FALL2016

National Drought Mitigation Center

DROUGHTSCAPE

The Newsletter of the National Drought Mitigation Center

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About the photo

A July 22 fire fueled by high winds and vegetation that was dry from a four-year drought became an inferno that tore through Little Tujunga Canyon, Placerita Canyon and Sand Canyon, burning more than 41,000 acres before it was contained. Here, the Sand Canyon Road in Los Angeles County, California.

Photo courtesy of Jim Mundy

DIRECTOR'S REPORT: Leadership switches hands

These stunningly beautiful fall days in Nebraska have been perfect for reflecting on transition. For me, the fall transition has been to step down as director of the National Drought Mitigation Center and see Dr. Mark Svoboda take over. While many transitions are difficult, this one will be easy because Mark brings great experience and leadership into the position and because the NDMC is built upon a strong foundation. Mark's strength in vision is exactly what the NDMC needs at this point, and it will be fun to watch how the center evolves under Mark's leadership.

Michael J. Hayes

I would like to take this opportunity to thank all of the NDMC staff for their hard work and support for me over the years. I will miss interacting with them. Their suite of talents and strengths were united in the mission to help society better prepare to deal with the impacts of drought. It was great to watch their achievements, and I look forward to seeing all that they accomplish in the years ahead. I also want to thank the many collaborators I have worked with while at the NDMC.

My new appointment here within

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As the new director of the NDMC, it is both humbling and exciting to take the helm after following in the footsteps of Dr. Don Wilhite, our founder, and Dr. Mike Hayes. I have had the good fortune of learning from two of the best in the field, and I would like to recognize them for their great work and for leading us to where we are today. Having been with the NDMC since the first days of our formation back in 1995, I look forward to helping our team in writing the next set of chapters in our center's history.

Mark Svoboda

Indeed, these are exciting times. We have slowly grown over the past year and are yet again poised to expand our work and staff in the coming year. The variety and scope of projects and efforts our staff are involved in with partners around the world is truly inspirational and a testament to what I've inherited in such a top-notch staff. If you haven't had a chance to do so, please do check out our staff and see just what it is that they do **here**.

I would like to highlight just a few of the recent activities I've had the privilege of participating in during just

Continued on **page 4**

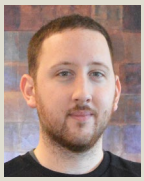
NDMC welcomes two to team

Markéta Poděbradská is a master's student at the School of Natural Resources, University of Nebraska – Lincoln, with a specialization in climate assessment and impacts. She obtained her bachelor's degree at the Czech University of Life Sciences in Prague with a major in applied ecology. Markéta was awarded the Robitschek Scholarship in 2014, which provided her an opportunity to study at Nebraska for one year. During that time, she worked as a student intern at the drought center, and she began her research, in cooperation with Dr. Robert Oglesby and Dr. Michael Veres, that led to her senior thesis: "Influence of the Sea Surface Temperature Variability on Formation of Pluvial Conditions in North America." Marketa's work at the NDMC focuses on ecological impacts of drought, which will contribute to the research cooperation of the NDMC and the National Integrated Drought Information System. This area likely will be a central point of her master's thesis.

Markéta Poděbradská

■ ■ ■

Tony Mucia is a master's student in natural resources at the University of Nebraska-Lincoln with a climate assessment and Impacts specialization. He got his bachelor's degree in meteorology-climatology from Nebraska in 2016. Tony began work at the drought center as an undergraduate senior in 2015. He assists on NDMC projects such as Multi-Hazard Tournaments and the Evaporative Stress Index. His research focuses on assessing the accuracy of remotely sensed groundwater from NASA's Gravity Recovery and Climate Experiment satellite system. This assessment will lead to incorporating the changes in water level into models and other usable products. Tony's thesis may incorporate other drought indicators such as ESI and Vapor Pressure Deficient.



Tony Mucia

Continued from **page 1**

the School of Natural Resources will focus on climate-related research and teaching in our new Climate and Spatial Science Applications major. I will not be walking completely away from drought. I plan to continue to partner with the NDMC when it is possible and interact with many of the same colleagues in the wonderful drought and climate communities. I also hope to have some role with NIDIS, perhaps as a member of the Engaging Preparedness Communities Working Group, which I helped to create when NIDIS was formed in 2006.

The opportunity to work with the NDMC has been fantastic. I have loved every moment working with stakeholders to improve their preparedness for drought — whether that is here in Nebraska or in some location across the country or around the world. I must also admit that I learned so much from others during my travels. Much progress toward drought risk management has been made, but there is still more to be done. My colleagues at the NDMC will continue their efforts, and I will as well in my new role.

Michael J. Hayes

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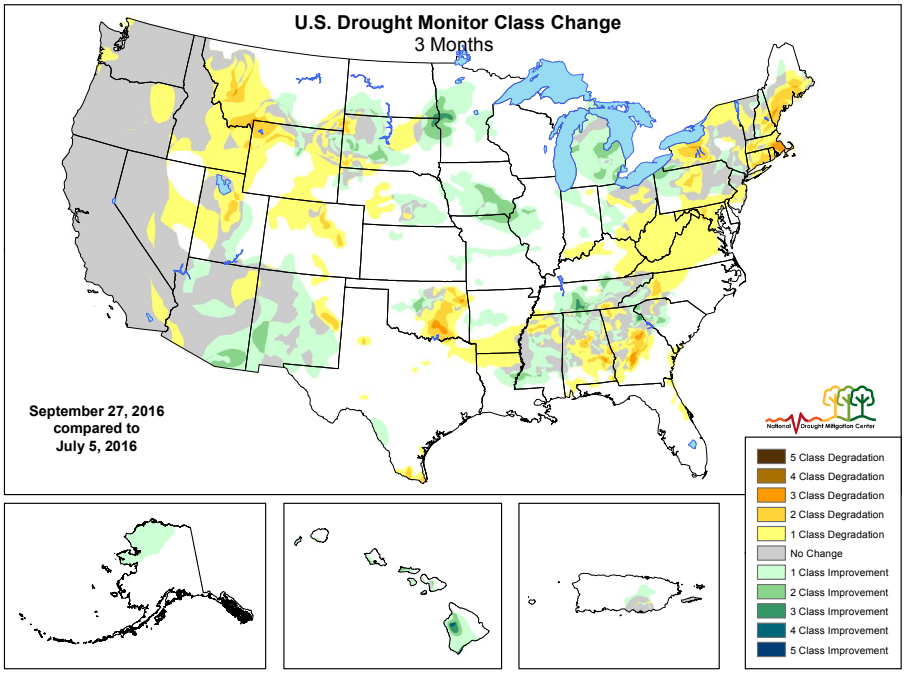
Drought slowly spreads, while severe drought improves slightly

