Why you should sweat climate change

Wendy Koch, USA TODAY

More American children are getting asthma and allergies, and more seniors are suffering heat strokes.

Food and utility prices are rising. Flooding is overrunning bridges, swamping subways and closing airport runways.

People are losing jobs in drought-related factory closings. Cataclysmic storms are wiping out sprawling neighborhoods. Towns are sinking.

This isn't a science-fiction, end-of-the-world scenario. Though more anecdotal than normal — today, at least — these scenes are already playing out somewhere in the United States, and they're expected to get worse in years ahead. In fact, a remaking of America is likely in our lifetimes — a flicker in geological time. This will transform how and where we live, work and play.

Massachusetts' climate will start to look more like North Carolina's, and Illinois will begin to feel like Texas. Montana's Glacier National Park, a glorious site that draws tourists from around the world, will likely lose its glaciers.

Climate change is partly the culprit. Scientific research shows that it's increasing the risk and intensity of heat waves, downpours, drought and wildfires. A key factor: the burning of fossil fuels. With these changes come rising sea levels and acidified oceans. So when Superstorm Sandy struck New York harbor in October, the flooding that killed scores of people, ruined thousands of homes and closed subways as well as airports came amid already rising seas.

As the planet edges this year toward what some scientists say will be the highest concentration of heat-trapping carbon dioxide emissions in at least 800,000 years, USA TODAY reporters will travel the country to explore places where climate change is already affecting lives.

Not all of it is bad news. As with any change, there will be winners and losers, especially at the local level. There will be longer growing seasons, lower heating bills and fewer cold-related deaths. Melting Arctic sea ice is opening the Northwest Passage off Alaska's coast, sought for centuries as a trade route, to tourism, maritime shipping and oil exploration.

Yet on a national level, the losers will probably outnumber the winners, according to a draft report of the third National Climate Assessment released by the U.S. government in January. It cites peer-reviewed research indicating that the rising demand for cooling will outpace the diminished demand for heating, and sweltering summers will contribute to more additional deaths than would be prevented by milder winters. Increased production of fossil fuels near Alaska will further warm the planet.

Americans can adapt to some climate change, and indeed already are, but a continuing rise in global carbon emissions will make adapting increasingly costly and difficult — especially in densely developed coastal areas.

Some potential impacts, such as higher flood insurance premiums for luxury waterfront homes or more bald spots on ski slopes, might seem trivial. Others — lower home values on the coasts, heat-related deaths in the Midwest or the relocation of entire villages in Alaska — not so much.

The effects of this new world are reverberating from coast to coast:

• "Who's going to hire me now?" asks Barbara Roberts,56, who lost her job of 36 years a month ago when a Cargill beef-processing plant in Plainview, Texas, closed its doors. The facility, which employed 2,000 people, was starved of cattle because of the drought. Roberts, who earned $13.70 an hour plus benefits, says she hurt her back after 20 years on the production line, leaving her unable to lift heavy items. The only other large decent-paying employer in town, she says, is Walmart.

• "My house isn't straight anymore. It's tilted," says Jeff Miskill, a general contractor in Norfolk, Va., where rising sea levels have contributed to repeated flooding throughout the city and a shifting of the ground under his home. "You can feel it inside. You feel like you're walking uphill."

Miskill says neighbors aren't worried about the semantics of what's happening, whether climate change or flooding. "Call it what you will," he says, "but we have a water problem."

• "My windows and doors are rotted away," says Stanley Tom, 52, the tribal administrator of Newtok, Alaska, a place where severe flooding is always a risk. The area's infrastructure was built on permafrost — soil saturated with frozen water — that because of higher temperatures, is now melting into mud. Roads and runways have been ruined, and water supplies are contaminated.

All of Newtok's 350 or so residents are being relocated from the eroding coastline to higher ground because, as Tom says, "the village is sinking."

Inside 'the mixed bag'

No doubt, scores of politicians and millions of Americans are skeptics. After all, no single storm, heat wave or wildfire — unlike longer-term patterns — can be linked directly to climate change. These esteemed scientists don't have all the answers, particularly as their projections stretch far into the future. While almost all agree on the broad contours of human-induced climate change, they continue to refine the details as new data and better tracking technology — such as a series of NASA satellites launched in 2000 — become available.

"It's a mixed bag," says Kerry Emanuel, a climate scientist at the Massachusetts Institute of Technology, about the link between extreme weather and climate change. Though Emanuel once doubted the evidence, he now says it's clear the world is warming beyond its natural variability. He notes that there are clearer links to some weather events than others.

