CLIMATE PILE-UP: Global Warming's Compounding Dangers

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Climate Central

CLIMATE CENTRAL

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Recent research shows that unchecked warming pollution could bring concurrent climate crises to U.S. cities by midcentury — and that emissions cuts could reduce the danger

Scientists tend to study the risks of climate change separately. Some papers consider how higher temperatures contribute to drought. Others assess the connection between warming and wildfires. Still others look at the links between carbon emissions and flooding, heat waves, or ocean acidification. In the vast library of climate science, these subtopics might occupy separate shelves, each adding its part to humanity's understanding of the consequences of climate change.

In reality, climate change's risks have more in common with an overturned bookcase than with a tidy library. The various effects of global warming can and increasingly do materialize in particular places almost simultaneously, in messy jumbles. Last year, for instance, Florida experienced severe drought, record high temperatures, wildfires, and the strongest hurricane ever recorded in the Panhandle. California, meanwhile, saw record-setting wildfires and extreme heat waves. As such hazards accumulate and intensify, each can become harder to manage, as our ability to respond becomes more strained.

There are a few ways that climate change can produce compounding threats. Greenhouse gas emissions increase atmospheric temperature, in turn boosting the capacity of the air to hold moisture. Combined with the heat, that enhances the evaporation of water from soil. In drier areas, these processes can result in drought, boost heat waves, and ripen the conditions for wildfires. In places that are commonly wet, on the other hand, heightened water evaporation results in excess rain — which can fall on saturated soil and lead to floods. In the oceans, meanwhile, warmer water evaporates faster, potentially increasing wind speeds and boosting the downpours released by hurricanes, whose surges can be aggravated by sea level rise.

Recent research makes it possible to understand how the risks of climate change may compound in the years ahead. A group of researchers, led by Camilo Mora of the University of Hawaiʻi at Mānoa, has assessed how a broad set of major climate hazards — from heat waves and floods to storms and wildfires — will pile up around the world over the coming decades, with profound consequences for human society. Their findings, published in late 2018 in *Nature Climate Change*, provide insights into the increasing risks communities face today and reveal the extent of the danger that locations across the country can expect to confront in the years ahead.

Based on those findings, Climate Central has assessed how climate-change hazards are projected to pile up at 244 locations across the United States. The results show that unabated emissions could put parts of the country at risk of nearly three major climate hazards by 2050. (Climate scientists refer to this unchecked emissions trajectory as Representative Concentration Pathway, or RCP, 8.5.) In some locations, the hazards of unabated warming pollution will be three times higher than those that would occur under moderate emissions cuts (RCP 4.5), roughly in line with the 2015 Paris agreement. In the longer term, the difference would be far larger if still deeper emissions cuts were made, under the scenario known as RCP 2.6.

For some American communities, humanity's choice between reducing emissions and letting them grow unchecked could represent the difference between manageable damage and unmanageable devastation.

WHAT WARMING HAS WROUGHT

Many Americans associate global warming with a handful of changes: higher temperatures, rising seas, and erratic weather. In fact, climate change will deliver a far broader range of threats.

Just how broad? To answer that question, there is a partial guide: the recent past. Since the beginning of the industrial era in the late nineteenth century, global average temperatures have risen by more than 1°C, or 1.8°F. The scientific literature documents this warming's many effects, in areas from agricultural productivity and disease transmission to infrastructure damage and economic loss.

Climate change damages human society when natural hazards linked to greenhouse gas emissions, such as sea level rise, affect human systems, such as coastal-area infrastructure. An enormous number of such interactions is possible. Climate-linked changes in precipitation, for instance, can have a broad variety of impacts, including on agricultural productivity, water quality, and tourism revenues.

Mora and his colleagues found evidence of 467 distinct climate impacts. They did so by creating a table: ten climate-linked hazards served as columns, and six aspects of human life, divided into 89 subcategories, served as rows. The result was 890 possible climate impacts, or intersections between climate hazards and human systems. A review of nearly 3,300 scientific papers showed that 467 of those impacts have already occured. (A list of those impacts and the supporting evidence appear at impactsofclimatechange.info.)