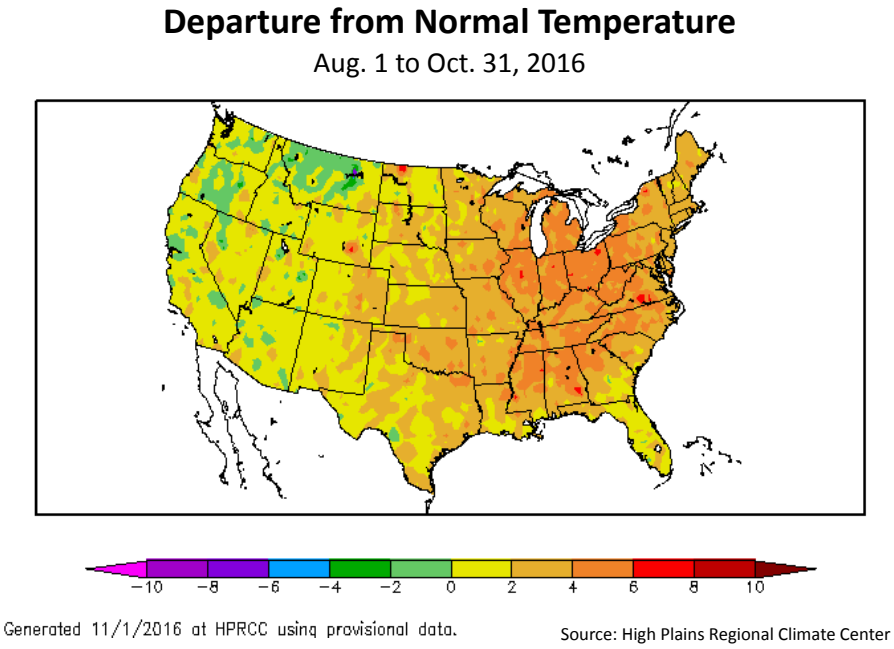
BY BRIAN FUCHS
NATIONAL DROUGHT MITIGATION CENTER CLIMATOLOGIST

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.***



http://droughtmonitor.unl.edu



Drought

Dryness has continued to be an issue over New England and the Southeast where drought has expanded and intensified over the last quarter. September ended with 15.85 percent of the United States in drought compared to 13.60 percent in July. Severe drought expanded from 4.56 percent to 6.77 percent, extreme drought increased from 1.97 percent to 2.67 percent, and exceptional drought increased from 0.92 percent to 0.97 percent. The expansion of extreme drought was mainly in western New York and along the coastal regions of New England but also in Alabama, Tennessee and Georgia. The Southwest and Hawaii saw some improvement but drought developed in eastern Oklahoma. September ended with approximately 101 million people in drought compared to approximately 81.7 million people at the beginning of July.

Temperatures

Temperatures were warmer than normal over most areas east of the Mississippi River with departures of 3 to 4 degrees above normal. Normal to cooler-than-normal temperatures were experienced over much of the northern Rocky Mountains, central Plains, and into the four-corners region. Coastal areas of California were normal to a slightly above normal. Temperatures in Hawaii were near normal, and most of southern Alaska was 2 to 3 degrees above normal.

Precipitation

Dryness over Georgia and Alabama

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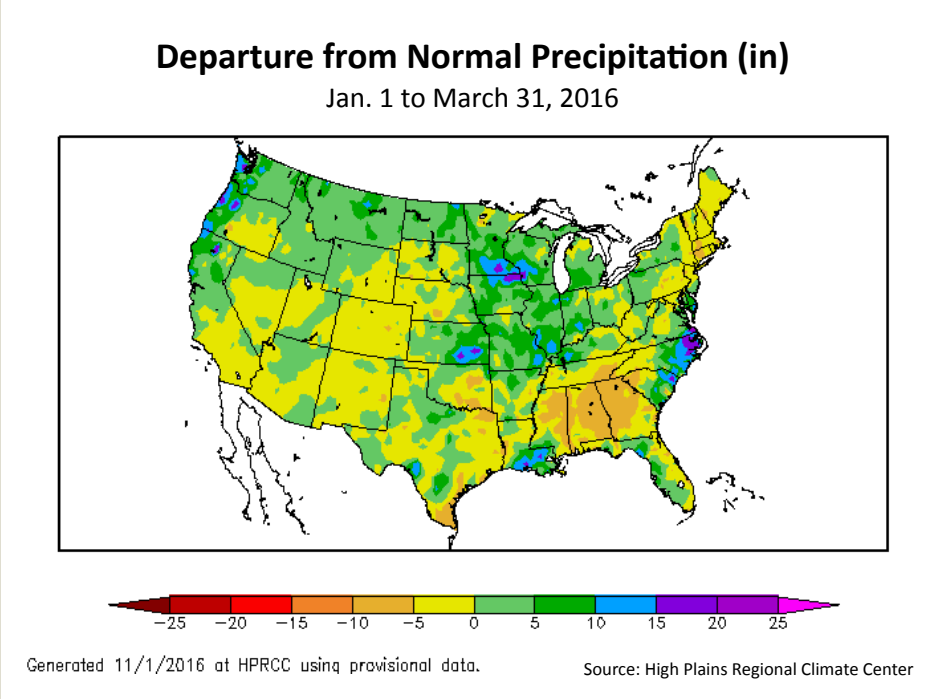
Summary continued from **page 3**

was widespread as was the Atlantic coast of Florida; departures were up to 8 inches below normal. Much of the Plains and Midwest was wetter than normal with departures of 12 to 16 inches above normal in southeast Kansas, southwest Missouri, southern Illinois, western Kentucky, southeast Minnesota and northeast Iowa. Southern Louisiana also was wetter than normal.

MONTHLY DROUGHT AND IMPACT SUMMARIES

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



Outlook

The seasonal outlook through the end of January has drought continuing to develop in the Southeast and into the Delta and Gulf Coast of Texas. In the Northeast, drought will improve and likely improve in Pennsylvania, New York, Vermont, New Hampshire and into Maine but will persist along the coastal regions of New England. The drought in the West will likely persist in areas of California and Arizona, but improvements are possible in northern California, Oregon and into the northern Rocky Mountains.

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the first month of my new post:

1) The launch of Dry Horizons. As a partnership between the National Integrated Drought Information System and the NDMC, this new e-newsletter is produced by the Drought Risk Management Research Center at the drought center with a goal of sharing information specifically geared toward drought planners. One of the questions we are often asked is, "What are others doing in regard to planning and preparing for drought?" Check out Dry Horizons for some answers to that question and see for yourself! You can find and subscribe to it **here**.

2) In mid-September, I participated as a member of the Integrated Drought Management Programme Advisory Committee in Geneva, Switzerland. The number of activities already completed, underway and planned are quite impressive given the short amount of time the IDMP has been around. It will be exciting to contribute to this global collaborative effort centered around the three pillars of drought risk management: monitoring and early warning; vulnerability and risk assessment; and mitigation and planning. You can find out more about the IDMP **here**.

3) Finally, I've also had the privilege to represent the NDMC as a sitting member of the NIDIS Executive Council in Washington, D.C., during the latter part of October. As NIDIS moves forward under its reauthorization charge, the list of work underway via the working groups and regional drought early warning systems is impressive, as is the amount of collaboration being conducted at all levels and between NIDIS and the National Drought Resilience Partnership. Couple that with the rolling out of a draft of the new NIDIS Implementation Plan (set to be finalized late this year or early in 2017) and there has never been so much information or services available to deal with drought in this country. It is an exciting time to be a part of it! For updates on this and other happenings within NIDIS, click **here**.

Through these activities, and many more, I've been able to hit the ground running and already have seen some potential new ways to expand the NDMC's horizons moving forward. I look forward to meeting new partners and making new friends in the coming months and years. If I've learned one thing over the past few decades it is that no one can go it alone when it comes to tackling the specter of drought!

