATION
CENTER DROUGHT IMPACT SPECIALIST

As the summer wore on, drought intensified in the Northern Plains, with northeastern Montana and the western Dakotas withstanding the worst of the drought. The lack of rain took a very harsh toll on agriculture and livestock in the region, with livestock producers having to sell cattle as pastures dried up. South Dakota entered 153 impacts to the Drought Impact Reporter attesting to the dry conditions, crop damage and water supply challenges, with 117 of those coming from individuals. Eighty-six impacts were collected for North Dakota, where crop losses and the need for hay were some of the main concerns. In Montana, there were heavy agricultural losses, too, but also widespread wildfire activity through the summer.

Federal assistance authorized for livestock producers in the Dakotas, Montana

As livestock producers in the Northern Plains struggled to feed and water their herds and the weather worked against them, the U.S. Department of Agriculture gave authorization for early haying of Conservation Reserve Program acres beginning on July 16 to help farmers and ranchers in the Dakotas and Montana enduring drought. Producers in counties experiencing drought severity of D2 or greater on the U.S. Drought Monitor, as well as counties within 150 miles of a county in D2, were eligible for early haying. Shortly thereafter, another 235,000 acres of sensitive wetlands and buffer strips on Conservation Reserve Program land in and around Montana and the Dakotas



DROUGHT IMPACT REPORTER



For more detailed reports, visit droughtreporter.unl.edu

became available for emergency grazing and haying.

[“Drought stricken ranchers can hay conservation lands early,”](#) by Jessica Holdman, The Bismarck Tribune (North Dakota), July 10, 2017

[“USDA opens more CRP land in SD for haying, grazing as drought expands,”](#) by Stephen Lee, (Pierre) Capital Journal (South Dakota), July 21, 2017

Hay lottery offers hope for Northern Plains ranchers

Poor crop growth in the Northern Plains meant that hay and forage for livestock was in short supply, leaving ranchers looking around anxiously for hay to purchase. Responding to the need, North Dakota’s Agriculture Department, North Dakota State University, and Ag Community Relief, based in Michigan, worked together to get hay to North Dakota ranchers via a lottery system. Ranchers in South Dakota and Montana were later invited to participate in the lottery. The first hay drawing took place in early September.

While some livestock producers were fortunate enough to win hay in the lottery, many producers had to decide whether to sell some of their herd or purchase hay at exorbitant prices for winter feeding. To take some of the sting out of the cost of hauling hay, the North Dakota Emergency Commission set up a \$1.5 million fund for a hay transportation program for livestock producers that will be administered by the state Department of Agriculture. Under the program, eligible producers could be reimbursed for a portion of hay transportation costs.

[“Project to Dole Out Donated Hay to Drought-Stricken Ranchers,”](#) Associated Press, U.S. News & World Report, Aug. 1, 2017

[“Drought hay donation lottery program now offered in 3 states,”](#) by Associated Press, Billings Gazette (Montana), Aug. 8, 2017

[“ND Emergency Commission approves \\$1.5 million for hay transportation program amid drought,”](#) by John Hageman, The Dickinson (North Dakota) Press, Aug. 22, 2017