Climate hazards
1. **Natural land cover change**, or changes in vegetative cover
2. **Drought**, or deficiencies in soil moisture
3. **Fire**
4. **Flood**
5**. Heat waves**
6. **Ocean chemistry**, or changes in water temperature, oxygen levels, and acidity
7. **Precipitation**
8. **Sea level**
9. **Storms**
10. **Warming**, or increases in average temperature

Human systems
1. **Health**
2. **Food**
3. **Water**
4. **Infrastructure**
5. **Economy**
6. **Security**

Note: Changes in natural land cover were included because of their connections to carbon sinks and sources, which affect other hazards assessed.
Source: Mora et al. 2018.

Start with **health**. Mora's team found evidence of deaths as a result of hyperthermia during heat waves, asphyxiation during wildfires, injuries during storms, and drowning during floods. Other studies documented respiratory problems delivered by dust during droughts, mold in the wake of storms, and pollen from longer flowering periods. And the researchers found that climate change had eased the conditions for the spread of diseases, including cholera, encephalitis, and malaria. In the United States, wildfire smoke leads to billions of dollars in healthcare costs every year, according to researchers at the Environmental Protection Agency.

Second, consider **food** and **water**. The researchers found that temperature shifts experienced to date have contributed to disruptions in crop, livestock, and fisheries supplies. In 2003, when Europe was struck by a historic heat wave, about a third of the continent's crops were lost. Three years earlier, more than three quarters of Kenya's livestock died as a result of drought. In America's Great Plains, years with strong heat waves tended to bring several thousand additional cattle deaths. Warming has contributed to drinking water shortages by encouraging drought and glacial retreat — and the quality of drinking water has been affected by heavy precipitation, hurricanes, and wildfires. In 2015, a group of scholars led by A. Park Williams of Columbia University found that climate change had worsened the California drought that began in 2011 by somewhere between 15 and 20 percent.

As for **infrastructure**, Mora and his colleagues reviewed numerous cases in which roads, railways, electrical grids, housing, and airports were damaged by weather and climate disasters. In 2003, a heat wave, which increased demand for electricity, left some 50 million people without power in Canada and the northeastern United States; Hurricane Sandy stripped some eight million Americans of power. Last year's Camp Fire in Northern California destroyed nearly 19,000 buildings, according to the California Department of Forestry and Fire Protection.

Those infrastructure losses often fed into broader **economic damages**. But the researchers found that the sources of economic damage were far broader than infrastructure. In 2015 alone, drought cost California's agriculture sector $1.8 billion. 1992's Hurricane Andrew pushed twelve insurance firms into insolvency — and more recently, subsequent to Mora's analysis, Pacific Gas & Electric declared bankruptcy in the wake of the Camp Fire. Heat waves raised the costs of healthcare and reduced labor productivity. In the United States, the number of weather and climate disasters causing at least a billion dollars in damages has trended upward in recent years: 2018 recorded 14 such billion-dollar events, according to the National Oceanic and Atmospheric Administration.

Finally, hazards that have been broadly linked to climate change affected people's **security**, forcing some to abandon their communities and, in some parts of the world, encouraging conflict over diminishing resources. In the United States, Hurricane Harvey contributed to an uptick in homelessness after years of decline, according to the Houston Chronicle. There is also evidence that some U.S. heat waves, which have generally become more intense as the climate has warmed, temporarily increased rates of rape and theft, according to research reviewed by the University of Hawaii-led team.

Flooding in Houston, Texas, caused by Hurricane Harvey, 2017.
Texas Military Department / Flickr

These dangers are not drawn from a vision of a darker future. Each of these impacts has already arrived. The natural hazards that produce these dangers — from rising seas and extreme precipitation to wildfire risk and stronger heat waves — are for the most part worsening, as humanity continually pours more heat-trapping gases into the atmosphere.

The warming of 1°C (1.8°F) that humanity has caused since the start of the industrial era represents just a fraction of the 3°C to 5°C (5.4°F to 9°F) of warming that the world can expect this century on its current emissions trajectory. In 2018, humans likely emitted more greenhouse gases than in any other year in history. Without deep cuts to warming emissions, the future will be significantly hotter, and more dangerous.

Paradise, California, after the Camp Fire, 2018.
California National Guard / Flickr

CARBON CHOICES, CLIMATE COSTS

The extent of the danger is a question in which all Americans have a stake. At issue is not just the development of individual dangers but how these hazards will pile on top of one another, stressing communities' abilities to respond and cope.

