

Fragmented Futures

The U.S. is experiencing slow economic growth and rising inequality while communities are increasingly battered by climate-related disasters. Poverty, crime, and civil unrest plague communities around the country, and tensions between haves and have nots undermine social cohesion and trust in government. Due to an abrupt drop in federal revenue, Congress passes austerity budgets that exacerbate the challenges faced by the Nation's most vulnerable populations, and resource constraints limit the ability of governments to respond effectively to emerging threats. Nevertheless, more affluent segments of society and innovation-driven businesses manage to thrive although the growing dependence on technology creates new vulnerabilities as well as opportunities.

2024  2050

340
MILLION



379
MILLION

\$26
TRILLION



\$45
TRILLION

Climate Indicators

Avg. Disaster Declarations (#/year)

120
A YEAR



150
A YEAR

Disaster Losses (\$B/year)

100
BILLION



150
BILLION

Exposure to Coastal Flooding (M ppl/year)

3.4
MILLION



4.0
MILLION

Average Heat Index >100 °F (# days/year)

14
DAYS



30
DAYS

Avg. Annual Wildfire Area Burned (km²/year)

6,000



8,000

Current Events

01/2050

The Washington Post

FBI's latest crime statistics show life in America is growing more dangerous

REUTERS

Fed Chairman claims stock market is out of sync with the broader economy

Chicago Tribune

Investment in air taxi startups takes off as city streets face gridlock

Tallahassee Democrat.

Rising costs of public insurance schemes set to sink state budgets

Climate

Continued dependence on carbon-intensive fuels has led to significant atmospheric warming and rising sea levels. These impacts are particularly salient in Antarctica, where the West Antarctic Ice Sheet has melted significantly, resulting in sea levels rising 12 inches along the U.S. coastline. Given past sea level rise predictions from the National Oceanic and Atmospheric Administration, well-resourced coastal cities have been successfully implementing flood risk mitigation strategies for 20 years. These strategies have included elevating structures, building flood walls, and restoring beach dunes and wetlands. Furthermore, these communities have invested in adaptive planning approaches and have been building according to new regulations designed for sea level rise. Even though billion-dollar disasters are at an all-time high due to coastal population growth (now 40% higher than in 2020), many coastal communities have a sense of protection from climate change impacts and are continuing to enjoy the amenities and experiences that these areas bring.

By contrast, flood mitigation investments have not been possible in under-resourced coastal areas. For example, the Gulf Coast region has not had sufficient resources, infrastructure, or support to implement the kinds of mitigation measures that have been possible in wealthier coastal communities. For example, whereas prosperous areas can avail themselves of U.S. Army Corps adaptation projects that have a 35-50% cost share, the hurricane-ravaged Gulf Coast can only afford the 10-20% cost share for after-the-fact dollars from FEMA, and Congress has refused to budge on changing these age-old formulas. This lack of investment means that communities are being disproportionately affected by climate change because they cannot adapt as well to the growing impacts of sea level rise. Furthermore, despite the danger, people continue to flock to these regions due to the low cost of living. Those who can afford to relocate their lives elsewhere, but the remaining residents struggle to recover from the continuous disruption of frequent flooding events. Without federal assistance, and in the face of state house resistance over their tax base, relocation is incredibly challenging for these increasingly vulnerable communities.

Along the eastern U.S. coastline, impacts from the significant sea level rise is compounded by the more frequent rapid intensification of Atlantic basin tropical cyclones (i.e., winds increase by 35 mph in a 24-hour period). Difficulties in predicting these notably uncertain events means that when they strengthen just before making landfall, communities are not prepared to respond and there is not time nor resources to execute well-supported evacuations. The outcomes of this reduced predictability especially affected elderly skewing low-income communities in South Florida who were in Hurricane Alba's (Category 3) path during the 2050 season. While many vulnerable households were able to flee to safer ground on short notice, they also quickly returned to their homes once the hurricane passed because they needed their shelter and FEMA is increasingly unable to source rental units from the private market. Within two weeks of their return, Hurricane Berta (Category 2) impacted the same communities. The compounding impacts of these two successive hurricanes has exhausted the savings of these low-income families and evacuation fatigue is at an all-time high as they try to recover from the disruption and destruction. Given that flood mitigation measures are not

sufficiently protecting low-lying land in under resourced areas, these communities will continue to be challenged as the magnitude of natural hazard events worsen.