Montana experiencing extensive wildfire activity

Numerous wildfires raged in Montana, sparked largely by hundreds

Continued on **page 5**

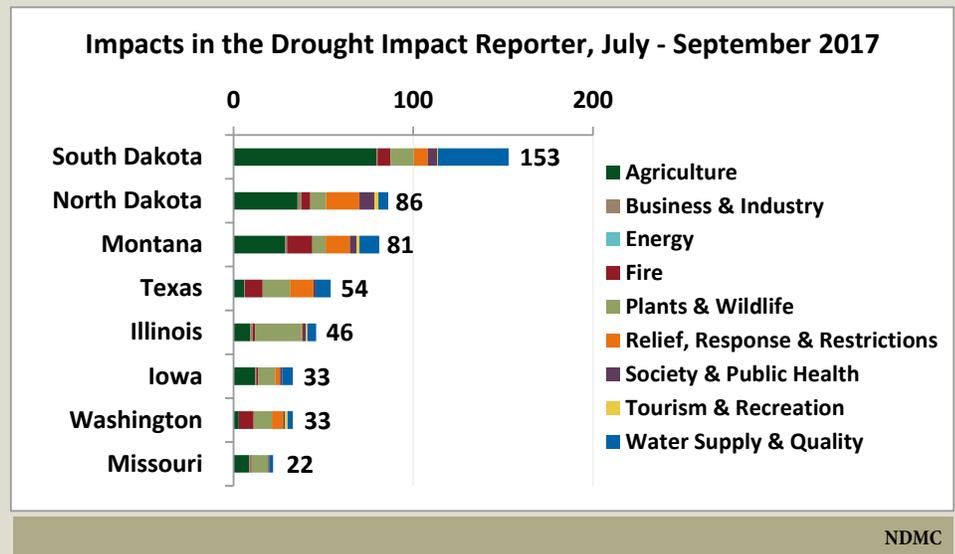
Continued from page 4

of lightning strikes in early July. The extensive wildfire activity led Governor Steve Bullock to sign an executive order in the latter part of July, declaring a fire emergency as the 270,000-acre Lodgepole Complex fire and other fires scorched more than 300,000 acres since the start of the year.

["Lightning sparks western Montana blazes; fire danger raised,"](#) by Perry Backus, Missoula Missoulian (Montana), July 10, 2017

["Governor declares emergency as Lodgepole Complex fire grows to 250,000 acres,"](#) by Sam Wilson, Billings Gazette (Montana), July 24, 2017

By the end of August, more than 1,500 fires burned nearly 600,000 acres, or 937 square miles, in Montana. About that time, a lightning storm that offered little rain sparked another 45 fires, as much of the state was in moderate to exceptional drought and was primed to burn. On Sept. 1, Gov. Steve Bullock issued an executive order declaring a state of disaster due to the multitude of wildfires. By the end of September, more than 1.2 million acres had burned in Montana since the start of the year, with fire suppression costs nearing \$400 million. The state's share of the bill was about \$62 million.



["Montana Wildfire Roundup For August 31, 2017,"](#) Montana Public Radio News (Missoula), Aug. 31, 2017

["Governor declares disaster exists in Montana,"](#) by Phil Drake, Great Falls Tribune (Montana), Sept. 1, 2017

["Fire Torch Historic National Park Chalet in Montana,"](#) by Matt Volz, Associated Press, U.S. News & World Report, Sept. 1, 2017

["\\$400 million spent on Montana wildfires this year,"](#) by Tom Kuglin, Helena (Montana) Independent Record, Sept. 30, 2017

Early fall color in eastern U.S.

Many areas across the eastern U.S. experienced early leaf color or other episodes of unusual fall color that numerous news articles and individuals blamed on dry weather

during the growing season. In south Illinois, brown leaves littered the ground, after dry conditions led trees to skip the color change, turn brown and fall early. Nearby in eastern Ohio, the absence of moisture over the past couple of months hastened leaf drop before the leaves displayed their full range of color. CoCoRaHS observers from Maine to South Carolina to Texas have similarly noted a departure from typical fall foliage appearance.

["Fall foliage impacted by dry weather,"](#) by Nick Hausen, WSIL-TV (Harrisburg, Ill.), Sept. 27, 2017

["Dry weather and hot temps cause leaves to fall early,"](#) by Emily Morgan, New Philadelphia (Ohio) Times-Reporter, Sept. 27, 2017

Study examines ag advisors' views on climate change

Rural sociologist and NDMC Project Manager Tonya Haigh was one of six authors of "Do advisors perceive climate change as an agricultural risk? An in-depth examination of Midwestern U.S. Ag advisors' views on drought, climate change, and risk management," a study published online in October 2017 in *Agriculture and Human Values*.

