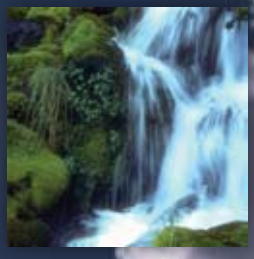









CSI: CLIMATE SCENE INVESTIGATIONS

BY TOMMY NEWTON

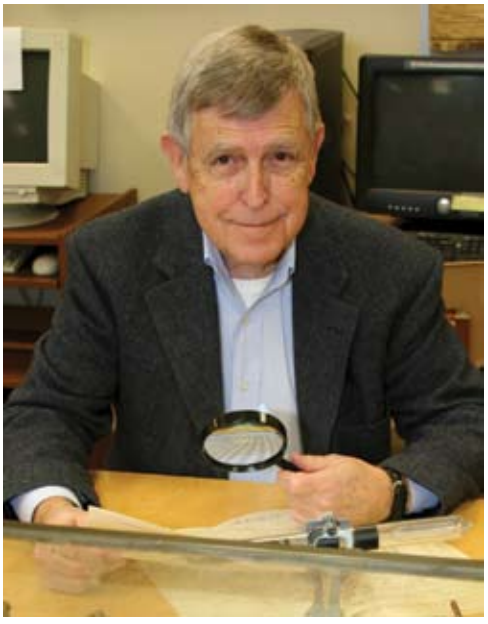
IF THEY MADE A TV SHOW FOCUSED ON THE RESEARCH OF RETIRED STATE CLIMATOLOGIST GLEN CONNER, IT MIGHT BE CALLED "CSI: BOWLING GREEN" OR "CSI: HELENA" OR "CSI: MILWAUKEE" OR "CSI: SALT LAKE CITY."

For Conner's work, however, "CSI" isn't Crime Scene Investigation; it's more like Climate Scene Investigation.

In recent years, Conner has traveled to two dozen cities to develop histories of weather stations whose records extend into the early 1800s. "The interesting thing is that it's real detective work because the information is not available easily. You don't open a book and copy it out."

For his "History of Weather Observations for Helena, Montana, 1866-1948," Conner visited libraries, government agencies, and other non-weather sites to find records, documents, maps, photos, and other information. "You just have to look," he said.

The Weather Station Histories are one part of the National Oceanic and Atmospheric Administration's Climate Database Modernization Program. The project, administered by the National Climatic Data Center (NCDC) in Asheville, North Carolina, also involves imaging paper, microfilm, and other records, and making them available online to researchers in a password-protected database; and then digitizing the weather data from those records to expand old climate databases or to create new ones.



Glen Conner

By digitizing the climate databases, researchers and others will be able to use the data to determine what variations are normal and to provide a better base for making climate analysis. Much of the data was collected before the cities had grown to their current size and before urban heat islands had formed.

Once researchers begin looking at the digital database records, they will be alert for anomalies in the data and will try to determine whether the anomalies occurred naturally over time, or were caused by humans, knowingly or unknowingly, Conner said.

For example, if a spike in the temperature data had occurred, the researcher would look at the digital data to determine whether any data entry errors had occurred. However, that's unlikely since two or three people input and check the data as it is digitized.

That's where Conner's detective work in compiling the weather histories is important for researchers. "Many things can appear to have caused a change in climate," he said.

Those include the following:

A change in location of weather stations. For example, in Bowling Green, the weather observations began downtown then moved to Ogden College in the late 1800s, then back downtown, then back to the Hill during World War II, and then to the airport. Each time an observing station moves, the altitude and nearby environment changes. In his report on Helena, Montana, Conner found seven observation sites.

A change in instrumentation. A spike in temperature data at a station might have been caused by a broken thermometer or other changes in the equipment.

A change in observers. Some observers in the late nineteenth century might not have been as conscientious in collecting data at 7 a.m., 2 p.m., and 9 p.m. as required. If there was a change in observers and the data changed, it would alert a researcher to possible problems.

