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Reservoirs can make local flooding worse, says study

By Matt McGrath
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Researchers say that large man-made reservoirs can increase the intensity of rainfall and could affect flood defences.

The scientists found that rain patterns around bodies of water in Chile were much higher than in similar areas without them.

This "lake effect" could overwhelm flood defences which are often built without taking it into account.

The study has been accepted for publication in the journal Hydrology.

Stormy edge

Previous **research** in this field has focused on the impact of dams on local climates. There is evidence that standing bodies like reservoirs and lakes can alter rain patterns by increasing the amount of water that evaporates.

Some experts believe that you also get circulating air patterns in the atmosphere above the boundary between the water and the land and this can initiate thunderstorms and showers.

The impact can be significant. One study showed that extreme precipitation increased by 4% per year after dams were built.

In this latest work, researchers from the University of Talca, Chile, examined data from 50 rain gauges near reservoirs in different parts of the country.

Chile has a large variety of climates ranging from areas that get 0mm of annual rainfall to places that get more that 4,500mm. The scientists found that the most intense rainfall was measured at weather stations located near water bodies, especially in drier climates.

One of the authors, Dr Pablo Garcia-Chevesich from the University of Arizona told BBC News that the work had important implications for flood defences.

"If you install a water reservoir that will change things totally and that will lead to flooding," he said.

"Engineers get fired when there's flooding because they didn't do a good design, but in reality they did good work but someone else installed a water reservoir and the climate changed."

"The bigger the water body, the greater the effect."

Dr Garcia-Chevesich said this area of research was controversial because changing the design of flood defences was very expensive.

Dam boosters
Other scientists took a more measured view of the study.

Dr Faisal Hossain, from Tennessee Technological University, said the Chilean study was purely observational and that while the lake effect changed rainfall patterns, the jury was still out on whether it increased or decreased the amounts.

However, he said that he was hoping to bring the research to the attention of dam builders around the world.

"We have modified the weather patterns in such a way that we didn't anticipate before building these reservoirs, and yes in the global context it might have serious ramifications," he said.

Prof Richard Harding from the UK Centre for Ecology and Hydrology (CEH) said several studies had now pointed to the impact of reservoirs particularly in dry areas.

"The physics says that it will happen, but I'm struggling a little to know how big an impact it is, and quite whether it is strong enough to change the design of flood defences," he said.

Dr Harding suggested that the new study might provide ammunition for those who oppose the building of large-scale new reservoirs.

The authors argue that they want engineers and designers to take this new work into account in planning new flood barriers.

"In the US, they are very rigorous about taking climate change into account when talking about storm water management design," said Dr Garcia-Chevesich, "but this is new and should be taken into account too."

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