Researchers focused on an important but rarely studied occupational link in the food production chain, agricultural advisors,



looking at their perceptions of climate change risk, how those perceptions influenced the advice given to producers, and theoretical frameworks

that might account for variations between the beliefs held and the advice dispensed. An important facet of the study was whether those interviewed had changed their behavior based on experiencing an extreme weather event such as the 2012 drought.

Agriculture and Human Values, the journal of the Agriculture, Food, and Human Values Society, is published by Springer Science+Business Media B.V.

— Suzanne Plass,
NDMC Communications

Redefining drought could lead to better preparation

SHAWNA RICHTER-RYERSON

NATIONAL DROUGHT MITIGATION CENTER
COMMUNICATIONS ASSOCIATE

A team of researchers, including two from the University of Nebraska-Lincoln, have developed and proposed a new definition of drought that integrates ecological, climatic, hydrological, socioeconomic and cultural dimensions of drought. This novel approach to thinking about drought may help decision makers better prevent and respond to drought impacts.

Up until now, definitions of drought have tended to focus primarily on drought's effects through a human-centric lens — reduced streamflow and lowered reservoir and lake levels, crop stress and failure, and socioeconomic impacts. What these definitions ignore is the high cost of drought on nature and how that affects human communities as well.

“Ecological drought impacts are important,” said Shelley Crausbay, a researcher on the project conducted by the Ecological Drought Expert Working Group with support from the U.S. Geological Survey [National Climate Change and Wildlife Science Center](#) and the Science for Nature and People Partnership. “But so far, they have not easily fit under the existing drought definitions long used by the drought community and, as a result, ecosystem responses to drought remain largely absent from most drought-planning efforts.”

The new definition, which was presented in the [Bulletin of the American Meteorological Society](#), describes ecological drought as a deficit in available water to the point that ecosystems are irreversibly altered, affecting benefits people typically gain from nature, such as food, water, clean air or recreation. The lack of benefits, in turn, triggers new reactions in both natural and human systems.

When ecosystems change, the

services they once provided may be altered or lost altogether — and replacing them can cost communities millions. After a decade-long drought, for example, Australia spent about \$6.2 million to support air quality regulation, water treatment, erosion prevention and other services that previously had been provided by a river ecosystem.

Those costs are likely to keep increasing.

Over the course of the 21st century, the researchers said, droughts have grown hotter, longer and more expansive than those previously recorded. Human demands for water will exacerbate the issue, and combined with changes in human land-use practices, such as fire suppression, and with climate change, ecosystems will continue to become increasingly sensitive to drought.

“We now see profound ecological responses to drought, like mass fish kills or widespread tree mortality in the western U.S., that have real consequences for biodiversity, including complete ecosystem transformations in some cases, for example, from forest to shrubland,” said Crausbay, currently a post-doctoral researcher with the National Center for Ecological Analysis and Synthesis at the University of California.

Working group members Mike Hayes, professor within the School of Natural Resources, and Deborah Bathke, climatologist with the National Drought Mitigation Center, both at University of Nebraska-Lincoln, said the definition for ecological drought will be a benchmark in drought risk management and planning. It already is being utilized by planners in Montana to identify which ecosystem services, if lost, would matter the most to their communities,

and how they can reduce the services vulnerability to drought.

Going forward, the SNAPP working group hopes to continue integrating ecological drought into drought science, planning, policy and management, so communities can take a proactive approach to combat drought, rather than a reactive one.

“It is time for ecosystems to have a seat at the drought decision-making table, with the realization that an investment in water for nature may

“IT IS TIME FOR ECOSYSTEMS TO HAVE A SEAT AT THE DROUGHT DECISION-MAKING TABLE, WITH THE REALIZATION THAT AN INVESTMENT IN WATER FOR NATURE MAY ALSO BE AN INVESTMENT IN WATER FOR PEOPLE”

Shelley Crausbay

also be an investment in water for people,” Crausbay said. “A more holistic planning and research approach that includes ecological drought means both people and nature will be better prepared for the rising risk of drought.”