A change in what is being observed. In the early days, observers were required to observe meteors, auroras, and

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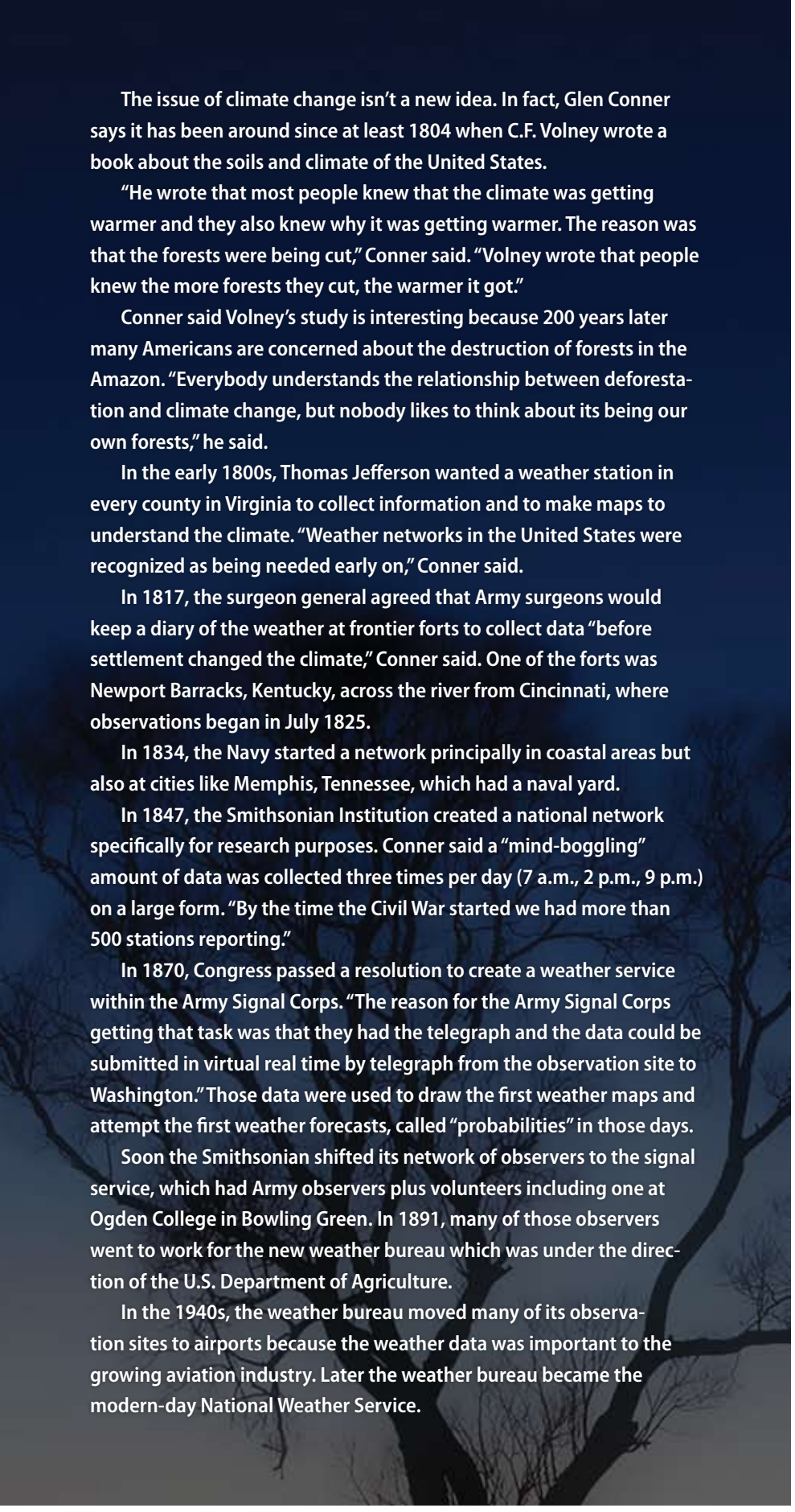

The issue of climate change isn't a new idea. In fact, Glen Conner says it has been around since at least 1804 when C.F. Volney wrote a book about the soils and climate of the United States.

"He wrote that most people knew that the climate was getting warmer and they also knew why it was getting warmer. The reason was that the forests were being cut," Conner said. "Volney wrote that people knew the more forests they cut, the warmer it got."

Conner said Volney's study is interesting because 200 years later many Americans are concerned about the destruction of forests in the Amazon. "Everybody understands the relationship between deforestation and climate change, but nobody likes to think about its being our own forests," he said.