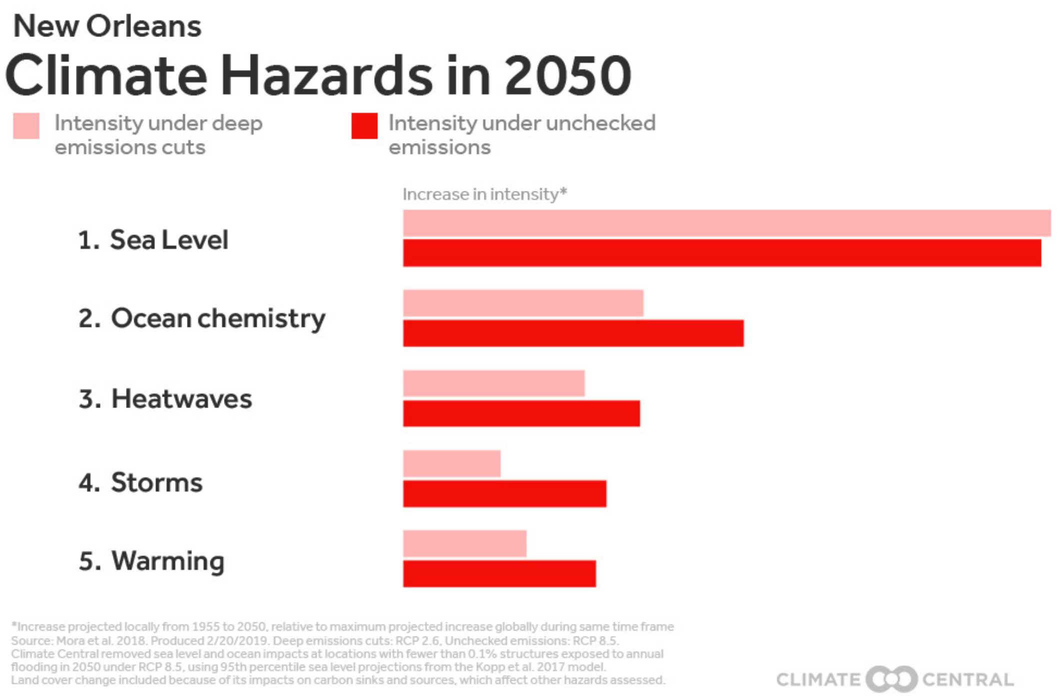
To understand the power of simultaneous climate hazards, consider the case of sea-level rise and coastal storms. Each of these hazards, on its own, can damage coastal infrastructure and disrupt daily life. Put together, their effects are more dangerous. Storm surges ride on the back of higher sea levels to reach farther inland — and cause more damage. Or consider how rising waters could eliminate parts of a municipality's tax base by inundating coastal property and forcing out-migration, which could shrink public resources and make it harder for local authorities to spend money on disaster response.

The combination of coastal storms and stronger agricultural drought provides another example. Together, those developments could reduce farmers' yields while damaging the supply-chain infrastructure on which their exports depend. It's possible to conceive of grimmer scenarios, in which heat waves, storms, and sea-level rise — or some other combination of dangers — become strong enough to paralyze communities.

One way to assess the extent of future climate pile-ups is to add together each of the 10 hazards identified by Mora and his colleagues above, plus freshwater scarcity — a human-centered hazard that can rise or fall in tandem with climate-linked changes. To measure each of these 11 hazards on a uniform, summable scale, the researchers created standardized index numbers for each of them, scoring their severities on a gradient from -1 to 1. In this system, 1 represents the worst possible increase in a hazard's intensity in a given year relative to 1955 levels, under unabated warming emissions. A score of .5 represents a rise half as bad as a score of 1 in a given year, and a score of zero represents no change. Negative scores represent decreases in the severity of climate hazards: droughts, for instance, may become less intense in some locations over time, due to more rain and snow in those locations. (These scores refer to the projected strengths of particular hazards in a given year, rather than their likelihood of occurring. A hazard with a score of 1, called a "major hazard," does not refer to a discrete event in a particular year — such as a single, intense heat wave — but to the intensity of a particular climate danger over the course of the year in question.)

Adding up the index numbers for all 11 hazards produced a cumulative score for each location. That score represents the number of major hazards that a location could expect in a particular year. A score of 2, for instance, indicates that a place could experience two major concurrent hazards, or the equivalent. Such a score could theoretically represent the sum of two single hazards, each with a score of 1. Most commonly, however, cumulative scores represent a combination of smaller index numbers across a broader range of hazards.

