## Frameworks

### Structural Violence

#### I value justice.

#### Structural Violence is according to

**Farmer, Connors & Simmons**, 1996, “Women, Poverty, and AIDS: Sex, Drugs, and Structural Violence” Monroe, Maine: Common Courage Press./ Livingston RB

**large scale forces** ranging from gender inequality and racism to poverty **which structure unequal access to goods and services**

#### You should privilege everyday violence for two reasons- A) social bias underrepresents its effects B) its effects are exponential, not linear which means even if it only causes a small amount of structural violence, its terminal impacts are huge

**Nixon ’11** (Rob, Rachel Carson Professor of English, University of Wisconsin-Madison, Slow Violence and the Environmentalism of the Poor, pgs. 2-3)

Three primary concerns animate this book, chief among them my conviction that **we urgently need to rethink**-politically, imaginatively, and theoretically-what I call "slow violence." By slow violence I mean a **violence that occurs gradually and out of sight, a violence of delayed destruction** that is dispersed across time and space, an attritional violence that is typically not viewed as violence at all. Violence is customarily conceived as an event or action that is immediate in time, explosive and spectacular in space, and as erupting into instant sensational visibility. We need, I believe, to engage a different kind of violence, a violence that is neither spectacular nor instantaneous, but rather incremental and accretive, its calamitous repercussions playing out across a range of temporal scales. In so doing, we also need to engage the representational, narrative, and strategic challenges posed by the relative invisibility of slow violence. **Climate change**, the thawing cryosphere, toxic drift, biomagnification, deforestation, the radioactive aftermaths of wars, acidifying oceans, and a host of other slowly unfolding environmental catastrophes present formidable representational obstacles that can hinder our efforts to mobilize and act decisively. The long dyings-the staggered and staggeringly discounted casualties, both human and ecological that result from war's toxic aftermaths or climate change-are underrepresented in strategic planning as well as in human memory. Had Summers advocated invading Africa with weapons of mass destruction, his proposal would have fallen under conventional definitions of violence and been perceived as a military or even an imperial invasion. Advocating invading countries with mass forms of slow-motion toxicity, however, requires rethinking our accepted assumptions of violence to include slow violence. Such a **rethinking requires that we complicate conventional assumptions about violence as a highly visible act that is newsworthy** because it is event focused, time bound, and body bound. **We need to account for how the temporal dispersion of slow violence affects the way we perceive** and respond to **a variety of social afflictions**-from domestic abuse to posttraumatic stress and, in particular, environmental calamities. A major challenge is representational: how to devise arresting stories, images, and symbols adequate to the pervasive but elusive violence of delayed effects. Crucially**, slow violence is** often not justattritional but also **exponential, operating as a major threat multiplier; it can fuel long-term, proliferating conflicts in situations where the conditions for sustaining life become increasingly but gradually degraded.**

#### it’s a prerequisite. Morality must be applied equally to everyone, or else it wouldn’t be moral. Oppression excludes minorities from moral consideration.

#### Winter and Leighton explain:

Deborah DuNann Winter and Dana C. Leighton. Winter "Peace, conflict, and violence: Peace psychology in the 21st century." 1999

Finally, to recognize the operation of structural violence forces us to ask questions about how and why we tolerate it, questions which often have painful answers for the privileged elite who unconsciously support it. A final question of this section is how and why we allow ourselves to be so oblivious to structural violence. Susan Opotow offers an intriguing set of answers, in her article Social Injustice. She argues that **our normal** perceptual/**cognitive processes divide people into in-groups and out-groups**. Those outside our group lie outside our scope of justice. Injustice that would be instantaneously confronted if it occurred to someone we love or know is barely noticed if it occurs to strangers or those who are invisible or irrelevant. We do not seem to be able to open our minds and our hearts to everyone, so we draw conceptual lines between those who are in and out of our moral circle**. Those who fall outside are morally excluded,** and become either invisible, or demeaned in some way **so** that **we** **do not have to acknowledge the injustice they suffer.** **Moral exclusion is a human failing**, but Opotow argues convincingly that it is an outcome of everyday social cognition. To reduce its nefarious effects, we must be vigilant in noticing and listening to oppressed, invisible, outsiders. Inclusionary thinking can be fostered by relationships, communication, and appreciation of diversity. Like Opotow, all the authors in this section point out **that structural violence is not inevitable if we become aware of it**s operation, **and** build systematic ways to **mitigate its effects.** Learning about structural violence may be discouraging, overwhelming, or maddening, but these papers encourage us to step beyond guilt and anger, and begin to think about how to reduce structural violence. All the authors in this section note that the same structures (such as global communication and normal social cognition) which feed structural violence, can also be used to empower citizens to reduce it. In the long run, reducing structural violence by reclaiming neighborhoods, demanding social justice and living wages, providing prenatal care, alleviating sexism, and celebrating local cultures, will be our most surefooted path to building lasting peace.

