

Flood Deaths in China Show Road Risks From Climate Change

At least four people died in a highway tunnel in central China that flooded at the same time as a subway tunnel after eight inches of rain fell in a single hour.



By Keith Bradsher

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ZHENGZHOU, China — More than 200 cars were caught in a highway tunnel on Tuesday in central China when record-setting rainfall soaked the area. Torrents of water poured in the tunnel's entrances, nearly filling it to the ceiling.

The death toll that day probably would have been higher had it not been for a semiretired special forces commando who swam back and forth among the bobbing, colliding vehicles to rescue drowning drivers as their cars filled with water and sank. The authorities are still draining the tunnel, and have said that at least four people died.

Initially, international attention to transportation safety risks from extreme weather focused on drownings in a subway tunnel that filled with water during the same cloudburst in Zhengzhou, in central China's Henan Province. But the highway-tunnel flooding deaths highlight the risks that climate change can also pose to motorists, transportation safety experts said this weekend.

Indeed, the deaths show that road engineers, like subway-system designers, will need to cope with the more intense rainfalls associated with climate change, said Kara M. Kockelman, a transportation engineering professor at the University of Texas at Austin.

A highway tunnel "can really fill like a bathtub in some of these rainstorms," she said, "and it's just going to get worse due to the climate catastrophe."

In 2011, a group of Chinese experts published a technical paper pointing out that the Zhengzhou tunnel, which was still being built, was in a low-lying area where ponds of stagnant water frequently formed in the streets. The tunnel opened in 2012.

It was built with a pumping system designed to handle as much rain as would fall once every 50 years. But the authorities have since described the deluge on Tuesday as, in theory, a once-in-at-least-1,000 years event.

"If water accumulates in the tunnel," the technical paper warned, "it will seriously threaten the safe operation of the tunnel."

The municipal government of Zhengzhou, the provincial capital, said on Saturday that another body had been found in the subway tunnel, bringing the official death toll from the subway flooding to 13. Overall, the provincial death toll from the flooding rose to 58, and five people have been recorded as missing.

While bright sunshine on Saturday dried the streets of Zhengzhou, many communities in northern Henan Province continued to face high water. "Some villages are besieged by floods and need to evacuate a large number of people," Guo Huajie, the chief engineer of the Henan Fire and Rescue Corps, said at a government news conference on Saturday.

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The highway-tunnel debacle could easily have been much worse, as 200 to 300 cars were stranded by the fast-rising waters.



High-capacity pumps worked on Friday afternoon to drain a flooded highway tunnel in Zhengzhou, China, as a tow truck maneuvered to remove damaged vehicles. Keith Bradsher/The New York Times

But a man in a white shirt, who was filmed by onlookers as he swam confidently among the sinking cars on Tuesday, pulled motorists to safety. He was identified by local media and by his employer late Friday as Yang Junkui, a former People's Liberation Army commando.

Mr. Yang, 45, told Shanghai news organizations that he had received automated cellphone warnings of heavy rain from the government and from his employer early Tuesday afternoon, so he began heading home from work as a driver for Caocao, a ride-hailing company like Uber.

He was driving through the tunnel when it began to fill with water and traffic stopped, and left his own car as the water reached the axles, just before cars around his began floating. He started knocking on the doors of other drivers, telling them to exit their vehicles, and led them to safety.

Three women who apparently did not know how to swim were abandoned nearby on the roof of a car that sank, as two men left them and moved to safety. Mr. Yang jumped back in the water and pulled the women out, one by one. He then tried, unsuccessfully, to save other motorists, but retreated after hurting his leg.

"I did not hesitate, nor was I afraid, but after I reached the side, I felt a bit scared in the past two days," he said to Jiemian, a Shanghai news organization.

Mr. Yang agreed to an interview early Saturday afternoon, but canceled at the last moment. Caocao said he had raced back to his home village north of Zhengzhou because it was about to be partly flooded by a controlled release of water from a reservoir.

Similar controlled releases were used in 1993 during the Mississippi River floods in the Midwest to alleviate pressure on dams when the water behind them became dangerously high.

Only two months ago, the Henan Province government was promoting its “smart tunnel” investments in the same mile-long, four-lane highway tunnel that flooded on Tuesday. Sensors could be used to track and precisely locate any person or vehicle, and to closely monitor the tunnel’s water pumps. An artificial intelligence system could be used to instantly analyze problems and suggest solutions.

Highway tunnels, including Zhengzhou’s, are built with their own pumping systems. But extreme cloudbursts like the one last week, in which eight inches of rain fell in a single hour, pose formidable challenges for road designers.



A flooded road on Friday in Zhengzhou. By Saturday afternoon, streets were mostly dry. Aly Song/Reuters

To work, such pumping systems need to be able to move the water somewhere that is not underwater itself. Zhengzhou is nearly flat and slow to drain. The entire street at the south end of the tunnel filled with water several feet deep.

Dr. Kockelman said that any investigation of what went wrong in Zhengzhou would need to examine whether the exit point for the pumps had become submerged. That could cause the flow of water through the pumps to reverse direction and fill the tunnel.

Liu Chunge, an owner of a tiny grocery store that sits two stairs above the sidewalk next to the south end of the tunnel, said that the water in the streets rose fast. She was soon calf-deep inside her store.

The freezer from which she sells ice cream began to float, so she loaded beverage bottles onto it to force it back down to the floor.

“I’ve never experienced such a big flood,” said Ms. Liu, 50. “In previous floods, the water never rose above the two steps.”

Zhengzhou officials have held three news conferences since the tunnel floods, but they have yet to directly explain what went wrong.

Local authorities have struggled to remove water from the highway tunnel. On Friday afternoon, they were operating a pair of pumps nearly the size of commercial jet engines attached to bright red, fire engine-size suction trucks at the tunnel’s south end. But the muddy water was still deep enough in the tunnel that only the roof of a white car inside was visible.

Several workers maneuvered a large yellow tow truck to try to pull a mud-covered black minivan out of the tunnel’s exit. The minivan had its rear wheels on a nearly yard-high highway median, and its driver’s door hung open. Five other mud-soaked cars and vans lay in the water nearby, including a dark blue Ford sedan with a white car on its roof.

Many Zhengzhou residents watched and filmed the crews' work on Friday afternoon, and were occasionally chased away by a few municipal police officers.

As for Mr. Yang, Caocao gave him a new, \$25,000 electric minivan on Friday night.

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