By 2050, if emissions grow unchecked, the worst-affected locations will all lie on the Gulf Coast, a low-elevation coastal region on the front lines of sea-level rise (see table 1). New Orleans, Louisiana, holds the unenviable top spot in the rankings: it is projected to face just over 2.75 concurrent major hazards by midcentury. Steep reductions in emissions would reduce the projected danger. Without serious emissions cuts, Biloxi, Mississippi and Lafayette, Louisiana would experience a roughly equivalent number of hazards by midcentury. All of those locations score highly for sea-level rise, but changes in ocean chemistry, storm intensity, and heat waves will also pose significant challenges.



Projections indicate that 21 of 244 locations, or 9 percent, will be threatened with at least two major and concurrent climate-change hazards by 2050, on an ongoing basis, including the big cities of Jacksonville, Miami, and Washington, DC. 61 locations, or 25 percent, could feel the equivalent of 1.5 major hazards in 2050. And 201 locations, or 82 percent, are expected to face the equivalent of at least one such hazard by midcentury, if emissions grow unabated.

Those dangers are not set in stone: whether they materialize depends on the choices that the world makes around greenhouse gas pollution.

Moderate emissions cuts, roughly in line with the 2015 Paris climate agreement, would make a major difference for many locations. The growing threat to Huntsville, Alabama, for instance, would shrink from the equivalent of 1.54 to roughly .69 severe hazards by 2050. At four locations — Parkersburg, West Virginia; and Zanesville, Canton, and Cleveland, Ohio — the level of damage expected under unchecked pollution by midcentury is more than three times higher than that projected under moderate emissions cuts.

Table 1: Locations with highest-intensity hazards by 2050

Location	Cumulative hazard intensity, unchecked emissions	Cumulative hazard intensity, moderate emissions cuts	Reduction in intensity, unchecked emissions vs. moderate emissions cuts
1. New Orleans, LA	2.76	2.19	0.57
2. Corpus Christi, TX	2.75	1.89	0.86
3. Biloxi, MS	2.75	2.02	0.73
4. Lafayette, LA	2.74	2.19	0.55
5. Lake Charles, LA	2.74	2.13	0.61
6. Mobile, AL	2.57	1.78	0.79
7. Pensacola, FL	2.57	1.78	0.79
8. Sarasota, FL	2.43	1.80	0.63
9. Tampa, FL	2.43	1.80	0.63
10. Beaumont, TX	2.41	1.94	0.47
11. Ft Myers, FL	2.41	1.68	0.73
12. Panama City, FL	2.38	1.57	0.81
13. Miami, FL	2.37	1.67	0.70
14. West Palm Beach, FL	2.37	1.67	0.70
15. Juneau, AK	2.25	1.69	0.56
16. Washington, D.C.	2.23	1.49	0.74
17. Richmond, VA	2.23	1.49	0.74
18. Jacksonville, FL	2.22	1.58	0.64
19. Savannah, GA	2.21	1.50	0.71
20. Portland, ME	2.21	1.42	0.79

Among 244 U.S. locations assessed by Climate Central. Locations with greatest reductions in hazard intensity via moderate emissions cuts are highlighted. Source: Mora et al. 2018.

By 2095 — well within the lifetimes of children born today — the differences in outcomes across emissions scenarios would become profound. By that time, 18 of the 244 U.S. locations assessed, or roughly 7 percent, are projected to face the equivalent of at least 4 extreme and concurrent climate hazards, should warming pollution grow unabated. 64 locations, or 26 percent, could face the equivalent of at least 3 crises. Mobile, Alabama and Pensacola, Florida are projected to face the equivalent of roughly 4.5.