#### Ethical theories must directly address structural violence first, otherwise they cannot be considered moral

#### 4.Consequences before epistemology.

Christopher A. Bracey 6, Associate Professor of Law, Associate Professor of African & African American Studies, Washington University in St. Louis, September, Southern California Law Review, 79 S. Cal. L. Rev. 1231, p. 1318

Second, reducing conversation on race matters to an ideological contest allows opponents to elide inquiry into whether the results of a particular preference policy are desirable. Policy positions masquerading as principled ideological stances create the impression that a racial policy is not simply a choice among available alternatives, but the embodiment of some higher moral principle. Thus, the "principle" becomes an end in itself, without reference to outcomes. Consider the prevailing view of colorblindness in constitutional discourse. Colorblindness has come to be understood as the embodiment of what is morally just, independent of its actual effect upon the lives of racial minorities. This explains Justice Thomas's belief in the "moral and constitutional equivalence" between Jim Crow laws and race preferences, and his tragic assertion that "Government cannot make us equal [but] can only recognize, respect, and protect us as equal before the law." [281](http://web.lexis-nexis.com/universe/document?_m=cd9713b340d60abd42c2b34c36d8ef95&_docnum=9&wchp=dGLbVzz-zSkVA&_md5=9645fa92f5740655bdc1c9ae7c82b328) For Thomas, there is no meaningful difference between laws designed to entrench racial subordination and those designed to alleviate conditions of oppression. Critics may point out that colorblindness in practice has the effect of entrenching existing racial disparities in health, wealth, and society. But in framing the debate in purely ideological terms, opponents are able to avoid the contentious issue of outcomes and make viability determinations based exclusively on whether racially progressive measures exude fidelity to the ideological principle of colorblindness. Meaningful policy debate is replaced by ideological exchange, which further exacerbates hostilities and deepens the cycle of resentment.

### Contention 1 is a safety net

#### In the status quo, billionaires are looking to space colonization to escape earth

**Tucker 20**, Reed Tucker, 8-8-2020, "Jeff Bezos and Elon Musk’s plans to colonize space are even crazier than we thought," New York Post, https://nypost.com/2020/08/08/billionaires-who-plan-to-colonize-space-live-in-a-dream-world/

Now **the future of space** is largely **in** his and **the hands of** other free-spending, big-dreaming **billionaires** like him, including Amazon’s Jeff Bezos. But what will this future look like? Some answers can be found in the new book “[Star Settlers: The Billionaires, Geniuses, and Crazed Visionaries Out to Conquer the Universe](https://www.amazon.com/Star-Settlers-Billionaires-Geniuses-Visionaries/dp/1643134485/?tag=nypost-20&asc_refurl=https://nypost.com/2020/08/08/billionaires-who-plan-to-colonize-space-live-in-a-dream-world/&asc_source=web)” (Pegasus Books) by Fred Nadis, out now. “I see [guys like Musk] almost like medieval cathedral builders, with this multi-century project that they’re willing to take their time and their livelihood,” Nadis told The Post. That said, the author thinks these billionaires may be dreaming a bit too big. As Matt Damon found in “The Martian,” the red planet’s atmosphere is much thinner than Earth’s and the planet generates no electromagnetic field, meaning it gets pounded by cosmic rays and other harmful-to-humans energy.©20thCentFox/Courtesy Everett C Musk, the founder of Tesla, **has said** that all of his earthly business ventures are just a way to fund **his true passion: colonizing Mars.** His company, SpaceX, is planning to send humans to the red planet in 2024. Within a century, Musk envisions reusable rockets blasting off every two years and ferrying some 200 passengers at a time, ultimately establishing an outpost of a million people. It’s still unclear how they’ll survive. At its closest, Mars is some 35 million miles from Earth, and a trip would take around nine months. Once they get there, the problem explorers will face is that Mars’ atmosphere is much thinner than Earth’s and the planet generates no electromagnetic field, meaning it gets pounded by cosmic rays and other energy harmful to humans. “It’s really challenging,” Nadis says. “Not quite as simple as SpaceX might make it out to be.” Musk has offered sketchy details of what life off-world might look like. Any Mars colony would have to be self-sustaining and not rely on supplies from Earth. Musk has suggested food be grown on hydroponic farms, either underground or in an enclosed structure to protect the crops from radiation, but because Mars’ surface gets about half the sunlight Earth does, whatever plants that can be grown will likely have to be supplemented with artificial lights — and powering those lights will be no small challenge. Musk has said farms will be powered by solar panels, though he’s offered few details. “Really pretty straightforward,” he told Popular Mechanics last year. Princeton physicist Gerard O’Neill imagined space colonies consisting of giant counter-rotating cylinders, simulating gravity.Rick Guidice/NASA In the same interview, the billionaire suggested Mars’ inhabitants might live under a glass dome with an “outdoorsy, fun atmosphere” until the planet is terraformed — artificially transforming the planet to make it more Earth-like, with a livable atmosphere. But that plan also presents a problem: A 2018 NASA-sponsored study concluded that terraforming Mars is impossible, because there is not enough carbon dioxide locked in the soil to release into the air. Musk, however, isn’t daunted. He has suggested exploding 10,000 nuclear missiles over Mars’ surface in order to melt the planet’s ice reserves, thereby releasing the carbon dioxide locked within. His company has even produced “Nuke Mars” T-shirts. Scientists are divided on whether the idea would work. Penn State climate scientist Michael Mann, for example, told US News and World Report in 2015, “There are so many things that could go wrong here, it is difficult to know where to start.” Meanwhile, **Bezos and his company**, Blue Origin**, are also focused on moving off-world** — but **onto space colonies**. **Bezos is worried that the Earth’s resources will be gone in a few hundred years, spurring the need to leave.** Bezos draws much of his inspiration from the work of Gerard O’Neill, a Princeton physicist who in the 1970s laid out a grand design for space colonies.

