

UNIVERSITY OF SOUTH AROLINA®

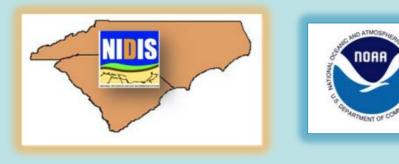
Introduction **Project Components** Currently, drought impacts data are not well integrated into drought monitoring and management. The With the exception of participant recruitment, all components of this project are ongoing. Since September Carolinas Integrated Sciences & Assessments (CISA) research team is collaborating with the National Integrated 2013, the CISA team has recruited a total of 43 volunteers who have submitted over 1,000 condition monitoring reports containing various types of information (Figure 2). Drought Information System (NIDIS) to advance drought preparedness and develop a Drought Early Warning System pilot program for the coastal Carolinas. In a 2012 pilot program scoping workshop, stakeholders recommended examining how tools developed by the Community Collaborative Rain, Hail and Snow Component 1: Citizen scientist recruitment and training (CoCoRaHS) network can be used to expand drought impact reporting and improve understanding of drought impacts in North and South Carolina. This citizen science project began in 2013, and this poster presents project • Recruited participants in North and South Carolina and coastal Georgia by identifying and findings to date. contacting groups who would be interested in recording precipitation measurements and local conditions in their area, such as Master Naturalists, Master Gardeners, and current CoCoRaHS observers (Figure 3) From Drought Impacts to Condition Monitoring Reports • Provided training on how to use rain gauges, take precipitation measurements, and record observations for condition monitoring reports CoCoRaHS is a national, non-profit, community-based network of local volunteer • Fostered participant support and retention by providing education and training through precipitation reporters (see <u>http://www.cocorahs.org/</u>) that augments existing National monthly newsletters, weekly blog posts, conference calls, webinars, and feedback surveys Weather Service precipitation monitoring networks. CoCoRaHS observers submit daily precipitation and drought impact reports through online reporting forms. They typically submit drought impact reports only when a lack of rainfall has led to noticeable and adverse effects on plants, animals, or people. A limitation of drought impact reports arises from the short temporal resolution of impact information that does not capture "What a difference a week makes! We went from extremely dry to nice and moist with over 2" of badly needed rain. The field crops seem to have doubled in size. That is certainly true for my tomatoes. And also applies to grass and weeds. The drought onset, intensification, and recovery. Hyco Lake level jumped up to 410.30'. There is plenty of boating, fishing and camping activity on and around the lake. Birds are singing, flowers blooming, bees and butterflies along with hummingbirds hovering about, temperatures nice. What onderful days!" - Report submitted June 7, 2015 by an observer in Caswell County. North Carolin Submit Data Reset Drought Impact Report Form For this project, the CISA team worked Station Number: SC-RC-56 with CoCoRaHS coordinators in North Station Name : Columbia 0.5 NE Carolina and South Carolina to The significance of drought is tied directly to the impacts that it causes. Identifying and documenting impacts as they first appear and as they continue is essential for comprehensive encourage observers to submit weekly drought monitoring. Please refer to the CoCoRaHS training slide show for reporting drought "condition monitoring reports" impacts. \* indicates required field through the "drought impact report" **Condition Monitoring** form on the CoCoRaHS website Agriculture, Horticulture & Landscaping SC Condition Monitoring Report (Figure 1). In contrast to drought Business & Industry A Condition Monitoring Report allows a regular observer to describe normal conditions that Energy impact reporting, condition are likely to change during drought, to create a basis for comparison. Please check Condition Fire GA Monitoring Report if that's what you are submitting. If you aren't sure, please leave it monitoring involves submitting unchecked. More information on categories of drought impacts and reports. General Awareness weekly or monthly reports describing Description Plants & Wildlife normal conditions that are likely to Please provide a description of how dry, normal or wet conditions are affecting you, your o have recovered now.' Relief, Response & Restrictions livelihood, your activities, etc. change during periods of less or more Society & Public Health arleston County, South Carolina rainfall. In doing so, observers Tourism & Recreation ■ Water Supply & Quality establish a long-term baseline of 0 15 30 60 CoCoRaHS Observer Report Categories information about local conditions Numbers in each label correspond to Map created by Janae Davis Please check at least one report category. If you check a category, please provide supporting the number of reports which include that may increase information about information in the description. More information on categories of drought impacts and condition information about that coded item. Figure 3: Participant locations and sample reports drought onset, intensification, and monitoring reports. Figure 2: Report content by drought If an amount of money is associated with the impact, please consider providing that information recovery. in the box to the right of the category. Including a dollar amount means you agree to allow it to impact categories be used as a summary statistic. Agriculture Component 2: Condition monitoring report coding and analysis Business And Industry Energy • Downloaded condition monitoring reports from the CoCoRaHS website • Coded using QSR NVivo 10, a qualitative analysis software, and a coding scheme derived from the US Drought Monitor drought impact categories, types of weather information, and degrees of dryness • Analyzed coded information to identify types and patterns of information submitted through Submit Data Reset condition monitoring reporting that might inform drought decision making **Figure 1**. Portion of CoCoRaHS Drought Impact Report Form used to submit condition monitoring reports Component 3: Decision maker interviews Objectives • Identified decision makers involved in drought monitoring and assessment at state and national scales who would represent a cross-section of the diversity of interests and 1. Assess the usefulness of information provided by citizen scientists in supporting drought-related decision approaches to drought management making • Provided interviewees with information packets prior to interviews 2. Examine how tools developed by Community Collaborative Rain, Hail and Snow (CoCoRaHS) can be used to expand drought impact reporting • Packets included selected condition monitoring reports, maps of aggregated data from condition monitoring reports and precipitation measurements, and types of condition monitoring information received from participants. Acknowledgements • Asked interviewees about his/her organization's role in and approach to drought management and feedback about materials provided in the information packet NIDIS • As of June 2015, semi-structured interviews have been conducted with 11 decision makers RISA Regional Integrated So Information System (NIDIS), the NOAA Climate Program from South and North Carolina drought management committees, U.S. Drought Monitor authors, National Drought Mitigation Center (NDMC), and CoCoRaHS.



