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Drought Forecasting, Monitoring, and Decision-making: A Review of the National Integrated Drought Information System

Witnesses:

Roger Pulwarty

Director, National Integrated Drought Information System, National Oceanic and Atmospheric Association

J.D. Strong

Executive Director, Oklahoma Water Resources Board

James Famiglietti

Professor and Director, Earth Systems Science, University of California-Irvine

Gregory Ballard

Mayor, City of Indianapolis

Patricia Langenfelder

President, Maryland Farm Bureau

Committee Members Present:

Ralph Hall (R-TX), Chair

Eddie Bernice Johnson (D-TX), Ranking Member

Lamar Smith (R-TX)

Zoe Lofgren (D-CA)

Jerry McNerney (D-CA)

Dan Benishek (R-MI)

Suzanne Bonamici (D-OR)

Paul Tonko (D-NY)

Dana Rohrabacher (R-CA)

Lynn Woolsey (D-CA)

Larry Bucshon (R-IN)

Andy Harris (R-MD)

On July 25, 2012, the House Committee on Science, Space, and Technology hosted a hearing to review draft legislation to reauthorize the National Integrated Drought Information System (NIDIS) and evaluate the state of drought forecasting, monitoring, and decision-making. The NIDIS Reauthorization Act would authorize \$13.5 million per fiscal year from 2013 through 2017 for the NIDIS program within the National Oceanic and Atmospheric Administration (NOAA). The National Integrated Drought Information Act (P.L. 109-430) established NIDIS in 2006. NIDIS was tasked to create an effective early warning system, coordinate and integrate federal research pertaining to droughts, and build upon existing forecasting and assessment programs.

Chairman Ralph Hall (R-TX) began the hearing with a description of the current state of drought within the United States. According to the U.S. Drought Monitor run by NIDIS, over 70 percent of the nation is classified as abnormally dry, half is experiencing moderate to extreme drought, and one third is under severe to extreme drought conditions. The drought conditions are having negative impacts on corn and soybean crops. Secretary of Agriculture Tom Vilsack designated 75 percent of country farmlands as drought-stricken areas, with 88 percent of corn and 87 percent of soy crops affected. Current drought conditions are the worst since the Dust Bowl years during the 1930s and the great droughts of the 1950s. Pointing to Congressional Research Service (CRS) reports, Chairman Hall asserted that droughts are not necessarily attributable to climate change because they have been afflicting North America for thousands of years and are part of the natural climate cycle. He reviewed the goals of NIDIS to proactively manage drought risk, create a drought portal and early warning system, establish a forum for stakeholders to discuss drought related issues, and provide decision support services for drought management purposes. Chairman Hall said funding for NIDIS will expire at the end of this year if not reauthorized.

In her testimony, Ranking Member Eddie Bernice Johnson (D-TX) denoted the impacts of the current drought on the Texas economy, from negative impacts on agriculture and tourism, to shortfalls in cooling water supplies for power plants and increased wildfire frequency. Although the "onset of drought is slow" and the "destruction is sprawling," Johnson asserted that droughts need to be recognized as extreme weather events. She highlighted the need to explore the relationship between global climate change

and drought frequency and severity, claiming that to ignore the potential linkage is “irrational and irresponsible.” Ranking Member Johnson concluded that she hopes to see the bipartisan support of NIDIS spread to other climate related programs.

Roger Pulwarty, director of the NIDIS program at NOAA, began the witness testimonies with an outline of the four main elements supporting NIDIS goals. One component is “Coping with Drought” research, which provides research grants to assess the impacts of drought on ecosystems, water resources, and agriculture and for development of mitigation strategies. Climate Test-bed research is done to improve climate forecasts and stream flow observations for watershed systems. The U.S. Drought Portal is a web-based tool that closes the information gap by providing credible and easily accessible data. The final element Pulwarty described is the Regional Drought Early Warning Information Systems (DEWS), which recognize regional drought variability and develop decision making strategies accordingly. Currently, DEWS is operating in the Upper Colorado River Basin, being developed throughout the state of California and the Apalachicola-Chattahoochee-Flint Basin, and is planned to expand to the Pacific Northwest, Great Plains, Carolinas, and Chesapeake Bay tributaries. Pulwarty emphasized that NIDIS relies on data coordination with other agencies, including the United States Department of Agriculture (USDA) National Resources Conservation Service SNOwpack TELEmetry (SNOTEL) sites, the Department of the Interior and United States Geological Survey (USGS) Water Census, streamflow and reservoir level data from the U.S. Army Corps of Engineers (USACE) and Bureau of Reclamation, and the National Weather Service’s Cooperative Observer Program (COOP). Pulwarty concluded that the key to future success is creating a “sustained national system of credible, consistent, and authoritative observations.” He informed the committee that advancement of NIDIS will depend on developing an understanding of the role of precipitation in ending drought, collaboration between researchers and the public to enhance the use and value of NIDIS, the spread of monitoring tools to more regions, and the establishment of private sector partnerships.

