

How vulnerable are agricultural societies in the Indian sub-continent to climate fluctuations?

-- *Atreyee Bhattacharya*



Today we do not need to be told that climate change (next probably to COVID) is the biggest disruptor of our lives, as we know. Our news, wherever we get it from, tells us in no uncertain terms how extreme events (floods, droughts, heat waves and wildfires) are upending lives (who would have thought of Germany and Belgium as flood hit countries!) and that extreme events are going to increase in frequency and scale. And even then, many of us think somehow that we are not going to be affected.

There is a large body of social and behavioral sciences research that explain our collective perception of not feeling vulnerable to effects of climate change, even as every scientific document and scientist warn otherwise; as a climate scientist though, one of the questions that I often ask, is this: How do we as a society react to climate? Are we only vulnerable to extreme climate events? Or are we far more vulnerable to smaller climate fluctuations than we think we are



In our recent publication, we interrogate this question in the context of famines – extreme instances of food scarcity and mass death-that impacted large swaths of semi-arid (drought prone) regions of the Indian sub-continent. We mined information from British colonial records preserved in the National Archives of India (NAI), New Delhi; we studied about 600 British colonial administrative documents – correspondences and meeting minutes mostly - that contained climate related information and found that colonial administrators over a period of 220 years (1729-1947) repeatedly ascribed famines, or acute food scarcity that affected large and limited swaths, to ‘rain failure’. We asked, how much rain deficits were needed for such extreme socioeconomic and human impacts?

It turns out that a deficit of only 14-16%, (one standard deviation and well within what you would expect in these regions, simply because of how the climatology is and varies) triggered these extreme, large-scale and acute socioeconomic and human impacts. Famines were typically characterized by food shortage, high grain price, and riots as well as selling children, incidence of diseases, migration and death.

Between 1729-1947 (the year of independence), there were about 22 instances of famines, two so large (1877 and 1899) that it killed millions of people from starvation. In other words, when we compare the famine instances that plagued the southern semi-arid regions of the Indian sub-continent with independent estimates of moisture and precipitation (tree ring reconstructions, cave carbonate based reconstructions and instrumental rainfall records) we find that all it took was normal fluctuations in climate to plunge half of the Indian sub-continent into the socioeconomic disruptions of famines.

Over the 20th and 21st centuries (more so after Independence in 1947), colonial administrators, and eventually the central and state government in India together several non-governmental organizations and foundations (including some spearheaded by Bollywood mega stars) have focused on water conservation, storage facilities and seed varieties so as not to cause famines that plagued the Indian sub-continent for over two centuries and even longer.

And those measures did prevent famines from occurring, especially after the late 1960s (famines occurred through the 20th century but disruption lessened over time). Today semi-arid regions in the southern Indian states do not see food scarcity because of rainfall reductions. But they see farmer suicides (those who cannot pay off debt). They see migration to cities. And they see conflicts over water resources.

Farmers in these semi-arid regions continue to grow and invest in water thirsty cash crops (sugarcane) that fetch a high value in the market shrinking the space for water resistant native food grains (pearl millet, for example)- a practice that started with cotton cultivation during the colonial period.

I find history very valuable. Not only because history tells us of how we got where we are, but because when it is analyzed creatively, it can reveal information that provides valuable lessons about our practices in contemporary times. It's true that we care about extreme events. And we must. But I find that as societies, we are probably not resilient to even small climate fluctuations and in light of the latest climate report, we are even more vulnerable than we recognize.

In conclusion, our study is a learning lesson and possibly the first step, at least in the context of climate studies in the Indian sub-continent, which suggests that for assessing and understanding climatic vulnerability we need to include area studies research. Lack of understanding, appreciation and inclusion of local population, cultures and practices can cause normal climate variability to deliver a large socio-economic impact.

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Ray, R., Bhattacharya, A., et al., 'Extreme rainfall deficits were not the cause of recurring colonial era famines in southern Indian semi-arid regions, Scientific Report, 11, 17568 (2021).
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