The drought expert working group is a collection of specialists from a variety of fields. They are climatologists; hydrologists; wildlife, fish and plant biologists; fire ecologists; science communicators; planners and policymakers; environmental economists; and social scientists dedicated to creating a framework to help communities better prepare for drought and adopt management strategies that support whole ecosystems. For more on the group, [click here](#).

VIEW the ecological drought framework.

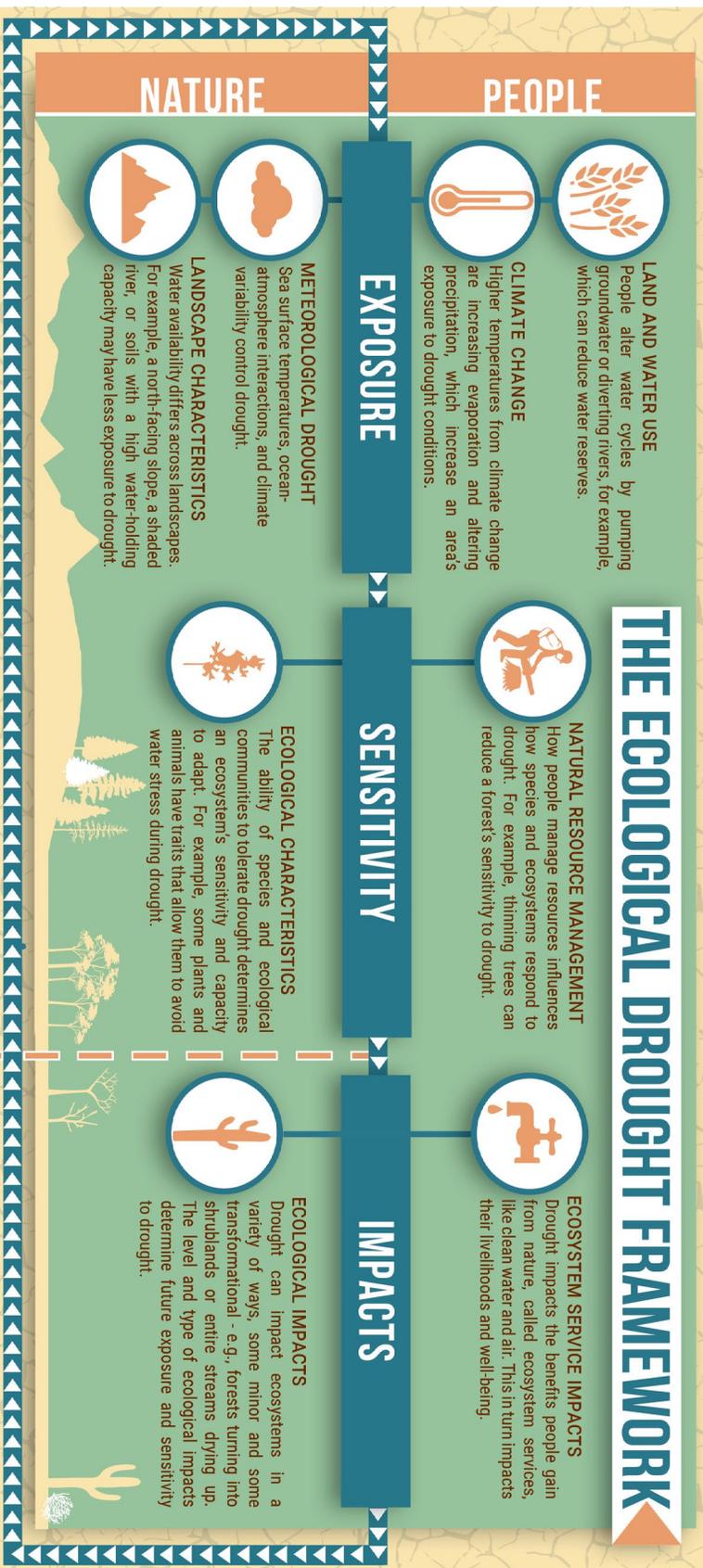
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RETHINKING DROUGHT

