Tea prices could spike as climate change makes India's monsoon season even more severe

JUNE 5, 2021, by Study Finds

PROVIDENCE, R.I. — If you can't start the day without some English breakfast tea and can't end the day with a relaxing cup of chamomile, bad news may be on the horizon. The price of a cup of tea could soar as climate change makes India's monsoon season even more severe, warns a new study.

Heavier rains wash away crops and worsen hunger for a country in which farming can make up a fifth of the economy. They will put the tea industry at risk by reducing tea yields, as well as the flavor and health benefits, say scientists.

An analysis of rock cores identified a direct link between global warming and more intense precipitation over the last 900,000 years. It adds to evidence calamitous weather events costing lives and livelihoods are set to become increasingly common.

The research vessel JOIDES Resolution drilled sediment cores from the Bay of Bengal, which were used to reconstruct past monsoon rainfall. Those data were used to test predictions of future monsoon rain as the climate changes. The data suggests that future rainfall could increase as CO2 levels rise. (Credit: Brown University)
"We show higher CO2 levels along with associated changes in ice volume and moisture transport were associated with more intense monsoon rainfall," says lead author Steven Clemens, a professor of geological sciences at Brown University, in a statement. "That tells us CO2 levels and associated warming were major players in monsoon intensity in the past. It supports what the models predict about future monsoons — that rainfall will intensify with rising CO2 and warming global temperature."

How rocks from the sea could predict what's to come for the tea industry
The international team scanned sediment samples collected off the coast of India by the drilling ship Joides Resolution (JE). It enabled them to reconstruct a history of monsoons. Periodic changes coincided with fluctuations in atmospheric CO2. It also affected the volume of land ice and the amount of moisture imported from the southern hemisphere Indian Ocean.

The data then tested predictions of future flooding and deluges as the climate changes.

It found that climate model forecasts are right, with rising levels of the greenhouse gas and higher temperatures leading to stronger monsoons.

The study, published in Science Advances, has implications for billions of people who live in the monsoon climates of South Asia, Africa and the tropical Americas. Every spring they wait for rains that will end the winter dryness, even though they might also cause disastrous floods. There is often too little water — or too much.

The South Asian monsoon is arguably the single most powerful expression of Earth's hydroclimate. Some locations get several meters of rain each summer, says Clemens. The rains are key to the region's agriculture and economy, but can cause flooding and destroy crops when they are particularly heavy. They are vital to nearly 1.4 billion people. Understanding how climate change may affect them is critical.

Clemens and colleagues sailed aboard the JR research vessel to the Bay of Bengal to recover rocks from beneath the sea floor. These rocks preserve a record of monsoon activity spanning millions of years. The water drains off the Indian subcontinent each summer. A dilute surface layer in the bay rides above the denser, saltier seawater below. It creates a habitat for plankton which use nutrients in the water to construct their shells from calcium carbonate ($CaCO3$).

When the creatures die, the shells sink to the bottom and become trapped in sediment. Oxygen isotopes in the fossils reveal the salinity of the water in which the creatures lived, indicating of changing rainfall over time. River run-off also brings sediment from the continent with it, providing another clue. The carbon composition of plant matter washed in and buried on the ocean floor reflects changes in vegetation type, too. And hydrogen in waxes on plant leaves varies in different rainfall environments, which can be identified from the rocks as well.

"The idea is we can reconstruct rainfall over time using these proxies, and then look at other paleoclimate data to see what might be the important drivers of monsoon activity," explains Clemens. "That helps us to answer important questions about the factors driving the monsoons. Are they primarily driven by external factors like changes in Earth's orbit, which alter the amount of solar radiation from the sun, or are factors internal to the climate system like $CO2$, ice volume and moisture-transporting winds more important?"

Periods of more intense monsoon winds and rainfall tended to follow peaks in atmospheric $CO2$, and low points in global ice volume. Cyclical changes in Earth's orbit that alter the amount of sunlight each hemisphere receives played a role in monsoon intensity as well, but on their own could not explain monsoon variability.

Taken together, the findings suggest monsoons are indeed sensitive to CO2-related warming.
“The models are telling us that in a warming world, there is going to be more water vapor in the atmosphere,” adds Clemens. “In general, regions that get a lot of rain now are going to get more rain in the future. In terms of the South Asians monsoons, that is entirely consistent with what we see in this study.”

Last year floods in India caused thousands of deaths and damage worth more than $42 billion. Millions of people were displaced from their homes.

A quarter of the world’s tea is produced in India. Intense rains erode and waterlog soil, which damages root development and slashes production.

SWNS writer Mark Waghorn contributed to this report.

https://www.studyfinds.org/tea-prices-climate-change-india-monsoons/