In the early 1800s, Thomas Jefferson wanted a weather station in every county in Virginia to collect information and to make maps to understand the climate. "Weather networks in the United States were recognized as being needed early on," Conner said.

In 1817, the surgeon general agreed that Army surgeons would keep a diary of the weather at frontier forts to collect data "before settlement changed the climate," Conner said. One of the forts was Newport Barracks, Kentucky, across the river from Cincinnati, where observations began in July 1825.

In 1834, the Navy started a network principally in coastal areas but also at cities like Memphis, Tennessee, which had a naval yard.

In 1847, the Smithsonian Institution created a national network specifically for research purposes. Conner said a "mind-boggling" amount of data was collected three times per day (7 a.m., 2 p.m., 9 p.m.) on a large form. "By the time the Civil War started we had more than 500 stations reporting."

In 1870, Congress passed a resolution to create a weather service within the Army Signal Corps. "The reason for the Army Signal Corps getting that task was that they had the telegraph and the data could be submitted in virtual real time by telegraph from the observation site to Washington." Those data were used to draw the first weather maps and attempt the first weather forecasts, called "probabilities" in those days.

Soon the Smithsonian shifted its network of observers to the signal service, which had Army observers plus volunteers including one at Ogden College in Bowling Green. In 1891, many of those observers went to work for the new weather bureau which was under the direction of the U.S. Department of Agriculture.

In the 1940s, the weather bureau moved many of its observation sites to airports because the weather data was important to the growing aviation industry. Later the weather bureau became the modern-day National Weather Service.

earthquakes, things which are not now considered to be weather. Even the time of observations changed when standard time was implemented. Before that, observations were taken on solar time which differs from location to location.

"All of these things that could cause changes in the data or changes in the way you analyze the phenomenon are what you would call station histories," Conner explained. By generating the station histories, Conner is providing a reference point for researchers to resolve data issues. "If they know the anomaly and what caused it, they can adjust the data set they're using," he said.

Conner and two other climatologists — Steve Doty, a retired employee of the NCDC; and Gary Grice, retired director of the Southern Region of the National Weather Service — are involved in writing the station histories.

The histories written by Conner are about sixty pages long and include text, charts, photos, and maps showing the location of observations, equipment used, a list of observers, and types of observations made. Conner has completed more than twenty histories, and is writing more. "Nothing in these station histories involves analysis of the data because what we're writing is a reference book for people who do that analysis," he said.

Before Conner visits a city like Helena or Milwaukee, he does online research to compile a list of anything about the city's history, its people, or its buildings that would include climate details. In photographs of cities, for example, Conner is looking for buildings that might have weather instruments. In a panoramic photo of Helena, he spotted what looked like an observation site. When the photo was scanned digitally and enhanced, Conner could see the wind instruments.

Conner also collects a wealth of data from various United States agencies — Army Surgeon General, Smithsonian Institution, Army Signal Corps, National Archives, National Medical Library, Agriculture Department, Weather Bureau, National Weather Service — that have compiled weather and climate information since the 1800s.

Conner also finds data in people's diaries, which may not have been part of an organized network, but are valuable to understanding climate. "In the early 1800s all observing data are valuable because there isn't much available at all," he said. "It might only be for a few months, but it is important data."

An antique Triple Register is used to measure sunshine, wind, and rainfall.

Conner's work isn't limited to the station histories. Research compiled during his career at WKU remains at the Kentucky Climate Center and he contributed articles on weather folklore and climate folklore to the new Kentucky Almanac.

He also makes presentations and writes papers based on his station history research. In "Nineteenth Century Weather Observers: A Whodunit," that looks at the Smithsonian Institution's network of observers and their qualifications, Conner explains that most of the observers in that network were college-trained people such as doctors, engineers, and pharmacists. "Therefore I have a great deal of confidence in the data they produced," Conner said.

Conner remains confident in observations made by the others whose data he's uncovered and investigated in recent years and whose data will assist researchers in the future. "One of the things that I believe strongly is that data recorded by these people and these networks over the years accurately depict what the weather has been at those spots in those years," Conner said. "Although the climate there might vary according to the environment around it, I have more confidence in those data than in modeling data that are not affected by environment at all. When these data become available from the National Climate Data Center, I'm confident they're going to be used extensively and in preference to modeling what one might presume the climate was like. When that occurs, these histories will be important." ■