Society

The mid-21st century finds the U.S. population living in what one academic calls the “Two Americas.” For one set of Americans, conditions are good – they have managed to concentrate wealth within their own communities resulting in plentiful jobs, median incomes that are well above average, and comfortable lifestyles. But another set of Americans has a very different experience. The poverty rate is persistently stubborn at 18% - a level not seen in America since the 1960s. Meanwhile, decades of progress in reducing income, health, and educational disparities stalls, with African American and Hispanic communities bearing a disproportionate share of the increases in poverty. The NAACP is already planning the 100-year anniversary of Rosa Park’s arrest in December, 2055 with marches in Montgomery, Alabama and Washington, D.C. The White House is attempting to bridge the divide with the President’s “We’re All in this Together” communication campaign, but her critics label her “tone deaf” and a planned 10-state whistle-stop tour is cut short due to low turnout and hostile crowds.

The combination of high poverty and unraveling social cohesion reduce many people to living in a state of acute vulnerability, such as a record unhoused population in Southern California. This was tragically illustrated by the Whittier Narrows Dam disaster of 2042, when multiple atmospheric rivers caused overtopping and failure of the dam, resulting in flooding and several hundred deaths in Los Angeles and Long Beach. After action reports revealed that although residents downstream were warned of the potential risk, many opted not to evacuate, and those in encampments were completely overlooked by artificial intelligence algorithms. The two most common reasons survivors gave for their decision were they a) “didn’t trust the warnings from government officials” and b) “lacked the resources to evacuate.” The event, as well as other similar instances of inequitable preparedness, response, and recovery to disasters, reinforces people’s perceptions of a federal government that is not only out-of-touch with the needs of disadvantaged Americans, but whose technological solutions are not to be trusted in real-time emergency situations.

High levels of inequality contribute to a rapid escalation of crime across many parts of the country. However, federal, state, and local governments are quick to blame a new, highly addictive synthetic drug, known on the street simply as “T2”. Police departments around the country are under pressure to employ more aggressive policing tactics from prior decades to contain crime, despite calls for a more socially just and evidence-based approach to designing interventions. Racial tension, mistrust of the police, and anger toward society’s elites also trigger civil unrest. This largely takes the form of flash mob property crimes, organized through encrypted social media by an underground organization known only as “The Resistance,” which often targets more affluent communities in urban areas – office buildings, shopping malls, utilities, and luxury autonomous vehicle dealerships. However, such events have been known to spiral out of control, resulting in riots, large fires, and more violent attacks on people, causing significant injuries and even deaths. Those with means have taken to reducing their exposure to areas that are perceived to be risky and taken what measures

they can to protect themselves. Spending on satellite security systems and gun ownership have never been higher, but rather than enhancing safety, statistics show worsening gun crime and pressure on first responders.

Economy

By the mid-21st century, the U.S. economy is struggling to find a stable footing. The “Black Monday” crash of 2039 and the resulting recession drove up unemployment. Parts of the economy bounce back quickly, particularly the knowledge and innovation-based industries concentrated on the coasts and within urban centers. However, traditional manufacturing and service-sectors that employ millions of Americans are not as fortunate. Corporations ramp up offshoring to reduce labor costs, despite public outcry over sending precious jobs overseas. Consequently, the economic pain persists for low-income and disadvantaged communities, particularly in small- and mid-sized cities and rural areas.