Mayor of Indianapolis Gregory Ballard testified in regards to the severe impacts of the current drought on his district. He told the committee that weekly drought data from the U.S. Drought Portal has been used extensively by Indianapolis’s water utility, Citizens Water, to determine if advanced water conservation efforts are necessary. NIDIS helped Mayor Ballard decide to enact mandatory water restriction bans on water intensive activities, which led to water usage decreases of up to 58 million gallons per day. He emphasized the difficult economic burden of the water use restrictions on local businesses and homeowners and said the sooner Indianapolis is aware of drought conditions, the sooner the local government can inform citizens and plan water conservation strategies. Ballard said he supported the reauthorization of NIDIS to improve drought prediction tools.

In his testimony, J.D. Strong of the Oklahoma Water Resources Board discussed the challenge of coping with a “creeping disaster” such as drought. He emphasized the need to focus monitoring on state, regional, local, and tribal scales to understand when a drought begins and prevent society from falling into the common, water wasteful “hydro-illogical cycle.” Strong then described local and regional drought mitigation efforts. Since its establishment in 1957, the Oklahoma Water Resources Board has utilized 120 mesonet climate monitoring stations, real-time data on precipitation, temperature, and soil moisture, streamflow information from the USGS Cooperative Streamgaging Program, USACE reservoir data, and Landsat thermal imaging of evapotranspiration to reduce the multi-billion dollar impacts of drought. He noted that NIDIS Regional Integrated Sciences and Assessments (RISA) teams have “established a more coordinated and effective drought monitoring network.” He applauded the U.S. Drought Portal, saying it has made access to necessary drought information much easier. Strong recommended that Congress add language to the reauthorization legislation to require a firm deadline for developing early warning systems and drought prediction strategies. He concluded that NIDIS can help “save both money and lives.”

Director of Earth Systems Science at University of California-Irvine James Famiglietti told the committee that current investment in drought forecasting tools remains “far too small.” Famiglietti said the nation’s ability to monitor and predict the state of the water cycle is “well behind” because of deficiencies in hydrological modeling assets, poorly integrated water observations, and lack of a national water monitoring network. He said the ability of the National Aeronautics and Space Administration’s (NASA) GRACE satellite and Surface Water Ocean Topography (SWOT) mission to identify areas of water stress and map changes in surface water storage is essential to improving drought management capabilities. Congressional support of NASA satellite programs, more computer simulation models, and improved knowledge of national hydrogeology, bathymetry of rivers and lakes, and stream discharge could position the U.S. as a world leader in characterizing and predicting all aspects of the water environment. Famiglietti concluded that “water is on a trajectory to rival energy in its importance.”

In her testimony, President of the Maryland Farm Bureau Patricia Langenfelder informed the committee that the current drought will impact the lives of every agricultural producer and consumer. More than 54 percent of the country’s pasture and rangeland is classified as in poor or very poor condition, with the corn crop experiencing its worst decline since the drought of 1988. She commented that dry pasture conditions are forcing many ranchers to thin cattle supplies, the effects of which will take years to reverse. Langenfelder expressed the importance of NIDIS data, which allows the USDA to make more informed adjustments to weekly crop progress reports and monthly production reports. She said she supports the reauthorization of NIDIS because it provides the nation’s farmers, ranchers, and agricultural market with effective and timely data on drought conditions and impacts.

