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AGU Fall Meeting: Accumulating sediment in Mississippi River threatens course change, water supply

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NEW ORLEANS — Accumulating sediment within the lower Mississippi River could, when coupled with a major flood, cause the river to abandon its current course, potentially ruining the drinking water source for roughly 1.5 million people, according to new research presented here today.

The Mississippi River is an alluvial river, meaning its course is shaped by sediment and floods, and its floor is composed of loose, moving sands and soils. Because of these qualities, the river naturally changes course every 1,000 to 1,500 years. The Old River Control Structure, a 54-year-old floodgate system, manages the flow of the Mississippi into the Atchafalaya River, which runs parallel to and west of the Mississippi. This system prevents the Mississippi from flooding and changing its course.

In the new research, scientists took measurements of sediment accumulating downstream of the Old River Control Structure to the Gulf of Mexico, a total of more than 300 miles (more than 480 kilometers). The floodgate system regulates the flow of water, but it does little to address sediment moving downstream in the Mississippi, where this sediment accumulates when the river's flow naturally slows, according to the researchers.

The new research finds sediment has caused the river floor downstream of the floodgate to elevate and the sandbars to grow in volume by more than 200 percent. At least 36 million metric tons (over 39 million short tons) of coarse sand has been added to the river and narrowed the river channel by 800 meters (half a mile), according to hydrologist Yi-Jun Xu from Louisiana State University in Baton Rouge, who will present the new findings today at the 2017 American Geophysical Union Fall Meeting. Xu's previous research found these sandbars could swell even larger in the near future, as sand has also accumulated upstream from the control structure and could wash downstream under the right conditions.

These changes diminish the river's capacity to carry water on its current course. When sections of the river's floor rise to a sufficient point, a sudden increase in flow — perhaps from a flood — could drive the Mississippi River to overwhelm the control structure and adopt a new path, potentially causing the Mississippi to be captured by the Atchafalaya, according to the new research.

Xu believes enough sediment has already accumulated in the area to pose a risk. Another recent study also suggests that by the 2090s, changes in temperature and precipitation could increase the Mississippi River's flow by nearly 60 percent, increasing the likelihood of frequent and large floods. Rapid urbanization of the area, too, boosts chances of flooding, as paved surfaces deprive the land of its ability to store and slowly release water.

"When a mega flood comes, it will overpower the Old River Control Structure, if the river floor elevation continues," Xu said.

Such an event would cause saltwater from the Gulf of Mexico to intrude upstream, Xu said, compromising freshwater for the New Orleans, Metairie, Kenner, and Houma-Bayou Cane-Thibodaux metropolitan areas, which collectively include nearly 1.5 million people. The Mississippi River is serviced by water treatment facilities, though none are designed to process saltwater into freshwater.

"If that happened, it would directly affect the lives of nearly two million Americans as well as the multi-trillion-dollar petrol chemical assets along the lower Mississippi River," Xu said.

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Notes for Journalists
Lead researcher Yi-Jun Xu will give a poster presentation about this research on Tuesday, 12 December at the 2017 AGU Fall Meeting.

Poster title:
What would happen if the Mississippi River changed its course to the Atchafalaya?

Session:
EP21C: Progress in Research on the World's Major River Deltas II Posters

Date and time: Tuesday, 12 December 2017**,** 8:00 a.m. – 12:20 p.m. CST
Location: Morial Convention Center, Poster Hall, Halls D-F
Abstract number: EP21C-1855

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