The divergent economy slows the inflow of tax revenue to state and federal governments. Political opposition to further expansion of the federal deficit, results in austerity budgets that cut spending, particularly on social services spanning health care, education, and the social safety net. This expands the poverty trap that many Americans are struggling to escape. The America Growth Act of 2042 cuts the corporate tax rate in hopes of stimulating growth of the private sector, but this reinforces existing economic disparities. To get through a deadlocked Congress, the legislation was required to be passed through budget reconciliation, and, in so doing, the Senate agreed to hold the ever upward spiral of Stafford Act dollars constant for the subsequent decade. There are also increases in the costs of subsidized crop and flood insurance as the government attempts to keep rising program deficits in check.

The growing toll of climate-related disasters weighs on the economy. By the late 2040s, a record number of private insurance providers have collapsed into bankruptcy, resulting in consolidation within the industry. Rising insurance costs and the significant contraction of insurers willingness to cover risk have led to a Blue Ribbon Commission to examine options for the federal government assuming regulatory authority for the industry rather than the states. This would have been previously thought impossible but for the collapse of several Fair Access to Insurance Requirements (FAIR) plans. This results in an environment where only those who can take steps to enhance their own resilience or afford to buy risky parametric insurance or bespoke policies from Lloyds are better able to weather the growing storm. Advocacy groups have released a variety of interactive maps that show forecasted zones of inhabitability for the next decade, where a natural disaster is nearly certain, insurance is largely unavailable, and a substantial percentage of the population has no means to relocate.

Technology

Following a day of particularly devastating tornadoes in Omaha, Nebraska, Federal emergency responders in partnership with their state and local counterparts, worked with unmanned vehicles to locate survivors under extensive rubble while it was still too dangerous to send people in to search. After successfully locating every missing person within 72 hours, search-and-rescue teams spoke to reporters about how they partnered with a popular technology company to detect distress signals from their popular augmented reality (AR) wearables. While many structures were destroyed, those with insurance were able to quickly rebuild by taking advantage of 3-D printed homes. Additive manufacturing capabilities have developed in recent years, though building homes remains expensive. Furthermore, the city was able to get back online quickly due to its distributed electrical grid architecture with advanced artificial intelligence-enabled microscale interconnects.

For those who can afford it, the spread of autonomous vehicles has made traveling easier and intensified the wildland-urban interface as driving long distances to get to work, see family, or go grocery shopping is no longer as undesirable. Individuals with access and functional needs who own these cars are also more willing to evacuate because they are not worried about driving. Those who cannot buy autonomous vehicles, however, suffer from the increased congestion that autonomous vehicles bring. They tend to live closer to their workplaces and, because of this, make compromises on their living conditions and find relocation less desirable and more difficult.

Just three months ago, the U.S. detected a genetically modified flea in the rat populations of several cities that escaped from a rogue European gain-of-function biomedical research facility. The insect carries a disease particularly deadly for the elderly, overwhelming hospitals. Once someone is infected, the only current cure involves a CRISPR gene editing infusion that can cost over \$1 million per person per dose and is hard to come by, so only the wealthy and well-connected can get it. At first, people had to travel to the Massachusetts production facility for security purposes, but there are now single distribution centers in large cities, though these are the focus of civil unrest. In the U.S., many have called for Medicare to cover the cost, especially for first responders, who have been threatening a strike over their lack of access. Instead, the government has decided to devote funds to a Manhattan Project-like endeavor that will use artificial intelligence and quantum computing to develop an alternative antidote.

Geopolitics

In the face of the viral menace, the U.S. and its partners initially bickered over who was responsible for the lab leak in the first place. The government, however, eventually responded to mounting public outcry by partially nationalizing the artificial intelligence and quantum computing industries.

Increasing regulations over the previous decade had yielded a near monopoly over resources and algorithms. Furthermore, U.S. competitors and adversaries are wary of this becoming the beginning of an arms race dynamic after the cure if the industry was not privatized and deregulated. The UN General Assembly unsuccessfully lobbied for promises from America and its partners to share the source code so that they could at least attempt the search for themselves. Many countries who had

contributed talented engineers, however, are now nervous they will not be prioritized in the rollout of a possible antidote or will have to pay exorbitantly for access.

