The United States Environmental Protection Agency reports that peak bloom dates for cherry trees occur earlier each year, but are dependent on local temperatures during the winter and spring. This begs the question, why does temperature affect peak bloom? The International Journal of Biometeorology studied the impacts of climate change and temperature on the phenology of temperate plants and found that most trees require an accumulation of winter chill and subsequent heat to cultivate growth in the spring. This relationship between chilling periods and warming periods is imperative for stable, predictable growth that has been impacted because of global warming. As the Earth’s temperature rises each year, on average we observe less winter chill accumulation and greater changes in spring heat which is conducive to earlier blooms (Eike Luedeling et al.). In a study conducted by Richard Primack et al., they also determined that climate change has had a significant impact on cherry trees in Japan. They specifically note that both changes in temperature and precipitation patterns have detectable effects on various species of cherry trees (Primack, et al.).

That being said, where does precipitation fit in? Dr. Ashleigh Massam reports that warmer temperatures increase the moisture content in the air leading to more overall precipitation. To elaborate, as average temperatures on the Earth’s surface increase, more moisture accumulates in the air and causes more evaporation to occur, which in turn, produces more precipitation (Temperature and precipitation - US EPA). While this explains the relationship between temperature and precipitation, is there a similar relationship between blooming and precipitation? Primack et al. also note that precipitation can contribute to earlier or later phenology depending on location and climate. This is also supported by a pilot study conducted by Natural Hazards where they emphasize that high-intensity precipitation events can impact blooming through damage to the trees' health

Given the wide availability and accessibility of both temperature and precipitation data, it makes for a reproducible initial model that can be expanded further. For my analysis, I used weather station data from the RNOAA package in R. As this data is recorded in hourly increments, I averaged both the temperature and precipitation data for each day before grouping it into years for further analysis with the cherry tree data in the form of linear regression to be used for prediction.

As previously established, precipitation and temperature are closely related. These are key elements of all life and ecological systems on Earth. Considering that many models are complicated and use a variety of meticulously calculated variables and metrics, I found it interesting to approach this problem from a simplistic angle by focusing on two variables with sufficient data and research. I believe further analysis can expand upon this model to improve it. Additionally, an alternative modeling method may prove more suitable or predictive for the data used. A potential flaw with this model could be that it does not account for any biological differences each species of tree may have or any disparities in the effects of temperature and precipitation due to the difference in species.

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