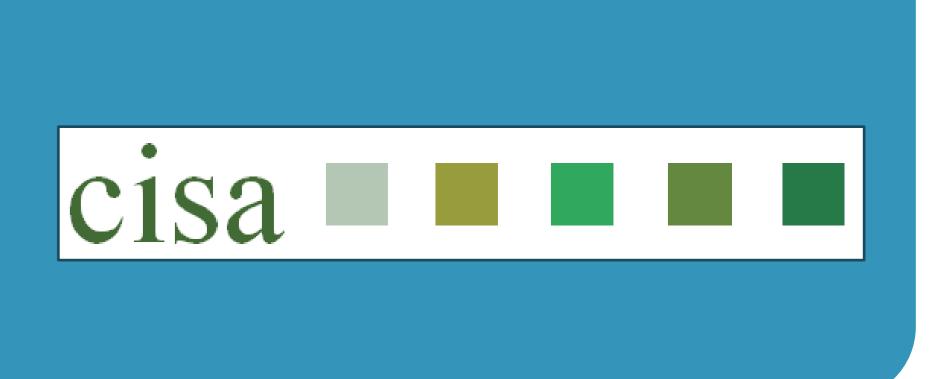


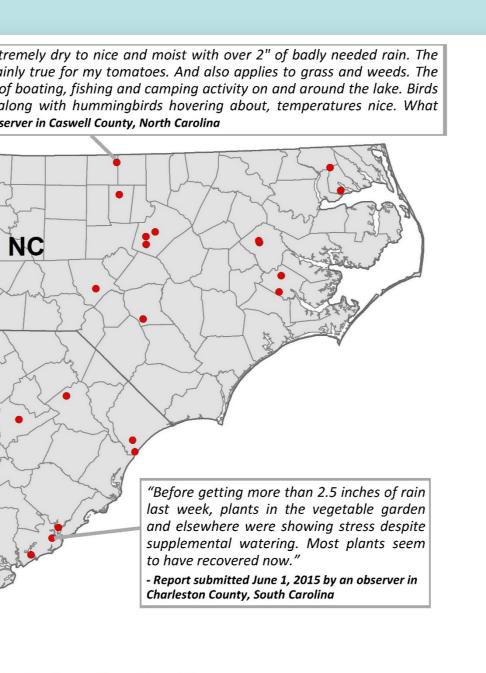
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Fire	\$
Plants And Wildlife	\$
Relief Response	\$
Society And Public Health	\$
Tourism And Recreation	\$
Water Supply And Quality	\$

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# Assessing the Usefulness of Citizen Science to Support Drought-Related Decision Making J. Davis, S. Selvaraj, A. Brennan, K. Dow, D. Eckhardt, B. Haywood, K. Lackstrom





