NOAA, USGS to Test Flash Flood and Debris Flow Warning System

In September, the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Geological Survey announced plans to conduct a pilot project in Southern California to improve NOAA National Weather Service (NWS) forecasts of potential debris flows. The project's goal is to provide public warnings of imminent threat in and near areas recently burned by wildfires. The project was announced when the agencies released the NOAA-USGS Debris-Flow Warning System report.

Because they are closely linked to precipitation, post-wildfire debris flows are somewhat more predictable than other types of landslides. The prototype warning system will improve watches and warnings issued by NWS for post-fire flash floods and debris flows. Precipitation estimates from the NWS will be compared with rainfall intensity-duration values derived from ongoing USGS research in the Southern California region. These thresholds were developed by comparing conditions in storms known to have produced flash floods and debris flows with those that did not.

A principal finding of the NOAA-USGS task force that developed the report is that the warning system can be enhanced and expanded to provide detailed maps of areas that could be impacted by flash floods and debris flows. Such maps could be generated in real-time during a storm by incorporating improved forecasts and measurements of precipitation into detailed susceptability models.

The demonstration project will cover the counties served by NWS forecast offices at Oxnard and San Diego, which serve the cities of San Luis Obispo, Santa Barbara, Ventura, Los Angeles, San Bernardino, Orange, Riverside, and San Diego. Some locations near housing developments within these counties have proved to be prone to wildfires. Heavy precipitation in these areas has resulted in flash floods and debris flows that caused considerable loss of life and property damage.

The report and a fact sheet are available at www.usgs.gov/homepage/science_features/debris_flow_ca.asp.

Tree-Ring Findings Show Droughts Affect Broad Region

from Salt River Project

When it's dry, it's dry all over, according to a new analysis of more than 400 years of annual streamflow in the Upper Colorado and Salt and Verde river basins. Using tree-ring data, University of Arizona researchers concluded that water supply for those rivers fluctuated in synchrony during periods of severe drought. The study goes back almost 800 years in the Salt-Verde basin and covers waterways from the states of Arizona, Colorado, New Mexico, Utah, and Wyoming.

The project's overall conclusion is that severe droughts and low-flow conditions in one basin are unlikely to be offset by abundant streamflow in the other basin.

"Prior to the findings from this study, the conventional wisdom was that runoff from the Colorado River would be available to make up for deficits on the Salt and Verde rivers during times of extreme drought," said Charlie Ester, manager of water resource operations for the Salt River Project (SRP). "The bottom line is that the Upper Colorado Basin and the Salt and Verde basins work together as one entire region."

The findings represent the first phase of a study partnered by SRP and the University of Arizona's Laboratory of Tree-Ring Research. The second phase, which began last fall, will take a closer look at the past 40 years, a period when the watersheds have experienced both record wet and dry episodes. Scientists from the tree-ring lab will re-core trees in the Salt and Verde watersheds to gather these data. Findings of the second phase will likely be available in summer 2007.

Key conclusions from the tree-ring study include:

- Extreme events, whether low flows or high flows, tended to occur simultaneously in the Upper Colorado and Salt/Verde river basins.
- Such synchronous low-flow and high-flow events tended to cluster in time.
- The longest continuous period when both basins had extreme low-flow was three years.
- Within any four-year period, having either high flow or low flow for two consecutive years occurred more than 20 percent of the time.
- For the Salt/Verde river basin, the recent drought is similar to that experienced in the 1950s.
- The tree-ring record reveals that between 1200 and 1903, the Salt/Verde river basin had at least eight droughts as severe as the 1950s drought.

Ester said the findings will help researchers devise an assessment tool for implementing the project's results into operational water supply decision-making. The results are being shared with other agencies, including the National Weather Service, U.S. Bureau of Reclamation, Arizona Department of Water Resources, Central Arizona Project, and cities in the Phoenix metropolitan area.

More details on the tree-ring report are available at www.ltrr.arizona.edu/srp.

Panel Studying How Much Water Is in the Colorado

Scientists acknowledge that the average amount of water that flows annually down the Colorado River is less than the volume upon which the 1922 Colorado River Compact was based. The river is overallocated, but by how much?

The National Research Council (NRC) is attempting to address this subject by studying the scientific bases of Colorado

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River Basin water management. According to the statement of project scope, a 12-member panel of researchers will evaluate the existing "body of scientific data and studies regarding Colorado River hydrology, including paleohydrological and dendrochronological studies." The primary objective will be "to help produce an improved hydrological baseline to be used in support of water project operations and water resources management decisions…across the Colorado River basin, and other regions of the western U.S., especially during periods of drought."

The researchers are synthesizing existing data, reconstructions, and models to try to derive "recommendations to strengthen the basis of a synthetic Colorado River streamflow history that more fully reflects long-term conditions than the 100 years of recorded data." They plan to make additional recommendations regarding future research needs and priorities to help advance hydrologic understanding and modeling capabilities in the basin.