Drought affects people and nature alike. Droughts are becoming longer, hotter, and more widespread, so informed planning is crucial to reduce harmful effects. The Ecological Drought Framework presents a new way of thinking about drought. It shows how both people and nature affect an area's **EXPOSURE** to drought, its **SENSITIVITY** to drought, and resulting **IMPACTS**, all of which feed back into the cycle. The framework gives decision makers a roadmap with several intervention points for reducing drought vulnerability.



THE ECOLOGICAL DROUGHT FRAMEWORK



ECOLOGICAL DROUGHT
noun | ēkə'lājīk(ə)l draut :
 Ecological drought is, "an episodic deficit in water availability that drives ecosystems beyond thresholds of vulnerability, impacts ecosystem services, and triggers feedbacks in natural and/or human systems." Unlike traditional understandings of drought, ecological drought incorporates all of its ecological, climatic, hydrological, socioeconomic, and cultural dimensions.



A WIN-WIN FOR PEOPLE AND NATURE
 Reducing nature's vulnerability to drought safeguards the ecosystem benefits people depend on, thus protecting both nature and human well-being.

Source: S. Grausbay, A. Ramirez, et al., 2017: Defining ecological drought for the 21st century. Bull. Amer. Meteor. Soc. doi:10.1175/BAMS-D-16-0292.1, in press.



Suzanne Plass, NDMC

Southwest Nebraska Public Health Department Director Myra Stoney (holding microphone) talks with NDMC researcher Dr. Theresa Jedd (standing) about the health impacts of the 2012 McCook drought at the Heartland Center's Community Capitals framework institute in mid-October 2017.

Small town, big steps toward drought readiness

BY SUZANNE PLASS

NATIONAL DROUGHT MITIGATION CENTER COMMUNICATIONS SPECIALIST

When researchers from the NDMC and partner institutions were looking for a model community for a drought resiliency planning project, NDMC Outreach and Research Specialist Nicole Wall suggested the team take a look at McCook, Nebraska.

"I kind of pushed McCook," said Wall, reflecting on the development of the project. "It is one of those communities that has faced drought for so long they kind of have things figured out."

The rural town of McCook had dealt with drought in 2012 and learned firsthand the many ways that the hazard can impact infrastructure, environment and the health of a community. By the spring of 2016 McCook residents were ready to look back at their experience to consider what they could do differently if faced with future droughts.

NDMC and their research partners

DEALING WITH DROUGHT
CASE STUDIES FROM THE FIELD

MCCOOK, NEBRASKA
TRACKING RESPONSE AND RECOVERY FROM THE 2012-2014 DROUGHT

DROUGHT IS A SERIOUS HAZARD
The 2012 drought, coupled with high temperatures, was one of the most extensive droughts to affect the United States since the Dust Bowl of the 1930s. It affected more than 70% of the continental United States at its peak (Figure 1), carrying an estimated cost of \$10 billion dollars and causing 125 deaths directly attributed to the associated heat wave. More than 80 percent of the productive agricultural land experienced drought conditions resulting in widespread harvest failure for corn, soybeans and soybean crops, among others. Drought also affected half of all livestock. The U.S. Department of Agriculture declared more than 120 counties in 20 states as natural-disaster areas—the highest such declaration ever. Record-breaking heat and relentless dryness spelled the third most disastrous wildfire season with more than 7,000 fires across the country. In 2012, communities throughout drought-affected regions struggled to find ways of coping with increased water demand, devastating agricultural losses, reduced air quality, local economic decline, unprevented wildfires, and public health concerns.