#### Space colonization if only done by private entities will only be accessible to the extremely wealthy

**Maney 15**, Kevin Maney, Kevin Maney is a best-selling author, award-winning columnist, and musician still waiting for his big break. Maney co-authored, with Al Ramadan, Dave Peterson and Christopher Lochhead, the 2015 book [Play Bigger: How Pirates, Dreamers and Innovators Create and Dominate Markets](http://www.harperbusiness.com/book/9780062407610/Play-Bigger-by-Al-Ramadan-Dave-Peterson-Christopher-Lochhead-and-Kevin-Maney/), published by Harper Business.  Maney’s other books include [The Two-Second Advantage: How We Succeed by Anticipating the Future...Just Enough](http://www.amazon.com/The-Two-Second-Advantage-Anticipating-Future-Just/dp/0307887650), a 2011 New York Times bestseller. He also co-wrote the most widely distributed business book of 2011, [Making the World Work Better:The Ideas That Shaped a Century and a Company](http://www.amazon.com/Making-World-Work-Better-Century/dp/0132755106), which marked IBM’s centennial. His other books are [Trade-Off: Why Some Things Catch On, and Others Don't](http://www.amazon.com/Trade-Off-Some-Things-Catch-Others/dp/0385525958); [The Maverick and His Machine: Thomas Watson Sr. and the Making of IBM](http://www.amazon.com/The-Maverick-His-Machine-Thomas/dp/0471679259); and [Megamedia Shakeout](http://www.amazon.com/Megamedia-Shakeout-Exploding-Communications-Industry/dp/0471107190). Maney has been a contributor to Fortune, The Atlantic, Fast Company and ABC News, among other media outlets. He was a contributing editor at Conde Nast Portfolio during its brief run from 2007 to 2009. For 22 years, Maney was a columnist, editor and reporter at USA Today. He has been a book and writing consultant to numerous CEOs and companies such as Cisco, IBM, IdeaPaint and Qualcomm. He lives in New York. 12-14-2015, "'Star Wars' Class Wars: Is Mars the Escape Hatch for the 1 Percent?," Newsweek, <https://www.newsweek.com/2015/12/25/mars-colonies-rich-people-404681.html> Livingston RB