Emanuel, author of *What We Know About Climate Change,* says rainfall may have the clearest climate link. He says it now occurs less often, but when it does rain, we're more likely to experience downpours. So wet regions will be wetter, causing flash flooding. Dry ones will get drier, resulting in drought. Heat, of course, is another consequence. So a heat wave that used to occur once every 100 years now happens every five years.

An indicator of that warming is the rising concentration of carbon-dioxide emissions in the atmosphere — now at 396 parts per million, according to January data by the National Oceanic and Atmospheric Administration. It was about 275 parts per million two centuries ago, and some research suggests that it probably hasn't exceeded 400 ppm — likely within the next few years worldwide — in at least 800,000 years. Leading climate scientists, including NASA's James Hansen, warn that concentrations above 350 ppm risk planetary perils, including melting ice sheets and rapidly spreading drought.

The most recent decade was the nation's hottest on record, and 2012 was the hottest single year. The average U.S. temperature has risen 1.5 degrees Fahrenheit since reliable record-keeping began in 1895 — 80% of that has occurred since 1980. The increase might seem small, but scientists warn that a ripple effect can trigger "tipping points," beyond which the planet may not be able to recover.

For example, the warmer the air, the more summer Arctic sea ice is lost. The more sea ice that's lost, the more warming occurs because ice reflects sunlight while water absorbs it. As the atmosphere warms, it holds larger amounts of water vapor, which could help energize everything from hurricanes to snowstorms. And the cycle continues.

Average U.S. temperatures will likely rise at least another 2 to 4 degrees in most places in the next few decades and between 3 to 10 degrees by 2100, depending on the amount of oil, gas and coal we burn, according to the draft of the 2013 National Climate Assessment. The report, written by 240 private and government scientists, is based on hundreds of studies published in science journals.

Higher temperatures mean higher sea levels, too. The reason's simple: As water warms, it expands. While global sea level has risen 8 inches since 1900 and is projected to rise another 1 to 4 feet by 2100, the problem is worse along the U.S. Atlantic Coast. The U.S. Geological Survey has found that its sea level is rising three to four times faster — about 1.5 inches per decade — because of differences in ocean currents, salinity, water temperatures and land movements.

The economic costs of all these changes are enormous — not only for those directly affected but also for the nation's taxpayers, who are stuck with the bills for disaster relief, national flood insurance and drought-related crop losses. In February, f or the first time, the non-partisan General Accountability Office said climate change puts the U.S. government at "high risk " of financial exposure. NOAA says 11 extreme weather and climate events last year alone in the United States cost more than $1 billion each.

Climate change will also strain the U.S. military by triggering unpredictable water, food and energy shortages, according to a 2012 study commissioned by the CIA and done by the National Research Council, a private non-profit group. Emanuel says Defense Department officials worry about the political unrest that climate disruptions could cause, putting the threat in stark terms: "It's right up there with (North) Korea and Iran."

At the heart of it: Water

For Jimmy Strickland, climate issues aren't theoretical. They're business. He owns an accounting firm with a one-story brick office building two blocks from Norfolk's waterfront. During his 35 years in the Hague section of town, three huge storms have struck — all in the past decade. Each time, his building flooded and had to be closed at least two months for repairs that cost his insurance company about $250,000.

"You lose time, and time is money," Strickland says. He's devised precautions. When Sandy came, he and his wife spent a couple of days preparing, installing door dams, moving furniture and putting computers atop desks. They spent 36 hours vacuuming up water as it seeped inside and then ran dehumidifiers.

"It's a nuisance," Strickland says. He has asked the Federal Emergency Management Agency (FEMA) for funding to retrofit his offices to prevent flooding. Yet he wonders whether taxpayers should foot the bill for that.

While Norfolk is second only to New Orleans for sea level rise, partly because its land is naturally sinking, other coastal U.S. cities — Boston; Charleston, S.C.; Miami; New York; Seattle; San Francisco; Tampa — are vulnerable, too.

"It's a harbinger of things to come," says Leonard Berry, a geoscience professor at Florida Atlantic University, of the regular high-tide flooding on Miami's streets. The Army Corps of Engineers expects South Florida's sea level will rise 3 to 7 inches by 2030; the range jumps from 9 to 24 inches by 2060.

As sea levels rise, storm-related flooding — such as occurred after Hurricane Katrina in 2005 — can disrupt oil refineries and pipelines. They can damage rail lines that carry coal to power plants, or runways at 13 of the nation's largest airports, which are located within 12 feet of current sea level, or nuclear power plants in Southern California, according to the National Climate Assessment.