The researchers also will explore a means for gathering and distributing hydroclimatic and water availability data so that a common scientific knowledge base can be used by all water managers in the basin. In addition, the existing data will be studied with respect to possible implications for near- and longer-term water delivery obligations in accordance with the laws for operating the Colorado River.

The panel is comprised of recognized experts in the fields of water resources and civil engineering; water law, management, and policy; and hydroclimatology, paleoclimatology, and climate dynamics. Project completion is scheduled for July 2006.

Visit www.nationalacademies.org/nrc/.

New Vision for California Water: Cut Waste by 20 Percent

California could cut its use of water by 20 percent in the next 25 years while satisfying a growing population, maintaining a healthy agricultural sector, and supporting a vibrant economy. That's the central message of *California Water 2030: An Efficient Vision*, a recent report by the Pacific Institute. The report describes how smart technology, strong management, and appropriate rates and incentives would allow the state to meet its needs well into the future with less water. This analysis, according to the group's press release, provides a sharp contrast to the most recent draft of California Department of Water Resources' *California Water Plan Update 2005*.

The benefits of the proposed approach, the institute claims, include improving the efficiency of urban and agricultural users which could help ameliorate the stress on the state's rivers, groundwater aquifers, and wetlands, while improving opportunities for business and recreation.

"*The California Water Plan* is a critical tool for state water planners, but as it now stands the DWR is delaying real action on conservation and efficiency for at least another five years—and we can't wait that long," said Heather Cooley, Research Associate for Pacific Institute's Water and Sustainability Program and co-author of the report.

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which include the Kunduz, Kokcha, and Wakhan rivers (30 percent)

- Hari Rud and Murghab rivers (10 percent)
- Helmand River, its tributaries and the western-flowing rivers, including the Farah Rud and Khash Rud rivers, as well as the Rigestan Desert to the south (49 percent)
- Kabul River and the southeast tributaries of the Indus (11 percent).

Groundwater Resources Impacts

Groundwater resources have been adversely impacted by a number of land-use and water management practices. Long-term reduced groundwater recharge caused by poor land-use practices poses a major threat to groundwater resources. Increased deeper tube well pumpage is responsible for water-level declines in the eastern Helmand River tributaries and the Kabul River Basin, as well as the drying up of shallow wells and karezes. Water quality impacts, though undocumented, are being noticed in urban and municipal areas, caused by improper wastewater disposal, poor drainage, and unsound disposal practices.

What Changes Are Needed?

New sources must be developed for irrigation. Traditional groundwater sources rely on gravity feed (karezes and springs) and shallow, hand-dug open wells. Well drilling at increasingly greater depths has resulted in lowered water levels in the hand-dug wells and also impacted the karez systems, which skim the top of the water table. Over-pumping is a concern in the Kabul, eastern Helmand, and western river basins.

Moreover, management plans and systems must be incorporated into local, provincial, and regional governance processes. While federal policies and regulations remain important, local acceptance and participation are critical for the development and implementation of effective management policies.

Contact Vincent Uhl at vuhl@vuawater.com.

"Our report provides what is missing from the *Water Plan*: an aggressive, high-efficiency approach that will pay many dividends in environmental protection, increased reliability, and lower costs."

The report is available at www.pacinst.org/reports/california_water_2030.

Experts Downplay Threat of Pharmaceuticals in Water

Since 2002, when USGS researchers published the first widespread survey on the occurrence of pharmaceuticals and other personal care products (PPCPs) in U.S. surface waters, researchers have been working to understand what impacts those compounds have on humans and the ecosystem (see *Southwest Hydrology*, Nov/Dec 2003). The media picked up the issue, raising considerable concern among the public. However, several lead scientists researching the topic told attendees the American Water Works Association annual convention last June that the concern is overblown, reported *Environmental Science and Technology Online*.

While concentrations of the contaminants may be sufficiently high to warrant further study in some specific areas, such as downstream from large animal farms or where septic systems have failed or are inadequate, the scientists agreed that PPCP concentrations in the majority of streams are not sufficient to create a public health concern, according to the article. The report stated that USGS hydrologist Michael Focazio said that much of the original findings were "overinterpreted…especially with regards to personal care products, to say that a certain compound was commonly found. The truth is that most of the compounds were not commonly detected."

However, PPCP impacts on ecosystems do warrant attention, according to Christian Daughton of the U.S. EPA's National Exposure Research Laboratory, as research has demonstrated the feminization of fish exposed to low levels of endocrine disruptors, said *ES&T Online*. These results have been "crossed up way too much" by the public as potential impacts on human health, said Shane Snyder, an environmental toxicologist with Southern Nevada Water Authority, according to the article.

Visit pubs.acs.org/subscribe/journals/esthag-w/2005/sep/policy/cc_pharmwater.html.