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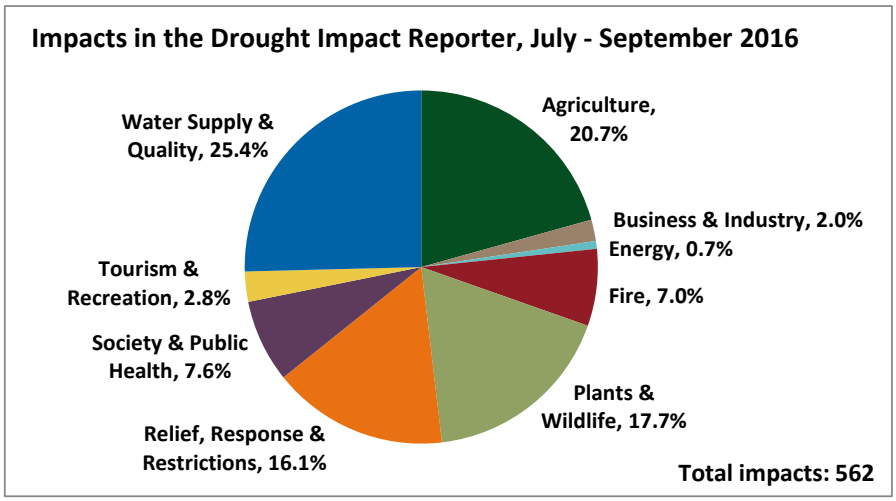
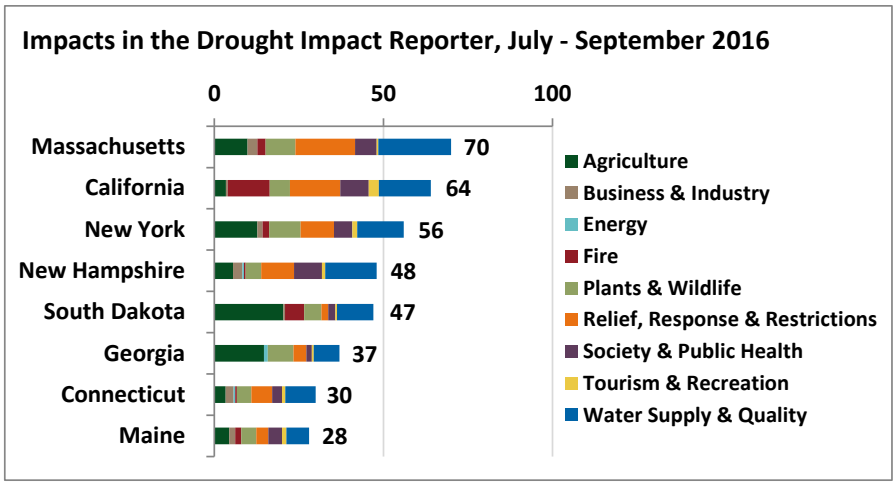
Hot, dry summer for Northeast, Southeast and California

BY DENISE GUTZMER
NATIONAL DROUGHT MITIGATION CENTER DROUGHT IMPACT SPECIALIST





Source: National Drought Mitigation Center

The 2016 summer was a hot, dry one for the Northeast and Southeast, hurting agriculture and cutting into crop yields, as farmers irrigated and salvaged what they could. New England's water supplies were not as full as usual at the start of summer, after a winter of poor snowfall, and were not positioned to carry the region through a drought. Farmers in the Southeast also were on edge, waiting for rain to fall and save crops, but for many, that didn't happen. River systems were low, reflecting the dearth of rainfall. In the West, wildfires burned explosively because years of drought left the landscape unusually parched. Water conservation efforts seemed to be waning, although conservation was still needed.

Northeast

Northeastern crops did not fare well amid drought, leaving farmers working long hours to irrigate and bearing increased costs for moving pipes and running pumps. Those who could not irrigate saw their crops wither and yields drop, leading to disaster designations for many counties in New England. Many apple growers, like many produce growers, had smaller fruit. Grape growers got smaller grapes, but those grapes benefitted from the dry, warm weather and were of higher quality and had concentrated flavors.

Pastures and hay suffered during the hot, dry summer, leaving dairy farmers, already hurt by low milk prices, in a very difficult situation. In New Hampshire, 19 of the state's 120 dairy farms closed in 2016, because the cost of purchasing hay, on top of poor milk prices, was too much of a financial burden for them. Other dairy farmers in New England, as well as other drought-affected parts of the country, were facing the same challenges.

"Dying dairies: How drought, low milk prices, lead to decline in N.H. Farms," by Elodie Reed, Concord Monitor (NH), Aug. 30, 2016

Homeowners relying on shallow or hand-dug wells were finding their water supply was not as reliable as they thought; numerous wells across New England went dry. Many water suppliers also saw their surface waters dwindle and imposed restrictions to protect water stores until rains returned to replenish reservoirs. Many states issued drought notices, alerting the public of the need to conserve water.

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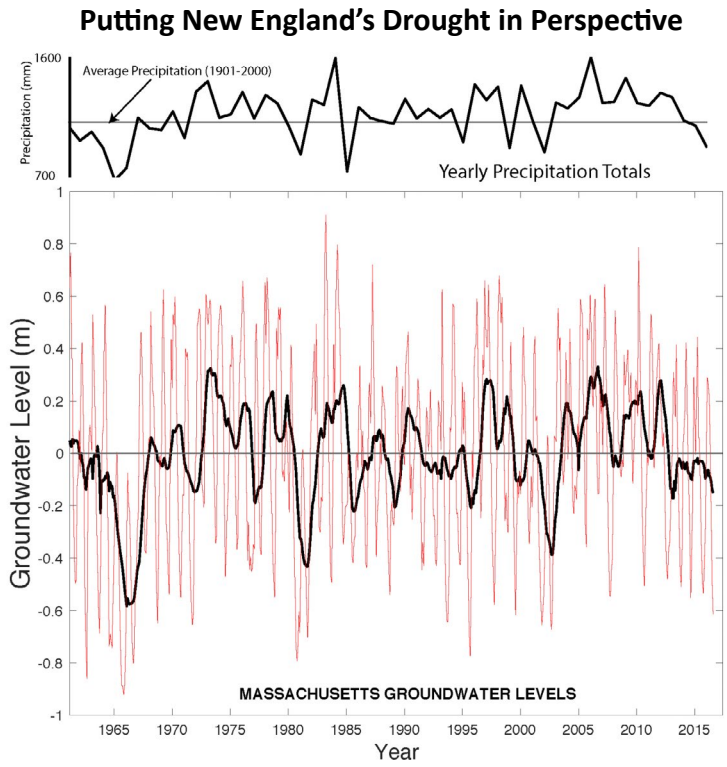
Southeast

The agricultural strain was similar in the Southeast, with corn baking in the summer heat, needing rain during a certain period for the ears to produce kernels. Many Alabama and Georgia cattle producers were anxious, seeing pasture and hay turn brown when herds ought to be grazing. Feeding hay during the summer meant buying additional hay to feed livestock through the winter.

Water systems were also sapped by the dry summer and required conservation from those depending on those sources. In Alabama, reservoirs owned by Alabama Power reduced releases to conserve water, as did the Army Corps of Engineers as water levels declined on the reservoirs on the Savannah River on the Georgia/South Carolina border. Flow from the Lake Thurmond Dam was reduced slowly, allowing the Southeastern Power Administration time to arrange for alternative sources of power.

"Ongoing drought taking toll on Alabama Power lake levels," The Randolph Leader (Ala.), Sept. 14, 2016

"Corps slows flow from lakes as drought increases but Hartwell still likely to go down," Greenville Online (S.C.), Sept. 21, 2016



Source: UMass Amherst

The drought in parts of New England are severe, but no where near the depth of dryness experienced during a five-year drought between 1962-1967, the University of Massachusetts Amherst reported.

"This drought is bad, but it's not the worst," said hydrologist David Boutt, of the university. "It's probably not yet in the top five drought periods in New England historically, so we need to keep things in perspective. Drought is a normal part of the water cycle."

