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BOZEMAN DAILY

# CHRONICLE

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## Researcher aims to transform flood forecasting



SAMUEL WILSON/CHRONICLE/REPORT FOR AMERICA

A section of utility lines are exposed in a washout of Northeast Entrance Road next to Soda Butte Creek in Yellowstone National Park in 2022.

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Chronicle Staff Writer

After the Yellowstone River's floodwaters rose, washing out roads, damaging bridges and forcing Park County residents to evacuate, a Montana State University researcher was inspired to help prevent future catastrophes from striking without warning.

Armed with a \$293,492 grant from the National Science Foundation, civil engineering professor Siwei He is working to improve rain-on-snow weather forecasting to help ensure his history does not repeat itself.

According to He, heavy rainfall alone isn't always to blame for catastrophic flooding. In 2022, a combination of late-season snow and rain caused rapid snowmelt, sending excessive water into rivers and flooding surrounding areas.

"That's the first time I noticed that rain-on-snow flood can be such a disaster," He said of the Yellowstone flood.

Though He wasn't in Montana during the floods — instead working as a researcher at the National Oceanic and Atmospheric Administration global systems laboratory at the

University of Colorado-Boulder — the event sparked his interest in advancing rain-on-snow forecasting research.

With the grant, he plans to deepen the understanding of rain-on-snow events



by developing numerical models to simulate streamflow. He will test the model using events, such as the Yellowstone flood, to assess accuracy. If successful, the model could then help predict when and where rain-on-snow floods may occur.



Now, the initiative is set to be on the ballot this Nov. 5.

"We are the last, the very last item on the election ballots," Quatraro said. "So hopefully people don't get what's called ballot fatigue and get to a certain point and go, oh, to heck with it, I'm not going any further."

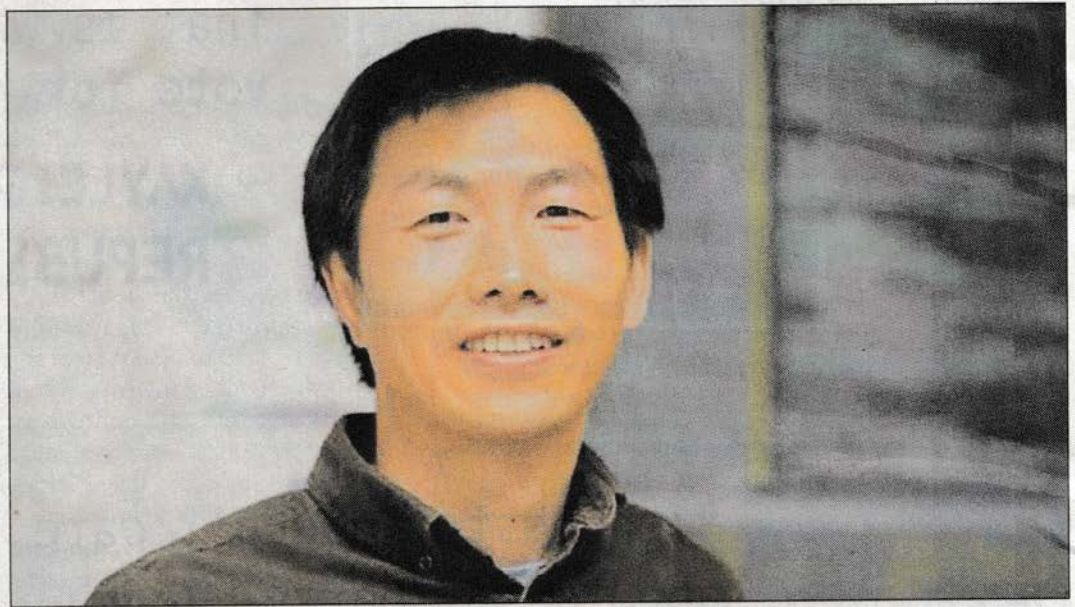
Quatraro wants the Bozeman community to consider the positive environmental and health benefits that this initiative will offer. According to MTPlastic Free, 12 states and over 500 municipalities have already implemented similar bans and have seen a reduction in plastic bag litter by over one-third. They also write that this will have no cost to taxpayers and will save businesses a significant amount of money as they no longer will have to purchase single-use shopping bags.

Quatraro also urges voters to consider factors beyond the environmental impact, such as the growing research into the negative health impacts of microplastics.

"It's everywhere, and it is in our bodies. [Microplastics] are insidious," Quatraro said. "You think they are just these small little particles — but they are everywhere."

"What choice do we want to make? Do we want to lead healthier lives, have cleaner environments, have healthier bodies or do we want to have our habits continue?"

To find out more about the proposed initiative or to get involved with the groups, visit <https://www.mtplasticfree.com/> and <https://www.beyondplastics.org/from-the-grassroots/montana-ban-on-bans>.



MONTANA STATE UNIVERSITY

Siwei He has been studying rain-on-snow flooding at MSU.

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He also hopes to use the grant to integrate community-scale flood forecasting, aiming to make rain-on-snow predictions more relevant for local preparedness.

"Currently, we have stream-flow/flood forecasts that are provided by federal agencies like NOAA River Forecast Centers and the National Water Center on many rivers in the U.S., but they are more focused on the larger rivers," He said.

To address this gap, He plans to prioritize streamflow forecasts for local streams, including Bozeman and Bridger creeks. This approach ensures that forecasters can quickly relay information during future

rain-on-snow events, enabling timely flood warnings and evacuation orders for nearby communities and authorities.

"Those rivers are very local and they are still important to our local community," He said.

The project will collaborate with the Iowa Flood Center at the University of Iowa, known for its community-level flood forecasts, and the NOAA National Weather Service Missouri Basin River Forecast Center, which provides operational streamflow forecasts for the Missouri Basin, according to MSU.

Although He is a specialist in hydrological modeling — the simulation of water movement, distribution, and qualities using

mathematics — he finds that the project's appeal extends beyond the science. He is particularly excited by the support from the local community and the enthusiasm of the undergraduate students he teaches.

"They (students) feel like they are doing something," He said. "They learn the theory from the textbook and they can then apply that knowledge to real-world problems."

Although the project is just beginning, He aims to utilize the model on streams across Montana within five years, providing timely local updates to ensure residents are never caught off guard again.

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