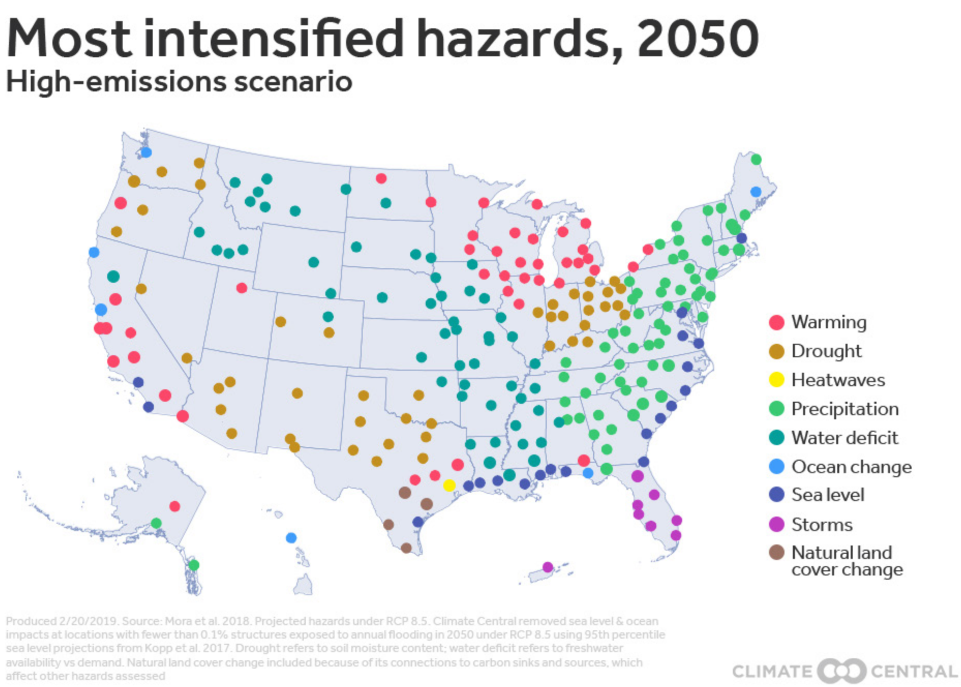
Such changes stand in stark contrast to the smaller changes projected under deep emissions cuts. (Such an outcome would require that emissions peak around 2020, that they fall to zero around 2070, and that humanity removes carbon dioxide from the atmosphere in the years that follow.) In Detroit and Flint, Michigan, the level of damage projected under unabated emissions is nearly five times higher than that expected under deep cuts to warming pollution at the end of the century. In Anchorage, Alaska, high emissions would worsen the damage nearly 17-fold relative to deep cuts to warming pollution.

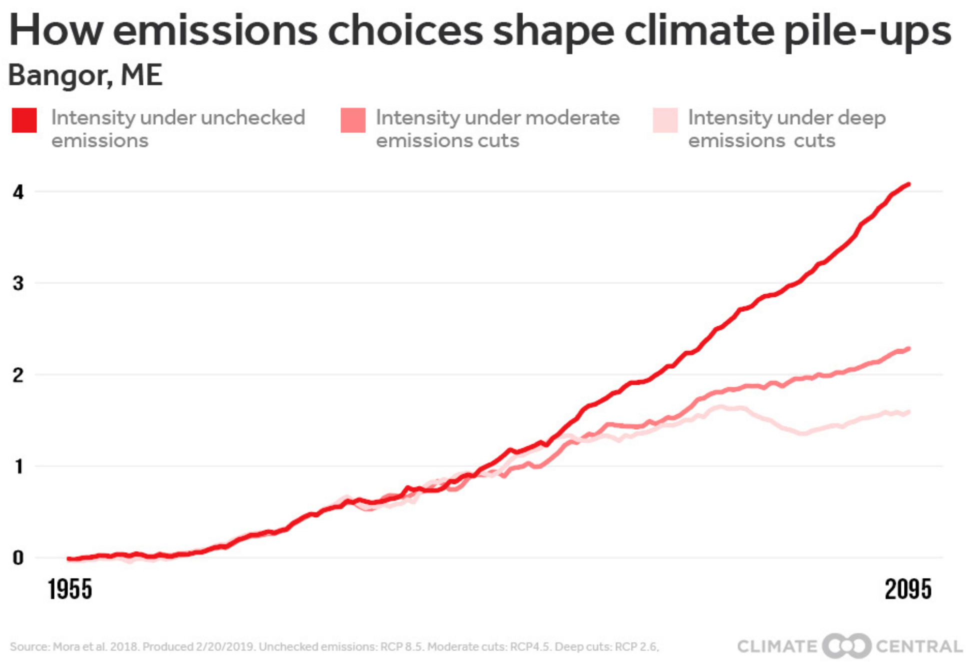
WHICH FUTURE?

The dangers of unchecked emissions are not evenly distributed (see map). Sea-level rise, for instance, will have the greatest effects along the U.S. Southeast and Gulf Coasts, both of which are relatively low-elevation coastal regions. Communities in those regions could face more than land loss thanks to this hazard: sea-level rise can also damage water quality, impede urban drainage, and empower storm surges and tidal flooding.

