

## 7.1 NATIONAL INTEGRATED DROUGHT INFORMATION SYSTEM (NIDIS): A MODEL FOR INTERAGENCY CLIMATE SERVICES COLLABORATION

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### 1. INTRODUCTION

Drought is among the most dangerous and least understood of all natural hazards. Many state and federal agencies are beginning to recognize the need to move forward with a more proactive, risk-based drought management approach (NIDIS PIT, 2007). The NIDIS Act of 2006 put in motion the implementation of an interagency activity to improve drought monitoring, forecasting and early warning that will improve the nation's capacity to proactively manage drought-related risks. This will be accomplished by providing those affected with the best available information and tools to assess the potential impacts of drought and to better prepare for and mitigate the effects of drought. Led by NOAA, NIDIS focuses on the consolidation of physical, hydrological and socio-economic impacts data; integrated observing networks; development of a suite of drought decision support and simulation tools; and interactive delivery of standardized products through an internet portal. The vision for NIDIS is a dynamic and accessible drought risk information system that informs user decisions in preparing for and mitigating the effects of drought. Elements of NIDIS are described below. This system serves as a model for the interagency collaboration necessary for providing successful climate services to the nation.

### 2. CENTRAL INFORMATION CLEARINGHOUSE

In support of the NIDIS vision, the U.S. Drought Portal (USDP; <http://www.drought.gov>) serves as a national clearinghouse for drought data, modeling, risk information and impacts. It is intended as a one-stop shop for decision makers looking to assess and mitigate the impacts of drought. The USDP also has the responsibility of integrating, archiving, and disseminating data via the internet.

The initial release of the USDP has proven especially helpful in assimilating drought-related information from multiple federal and state agencies

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and academic partners in support of monitoring, forecasting, and impacts assessment endeavors, as shown in Figure 1. Current capabilities include the availability and display of a myriad of national and international drought products spanning numerous federal agencies and state and local governments, including the U.S. Drought Monitor and the North American Drought Monitor.

Near-term future plans for the USDP include establishing communities. This will serve as a place to share ideas and information on drought at local or regional scales or to provide a virtual location for sectors impacted by drought to communicate amongst themselves. Other plans include expanding the data and product suite available through the USDP and providing geographic information systems capabilities within the USDP to allow custom analysis and mapping of data, as shown in Figure 2. All of these activities are aimed at providing information to state and federal agencies, constituents, and decision makers to help them make informed, science-based decisions on all things impacted by drought.

### 3. OBSERVATIONS

Two distinct types of information are necessary to characterize drought: *observations* of past and current physical states of the environment and documented *impacts* on human and natural systems.

A wide variety of federal and non-federal observation networks exist across the nation. However, these networks are neither integrated nor are they necessarily geared toward addressing drought monitoring.

Initial attempts to integrate existing information into a single depiction of drought is a role the U.S. and North American Drought Monitors play. However, these tools currently are not sufficient for local depictions of drought. Improvements in observing systems are necessary to obtain an adequate snapshot of drought at the sub-state level. NIDIS is working with activities like the Historical Climate Network Modernization program and the U.S. Climate Reference Network to ensure that future investments in observing systems address drought.

Likewise, systematic collection and distribution of drought impact observations are in their infancy. The

Drought Impacts Reporter, a tool of the National Drought Mitigation Center, is a first attempt at assimilating and distributing drought impacts information at the state and county levels.

Unfortunately, the necessity of reporting this type of information is not ingrained in the activities of any federal or non-federal agency. Reports are primarily



**Figure 1.** The U.S. Drought Portal Homepage. This page emphasizes the importance of drought observations, impacts, and forecasting.

received from a combination of private citizens and newspapers. The National Weather Service (NWS) has recently implemented a new Drought Information Statement product whereby each NWS office currently in severe drought (D2 according to the U.S. Drought Monitor) or worse will provide a summary of the drought conditions and the impacts those conditions are having on the local area. Efforts to formally notify representatives of affected decision makers such as the agricultural extension agents of drought conditions are also currently under way.

NIDIS hopes to provide high-resolution observational databases which will be a combination of federal, state, and partner *in situ* observations and complementary data from remotely-sensed platforms. These data will be used to depict drought at a finer scale than is currently available while providing more reliable information which will lead to improved drought forecasts.

#### 4. IMPROVING FORECASTS

Part of a successful so-called “Early Warning System” for drought will require improvements to forecasting. Better initial data, described above, is a start but the role that NIDIS hopes to play is as an integrator of drought research efforts across federal agencies with the goal of improving predictions of hydrometeorological parameters and indices related to drought. These include dynamical forecasts of soil moisture, evaporation, precipitation, surface and soil temperature, streamflow, and snow conditions.

