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## Wing dams deepen Midwest flood waters

Wednesday, December 05, 2001

By Environmental News Network

In 1997, the year's single most costly disaster was the massive spring floods in the Upper Midwest that ravaged Minnesota and the Dakotas, costing U.S. taxpayers \$730.8 million in disaster relief. The Ohio River Valley floods in 1997 and the Texas floods in 1998 each cost more than \$100 million in federal funds.

These floods are part of an increasing pattern of disasters, says the Federal Emergency Management Agency (FEMA). Damage from more frequent and severe weather calamities and

other natural phenomena during the decade 1990 to 1999 required 460 major disasters to be declared, nearly double the number of presidential declarations issued for the previous 10 years and more than any other decade on record.

Flooding resulting from severe storms and other causes was the most frequently declared type of disaster, with more than \$7.3 billion committed by FEMA in response and recovery funding. The most costly of these were the Midwest floods in 1993, which required the expenditure of \$1.17 billion.

In the Midwest, floods are worse than ever, and human engineering is responsible for the increase in flood damage, two professors in the Department of Earth and Planetary Sciences at Washington University in St. Louis have found.

Dr. Robert Criss and Dr. Everett Shock say that recent flood magnitudes and frequencies cannot be blamed on global warming or climate change, the popular notions. They point to human engineering of the rivers to try to control them for navigation.

In their paper, "Flood Enhancement through Flood Control," published in the October issue of the journal *Geology*, Criss and Shock lay the primary blame for increased flood levels on the Missouri and Mississippi rivers over the past century on the placement of wing dams on the nation's largest rivers.

Wing dams are jetties of rock placed nearly perpendicular along river banks. They are intended to stabilize channels and to keep water levels high in mid-river for barge traffic. In the reaches of both rivers in Missouri there are literally thousands of wing dams, many visible through a car windshield.

Most of them were built in the 1930s and '40s by the U.S. Army Corps of



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Wing dam

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Engineers. During low flow, the wing dams keep the channel deeper for barge traffic and increase water velocity in the center for a stable, self-scouring channel.

But under flood conditions, Criss says, the structures act like scale in a pipe. They actually slow water velocity and constrict the channel, impeding the flow of water, forcing flood levels to rise.

"The main problem with wing dams is that they make flood waters deeper," said Criss. "For floods of a given magnitude, the depth of water is much greater when you have them compared with places without them. In many areas of Missouri with wing dams, flood water can be 10 feet higher than it was before they were built."

Criss and Shock compared flood stage levels of the lower Missouri River and the middle Mississippi River from the confluence of the Missouri River down to the Ohio River, both heavily lined with wing dams, to the Meramec River in Missouri, which is one of the few free-flowing rivers in the United States, and the Ohio River at Cincinnati.

The Ohio there is free of wing dams but does have levees and navigational locks and dams, which show little effect on water depth over 140 years of data.

Both the Meramec and Ohio rivers show constant flood levels through the years on graphs Criss and Shock drew up. The Mississippi and Missouri rivers, dotted with wing dams, show rising lines throughout the past century. This comparison clarifies the consequences of different engineering practices over time.

"Where none of this kind of engineering occurred, the records today look just like the records of 100 years ago," said Criss. "Such is not the case on the heavily engineered Mississippi River at St. Louis. Before World War II, floods that reached 38 feet or higher at St. Louis were very rare, occurring only about every 50 years, but now flood stages of this magnitude occur every five years or so."

Criss continued, "Severe flooding is commonplace now. If you look at our table and graphs, you see the trends are going up. The government is misleading the public by saying the Great Flood of '93 was a once-in-200-years event, or even a 70-year event. Our data show it won't take a century for a flood like that to reoccur. I would not even be surprised if it happened in the next 15 years."

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