As for changes in precipitation, they are expected to be most intense in the Northeast — a region where overabundant moisture has already damaged crops, according to the U.S. Global Change Research Program. In the decades ahead, heavy rain could cancel out the benefits of earlier springs for that region's farmers, soaking the soil and delaying planting times.

Drought is projected to be particularly strong in the Southwest. Today, climate change is worsening the ongoing drought in the Colorado River Basin — the most intense drought in the area's recorded history. Further warming will increase the risk of droughts lasting a decade or more in that region. (For rankings of where each hazard will be strongest, see Appendix.)





Even though it is felt locally, climate change is a global issue. Just as American communities face its dangers, so will others around the world. Unless humanity cuts warming emissions, some areas — as in coastal Central America — will face the equivalent of six extreme and concurrent hazards by the end of the century.

Such profound dangers may appear to lie far from the United States' borders. But their aftershocks will come close to home. Climate impacts in one area can have worldwide consequences. Heat-driven agricultural losses, for instance, can shape global food prices. Sea-level rise, drought, and other hazards can prompt international migration. Indeed, such effects have already materialized — and with more warming pollution, they could worsen. At stake in humanity's emissions choices is not just the possibility of a climate pile-up in the United States, but of simultaneous devastation around the world.

METHODOLOGY

Standardized index values for all hazards were extracted by members of the original research team for 244 weather stations based on latitudes and longitudes. The data cover 1955 to 2095 under three RCP scenarios (RCP 2.6, RCP 4.5, and RCP 8.5). Detailed information on the methodology can be found in Mora et al. 2018. Sea level and ocean chemistry variables were extrapolated to the nearest 1.5 degree coastal grid, which resulted in unexpected projections at some inland stations. Climate Central removed sea level and ocean impacts at locations with fewer than 0.1% structures exposed to annual flooding in 2050 under RCP 8.5, using 95th percentile sea level projections from the Kopp et al. 2017 model.

APPENDIX

Table 1: Sea level hazard intensity, 2050, selected locations

Location	Intensity, unchecked emissions	Intensity, moderate emissions cuts	Reduction in intensity, unchecked emissions vs. moderate emissions cuts
1. New Orleans, LA	1	1	0
2. Lafayette, LA	1	1	0
3. Lake Charles, LA	0.972	0.937	0.0345
4. Biloxi, MS	0.923	0.890	0.033
5. Beaumont, TX	0.743	0.709	0.034
6. Mobile, AL	0.673	0.641	0.032
7. Pensacola, FL	0.673	0.641	0.032
8. Corpus Christi, TX	0.672	0.636	0.036
9. Washington, D.C.	0.605	0.575	0.03
10. Richmond, VA	0.605	0.575	0.03

Note: Data represent projected changes in hazard intensity in 2050 relative to 1955 levels. Locations with zero scores may still experience the hazard assessed. Locations with greatest reductions in hazard intensity via moderate emissions cuts are highlighted. Source: Mora et al. 2018.

Table 2: Precipitation hazard intensity, 2050, selected locations

Location	Intensity, unchecked emissions	Intensity, moderate emissions cuts	Reduction in intensity, unchecked emissions vs. moderate emissions cuts
1. Juneau, AK	0.676	0.327	0.349
2. Presque Isle, ME	0.635	0.519	0.116
3. Anchorage, AK	0.628	0.532	0.096
4. Burlington, VT	0.571	0.417	0.154
5. St. Johnsbury, VT	0.571	0.417	0.154
6. Albany, NY	0.562	0.384	0.178
7. Portland, ME	0.545	0.429	0.116
8. Newark, NJ	0.529	0.376	0.153
9. New York City	0.529	0.376	0.153
10. Hartford, CT	0.515	0.398	0.117

Note: Data represent projected changes in hazard intensity in 2050 relative to 1955 levels. Locations with zero scores may still experience the hazard assessed. Locations with greatest reductions in hazard intensity via moderate emissions cuts are highlighted. Source: Mora et al. 2018.