Peak of drought
The U.S. Drought Monitor from Nov. 21, 2012, showed the peak spatial extent of the 2012-14 drought across the United States.

CATEGORY
Abnormally dry
Moderate drought
Severe drought
Extreme drought
Exceptional drought

DROUGHT IS A DIFFERENT TYPE OF DISASTER
Unlike replacement events such as tornadoes, floods, earthquakes and hurricanes that have an identifiable beginning and end, drought is more subtle. Its impacts are often less visible and delayed in time, and can be difficult to characterize. While drought is a climatological event caused by insufficient rainfall,

NATIONAL DROUGHT MITIGATION CENTER
NDMC

The McCook Case Study is available for download on the drought center's website.

leaders in the town and eliciting their perspectives on McCook's strengths and vulnerabilities related to the impacts of drought on the city.

The process of interviews and group discussions that took place over the following weeks is summarized in NDMC's new case study of McCook, Tracking Response and Recovery from the 2012-2014 Drought, just released in October.

NDMC Climatologist and Education Specialist Deborah Bathke described McCook as having faced the same challenges many cities were looking at in the summer of 2012. "The 2012 drought was what we sometimes refer to as a flash drought because of its rapid onset," explained Bathke, "but it was still really intense. At the peak of the drought, 65% of the nation was being impacted. It was the largest extent of drought since the Dust Bowl. Because rural economies are frequently based upon natural

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capital, and since that's one of the things most impacted by drought, it can have an impact that ripples through all sectors of society."

Despite that ripple effect, McCook was able to fare better than similar rural cities. "Not that they weren't impacted," Bathke was quick to add, "but they were able to come through it more successfully than other communities."

The new case study describes

how, using the Community Capitals Framework developed by sociologists Cornelia and Jan Flora, McCook's leaders worked with the research team to identify the community's drought assets and the town's resources that could be impacted by drought.

"At the NDMC we firmly believe that building resilience to drought is about using what you have within the community," said Bathke. "People often get hung up on the idea 'we

don't have any money, so we can't do anything.' And that's where the conversation stops. If you want to be better prepared for drought, you need to understand how it is impacting you. Then, if you can align resources with what you have and turn those into actions, you can increase your drought resilience."

A PDF of Tracking Response and Recovery from the 2012-2014 Drought is available for [download here](#).

Mapping a drought planning process for Korea

The National Drought Mitigation Center hosted Dr. Jae Young Park and Dr. Hosun Lee, of K-water, Korea's state-owned water management company, on Oct. 10, 2017. Park is director general of the Water Information Department for K-water, and Lee is Kwater's principal drought specialist.

K-water established a National

Drought Information Analysis Center as the result of a 2014-2015 drought that led to food scarcity, and it recently launched an interactive website for informing the public about water management and wise use.

The October K-water and NDMC meeting in Lincoln is one in a series of planned exchanges related to the formalization of a memorandum

of understanding between the two organizations. Discussion topics for the meetings include remote sensing, drought monitoring and mapping, and drought resilience planning.

Mark Svoboda, drought center director, will travel to Korea in 2018 for the next stage of the meetings.

— Suzanne Plass,
NDMC Communications



From left, Dr. Jae Young Park, Dr. Hosun Lee, and Dr. Mark Svoboda outside the National Drought Mitigation Center after collaborative discussions Oct. 10, 2017.

Suzanne Plass,
NDMC



Shawna Richter-Ryerson, NDMC

Muthoni Masinde talks about her research during a meeting with the National Drought Mitigation Center in October 2017.

Drought forecasting: Integrating dragonflies with the Digital Age

BY SUZANNE PLASS
NATIONAL DROUGHT MITIGATION
CENTER COMMUNICATIONS SPECIALIST

As a young girl visiting her aunt, Kenyan Muthoni Masinde had to cross a river on an *itiki*, the traditional bridge built and rebuilt by river valley residents for generations. The swaying, flexible bridge meant river crossings felt harrowing — and memorable — for the young Masinde.