Chairman Ralph Hall began the question and answer period by asking the panel if NIDIS provides all needed drought information and if there are areas for improvement. Mayor Ballard responded that NIDIS is a major component of city planning used by the homeland security system and emergency operations centers in his district. Strong and Langenfelder suggested NIDIS start to improve long-term drought prediction capabilities to support mitigation efforts up to a year in advance. Chairman Hall then asked about the accuracy and level of scale of NIDIS drought forecasting. NIDIS Director Pulwarty replied that the seasonal forecasts are reliable, particularly with predictions of El Nino and La Nina conditions; however, climate changes such as the Pacific Decadal Oscillation and Atlantic Decadal cycles make longer-term forecasting more difficult.

Ranking Member Johnson mentioned NOAA's 2011 State of the Climate Report and an American Meteorological Society publication, which examines the potential linkages between climate change and extreme weather events such as drought. She expressed her disappointment in blocked investments into climate change research and said mitigation depends on understanding the contribution of climate change to drought severity and duration. Strong responded that long-term predictions of climate variability "would be great," but NIDIS should improve short term accuracy first. Representative Johnson questioned the role of NIDIS in water planning and management. Pulwarty told her that NIDIS tries to ensure that federal and state drought plans are developed before the onset of a drought event and assimilate local drought and water data.

Representative Lamar Smith (R-TX) asked if NIDIS is receiving enough investment from the reauthorization legislation and if there were practical improvements that could be made within the program. Famiglietti said NIDIS will require more funding if the program is going to improve modeling systems. The panel said enhanced forecasting, greater coverage of early warning systems, interconnected state programming, and increased education and awareness would all improve NIDIS.

Representative Zoe Lofgren (D-CA) inquired about the possibility of integrating global climate change data into the mission of NIDIS. Famiglietti said it is essential that satellite data of floods, agriculture, and changes in surface water storage is integrated with ground observations and computer simulation models. He added that water cycle models can improve understanding of snowpack, soil moisture, streamflow, and groundwater trends and better inform water planning decisions.

Representative Andy Harris (R-MD) stated some crop prices have reached record highs, such as corn at \$8 per bushel. Langenfelder added that farmers have been forced to cut back on livestock due to increased prices for feed. Representative Harris suggested that NIDIS could help predict grain prices and alleviate the adverse impacts of drought on farmers and consumers.

Representative Jerry McNerney (D-CA) asked how the United States could become a world leader in water management. Famiglietti said this would require Congressional support of NASA, NOAA, and the National Science Foundation research efforts, development of a national water model for streamflow and water availability observations, organization of public-private partnerships, and establishment of a reliable budget for NASA satellite programs.

Representative Dan Benishek (R-MI) questioned the accessibility of NIDIS data by farmers and ranchers. Langenfelder responded that most farmers are up to date with the latest technology and stay informed through the online drought portal and agricultural reports. Pulwarty added that NIDIS has programs in place to help communities become familiar with drought information services and create "drought ready communities."

Representative Suzanne Bonamici (D-OR) described the reductions to USDA cooperative extension services in the FY 2013 budget proposal, which would significantly impact specialty crop communities in Oregon that rely on extension services for information.

Pulwarty said NIDIS could help remediate this impact by providing essential data to agricultural communities through the Department of Interior's regional Climate Center based out of Oregon State University.

In response to Representative Paul Tonko's (D-NY) question on adaptation strategies, Strong described adaptation as a function of regional climate centers that hinge on the accuracy of data and potential climate scenarios. Pulwarty added that the major role of the eleven regional DEWS is to increase capabilities for drought preparation. Representative Tonko then asked about the status of the USGS streamgaging networks. Famiglietti said streamgages are essential to collection of water data and that USGS programs are "invaluable and could use your help." Strong and Pulwarty emphasized that consistent funding of USGS and NASA programs is essential because NIDIS relies on local monitoring and observational data from other agencies.

Representative Dana Rohrabacher (R-CA) said the nation should rely more on "hard data" and less on computer models. He mentioned the water resource problems occurring in California and the need to have established water alternatives such as desalination.

Representative Lynn Woolsey (D-CA) commented that "we are fooling around with mother nature." She concluded the questioning period by asking how forecasting and monitoring can be utilized to prevent droughts. Panelists responded that the integrated network of data compiled through NIDIS can help raise awareness in communities about water availability and the threat of drought, and encourage people to be proactive about conserving water.

For opening statements, witness testimonies, and an archived webcast of the hearing, visit the House Science, Space, and Technology Committee web site.