Table 3: Natural land use change hazard intensity, 2050, selected locations

Location	Intensity, unchecked emissions	Intensity, moderate emissions cuts	Reduction in intensity, unchecked emissions vs. moderate emissions cuts
1. Laredo, TX	0.645	0.279	0.366
2. McAllen, TX	0.634	0.24	0.394
3. Corpus Christi, TX	0.55	0.223	0.327
4. San Antonio, TX	0.416	0.171	0.244
5. San Angelo, TX	0.318	0.179	0.139
6. Victoria, TX	0.312	0.084	0.228
7. Austin, TX	0.281	0.12	0.162
8. Bryan, TX	0.222	0.02	0.202
9. Houston, TX	0.209	-0.004	0.212
10. Tucson, AZ	0.203	0.16	0.043

Note: Data represent projected changes in hazard intensity in 2050 relative to 1955 levels. Locations with zero scores may still experience the hazard assessed. Locations with greatest reductions in hazard intensity via moderate emissions cuts are highlighted. Source: Mora et al. 2018.

Table 4: Freshwater hazard intensity, selected locations, 2050

Location	Intensity, unchecked emissions	Intensity, moderate emissions cuts	Reduction in intensity, unchecked emissions vs. moderate emissions cuts
1. Mitchell, SD	0.613	0.466	0.146
2. Rapid City, SD	0.593	0.475	0.117
3. Billings, MT	0.588	0.463	0.125
4. Bozeman, MT	0.587	0.451	0.136
5. North Platte, NE	0.538	0.437	0.101
6. Lincoln, NE	0.536	0.409	0.126
7. Sioux City, IA	0.534	0.403	0.132
8. Butte, MT	0.534	0.413	0.121
9. Sioux Falls, SD	0.532	0.396	0.137
10. Great Falls, MT	0.523	0.395	0.128

Note: Data represent projected changes in hazard intensity in 2050 relative to 1955 levels. Locations with zero scores may still experience the hazard assessed. Locations with greatest reductions in hazard intensity via moderate emissions cuts are highlighted. Source: Mora et al. 2018.

Table 5: Ocean Chemistry hazard intensity, selected locations, 2050

Location	Intensity, unchecked emissions	Intensity, moderate emissions cuts	Reduction in intensity, unchecked emissions vs. moderate emissions cuts
1. Anchorage, AK	0.596	0.518	0.079
2. Juneau, AK	0.518	0.454	0.064
3. Bangor, ME	0.488	0.389	0.099
4. Portland, ME	0.485	0.398	0.088
5. Panama City, FL	0.463	0.394	0.068
6. Boston, MA	0.459	0.391	0.069
7. Sarasota, FL	0.450	0.365	0.084
8. Tampa, FL	0.450	0.365	0.084
9. Mobile, AL	0.443	0.379	0.064
10. Pensacola, FL	0.443	0.379	0.064

Note: Data represent projected changes in hazard intensity in 2050 relative to 1955 levels. Locations with zero scores may still experience the hazard assessed. Locations with greatest reductions in hazard intensity via moderate emissions cuts are highlighted. Source: Mora et al. 2018.

Table 6: Storm hazard intensity, selected locations, 2050

Location	Intensity, unchecked emissions	Intensity, moderate emissions cuts	Reduction in intensity, unchecked emissions vs. moderate emissions cuts
1. Miami, FL	0.54	0.254	0.287
2. West Palm Beach, FL	0.54	0.254	0.287
3. Ft Myers, FL	0.518	0.221	0.297
4. Orlando, FL	0.506	0.234	0.272
5. Sarasota, FL	0.488	0.218	0.269
6. Tampa, FL	0.488	0.218	0.269
7. San Juan	0.396	0.238	0.159
8. Gainesville	0.378	0.18	0.197
9. Wilmington, NC	0.263	0.244	0.019
10. New Orleans, LA	0.253	0.131	0.123

Note: Data represent projected changes in hazard intensity in 2050 relative to 1955 levels. Locations with zero scores may still experience the hazard assessed. Locations with greatest reductions in hazard intensity via moderate emissions cuts are highlighted. Source: Mora et al. 2018.

Table 7: Warming hazard intensity, selected locations, 2050

Location	Intensity, unchecked emissions	Intensity, moderate emissions cuts	Reduction in intensity, unchecked emissions vs. moderate emissions cuts
1. Fairbanks, AK	0.485	0.315	0.170
2. Anchorage, AK	0.399	0.392	0.007
3. Salt Lake City, UT	0.389	0.319	0.070
4. Minot, ND	0.384	0.304	0.081
5. Fargo, ND	0.384	0.320	0.064
6. Duluth, MN	0.383	0.297	0.086
7. Sioux Falls, SD	0.381	0.307	0.074
8. Alpena, MI	0.379	0.302	0.077
9. Marquette, WI	0.379	0.297	0.081
10 Presque Isle, ME	0.378	0.292	0.086

Note: Data represent projected changes in hazard intensity in 2050 relative to 1955 levels. Locations with zero scores may still experience the hazard assessed. Locations with greatest reductions in hazard intensity via moderate emissions cuts are highlighted. Source: Mora et al. 2018.