Years later as she pursued a doctorate degree in information technology, Masinde wondered what she could study at her university in South Africa that might help her drought-stricken farming community back home in Kenya. She ultimately found her inspiration in the *itiki* that

had once alarmed her. The same give and sway that had troubled the young girl walking across the bridge deck, had allowed *itiki*s built with indigenous knowledge to survive seasonal river floods in the early 1990's, while the rigid frames of bridges set in place under the guidance of engineers had washed away.

Seeing the possibility of using the wealth of indigenous knowledge of the natural world to also enhance drought forecasting, Dr. Masinde began an investigation of technology used for climate monitoring. Her research quickly led her to the resources of the National Drought Mitigation Center, including the work of NDMC geospatial scientist Dr. Tsegaye Tadesse.

Within a few years, she was presenting at one of his workshops. That 2014 workshop, organized by the NDMC and partners and funded by NASA, was hosted in Addis Ababa, Ethiopia, and gained Masinde international recognition for her drought forecasting application, ITIKI.

Information Technology and Indigenous Knowledge with Intelligence is an app that bridges technologically generated climate information and the human “database” of indigenous knowledge amassed through generations of observations of the local environment.

“In two villages in which I work, they predict how long it will take for it to rain

Continued on page 11

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by the level at which the dragonflies are flying,” Masinde said. “They say 3 meters means it will take three weeks. One meter is one week. Half a meter is two days. In 2013, I followed it up. The Kenya Meteorological Department had said it would rain on Nov. 14, and the local farmer said it would rain on the 11th. On the 11th, at night, it rained. So the idea has been tested since 2012 with an accuracy of 90 percent.”

Tadesse believes ITIKI will continue to increase in reliability, accuracy and usability, because farmers see it as a tool they helped make possible.

“They have a depth of knowledge that we haven’t traditionally appreciated,” Tadesse said, “so getting that knowledge from their own experience, and their fathers, grandfathers and grand-grand-

grandfathers — and mothers as well — that’s really something that should be used in improving the forecast.”

Some of the forecast information shared back with local users is distributed via SMS and local web portals. Masinde’s researchers also produce audio files in the local language, “so that people who can’t read or write can listen to the forecast. For example, ‘The rain will be delayed by two days’ or ‘The rain will fall in three stages so you shouldn’t plant things requiring sustained rainfall.’ Though we produce the quantitative information, they want the qualitative also. They are interested in the story behind it.”

For several years, Masinde has worked with Tadesse to develop projects and administrative relationships in conjunction with the memorandum of understanding formally signed by Central University

of Technology in Bloemfontein, South Africa, and University of Nebraska-Lincoln in 2015. Masinde is an award-winning professor and head of the Department of Information Technology at CUT.

In visiting the drought center and the university in October, Masinde hoped to build the foundation for future cooperative projects, including more exchanges of students and professors from the two universities. And not just for research related to the ITIKI project.

“We would like to replicate the NDMC (in South Africa),” Masinde said, “and UNL could test some of their research models in South Africa. I would love to see the MOU expand to a wider community on both sides — computer science, biosystems engineering, robotics, irrigations.

“There is so much we can learn from each other.”

Cultivating drought preparedness in South Africa

BY SUZANNE PLASS

NATIONAL DROUGHT MITIGATION
CENTER COMMUNICATIONS SPECIALIST

The seed of an idea from Dr. Andries Jordaan’s visit to the National Drought Mitigation Center several years ago is finding fertile soil in South Africa’s disaster management communities.

Jordaan first visited the NDMC to meet with the center’s founder Don Wilhite. Many of the principles the two discussed were disseminated to a new generation of South African planners in Jordaan’s capacity as director of the Disaster Management Training and Education Centre for Africa at the University of the Free State.