While there's to o much water in some places, there's not enough in others. Drought afflicted as much as 65% of the contiguous states last year and still lingers in more than half of the country. Corn, wheat and soybean crops were decimated, prompting a rise in food prices. Nearly two dozen ethanol plants in 13 states halted production because they lacked a key ingredient: corn.

In Plainview, Texas, Cargill's plant closing took workers by surprise.

"They didn't tell us 'til that day," Roberts says. "It was 10:45 a.m. when the announcement came: 'Everyone off the floor.' " She says they went to the cafeteria for the news. "We didn't go back to the floor. We went home."

"The U.S. cattle herd is at its lowest level since 1952," Cargill Beef's president, John Keating, said in announcing the closure. He said the company delayed it "as long as possible," hoping the drought would break. "Unfortunately," he added, "the drought has not broken."

Roberts, who says she'll collect severance pay until March 19, expects she'll have to tap her 401(k) savings to pay bills. She'd consider going elsewhere to find work, but with so many others laid off, she doesn't know who would buy her home.

Others have suffered from, if not drought, the heat itself.

"It's the silent killer," says Laurence Kalkstein, a University of Miami professor who studies the effect of heat on health. He says if climate change brings hotter — but still variable — weather, more heat-related deaths will likely occur. He says heat can cause fatalities among even the fittest, though he points out that the elderly and those with physical and mental ailments are most vulnerable.

Riley Kimble was found dead in a tiny stifling apartment without air conditioning in Chicago last July on a day when outside temperatures reached 103 degrees. The city's medical examiner said heat stress contributed to his death and that of at least two dozen others. He was 59.

His stepdaughter, Nicole Hughes, who grew up with Kimble and her mother in Chicago but now lives in Tempe, Ariz., says he suffered from schizophrenia. As a young man, before his illness struck, she says, he was a college student and avid reader who helped her with homework. He was the only dad she ever knew.

Ernestine Williams says she's struggling to "keep it together" since her daughter Mary, then 56, died in the same Chicago heat wave. She lives on a widow's pension but has taken in Mary's three young adult children, who she says took the death "real hard. ... No one was prepared for that."

Where are we headed?

Many climate scientists warn of potential catastrophe ahead. Ken Caldeira of the Carnegie Institution for Science has looked at what would happen if people burned all of the fossil fuels available over the next few centuries. He predicts, based on mathematical models, a hotter climate like that of 100 million years ago when dinosaurs roamed the Earth.

Jeffrey Archer, a professor of geophysical sciences at the University of Chicago, says that even if fossil fuel use stops, current high CO_2 levels will linger in the atmosphere for millennia — what he calls "the long tail."

Even so, some of these scientists are technology optimists.

"I'm not at all without hope," Archer told journalists at an MIT climate conference in December. He says geo-engineering, which involves trying to manipulate the Earth's climate, might find a way to suck carbon out of the sky (but, alas, not out of the oceans).

They see a possible new source of cheap, carbon-free energy. While today's solar, wind and nuclear power emit no CO_2, the first two can be costly and intermittent, and the last — embraced by many climate experts such as Emanuel but not environmentalists — lacks public support because of safety concerns.

Almost every day, researchers in some part of the world announce breakthroughs. In February alone, Australia's Monash University discovered a new energy-efficient material that can capture and store CO_2 emissions from coal-fired power plants. The University of Southern California developed a new type of lithium-ion batteries capable of holding three times as much energy.

There are also efforts to adapt to climate change. Norfolk, for example, has elevated some streets and houses. Its City Council is considering other steps, including a requirement that new or renovated homes in flood-prone areas be built at least 2 feet — instead of the current 1 foot — above the community's flood level.

FEMA is updating flood maps, which are used to set insurance requirements and building codes. Its new ones for New York City's Brooklyn, Queens and Staten Island boroughs, prepared before Sandy, have twice as many homes and businesses at high risk for flooding — an additional 35,000 buildings — as did the maps from 1986. Those in flood zones will have to elevate homes or pay higher flood insurance premiums.

In an omen for possibly millions of coastal U.S. residents, New York Gov. Andrew Cuomo has called for many with Sandy-damaged homes to relocate rather than rebuild. He's seeking federal funds to buy about 10,000 homes, at pre-Sandy prices, and return the land to nature.

Public health officials are also taking steps to adapt such as opening cooling centers for vulnerable people like Kimble on sweltering days.

Kim Knowlton, a health professor at Columbia University, says people need to act quickly, adding: "Climate change is not a place and time distant — it's here and now."