This is the unspoken flip side of Musk's [SpaceX](http://dcinno.streetwise.co/2015/12/07/spacex-2016-elon-musks-internet-satellites-nasa-missions/) and Bezos's [Blue Origin](https://www.businessinsider.com/about-blue-origins-be-4-engine-2015-12). The space travel companies say they are creating a way for the human species to endure by populating other planets. But **the bottom line is that only the wealthy will have the means to move to Mars**. Musk's target ticket price is $500,000 a person in 2015 dollars, and that's just to get there. Imagine the new outfits you'll have to buy to go with that space helmet. So **you can picture a scenario that's something like the 1970s**[**white flight**](http://www.citylab.com/work/2013/11/mapping-60-years-white-flight-brain-drain-and-american-migration/7449/)**from inner cities, when the wealthier classes moved to freshly built suburbs, leaving the declining neighborhoods to the lower classes.** In fact, **the fleeing upper classes sped up the decrepitude of that era's older cities by relocating their money and clout with them**. Today, we're seeing a similar situation in Syria, as the wealthiest and most educated people [escape](https://www.ibtimes.com/europe-refugee-crisis-facts-wealthy-educated-syrians-risking-lives-leave-war-2089018) to the West, which will make the country even harder to stabilize and rebuild.

#### This means that it allows for the extremely wealthy to have a safety net to turn to if things on earth go bad

**Moran 20**, Michael Moran, 08-02-2020, "Billionaires could leave Earth behind 'for space colony' as 'climate collapses'," Dailystar.co.uk, <https://www.dailystar.co.uk/news/weird-news/billionaires-could-leave-earth-behind-21445413> Livingston RB

But noted American media theorist Douglas Rushkoff has written that **the overall direction of technological development was about creating an escape route for the super-rich**. He pointed out that combat robots would serve very well to guard the bolt-holes of billionaires remaining on Earth **once climate change reached its end-game** and described Elon Musk’s **planned Mars** colony **as “less a continuation of the human diaspora than a lifeboat for the elite.”** They can certainly afford a lifeboat. The world’s richest people have seen their share of the world’s total money supply increase from 42.5% at the height of the 2008 financial crisis to just over 50.% by the end of 2017. That adds up to about or $140trillion (£106tn), according to a report from Credit Suisse.

#### And the ultra-wealthy are the ones exploiting earth in the squo

**Zimmerman 15**, Jess Zimmerman, 9-16-2015, "What if the mega-rich just want rocket ships to escape the Earth they destroy?," Guardian, <https://www.theguardian.com/commentisfree/2015/sep/16/mega-rich-rocket-ships-escape-earth> Livingston RB

Of course, **uber-wealthy** tech entrepreneurs **aren’t just buying rockets for their personal amusement.** They’re founding or investing in space travel – they want to get you off-planet, too. Well, not you-you, but someone like you with much, much, much more money. And that’s where the vogue for billionaire space travel magnates gets a little weird –and maybe even sinister. It’s already very true that **money expands your world**; the person with the funds to have a car is less restricted in her movements than the person without one, and the person with a huge plane and the money to fly it is less restricted still. The expansion of rich people’s travel horizons comes at a price for everyone, both rich and poor. With the exception of America’s weirdly-expensive Amtrak system, cost and luxury scale with fossil fuel consumption; travel that costs more and feels more indulgent is also travel that has a cataclysmic effect on the environment. The faster and further you can afford to travel, the greater your environmental footprint. And often, the people less able to travel are the ones left holding the toxic-chemical and pollution-filled bag. **Companies** like Blue Origin **are using** money and **resources to push outwards**, to expand the worlds of their rich customers all the way into space. **But those same customers** – and some of the owners – **are** making their terrestrial money in the classic capitalist terrestrial way: by **working around any obstacle to profit, including environmental regulations and conservation efforts**. Almost **all industry is environmentally disastrous**, after all; truly prioritizing earth-friendliness would destroy most companies. Some people with a great deal of money care more about the fate of the world than others, but they’re all willing to cut corners if it affects the bottom line. You can tell because they have a great deal of money; you can also tell because they’re willing to spend it on a ride in a spaceship. Which raises the question: are they just gearing up to wash their hands of the planet and leave the rest of us to clean up? **By pushing outward while ignoring the problems it causes back on the home turf**, are **they effectively** **creat**ing **a galactic upper class that rests on the backs of the earthbound**? Even if that’s not literally the plan, it may be the ultimate outcome.