### **Emerging Findings from Decision Maker Interviews**

### Utility of citizen science information

"We've been watching conditions quickly deteriorate in the western half of NC over the last few weeks and these have been invaluable sources of on-the-ground information. ... The wealth and detail of information in these reports is amazing -- from talking about stagnant creeks that were flowing only a few weeks ago, to squishy yards, to the species of plants that are emerging. Connecting the information in these reports with objective indicators such as streamflow levels or SPI really gives us a fuller picture of what's happening in parts of the state." - NC Drought Management Advisory Council (NCDMAC) Representative

However, interviewees described utilizing the information from CoCoRaHS observers in different ways. They indicated that the utility of citizen science information for drought decision making varies depending on decision makers' current use of citizen science information, perceptions of reliability, and their organizational context.

What determines whether, when, how, and which reports are used?

- Reliability
  - Related to quality of reporting including correct decimal placement of precipitation measurements, reporting zeros on days with no precipitation, and consistently submitting daily precipitation and weekly condition monitoring reports
- Drought management organizational context
  - Drought committee meeting frequency
    - The NC drought committee meets weekly to determine drought status for the state while the SC drought committee meets only when conditions become dry.
  - Available resources dedicated to reading and analyzing reports
  - Information preferences
    - Precipitation vs. condition monitoring reports
    - Longer vs. shorter reports

## What is needed to increase the usefulness of condition monitoring reports? • Aggregation of data into maps, graphs and charts are needed to

- quickly assess general conditions and understand where to focus attention (Figure 4).
- Observers primarily report impacts observed in their yards. Reports describing conditions at neighborhood, community, town and county scales are also needed.
- Saliency of information provided in reports increases as dry conditions intensify.

### **Considerations in expanding this approach**

Issues in scaling up project model

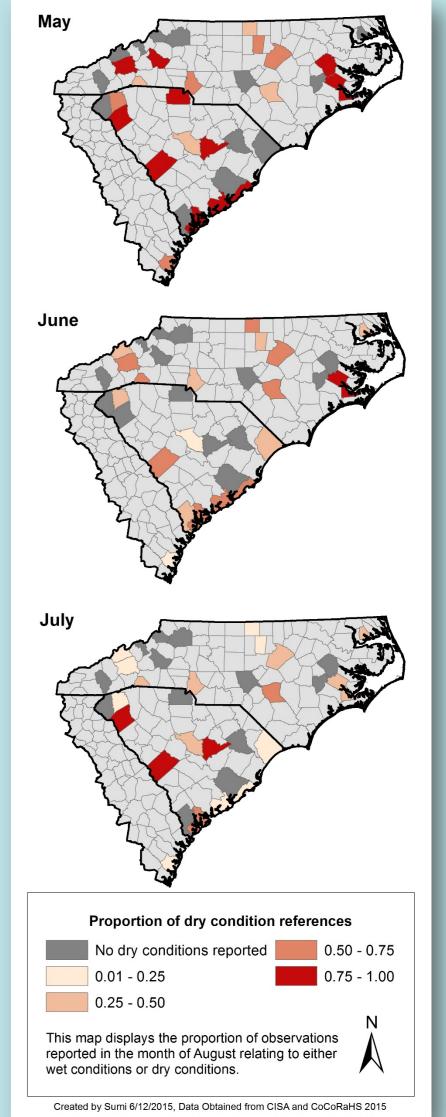
• Because observers tend to discuss a wide variety of impacts and conditions, coding structure is extensive and the coding process is time intensive.

Timely publishing to the Drought Impact Reporter that decision makers may not receiving the most up-to-date information.

Web tools for downloading data from the CoCoRaHS website made more accessible through tools for downloading files.

- Continue coding and analysis of condition monitoring reports and interviews with decision makers
- Increase efficiency of coding and analysis by working with CoCoRaHS staff to develop a reporting form that will allow observers to indicate relative wetness and dryness using a Likert scale. These ratings would be translated in to quantitative values enabling decision makers to graph, map or chart data for quick assessment

### All interviewees found condition monitoring reports useful. Most used them to verify information provided by quantitative indicators such as precipitation, agricultural conditions, stream flow, and fire risks.



**Figure 4:** Dry condition references for May-July 2014

• U.S. Drought Monitor authors at the NDMC and the NCDMAC representative utilize the Drought Impact Reporter (DIR) to access condition monitoring reports for determining weekly drought status. However, it takes several days for reports submitted to the CoCoRaHS database to be published on the DIR indicating

• Currently, data on the CoCoRaHS website must be obtained through manual operations. Data can be

### Next Steps