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Research News

Model predicts urban development and greenhouses gasses will fuel urban floods

Scientists conduct research on twin forcing agents of environmental change

A new model predicts that urban development and greenhouses gasses will fuel urban floods.

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When rain began falling in northern Georgia on September 15, 2009, little did Atlantans know that they would witness epic flooding throughout the city. Neighborhoods such as Peachtree Hills were submerged; Georgia's busiest expressway was underwater, as were other roads and bridges; untreated sewage mingled with rising flood waters; cars and people were swept away.

Moisture from the Gulf of Mexico fueled the flood of 2009. A decade later, Arizona State University (/cgi-bin/good-bye?https://news.asu.edu/20210318-model-predicts-urban-development-greenhouses-gasses-will-fuel-urban-floods) researchers are asking whether a combination of urban development and climate change fueled by greenhouse gasses could bring about comparable scenarios in other U.S. cities. Based on a new study, the answer is yes.

"When we account for these twin forcing agents of environmental change, the effect of the built environment and the effect of greenhouse gasses, we note a strong tendency toward increased extreme precipitation over future U.S. metropolitan regions," said Matei Georgescu, lead author of the study.

Previous studies have shown that urban development modifies precipitation, thanks to what's known as the urban heat-island effect: the difference between the temperature in a city and the surrounding rural area. As a city grows, it gets warmer. The added warmth adds energy to the air, forcing the air to rise faster, condense, form precipitation and rain over the city or downwind of the city. The amount of precipitation a city receives increases or decreases in response to the urban heat-island effect.

However, when greenhouse gasses and urban development are both taken into account, climate modeling of the continental U.S. shows the effect of urban development and greenhouse gas emissions on extreme precipitation.

The U.S. National Science Foundation <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1444758&HistoricalAwards=false> -funded <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1940781&HistoricalAwards=false> study was published in the journal *Environmental Research Letters* (/cgi-bin/good-bye?https://iopscience.iop.org/article/10.1088/1748-9326/abd8ac/meta). "This research reflects the emerging field of urban climate science, which is of vital relevance now and in the future," said Bruce Hamilton, a program director in NSF's Directorate for Engineering.

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