Putting New England's Drought in Perspective, UMass Amherst, Sept 19

California

California, enduring its fifth year of drought, experienced another summer of horrific wildfires that tore through dry brush and desiccated vegetation and destroyed homes. Through Oct. 14, firefighters fought 6,969 wildfires that had charred 553,273 acres since the start of 2016. One particularly persistent fire, the Soberanes Fire that began July 22 in the Big Sur area of Monterey County, burned more than 132,000 acres and dozens of homes and continued to burn, although the fire was fully contained, underscoring the challenge of controlling fires amid drought. The cost of fighting the fire was put at $260 million. The exceedingly dry landscape allowed many fires to flare across the Golden State, exhibiting extreme fire behavior that caught even veteran firefighters off-guard.

Fire stats from "National Interagency Coordination Center Incident Management Situation Report," Friday, Oct. 14, 2016 – 0530 MT

"The blaze that won't die: How Monterey County wildfire became one of costliest to fight," by James Queally, Los Angeles Time, Sept. 30, 2016

Water conservation in California was still an expectation, as it had been for years, because the drought persisted. But after years of strict conservation mandates, public water conservation rates were slipping since mandatory water restrictions were eased in June. As water use inched higher, the State Water Resources Control Board watched the trend warily, and considered whether an additional rate structure on water conservation was needed. Oct. 1 marked the start of a new water year that will hopefully bring relief.

"Californians using more water again," by Lauren Williams, The Press-Enterprise (Riverside, Calif.), Nov. 1, 2016

Sinking more wells in the San Joaquin Valley

California farmers resorted to using groundwater to keep crops growing as drought persisted and water deliveries from the state and federal projects

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were slim. In the San Joaquin Valley in 2015, farmers dug about 2,500 new wells, the most in one year and five times the annual average for the previous 30 years, according to a Sacramento Bee analysis of state and local data. From 2012 through 2015, San Joaquin Valley farmers dug more than 5,000 wells, more than were dug altogether during the previous 12 years. Most of the new wells were in Fresno and Tulare counties, where officials issued an average of nearly 10 agricultural well permits each business day in 2015, although some of the permits were not used. The permit-issuing pace slowed in the first few months of 2016, but remained higher than pre-drought levels. There were plenty of drilling jobs lined up for a Fresno-based well driller, who expected to drill about 260 new wells in the San Joaquin Valley in 2016. A recent well was sunk 1,200 feet in Poplar at a cost of $260,000, although just a few years ago, the average well depth was roughly 600 feet. Sacramento Bee (Calif.), Sept. 25, 2016.

DROUGHT IMPACT REPORTER

For more detailed reports, visit **droughtreporter.unl.edu**

Farmers say, 'No apologies,' as well drilling hits record levels in San Joaquin Valley - Sacramento Bee (CA) 9/25/2016

California farmers drilling wells as groundwater limits loom - Sacramento Bee (CA) 9/26/2016

Courtesy image

Tsegaye Tadesse, climatologist and remote-sensing expert with the NDMC and senior consultant for the Food and Agriculture Organization, presents a drought-risk management strategic framework proposal at the African Drought Conference in late August 2016.

Drought management framework for Africa approved

SHAWNA RICHTER-RYERSON
NDMC COMMUNICATIONS ASSOCIATE

Getting governments to consider a proactive approach to prepare for future drought events is almost always an uphill battle. This doesn't daunt Tsegaye Tadesse, a climatologist for the National Drought Mitigation Center at University of Nebraska-Lincoln.

In August, he attended the African Drought Conference in Windhoek, Namibia, where the goal was to develop a drought risk management strategy for all of Africa, a continent nearly 3.5 times larger than the United States. Such a strategy will enhance each country's resilience to drought impacts.

"It is ambitious," he acknowledged, "But you have to start somewhere; 10,000 steps start with just one."

The conference may have propelled an entire continent into taking that first step. There, Tadesse presented a proposal on a drought risk management framework, "Drought Resilient and Prepared Africa," which builds on the long legacy of international drought risk management work by NDMC faculty — current Director Mark Svoboda, Cody Knutson and Michael Hayes — and drought center founder Don Wilhite. The proposal was revised and approved by the ministers of all participating African countries over the

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five-day conference.

In the past, Tadesse said, many African countries have not placed a "proper priority" on drought risk management. Most often, countries have taken a crisis-management approach, rather than a proactive, preventative one.

But, since droughts are natural phenomena, they aren't going anywhere. They are an expected part of all climates, and growing evidence indicates droughts in Africa are likely to become more frequent and last longer as a result of climate change and will leave severe economic and social damage. A report by the UNOCHA in July stated that more than 30 million people in Africa were affected by severe El Niño-linked drought impacts in 2016, with southern Africa experiencing the driest cropping season in 35 years. The resulting food scarcity has led to thousands of deaths.

That means not having a plan really shouldn't be an option.

"Each country needs a drought policy and a commitment to a drought policy," Tadesse said. At the same time, he said in the proposal, "While each country in Africa has the primary responsibility for managing and reducing drought risk, it is a shared responsibility between African governments and relevant stakeholders, scientific institutions and the private sector, as well as UN agencies."

To help countries create their short-, medium- and long-term drought mitigation plans, a Drought Task Force has to be created, Tadesse said. The African Union Commission and United Nations agencies also plan to help fund the creation of plans for the poorer countries in Africa.

"The African Union and delegates want to do the next step as soon as possible to keep the momentum going," Tadesse said about the outcome of the conference. "Within a couple of years, they want to have an overarching drought policy and implementation plan for Africa."

> ***"WHILE EACH COUNTRY IN AFRICA HAS THE PRIMARY RESPONSIBILITY FOR MANAGING AND REDUCING DROUGHT RISK, IT IS A SHARED RESPONSIBILITY BETWEEN AFRICAN GOVERNMENTS AND RELEVANT STAKEHOLDERS, SCIENTIFIC INSTITUTIONS AND THE PRIVATE SECTOR, AS WELL AS U.N. AGENCIES."***
>
> **Tsegaye Tadesse, National Drought Mitigation Center**

Still, Tadesse said, he and other leaders know political will and commitment is important, and planning for drought can't be forced on people. Some countries may choose not to. But Tadesse is ever hopeful that won't be the decision made.

"The president of Namibia, Dr. Hage Geingob, was there while I was presenting the DRAPA proposal at the African Drought Conference," he said. "I think he is committed to the issue, and that is really good. We have to try and move the needle and having his commitment to the issue will set a good example for other countries in Africa."

Tadesse said generally Africa has shown recent enthusiasm for battling the issue, and some countries, such as Ethiopia and Kenya, already have policies in place. However, the plans need to be dynamic and improved periodically to incorporate lessons learned.

"These plans need to be proactive and dynamic and should be revised for each country based on resources, culture and indigenous knowledge," Tadesse said. "Conditions change. We want each country to review their policy every five years, to look at what worked and what didn't work, and then make significant changes if needed."

The "Drought Resilient and Prepared Africa" framework incorporates the approach promoted by the Integrated Drought Management Programme that highlights the development of national drought policies based on the three pillars of drought risk management:

- drought monitoring and early warning;
- drought vulnerability and risk assessment;
- and drought preparedness, mitigation and response.

Tadesse further emphasized three specific elements in the framework:

- policies and governance for drought risk management;
- drought awareness and knowledge management;
- and reducing underlying factors of drought risk.

If done appropriately, drought plans can help reduce impacts to people and property, but also strengthen the ties between the countries of Africa while reducing the monetary cost of drought recovery.

"Each country in Africa has a stake in this," Tadesse said. "Having a drought plan is not just an advantage for an individual country. It also is a benefit to the entire continent."