Still, after his nation’s struggles with record-breaking drought in 2015, Jordaan saw room for improvement. “I recognized that in spite of the impact DiMTEC has been able to make on disaster preparedness, a gap remains



Shawna Richter-Ryerson, NDMC

Andries Jordaan talks about next steps forward during an information-gathering meeting with the National Drought Mitigation Center in August 2017.

in disaster response in South Africa.”

That recognition led Jordaan to invite a few key players in South Africa’s agriculture and disaster

response communities to join him on a return visit to Lincoln. With Jordaan on the August 2017 trip were Janse

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Shawna Richter-Ryerson, NDMC

From left: Deborah Bathke, climatologist with the National Drought Mitigation Center; Janse Robie, head of Natural Resources at AgriSA; Mark Svoboda, drought center director; Moses Musiwale Khangale, director of Fire Services for the South African Ministry of Cooperative Governance and Traditional Affairs; Brian Fuchs, drought center climatologist; and Kelly Helm Smith, assistant drought center director.

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Robie, head of Natural Resources at AgriSA, a nonprofit organization that functions as an interface between government and about 28,000 South Africa farmers; and Moses Musiwale Khangale, director of Fire Services for the South African Ministry of Cooperative Governance and Traditional Affairs.

The South Africans shared an overarching concern about drought's impact on South African food production and availability, and a joint goal of preventing food scarcity during future droughts. The two main agricultural production systems in South Africa, commercial farmers who are usually net exporters of food crops and communal farmers who own the bulk of the countries livestock, were each hit hard in 2015. Most of the latter are subsistence farmers, who had no resources to spare as drought progressed. "Any dry period to them is a drought because they have no resiliency," Jordan said. "Drought impacts them at a lower SPI

than commercial farms. ... We need to research better thresholds for drought."

Rice yield from commercial farms was less than half of the usual annual total because of the drought. Normally self-sufficient and with enough food security to be a net food exporter, the drought led to imports of rice, and a rise in food prices in the country. "There is a saying in South Africa," Jordaan said. "When agriculture sneezes, the whole economy catches cold."

Robie saw the potential for mitigating a repeat of the 2015 harvest scenario through South Africa's utilization of NDMC monitoring and prediction tools. The challenge before him now is to start discussions to determine the entity that would best adapt and administer those tools in a consistent, objective manner. One thing he has in his favor is the frank communication between AgriSA and its members. "As a testing ground," Robie said, "farmers well give honest feedback

on whether the system is working or not."

Khangale was also thinking of his constituents, in this case municipalities across South Africa. Currently the ministry's forecasting is done with post-drought data and applied to a response mode of drought management. Products like VegDRI and QuickDRI would be a boon to his agency's predictive capacity, and utilizing online NDMC handbooks can help municipal planners. He sees his agency as being in a position to "draw some lessons from the use of NDMC outreach and planning frameworks that could help local governments served by the ministry to identify the community assets to be accessed and managed during disasters like drought."

Following two days in Lincoln exchanging information with NDMC climatologists, geospatial technologists, and outreach and planning analysts, the group headed

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west to a ranch outside Chadron, Nebraska, owned by Barb Cooksley, a member of the Nebraska Climate Assessment Response Committee (See below for photos from the visit). Robie saw the ranch visit as an opportunity to see first-hand how drought planning would be “implementable from an agricultural

point of view, and how it’s done on the farm. That’s important.”

Looking forward to further collaboration with NDMC and to sharing lessons learned in Lincoln with his colleagues in Pretoria, Khangale was optimistic about getting NDMC’s monitoring and planning tools even more deeply integrated into South African disaster preparedness. “When we go back we

will prepare a comprehensive report to the Minister, which is the normal process. But because the minister has established an inter-ministerial drought task team, we will then also present the report to that task team. ... so that we plant that seed to say we were away, and these are the things we can take away from the important conversations we had the last two days.”

COOKSLEY RANCH VISIT



Photos by Mark Svoboda, NDMC