Table 8: Drought hazard intensity, selected locations, 2050

Location	Intensity, unchecked emissions	Intensity, moderate emissions cuts	Reduction in intensity, unchecked emissions vs. moderate emissions cuts
1. Boise, ID	0.441	0.335	0.106
2. Spokane, WA	0.438	0.322	0.116
3. Lewiston, ID	0.437	0.324	0.113
4. Wichita, KS	0.425	0.447	-0.022
5. Twin Falls, ID	0.416	0.328	0.088
6. Colorado Springs, CO	0.416	0.286	0.13
7. Yakima, WA	0.411	0.297	0.114
8. El Paso, TX	0.411	0.303	0.108
9. Albuquerque, NM	0.410	0.304	0.106
10. Denver, CO	0.403	0.286	0.117

Note: Data represent projected changes in hazard intensity in 2050 relative to 1955 levels. Locations with zero scores may still experience the hazard assessed. Locations with greatest reductions in hazard intensity via moderate emissions cuts are highlighted. Source: Mora et al. 2018.

Table 9: Heat-wave intensity, selected locations, 2050

Location	Intensity, unchecked emissions	Intensity, moderate emissions cuts	Reduction in intensity, unchecked emissions vs. moderate emissions cuts
1. Miami, FL	0.370	0.325	0.045
2. West Palm Beach, FL	0.370	0.325	0.045
3. Ft. Myers, FL	0.349	0.299	0.05
4. San Juan	0.347	0.218	0.129
5. Orlando, FL	0.309	0.263	0.046
6. New Orleans, LA	0.295	0.258	0.037
7. Sarasota, FL	0.293	0.261	0.032
8. Tampa, FL	0.293	0.261	0.032
9. Gainesville, FL	0.276	0.232	0.044
10. Victoria, TX	0.272	0.239	0.033

Note: Data represent projected changes in hazard intensity in 2050 relative to 1955 levels. Locations with zero scores may still experience the hazard assessed. Locations with greatest reductions in hazard intensity via moderate emissions cuts are highlighted. Source: Mora et al. 2018.

Table 10: Fire hazard intensity, selected locations, 2050

Location	Intensity, unchecked emissions	Intensity, moderate emissions cuts	Reduction in intensity, unchecked emissions vs. moderate emissions cuts
1. Laredo, TX	0.090	0.061	0.029
2. Las Vegas, NV	0.078	0.080	-0.002
3. Tucson, AZ	0.069	0.070	-0.001
4. Yuma, AZ	0.068	0.072	-0.004
5. Corpus Christi, TX	0.061	0.038	0.023
6. Twin Falls, ID	0.061	0.052	0.009
7. San Diego, CA	0.061	0.038	0.023
8. Phoenix, AZ	0.054	0.053	0.001
9. Prescott, AZ	0.054	0.053	0.001
10. Flagstaff, AZ	0.052	0.054	-0.002

Note: Data represent projected changes in hazard intensity in 2050 relative to 1955 levels. Locations with zero scores may still experience the hazard assessed. Locations with greatest reductions in hazard intensity via moderate emissions cuts are highlighted. Source: Mora et al. 2018.

Table 11: Flood hazard intensity, selected locations, 2050

Location	Intensity, unchecked emissions	Intensity, moderate emissions cuts	Reduction in intensity, unchecked emissions vs. moderate emissions cuts
1. Palm Springs, CA	0	0	0
2. San Diego, CA	0	0	0
3. Los Angeles, CA	0	0	0
4. Yuma, AZ	0	0	0
5. Bakersfield, CA	0	0	0
6. Santa Maria, CA	0	0	0
7. Fresno, CA	0	0	0
8. Las Vegas, NV	0	0	0
9. Phoenix, AZ	0	0	0
10. Prescott, AZ	0	0	0

Note: Data represent projected changes in hazard intensity in 2050 relative to 1955 levels. Locations with zero scores may still experience the hazard assessed. Zero values represent rounding to the thousandth decimal point. Source: Mora et al. 2018.