This work ties in closely with other recent work by the university in the Middle East and North Africa region. The drought center and the Robert B. Daugherty Water for Food Global Institute are working together with the Dubai-based International Center for Biosaline Agriculture to help the region balance water consumption and increase agricultural productivity, with a focus on drought management.

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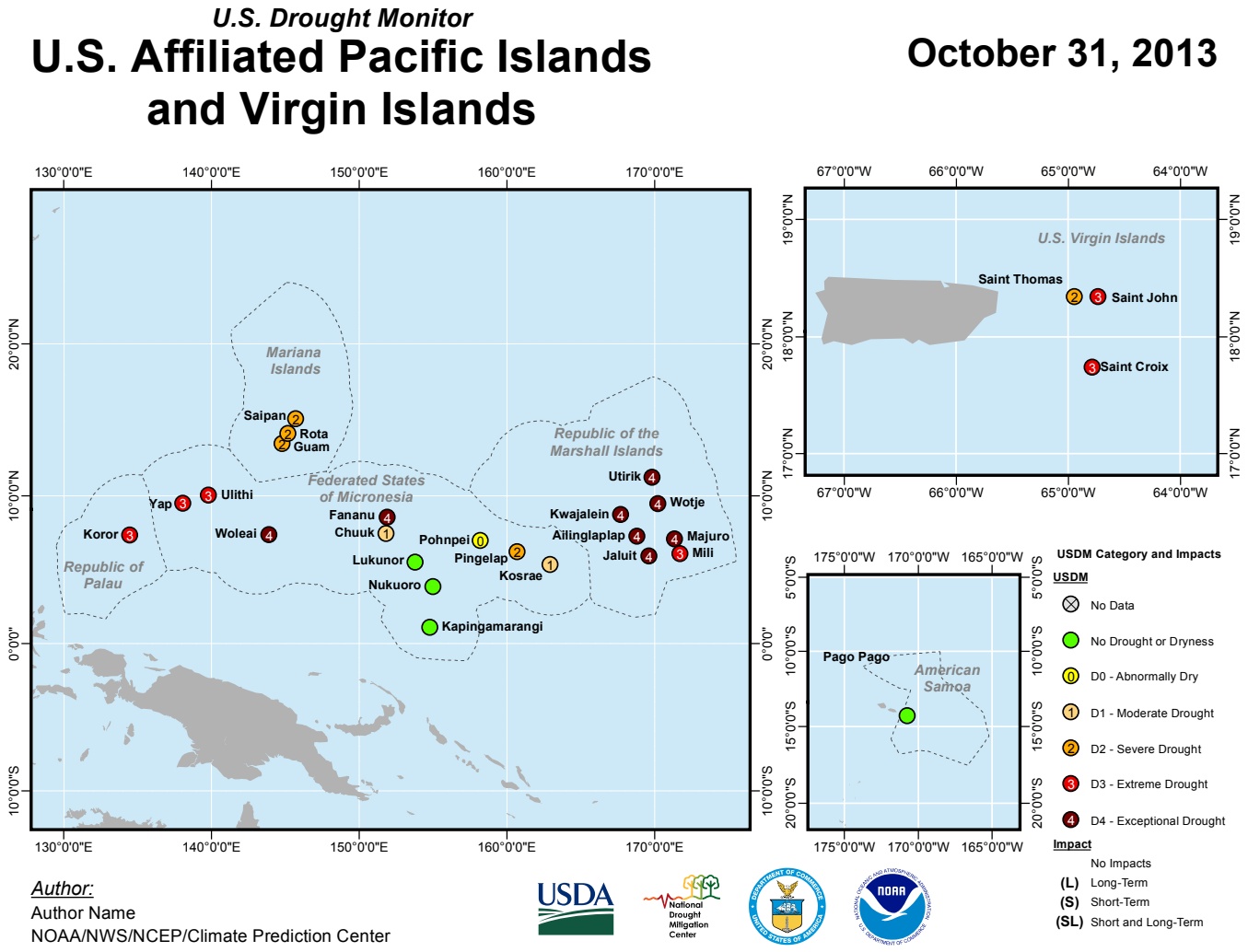
MENA PROJECT

The drought center's work in the Middle East and North Africa region in developing a composite drought index and working with stakeholders on drought planning continued with workshops in Tunisia, Jordan and Morocco. Staff from the drought center worked closely with planners and practitioners in both countries during those workshops. Read more about those activities next month on drought.unl.edu or look to the winter edition of DroughtScape.



NDMC

This is an experimental U.S. Drought Monitor map for the Pacific and Virgin islands.

Bringing the U.S. Drought Monitor to the USVI

JULIE WRIGHT
USDA NATURAL RESOURCES CONSERVATION SERVICE

The Virgin Islands is one step closer to being included in the U.S. Drought Monitor, a national assessment tool that maps drought conditions nationwide on a weekly basis. The USDM uses historic and current precipitation and temperature data, economic impacts to agriculture and other climatological factors to determine if an area is experiencing drought. Many USDA drought relief programs are triggered by USDM drought designation.

The 2015 drought dealt a huge blow to agriculture in the Caribbean Area: It damaged crops, weakened and killed livestock, and increased the threat of wildfires. However, VI agronomists and farmers soon discovered that the U.S. Drought Monitor's weekly assessments covered all 50 states and Puerto Rico, but not the U.S. Virgin Islands. The USVI didn't have sufficient data to be included.

To address this problem, USDA and the National Drought Mitigation Center offsite link image — in partnership with the University of the Virgin Islands, the VI Department of Agriculture, VITEMA and the National Weather Service – convened a forum to discuss how the territory can receive additional drought relief resources through data collection and communication to reduce the time it takes for drought to be officially declared and for federal funding to arrive. The forum was held Aug. 30 to 31 at the UVI Great Hall on St.

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 © 2016 National Drought Mitigation Center

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Croix, with a video-conference link to UVI St. Thomas. Local agency personnel, farmers, researchers, teachers and students gathered at the forum to determine what steps to take to get the Virgin Islands on the weekly Drought Monitor map.

VI Agriculture Commissioner Carlos Robles revealed to Drought Monitor authors and forum attendees that the VI's absence from the USDM delayed the federal drought declaration last year – to compensate for the lack of data the VI government had to gather proof that the islands were experiencing an emergency drought situation.

"We had to develop an on-the-ground story before we convinced the USDA Farm Service Agency and the Secretary of Agriculture to make a declaration of drought in the Virgin Islands," Robles explained, adding that newspaper articles and Facebook photos of starving livestock were part of the evidence the VI Agriculture Department gathered.

Having a system in place that collects data for the drought monitor would have been a much faster and easier way to prove the territory was in a drought. A drought monitoring tool can speed the time federal funding comes in during a drought disaster and can also help farmers better understand water and pasture conditions and manage them accordingly. But gathering the necessary data and getting it to the USDM authors on a weekly basis is a daunting task.

During the day-and-a-half forum, 48 participants on St. Croix and 17 on St. Thomas learned from a half dozen authors about the history of the U.S. Drought Monitor, how the weekly USDM maps are developed, and the data requirements to put together the maps on a weekly basis.

Brian Fuchs, a NDMC climatologist, said that between 40 and 60 different indicators are collected for each locale depending on its particular characteristics. Precipitation, drought indices, stream flow, soil moisture, ground water and satellite data are all common indicators. The climatological record for each indicator is important, too, since a historic baseline is needed to assess "normal" conditions.

