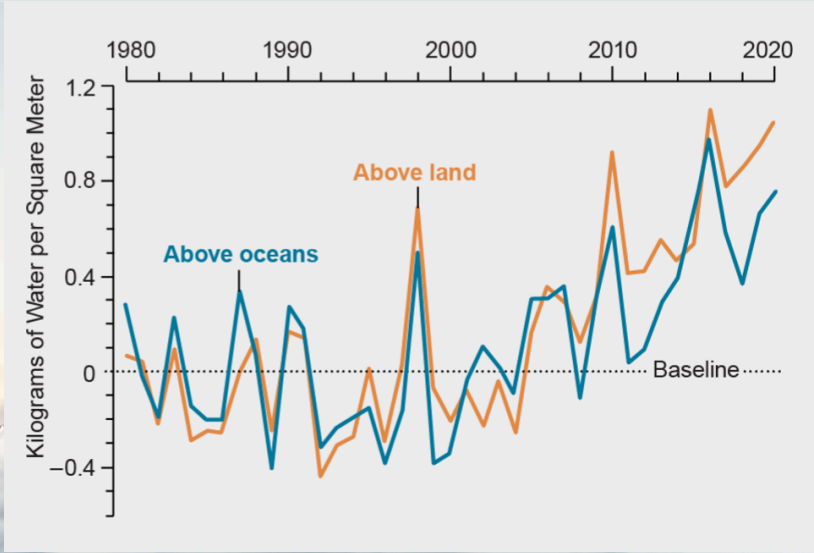
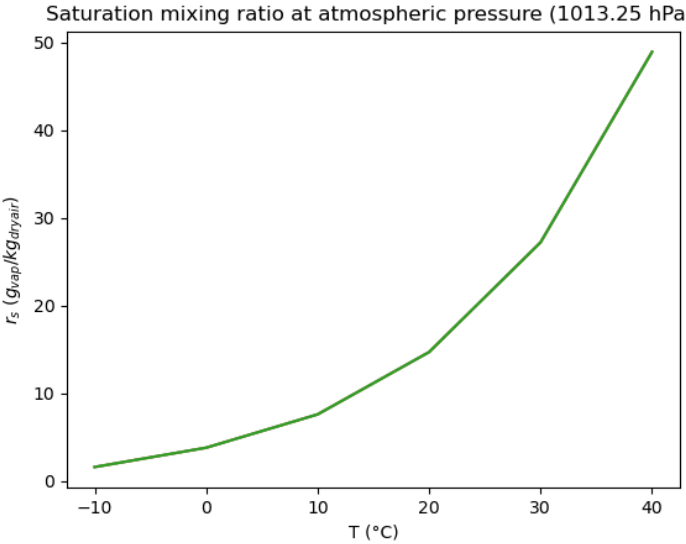
Increase of water vapor in atmosphere



For the past 20 years, the humidity in the atmosphere has increased, above land and above oceans. This can be explained by the fact that the air is becoming warmer, which leads to more water being stored in the form of vapor in the atmospher.

Relative humidity



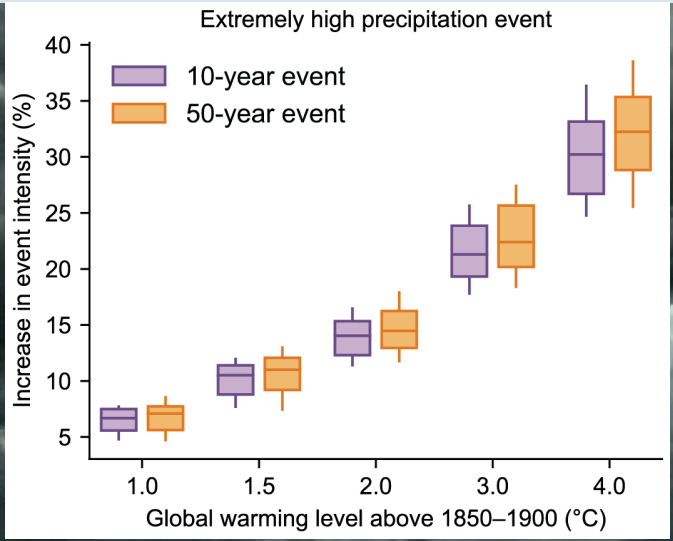
The saturing mixing ratio is defined by

$$r_s = \frac{r_{s0} p_0}{p} exp\left(-\frac{L}{R_v}\left(\frac{1}{T} - \frac{1}{T_0}\right)\right)$$

with rs in g of vapor per kg of air.

This means that at constant pressure, the warmer the air, the more watervapor it can hold.

