COMMUNICATION

Influencing policymakers

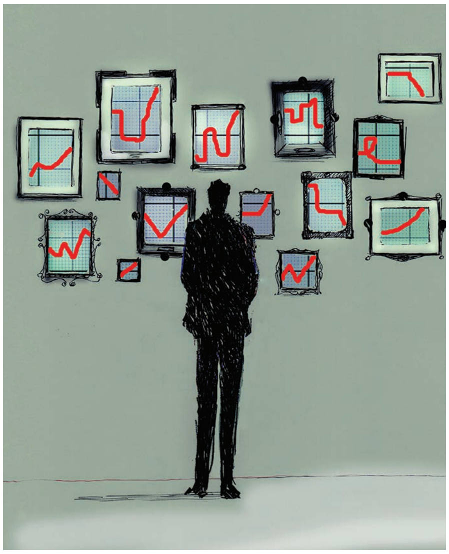
Policymakers play a critical role in the global response to climate change. Now, research reveals an effective visual strategy for communicating climate science to policymakers and climate negotiators.

Jiaying Zhao

Climate change policy needs to be based on rational thinking and scientific data. However, this can be a challenge because most policymakers are not climate scientists. One critical piece of information for climate negotiations is how much global temperature is predicted to increase based on current and future greenhouse gas emissions. However, such information presents an additional challenge because model predictions are inherently uncertain. How do policymakers make sense of this information? Does it influence their views of future global temperature patterns? Is there an optimal way to present such information? Writing in *Nature Climate Change*, Valentina Bosetti and colleagues demonstrate that presenting individual climate model predictions with the statistical range is the most effective way to influence policymakers' views on future global temperature increases[1].

In the last two decades, a clear consensus has emerged from the scientific community that an increase in greenhouse gas concentrations in the atmosphere has caused a rise in global temperature[2,3]. This scientific consensus not only makes global warming an undeniable reality, but also highlights the urgent need for governments around the world to set policies on climate change adaptation and mitigation[4,5]. Previous work has highlighted the political, economic, technological, and social challenges for climate policy[6,7] and has offered insights on how to effectively present climate science information to the public[8–10]. However, little is known about how to best convey climate evidence to policymakers who play a decisive role in climate negotiations and policy development.

To address this gap, Bosetti and colleagues conducted a unique study with 217 policymakers who attended the 2015 United Nations Climate Change Conference in Paris (COP21)[1]. Policymakers at the conference were asked to predict how much global temperature will increase by the year 2100, before and after seeing a graphical depiction of predicted temperature increases based on climate model data. The goal was to see whether and by how much policymaker predictions shifted based on model forecasts.



GARY WATERS / ALAMY STOCK PHOTO

Two striking findings emerged from this study. First, the vast majority of policymakers did not sufficiently take the scientific data into account: after seeing the scientific data, their predictions of future temperature increases remained closer to their original estimates rather than shifting toward the model forecasts. This is in stark contrast to a follow-up study with a group of Master of Business Administration (MBA) students, who made similar initial predictions as the policymakers, but did update their beliefs about future temperature increases after seeing model predictions. The lack of updating in policymakers could be explained by greater confidence in their own predictions before seeing the scientific data. Interestingly, among the policymakers, climate negotiators (versus non-negotiators) were the most reluctant to update their beliefs according to scientific model forecasts.

Second, how researchers presented the scientific data in the graph mattered. The graph was based on data from 30 climate models that made predictions on how much global temperature would increase by the year 2100. The graph was presented in three different formats similar to those used in IPCC reports: a boxplot that covers 90% of the predicted temperatures from the 5th to 95th percentile of the data, the same boxplot showing additional data points that are outside the 90% range, and finally the same boxplot with all 30 data points. MBA student predictions were not influenced by data presentation format. In contrast, policymakers were more likely to update their predictions of future temperature increases when they were shown all data points and the statistical range.

Unlike previous work that concludes that people are blind or insensitive to climate evidence[11], this study provides hope for climate science communication. Specifically, it points to a data visualization principle that can be easily implemented when communicating climate science information to policymakers. This is a prime example of how behavioural science can be used to better inform public policy. This study also opens a fruitful line of questions for future investigations, such as how data visualization can be used to influence not just perception, but action among policymakers, why presenting the full dataset with the statistical range led to the strongest belief updating for policymakers, and how to tailor data visualizations for different demographic groups to elicit the best outcomes.

The study by Bosetti and colleagues[1] presents a promising approach for communicating climate science to policymakers that can be used to ensure scientific data has a meaningful impact on climate policy. ❐

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PALAEOCLIMATE

Aerosols shift lake ecosystem

Anthropogenic aerosols over the Chinese Loess Plateau have diminished monsoon precipitation and concomitant soil erosion that plagues the region. Now, a reconstruction documents the differences between historical warming events and the present, highlighting the paradoxical implications of decreasing atmospheric aerosols.

Harry J. Dowsett

Like clockwork, summer monsoon rains come and go, governing and impacting the lives of more than 100 million people living on the Chinese Loess Plateau (pictured). This fertile region, with its intrinsic ties to seasonal weather change, has played a key role in the evolution of Chinese civilization for millennia. The seasonal rains cause episodes of wholesale erosion that affect the health of freshwater ecosystems downstream. Understanding such climate processes, and how they might be affected by future change, is paramount to the socioeconomic health of this region. Writing in *Nature Climate Change*, Jianbao Liu and co-authors report on changes associated with well-known warming events occurring over the past 2,000 years and compare those to markedly different ecological changes now occurring due to anthropogenic aerosols[1].

The impact of aerosols on climate has been a topic of much discussion over the years. Aerosols scatter light, and act as seeds (condensation nuclei) for cloud formation. The irregular distribution of aerosols can cause large and variable regional impacts. While aerosols and their relationship to radiative forcing are increasingly better understood, they are still one of the largest contributors to uncertainty in future climate projections[2].

Ever-increasing air pollution and anthropogenic aerosols from developing Asian countries are reducing radiative forcing, leading to a reduced land–sea temperature contrast and diminished wind fields. This increase in anthropogenic aerosols over the past half century has weakened the Asian summer monsoon system[3,4], as the monsoon is essentially a seasonal reversal of strong winds governed by changes in the land–sea temperature contrast. Rainfall associated with the monsoon typically causes massive erosion and mobilizes large amounts of nutrients in the form of phosphate from the soil. This nutrient-laden runoff fertilizes both fresh water and marine ecosystems, increasing biological productivity. This lowers oxygen levels in these systems and reduces water quality for consumption. Additionally, the associated strong seasonal winds affect vertical mixing of lake waters. Thus, in terms of freshwater quality for much of Asia, the weakened monsoon may be beneficial.

DENNIS COX / ALAMY STOCK PHOTO

To gain insight into the effects that warm periods and associated changes in monsoon strength have on freshwater ecosystems, Liu *et al.* investigated sediment records from Lake Gonghai on the Chinese Loess Plateau[1]. By monitoring changes in diatom assemblages, they found that during two pronounced intervals of historical warming, the Medieval Warm Period AD 931–1320 and the Sui-Tang Warm Period AD 541–760, increases in monsoon rainfall delivered greater amounts of nutrients to the lake. The composition of diatom assemblages in the lake during both warming events indicates shifts toward eutrophic (excess nutrient) conditions.

During the last half century, while the region has experienced warming, the monsoon system has weakened due to increased atmospheric loading of particles, resulting in lower precipitation and runoff. This shows up in the lake sediment record as a turnover to a very different diatom