"We're going to need the stakeholders, we're going to need the local experts, we're going to need the participation," Fuchs said. "It's good for one person to take the lead

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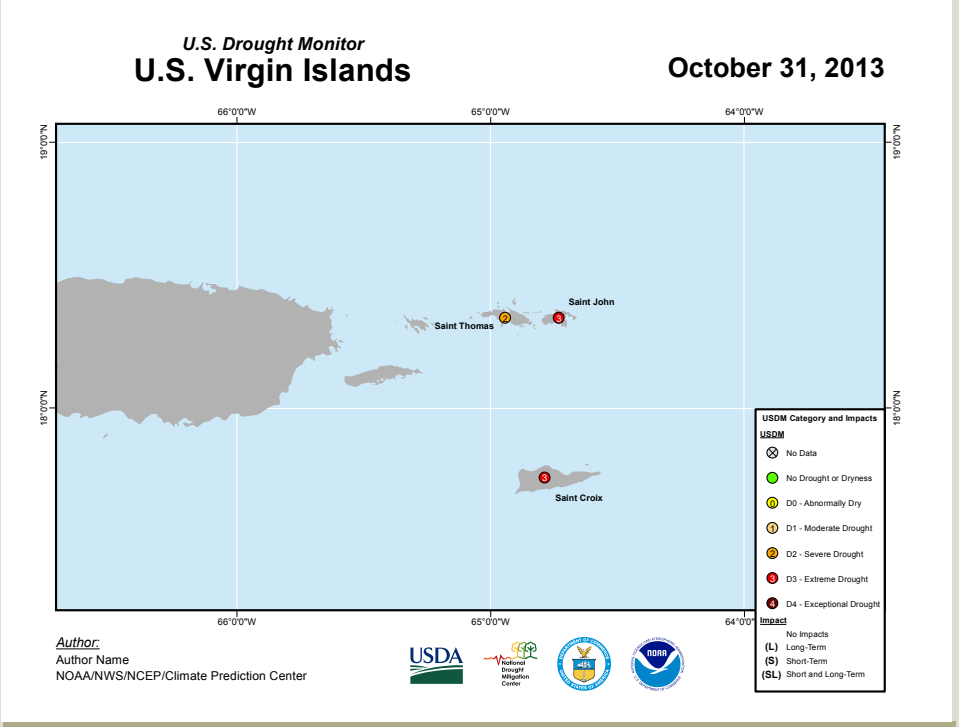
Puerto Rico Drought Plan Unveiled

Drought Monitor authors also held a forum in Puerto Rico on Sept. 1. The forum was at the U.S. Forest Service offices in the Rio Piedras Botanical Gardens to provide similar information to local and federal researchers and emergency managers, and to present the new Puerto Rico Drought Plan.

National Weather Service and U.S. Geological Survey representatives provided a summary of rainfall deficit and hydrologic conditions in Puerto Rico. The Puerto Rico Emergency Management Agency and the PR Department of Environment and Natural Resources detailed the local drought protocol. Researchers from the University of Puerto Rico also gave a presentation about the impacts of drought on public health and soil moisture.

This forum resulted in a better local drought assessment process.

Visit go.unl.edu/puertorico to download a copy of the plan.



NDMC

This is an experimental drought monitor map for the U.S. Virgin Islands.

Continued from **page 11**

but we still need multiple people to champion the effort."

Michelle Martinez and Debbie Folsum from the USDA Farm Service Agency, explained that once U.S. Secretary Tom Vilsack declared the drought disaster last year, federal funds were released through FSA assistance programs that reimbursed farmers for feed they had to buy during the drought (since pasture grass and hay were scarce) and for livestock that died as a result of the drought.

Local researchers and conservationists described their USVI data and drought mitigation programs during the Forum, including Jaime Valentín of the USDA Natural Resources Conservation Service, Dr. William Gould of the USDA Caribbean Climate Hub, Dr. Robert Godfrey of the UVI Agricultural Experiment Station, Dr. Kristin Wilson-Grimes of the UVI Water Resources Research Institute, Christina Chanes of the UVI Cooperative Extension Service, Dr. David Morris of the UVI Science and Math Department, and Odalys Martínez of the NOAA National Weather Service.

It was clear from the presentations and discussion that much of the local climatological data needed for the drought monitor already is being collected, and there also is historic weather data available. But Mark Svoboda from the NDMC explained that even though VI data is available, it needs to be converted to GIS format and provided to the USDM authors on a weekly basis. In addition, indicators such as water costs, economic effects on farmers and other types of impact data are not systematically collected.

Yvette Browne of Sejah Farms said the territory should put a committee together to determine how data will be collected. "This needs to be done now, sooner than later, even if the water situation is better this year, since it can help forewarn farmers about coming issues," she stated.

According to Commissioner Robles, the U.S. Geological Survey will soon be back in the territory to monitor groundwater resources, which is data that could feed into the drought monitor. But getting on the map won't happen overnight, despite the forum's forward motion.

"Given what I heard today, there's going to be some time to develop the local resource pool and get that coordinated so the people at the national level can get what they need from us," Robles said. "Our request to get on the monitor has been heard and the process has been commenced in earnest. Now we understand what it takes to get on and stay on the monitor."

HUSKER HARVEST DAYS

The National Drought Mitigation Center participated in the annual Husker Harvest Days — the world's largest, totally irrigated, working farm show — outside of Grand Island, Nebraska, in early September. Experts from the center met with farmers, land managers and agriculture industry experts over the three-day event.

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Tonya Haigh/NDMC

The Missouri River begins here, where the Jefferson, Madison and Gallatin rivers converge, near Three Forks, Montana.

Montana looks to improve watershed resilience

The mighty Missouri River begins in Southwest Montana, as the confluence of small river systems such as the Big Hole, the Beaverhead, the Ruby, the Madison and the Gallatin. These watersheds are known for world class fly-fishing and tourism and also support farming, ranching, rural communities, growing urban areas, and critical ecological systems and connectivity. Proactive drought planning efforts are underway to improve the resilience of these watersheds in the face of drought and increasing water demands.

"As a national demonstration project, the Montana Drought Resilience Project is showing how multi-partner collaboration can build community drought resilience," said Ann Schwend, water planner for the Montana Department of Natural Resources and Conservation, Upper Missouri Basin.

The National Drought Mitigation Center, through partnerships with the National Integrated Drought Information System and the National Drought Resilience Project, is helping.

"WE HOPE THAT NOW THE COORDINATORS ARE FEELING READY TO ROLL UP THEIR SLEEVES AND ENGAGE THEIR LOCAL COMMUNITIES IN DROUGHT PREPAREDNESS AND LONG TERM PLANNING."