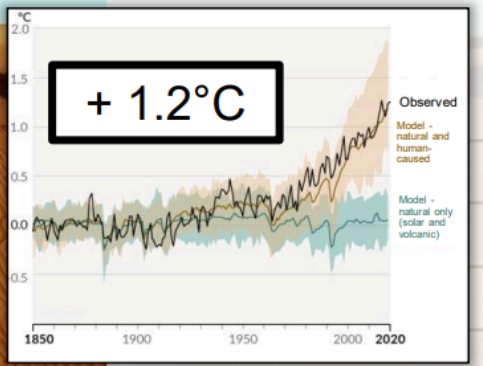
Intensification of extreme weather events

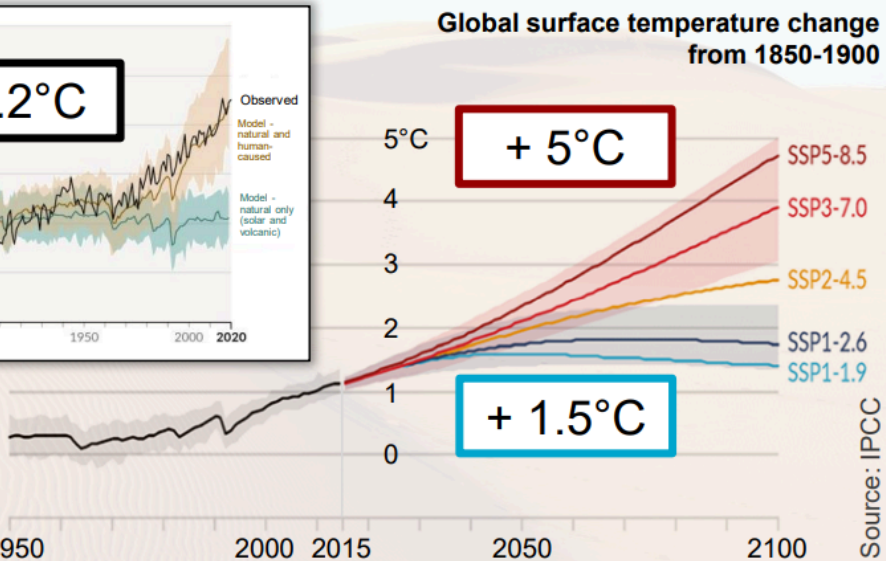


Water vapor transport a form of energy named “latent heat”. When water vapor condenses, it releases heat. This latent heat is the principal fuel of cyclones, storms and rainfalls.

Meaning that the more water is contained in the atmosphere, the intenser the weather events.

Rising Air Temperatures





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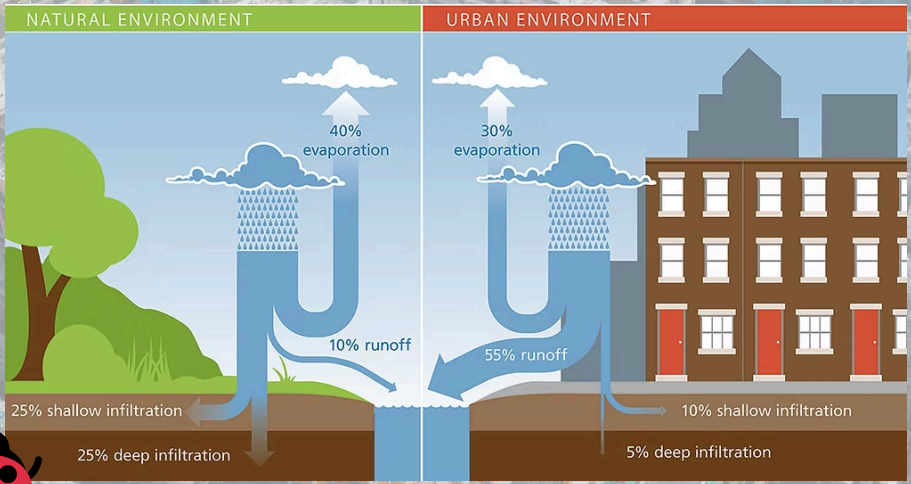
The average air temperature at the surface of the Earth has increased by 1.2°C since 1900. Future emission scenarios predict that this increase will reach between 2 and 5°C by 2100.
During the last ice age 20,000 years ago, the average air temperature was only 5°C lower than today and warming up took 10,000 years.