The rest of the world is even more inequitable and less well off. Asian economies have struggled to maintain their growth due to an aging working population, decimating what was once a burgeoning middle class. With their society walled off because of a series of novel disease outbreaks, the top tech talent from foreign nations that cannot immigrate to America, or its allies, is pursued by pariah states and transnational criminal organizations. These groups now have footprints across the globe, relentlessly attacking Western infrastructure.

Some ex-government cybersecurity experts have gone rogue and banded together as the Copland Group, going on the offensive to defend “the common man,” with much public fanfare, leaving DHS components to respond to the most novel threats. Threatened physical infrastructure disruption, ranging from shutting dynamic access toll roads in the NY/NJ/CT tri-state area during the Thanksgiving travel period to preventing the orderly shutdown of Gulf Coast chemical plants prior to hurricanes, without paying ransom is not unusual. A recent investigative report uncovered that half of Fortune 500 companies had paid north of \$1 billion in ransom each over the past five years. These companies are currently suing the federal government to access pre-disaster mitigation funds to reimburse the cost of their operations, having commissioned a study suggesting that prevented loss of life and continuity of operations has a benefit-cost ratio of 9:1, outstripping the effectiveness of deploying strategies against natural hazards traditionally in FEMA’s remit such as coastal and riverine flooding.

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Population data is derived from:

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- Riahi, K. et al., 2017: The Shared Socioeconomic Pathways and their energy, land use, and greenhouse gas emissions implications: An overview. *Global Environmental Change*, **42**, 153-168, doi:<https://doi.org/10.1016/j.gloenvcha.2016.05.009>.

GDP data is derived from:

- Hewitt, R. J., R. Cremades, D. V. Kovalevsky and K. Hasselmann, 2021: Beyond shared socioeconomic pathways (SSPs) and representative concentration pathways (RCPs): climate policy implementation scenarios for Europe, the US and China. *Climate Policy*, **21**(4), 434-454, doi:[10.1080/14693062.2020.1852068](https://doi.org/10.1080/14693062.2020.1852068).
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Climate Indicators:

- Disaster Declarations are extrapolated from historical data, excluding outlier years of 2011 and 2020, with adjustments to maintain consistency with underlying scenario. Data available at <https://www.fema.gov/openfema-data-page/fema-web-disaster-declarations-v1>.
- Disaster Losses are extrapolated from historical billion-dollar disaster time series, excluding outlier years of 2005 and 2017. Data available at <https://www.ncei.noaa.gov/access/billions/time-series>.
- Exposure to Coastal Flooding metrics are based on Hauer, M.E., Hardy, D., Kulp, S.A. et al. Assessing population exposure to coastal flooding due to sea level rise. *Nat Commun* **12**, 6900 (2021). <https://doi.org/10.1038/s41467-021-27260-1>.
- Heat Index metrics are based on Dahl, K., Licker, R., Abatzoglou, J.T. and Delet-Barreto, J., 2019. Increased frequency of and population exposure to extreme heat index days in the United States during the 21st century. *Environmental Research Communications*, **1**(7), p.075002. <https://iopscience.iop.org/article/10.1088/2515-7620/ab27cf>.

- Wildfire Acres Burned metrics are based on Abatzoglou, J.T., Battisti, D.S., Williams, A.P. et al. Projected increases in western US forest fire despite growing fuel constraints. *Commun Earth Environ* 2, 227 (2021). <https://doi.org/10.1038/s43247-021-00299-0>
<https://www.nature.com/articles/s43247-021-00299-0#citeas>.

Scenario Narrative:

- For more information on the West Antarctic Ice Sheet and implications of its melting, see: <https://www.nature.com/articles/s41558-023-01818-x>.
- For more information on billion-dollar disasters, see: <https://www.washingtonpost.com/climate-environment/2019/10/29/scientists-triple-their-estimates-number-people-threatened-by-rising-seas/> or <https://www.nature.com/articles/s41467-019-12808-z>.
- For more information on Atlantic basin tropical cyclones and their implications for sea level rise, see: <https://www.nature.com/articles/s41467-022-34321-6>.