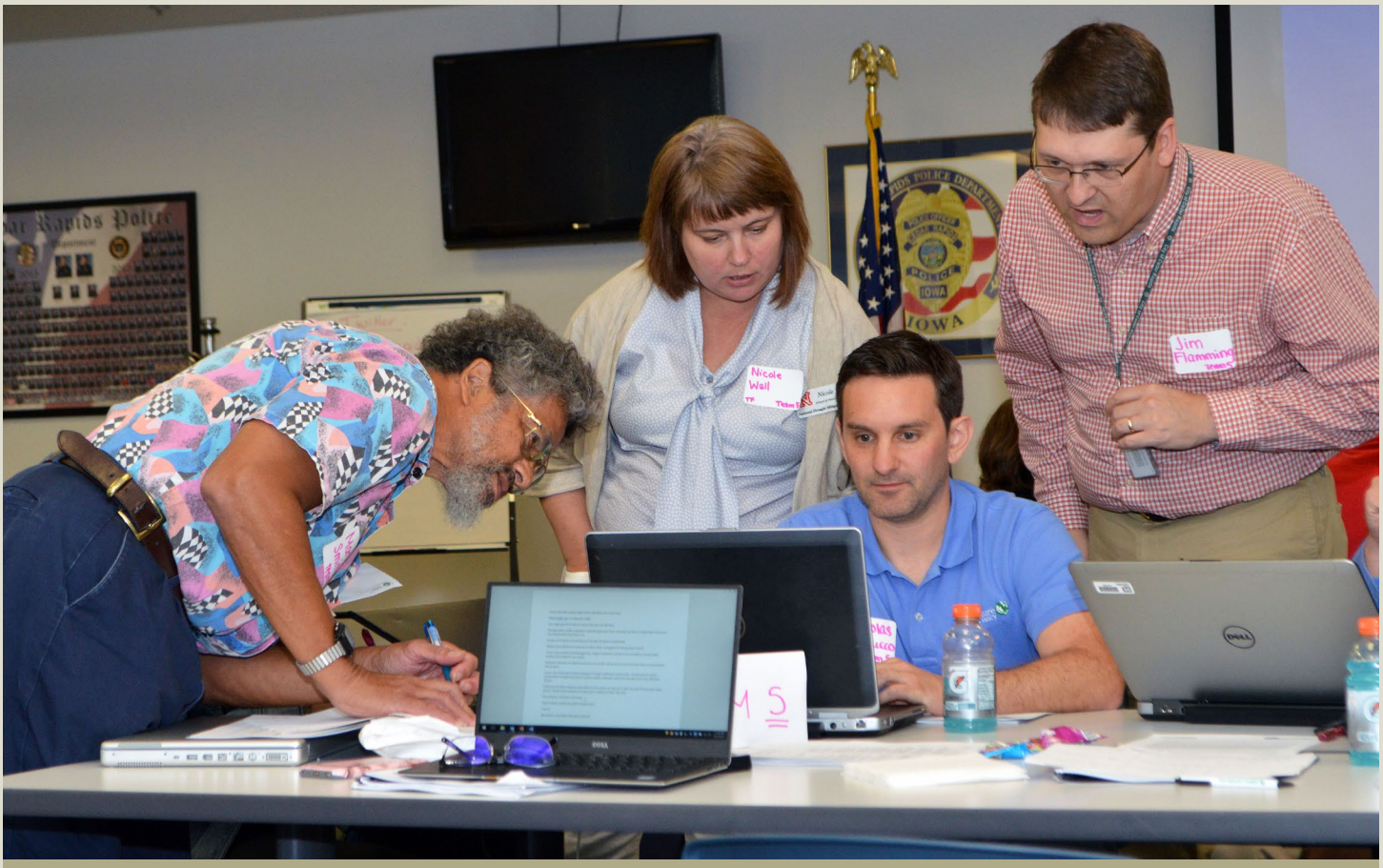
Ann Schwend,
water planner for the Montana Department of Natural Resources Conservation, Upper Missouri Basin

The NDMC participated in workshops and trainings with community drought coordinators for the eight watersheds that make up the Missouri Headwaters sub-basin, beginning in March 2015. This spring, NDMC staff helped to train the community drought coordinators on Building Drought Resilient Communities, through a series of five webinars. The sessions were based on the NDMC's Drought Ready Communities handbook and included sessions on understanding water, climate and drought in the community, identifying drought vulnerabilities, and developing response and mitigation plans.

In September, the community drought coordinators and partners came back together to build on tools and skills for leading drought planning in their communities. The NDMC provided an interactive session on working with community members to identify drought impacts as well as the underlying factors that make their community more vulnerable to drought. In addition, researchers with the Science for Nature and People Partnership led a discussion of historic and future drought scenarios and where to find data, and NIDIS reviewed response and mitigation planning concepts.

According to Schwend, "We hope that now the coordinators are feeling ready to roll up their sleeves and engage their local communities in drought preparedness and long-term planning."

— Courtesy of Ann Schwend



Shawna Richter-Ryerson/NDMC

Nicole Wall of the drought center, second from left, helps her team contemplate their options for the Cedar River watershed during the Multi-Hazard Tournament on Sept. 1 in Cedar Rapids. Wall served as a facilitator at the event.

Iowa tournament tackles flooding, drought possibilities

SHAWNA RICHTER-RYERSON
NDMC COMMUNICATIONS ASSOCIATE

CEDAR RAPIDS, IOWA — The participants at the Cedar Rapids and Surrounding Area Multi-Hazard Tournament were from a variety of fields: city planners, water resources districts, farmers. They were from upstream near the top of the Cedar River near Austin, Minnesota, and from the bottom, too, at Cedar Rapids.

Broken into eight teams, they weighed their options in a September contest that pitted each group against each other, but also – though they didn't know it – each round against the prior.

In turn one, a steady hum of energy filled the Cedar Rapids Police Department community room. Teams threw out and agreed to ideas to help manage the watershed based on forecasted climate conditions. Ideas implemented included restoring or adding wetland spaces, reclaiming property, raising houses out of flood zones, infrastructure improvements and reinforcing levees. The enthusiasm pained many in turn two, where if they hadn't planned how to use the annual versus 20-year investment funds well, they had few options left to combat a flood, and still fewer to battle the drought in turn three.

But the point of the simulation exercise wasn't to play the game perfectly. It was to deliberate with stakeholders from varying parts of the watershed to determine the most effective investments for reducing flood, drought and water quality hazards along the Cedar River, said Andrea Carson, one of the organizers for the event from the Collaboration and Public Participation Center of Expertise with the U.S. Army Corps of Engineers. The hope was participants would walk away with a better understanding of how their decisions could affect potential adverse impacts of water resource hazards and better

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understand the trade-offs economically, socially and environmentally between actions.

"At the end of the day, the tournament allowed stakeholders to consider holistic and systematic approaches to dealing with water-related hazards in the basin by sharing their knowledge and their perspectives on issues within the Cedar River Basin — an opportunity many may never have had before," Carson said. "I truly believe we guided the stakeholders in the Cedar River Basin to begin thinking along the lines of Integrated Water Resources Management, a goal that many, including the Corps, continually aim for and one-day hope to achieve."

Staff from the National Drought Mitigation Center, including Nicole Wall, Deborah Bathke, Tonya Bernadt and Shawna Richter-Ryerson, helped prepare for and execute the event. Bathke provided historical information on drought for the playbook, and Wall served as a team facilitator.

To play, teams used a computer-based tool, the decision support system, designed specifically for the tournament to evaluate their choices and the impact it would have on public and private property, water quality and aquifers, among others areas. Prior to each round, teams were given a budget for investments, a climate condition forecast and a list of pre-defined adaption options, which included localized alternatives (protect municipal water supply, structural actions and non-structural actions) and watershed alternatives (land cover changes, grassland-based, wetland based or both; and land cover and land management change).

Turn one was the initial set-up for the watershed management strategy and had a $1.6 billion budget for a 20-year investment horizon; the budget was based on a real-world estimate of anticipated funding in the Cedar River region over that time span.

Shawna Richter-Ryerson/NDMC

Referees discuss the innovations created during round two of the Multi-Hazard Tournament on Sept. 1 in Cedar Rapids.

Shawna Richter-Ryerson/NDMC

One team member makes his case for managing the Cedar River watershed during round one of the Multi-Hazard Tournament on Sept. 1 in Cedar Rapids.

Teams could invest in policy, structural or non-structural adaptation options, and they had to decide what type of management strategy to take.

"A strategy that invests too heavily on localized actions and does not look upstream may be subject to unfavorable flow or water quality conditions," participants' game handbook stated. "A strategy that invests too heavily in the watershed improvement actions may reduce flowrates and improve water quality but may not be enough to offset signification hydrologic hazards, resulting in major economic, social and environmental impacts.