Set 1

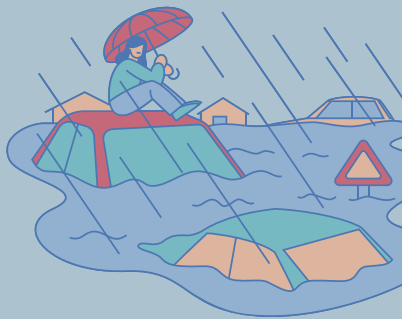
Urbanisation



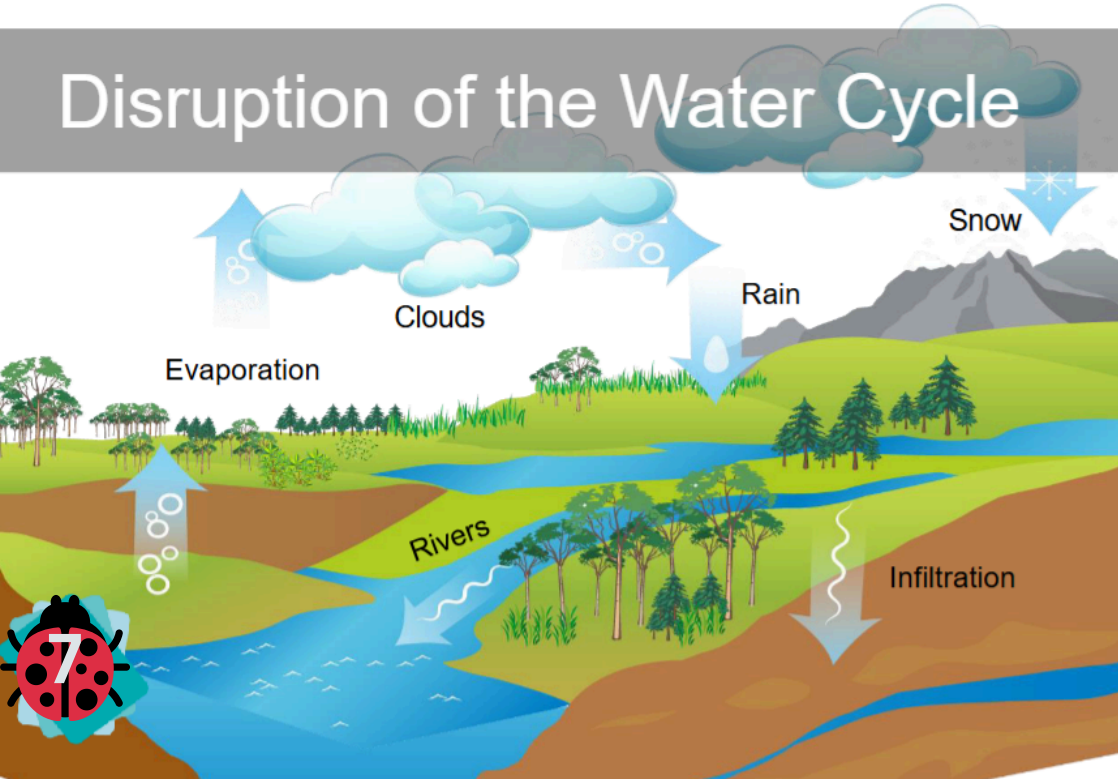
The growth of cities and towns through land conversion, increased population density, and distinct economic/social structures. Very often involves the removal of green spaces, leading to increased runoff and water pollution.

Floods

Urbanization's impermeable surfaces reduce water infiltration, increasing flood risk. Floods can also elevate evaporation, potentially leading to more localized humidity and heavier rainfall elsewhere.



Disruption of the Water Cycle



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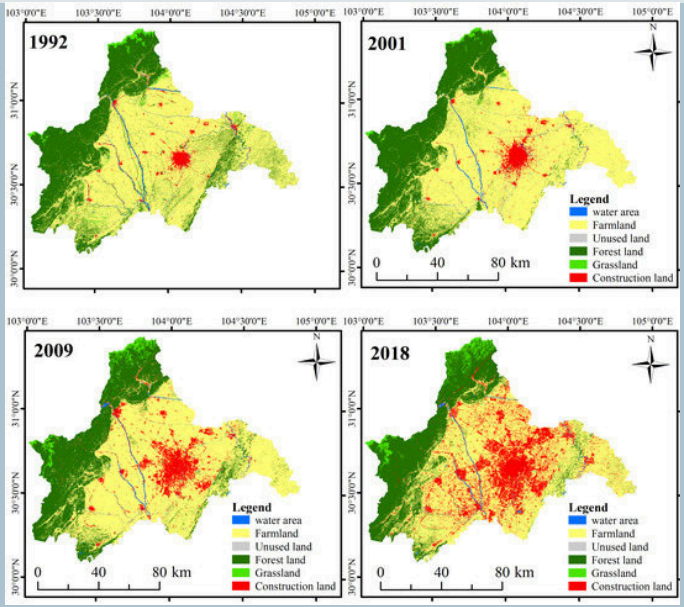
Hotter oceans and a hotter atmosphere lead to stronger evaporation, causing rainclouds and rainfall. Hotter land and a hotter atmosphere also lead to stronger evaporation, this time causing the ground to dry out.

Set 3

Land Use and Land Cover Changes



Changes in land cover due to deforestation, agriculture and urban expansion significantly alter how the land interacts with water.
When natural landscapes are replaced by crops, bare soil or impermeable surfaces, the land is no longer able to manage rainfall.