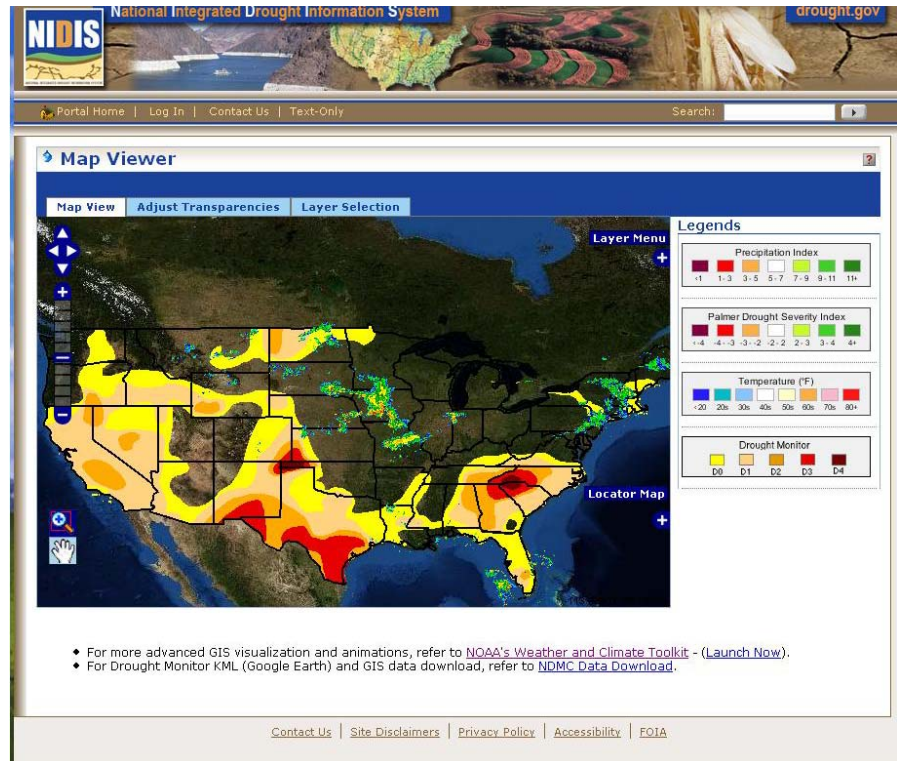
Additional improvements to forecasts of drought parameters include addressing poorly-represented timescales such as the sub-seasonal scale and addressing regional variability and persistence. Improvements in forecasts will require forecast verification. Initial efforts aimed at addressing these activities and goals are currently underway in the NOAA Climate Test Bed, managed at the NWS’ Climate Prediction Center.

## 5. INTERDISCIPLINARY DROUGHT RESEARCH

NIDIS aims to develop and support a framework for collaboration between researchers and managers. This will provide sustained interaction between researchers and beneficiaries. One of the

goals of this research will be to enable decision makers to conduct “if- then” scenarios within their planning horizons to allow

**Figure 2.** Mapping Capabilities Available in the U.S. Drought Portal. Through advanced geographic information systems capabilities, the USDP will allow users to view and couple drought-related map information for customized purposes. In this example, areas of radar-observed precipitation are overlaid upon the U.S. Drought Monitor depiction.



them to evaluate the potential effect on their system of modifying existing management strategies based on drought conditions.

Additional efforts will focus on developing standards for loss estimation, developing new or improving current drought triggers, and incorporating economic models and data into drought-related decision making.

## 6. ESTABLISHMENT OF PILOT PROJECTS

The aim of developing pilot projects under the auspices of NIDIS is to provide a mechanism for prototyping approaches to drought early warning for proactive drought impact reduction. Specifically, these interagency, collaborative pilot projects will

- Support the capability to provide data and information required for local, national, and

regional decisions on drought and other sectoral issues;

- Act as a data integrator to complement and support sector-based issues (e.g., drought, water quality, carbon cycle, etc.);
- Promote data standards (e.g., Service-Oriented Architecture) for linkage of agency data to user inputs; and
- Contribute to enhanced data visualization tools that allow integration and interrogation of agency-provided and user-input spatial data.

Each pilot project must: include elements of education and public awareness, integrate monitoring and forecasting, develop risk assessment systems, engage preparedness systems, communicate with decision makers, and evaluate feedback. Elements of the pilots proven successful can then be examined for implementation in other regions or nationally.

Transferability is a prime consideration for activities conducted in the pilot projects.

## **7. CLIMATE SERVICES COLLABORATION**

What if you are not concerned specifically with drought but want other types of meteorological or environmental information? NIDIS is being touted as a prototype for a National Climate Service (NCS). The goals of NIDIS, through the activities described above, are the same elements that will make up a successful NCS. Providing early warning systems for climate also include improving environmental and impact observations, improving forecasting, coordinating and conducting research, providing a central, authoritative location for the distribution of information, and providing information at the scale most decision makers are interested in – the local to regional scale. Early successes in NIDIS are currently informing the NCS process. Conceivably within a NCS many of the same partners already working together on NIDIS, as well as other U.S. and international partners, would contribute to a Climate Portal. Current and future lessons learned through NIDIS will be pivotal in the success of a NCS. An

advantage of leveraging NIDIS for a NCS is that the activities included also fit into the recommendations of the National Research Council for the development of climate services (NRC, 2001).

## **8. REFERENCES**

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