"A systemwide management strategy may have the best outcome on the watershed resources."

Teams had to justify their choices to other teams, as well as to judges, through press releases delivered at the end of each turn.

In turn four, participants adjusted their watershed management selections based on lessons learned in the three previous turns, but this time made selections under the scenario that climate change had caused more frequent and extreme hydrological hazards.

Most plans changed.

"It was unclear how much impact what you chose in one round would affect later rounds," one team said after the turns were completed, but

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it did force teams to get creative and innovative to find solutions that would balance the varying needs of all stakeholders along the river.

Referees judged the teams based on the appropriateness of adaptation options; consideration of the ecological, economic and societal impacts; and on innovation.

"The beauty of the MHT is that the resources developed for the tournament are able to be utilized far beyond the day of the tournament," Carson said. "The MHT was one more piece of the puzzle that provided basin stakeholders with the information necessary to build on previous work in the Upper and Middle Cedar River basins."

Participants have been given permanent access to the decision support tool (iowawatersheds.org/dss/tournament) so they can go back and examine each team's choices, plans and outcomes and continue informing decisions going forward.

Partners in the event were the Rock Island District, the Institute for Water Resources and the Portland District, all with the USACE; Sandia National Laboratories; University of Iowa IIHR; the city of Cedar Rapids; the National Drought Mitigation Center at University of Nebraska-Lincoln; the Natural Resources Conservation Service; U.S. Geological Survey; the National Integrated Drought Information System; and Iowa State University. The partners will be checking back with participants in the upcoming months to see exactly how the tournament changed their approach to reducing risks from flood, drought and water quality.

Shawna Richter-Ryerson/NDMC

Harvey Hill (standing at right), research scientist with the Global Institute for Water Security, gives a team advice during round two of the Multi-Hazard Tournament on Sept. 1 in Cedar Rapids.

What is a Multi-Hazard Tournament?

The Multi-Hazard Tournament (MHT) is a table-top or simulation exercise designed to aid decision-making by playing out potential strategies to reduce drought, flood risk, and/or other water-related risks. The MHT, a type of "serious game," is an innovative way to spur new ideas by creating a competitive, team-centered learning environment and to address potential polarizing aspects of the focal watershed — with the goal of reducing barriers to innovative and productive decision-making.

Taking the traditional tabletop exercise one step further, the Multi-Hazard Tournament asks participants to collaborate in teams, to consider the effectiveness of non-structural approaches (such as altering land use practices or policies) as well as structural approaches (such as treatment plants and wells).

Top 4 uses of the Multi-Hazard Tournament

1. Improving communication among stakeholders.
2. Creating new collaborations to address common problems.
3. Identifying the costs and trade-offs among various strategies for solving problems.
4. Identifying strengths and weaknesses in various strategies to reduce risk.

Who Should Attend?

Tournaments ask participants to create solutions to address water-related issues within a specified basin. Participants who are 1) involved in making decisions related to water-related hazards; 2) have knowledge of the basin related to the biological, ecological, hydrological components or other similar areas of expertise; or 3) are often impacted by or concerned with these hazards in this basin, should consider attending.

Where Have These Happened Thus Far?

- September 2015 - San Antonio Multi-Hazard Tournament
- September 2016 - Cedar Rapids and Surrounding Area Multi-Hazard Tournament
- Anticipated March 2017 - San Antonio Multi-Hazard Tournament (x2)
- Anticipated June 2017 - Virginia Peninsula Multi-Hazard Tournament

Upcoming drought tournaments

- Nov. 18 - North Platte Natural Resources District tournament
- Dec. 1 - Kansas Drought Tournament with the Kansas Water Office

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Web tool will help officials make drought-related decisions

UNIVERSITY OF NEBRASKA-LINCOLN

A grant from the National Oceanic and Atmospheric Administration will help a University of Nebraska-Lincoln research team create a web-based tool to aid policymakers in making drought-related decisions.

The two-year, $284,588 grant from the NOAA's Sectoral Applications Research Program will be used to develop a model that brings climate information to officials through the Federal Emergency Management Agency's Threat and Hazard Identification and Risk Assessment process.

The model will use data to construct scenarios that illustrate the impact of drought over time. These scenarios will then be tested in Nebraska using data for the Platte River Basin. The final product will be an online tool that includes templates, guidelines and data resources for planners to build drought scenarios that can be replicated in all states and territories. Officials will be able to use the tool to mitigate and protect against adverse impacts of water-related disasters.

Deborah Bathke
NDMC

Crystal Stiles
NDMC

Denise Bulling
Public Policy Center

Lisa Pytlik Zillig
Public Policy Center

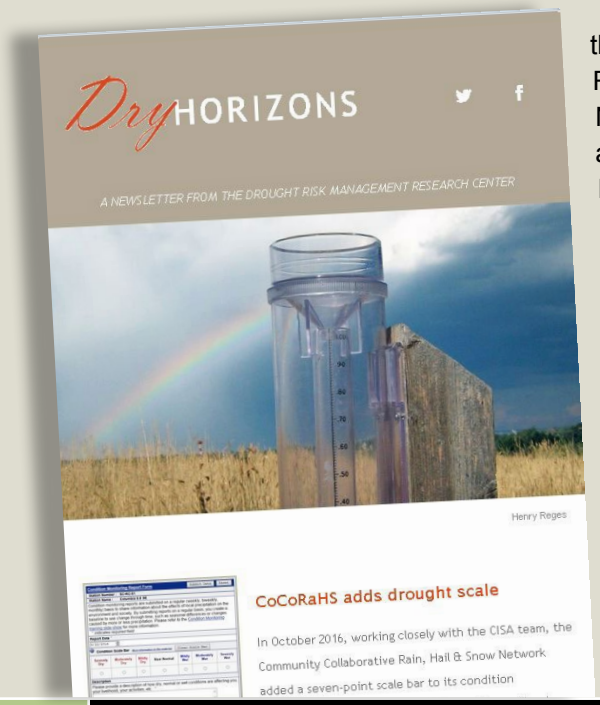
"This project has the potential to bridge the planning efforts of water resource professionals with more traditional disaster planning done by emergency management agencies," said Denise Bulling, senior research director at the University of Nebraska Public Policy Center and lead researcher on the project. "The university's research team is partnering with professionals in the field to ensure the process and products are useful to decision makers when they consider threats brought about by climate variability."

The research team also includes Lisa Pytlik Zillig, senior research manager at the Public Policy Center; Crystal Stiles, applied climatologist and postdoctoral research associate at the High Plains Regional Climate Center; and Deborah Bathke, climatologist at the National Drought Mitigation Center.

We're introducing Dry Horizons

Dry Horizons is a newsletter for you: concerned citizens; engaged water supply, agriculture or emergency managers; drought planners; policymakers. It's for people who may be involved in a regional Drought Early Warning System or who may be new to drought issues.

The newsletter provides a way to highlight practitioners' success stories, to learn about new developments, and to raise questions. It also will be a way to distribute surveys and solicit feedback as we develop tools for drought planners.



Dry Horizons is a product of the Drought Risk Management Research Center, a project of the National Drought Mitigation Center at the University of Nebraska-Lincoln, which is supported by the Coping with Drought Initiative of the National Oceanic and Atmospheric Administration's Sectoral Applications Research Program, and by the National Integrated Drought Information System.

Please email ndmccomm@unl.edu with your ideas and submissions.

Sign up for the newsletter at go.unl.edu/dryhorizons.