

# HIGH WATER

## Will Venice sink and why does the Italian city flood?

Erica Doyle Higgins  
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**THE waterways of Venice attract millions of tourists from around the world every year - but rising floodwaters have overwhelmed the Italian city.**

Here we explain why Venice has flooded, what defences there are, and if the city is sinking.



### Why does Venice flood?

Venice experiences a phenomenon "acqua alta" or "high water" due to exceptional tide peaks in the Adriatic Sea. The tidal peaks reach their maximum level in the Venetian Lagoon, which runs around and through the city, causing flooding in the region.

The causes of the tidal peaks are down to a number of factors, including the movement and phase of the moon, wind strengths and direction as well as rain level and rising sea-levels. The flooding levels vary across the city due to varying altitudes above sea level, plus heights of pavements and distance from channels.



### Is Venice sinking?

According to LiveScience, the rise in sea-level isn't the only thing that has Venice's famous canals rising every year because the city is subsiding.

Previous studies had suggested the city's subsidence had stabilised but it has been claimed that the city is tilting to the east. Scientists tracked the elevation of Venice and its surrounding lagoons over a ten year period and have said that on average, the city is sinking up to two millimetres

every year. It's thought the subsidence is due to plate tectonics as the Adriatic plate, on which Venice sits, is subducting beneath the Apennines Mountains and causing the city and its environs to drop slightly in elevation.

### How often does Venice flood?

Exceptionally high tides in Venice occurs once every four years, on average. However minor flooding in the city happens around four times a year and usually within the winter months.

High water can sometimes last only for a few hours but it is dependent on which part of the island is hit by floodwaters. In 2018 the waters reached a height of 156cm in October after flooding across Italy.



But this was exceeded in 2019 as it reached 187cm - the highest since the flood of 1966.

The city declared a state of emergency after a 1.8-metre flood devastated the tourist hotspot and killed at least two people.

### What defences are there?

During the 2018 floods, Venice Mayor Luigi Brugnaro said a series of underwater barriers that were being erected in the lagoon would have prevented the inundation.

According to Associated Press, Brugnaro said he had asked to talk with Premier Giuseppe Conte to underline the urgency of the project, nicknamed Moses, which would raise barriers when the tide reaches 43 inches. Full completion and operation of the project is expected in 2022.

Residents and businesses typically reinforce their doors with metal or wooden panels to prevent water from entering the bottom floors, but photos on social media showed shop owners using water pumps this time to try to protect their



goods. The city installs gangways for pedestrians to use, but in the 2018 floods these had to be removed as the water exceeded the raised walkways.

Venice has been hit by floods that have seen more than 80% of the city, a Unesco world heritage site, under water when the tides were at their highest. The Mayor of Venice was very quick to attribute the floods to climate change. Critics though have pointed to delays and corruption in relation to the installation of a major floodwater defence system that might have limited the damage.

Climate scientists, however, see a clear relation between rising temperatures and the inundation. "Sea level rise is rising globally and it is also rising in the Adriatic," said Prof Gabi Hegerl, from the University of Edinburgh. The immediate flood has been caused by the Sirocco wind and the high tides but it wouldn't have been as high without the sea having risen as well."

### What about the Australian fires - where's the climate link?



The latest Lancet report on health and climate change "found that human exposure to fires had doubled since 2000".

"Wildfires not only cause deaths and health damage but had significant economic and social impacts," it found. In Australia, the bushfires this year have come far earlier and on a larger scale than seen previously. While climate change doesn't directly cause fires like these - it is major

factor in creating the right conditions for fires to take hold.

"In areas like Australia where we have had prolonged dry periods, you can't definitely attribute this to climate change but the environmental conditions are increasingly ripe for these sorts of things," said Prof Nigel Arnell from the University of Reading.

"The precursors are all going in the direction of increased fire risk in those fire-prone regions." Other researchers also point to indirect links. "Most droughts are found to be in part caused by climate change," said Prof Piers Forster. "Stronger winds, again associated with more energy in the climate system, add to the fire risk and make them more intense and faster moving."