

# DEVELOPING A DROUGHT IMPACT REPORTING SYSTEM FOR THE CAROLINAS

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Nationally, drought is the most expensive natural hazard costing an estimated \$6- \$8 billion a year in losses (FEMA, 1995). Moving towards a more effective risk management approach to drought requires greater understanding of potential impacts (Wilhite and Buchanan-Smith, 2005). While this is a large number, we know that drought impacts are widely underreported (Hayes *et al.*, 2004). The most consistent impact and loss information is related to agricultural losses gathered by the Department of Agriculture as part of disaster relief programs. These data are often accompanied by other agency efforts, such as forest service reporting of fires, losses, and firefighting costs. However, there is a wide variety of drought impacts that are not systematically reported and therefore not consistently considered in water resources planning, drought management, or emergency response planning.

One of the major challenges in developing a drought impact reporting system capable of providing information to inform decisions is the nature of drought itself, long-term, covering wide geographic areas, and reaching deep across many sectors of society (Wilhite *et al.*, 2007). Many less reported impacts, while significant, are widely distributed across drought sensitive sectors such as water supply systems; recreation and tourism businesses including fishing, boating, marinas, kayaking; small businesses such as nurseries, landscaping, car washes, and swimming pool maintenance; and industries. There is often not an organization collecting and reporting impacts in

the sectors. In times of crisis, some industries may have the capacity to quickly gather and report data, while others do not.

There is a national effort to improve drought impact information. In order to better understand drought impacts and inform water resources and drought management policy, the National Drought Mitigation Center established a Drought Impact Reporter (Wilhite *et al.*, 2007). The Drought Impact Reporter is an online tool that allows people to select a sector and provide a written description (up to 500 words) of drought impacts (NDMC 2008). The impact reporter also draws heavily on newspaper coverage to capture information on impacts. This approach allows anyone with Web access to include their information and creates the potential for much richer understanding of these challenges.

As the nation becomes more climate aware, NOAA and other agencies, have begun to discuss the challenge of providing national climate information while recognizing significant differences in regional climates and economies. The Carolinas Integrated Sciences and Assessments (CISA) team, working in collaboration with the Climate Assessment for the Southwest (CLIMAS), is building on that national effort in developing a more regionally specific drought impact reporting system for use in South Carolina and the Southeast. The development of the Southeast DroughtWatch engages both regional needs and the national challenges in providing climate impact information.

The Arizona DroughtWatch is primarily a project of University of Arizona Cooperative Extension with the collaboration of CLIMAS and Arizona Dept. of Water Resources and funding from the Arizona Water Institute. Arizona DroughtWatch is a regionally specific, web-based drought impact reporting system for Arizona. This tool includes summary reporting features not available in the national Drought Impact Reporter. The architecture of the system also makes reporting impacts easier in several ways, but the impacts and questions are geared to the drought experience of the Southwest. The Southeast DroughtWatch will rely on the programming architecture of Arizona DroughtWatch, but with the advice of drought managers across the region, we are working to assure that the tool captures questions of significance to the Carolinas from the Piedmont to the coastal plain.

The DroughtWatch tool is designed to make reporting easier and impacts information more useful to decision-makers. The tool will rely, at least partially, on volunteer reporters, therefore making reporting easy is an important element. DroughtWatch addresses this issue in several ways. Rather than asking for a written description of impacts, this tool provides a checkbox list of common impacts. Users need only check the boxes that apply to them, but they may choose to add additional comments; provide a photograph; indicate whether conditions are improving, holding steady, or deteriorating; and include economic losses. The list of impacts is structured in a tree format so that users may initially identify the large category of concern - water impacts, agricultural, community, or ecological- and then the array of impact expands to address common issues for that sector. Of course, there are options to comment and add additional information.

Updating reports is made more convenient by allowing users to register and save information at the site. For instance, if someone would like to provide monthly updates on impacts to their

business, water system, farm or community, they can create a report and return to the site later and provide updates, rather than starting over entering information. This option is available through a link on the top bar of the website, "My DroughtWatch." Individuals may create, revise, and update as many reports as they would like. Creating a report is also simplified providing a Google Earth interface for users to pinpoint the location they are reporting on. They do not need to provide a street address, county name, watershed, or latitude and longitude, all of that is done by Google Earth.

In addition to making their circumstances known and informing response, DroughtWatch users may access summary reports to provide both an overview and detail of drought impacts. The homepage of DroughtWatch displays a state map for the current month showing where and how many sectors are experiencing drought impacts. The major sectors in the Arizona version are listed in Table 1. Users may choose to look at maps for previous months. They may also choose to display information by county or watershed/6, 8, and 10 digit Hydrologic Unit Codes. The ability to look at several sizes of watersheds allows consideration of upstream and downstream conditions. The scope will initially focus on the Carolinas and ultimately extend across the Southeast giving a better picture of regional conditions. Beneath the map is a summary table showing the number of reported impacts by sector for each county or watershed.

The detail of each report is also available to users. A link on the home page to summary reports provides the specific impacts reported as well as comments and photographs. These reports are identified by reporter type – resource manager, consultant, municipal official, consultant,

university researcher, citizen volunteer, agency scientist, or extension agent, rather than by individual names. Individual identifying information is available only to the DroughtWatch

staff. For the Carolinas, the NOAA Southeast Regional Climate Center will be housing the tool and maintaining the database.

Initial review of the Arizona DroughtWatch indicates that several aspects of the tool will need to be revised to better meet regional needs. The tool must include impacts on coastal ecosystems, resource uses, communities, and businesses. Improving the approach to incorporate economic impacts will also be important. Other refinements are expected to emerge through consultation with members of the North and South Carolina drought advisory committees, State Climatologists, and drought coordinators.

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<b>Table 1: Major Reporting Categories</b>
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| Water Resources and Hydrology            |
| Agricultural Impacts                     |
| Livestock Production and Grazing Impacts |
| Social and Community Impacts             |
| Tourism and Recreation                   |
| Ecological Impacts                       |