#### This leads to worse warming of earth. Billionaires already do it and space means there are no consequences. Warming harms the least well off the most

**Paddinson 21** Laura Paddison, 21-10-2021, "How the rich are driving climate change," No Publication, https://www.bbc.com/future/article/20211025-climate-how-to-make-the-rich-pay-for-their-carbon-emissions

In 2018, Stefan Gössling and his team spent months scouring the social media profiles of some of the richest celebrities, from Paris Hilton to Oprah Winfrey. The tourism professor from Linnaeus University in Sweden was looking for evidence of how much they were flying.  The answer was a lot. Bill Gates, one of the world's most high-profile environmental advocates, took 59 flights in 2017, according to Gössling's [calculations](https://www.sciencedirect.com/science/article/abs/pii/S016073831930132X?via%3Dihub), covering a distance of around 343,500km (213,000 miles) – more than eight times around the world – generating more than 1,600 tonnes of greenhouse gases (that's equivalent to the [average yearly emissions of 105 Americans](https://data.worldbank.org/indicator/EN.ATM.CO2E.PC?locations=US)).  Gössling's aim was to try to uncover **the individual consumption levels of the mega rich**, whose lifestyles **are often shrouded in secrecy**. His research coincided with a growing environmental movement, spearheaded by Greta Thunberg, which put a spotlight on personal accountability. Flying, one of the most carbon-intensive forms of consumption, became a symbol of this new accountability.  "**The bigger your carbon footprint, the bigger your moral duty,**" Thunberg [wrote in the Guardian](https://www.theguardian.com/environment/2019/jan/25/our-house-is-on-fire-greta-thunberg16-urges-leaders-to-act-on-climate) in 2019.  The last few decades have shone a spotlight on global inequality. From the 2008 financial crisis, to the pandemic and the [increasingly severe impacts of climate change](https://www.bbc.com/future/article/20200618-climate-change-who-is-to-blame-and-why-does-it-matter) – disruptive events tend to hit the poorest first and hardest.But in debates about how to solve inequality, over-consumption is often overlooked. "Each unit you overshoot means someone has to give [something] up," says Lewis Akenji, managing director of Hot or Cool Institute, a Berlin-based think tank. As a result, the outsized carbon footprints of society's richest entrench inequality and threaten the world's ability to stave off catastrophic climate change. The statistics are startling. **The world's wealthiest 10% were responsible for around half of global emissions in 2015, according to a 2020**[**report**](https://www.sei.org/wp-content/uploads/2020/09/research-report-carbon-inequality-era.pdf) from Oxfam and the Stockholm Environment Institute. **The top 1% were responsible for** 15% of emissions, **nearly twice as much as the world's poorest 50%,** **who** were responsible for just 7% and **will feel the brunt of climate impacts despite bearing the least responsibility for causing them.**

### Contention 2 is debris

**Profit motives prevent private entities from being interested in the scope of the project that is needed**

**Phillips 20** [(Leigh, science writer and EU affairs journalist, and science writer for the Pacific Institute for Climate Solutions at the University of Victoria.) “We Don’t Need Elon Musk to Explore the Solar System,” May 8, 2021, https://jacobinmag.com/2021/05/elon-musk-space-exploration-mars-colonization//Ak /

He opens the paper with a recognition that, at some point, if we stay on Earth, we will confront an eventual extinction event. “The alternative is to become a spacefaring civilization and a multi-planetary species.” He alights upon Mars as the obvious first option for establishing a “self-sustaining city — a city that is not merely an outpost, but which can become a planet in its own right.” He rejects Venus due to it being, as he correctly puts it, a super-high-pressure, hot acid bath. He rejects Mercury due to it being too close to the Sun, and the Moon for lack of atmosphere and its twenty-eight-day “day” (a Martian day, or “sol,” for comparison, is an Earthling-friendly 24.5 hours). And he rejects, at least for now, the moons of Jupiter or Saturn, as they are much harder to get to. Mars has more than its own share of habitability issues, but Musk does not mention them, other than to say that, while Mars is “a little cold” (in reality, -63ºC, or -81ºF, compared to Earth’s balmy 16ºC, or 57ºF), “we can warm it up.” The Martian atmosphere is “very helpful” because it’s primarily CO2, with some nitrogen and argon, meaning that “we can grow plants on Mars just by compressing the atmosphere.” Most cheery of all, Musk says it would be “quite fun” to be on Mars, because the gravity is about 38 percent that of Earth, making it easy to lift heavy things and “bound around.” Mars, as seen from space. (WikiImages via Pixabay) It’s all so simple. “We just need to change the populations because currently we have seven billion people on Earth and none on Mars.” And so the paper is primarily devoted to explaining how to solve that sole problem: how to lower the cost of a trip to Mars from the current roughly $10 billion per person down to the median cost of a house in the United States. By making rockets reusable, refilling in orbit, producing propellant on Mars, choosing the right propellant, and improving system design and performance, Musk reckons he can get the cost of a ticket down to $200,000, perhaps as little as $100,000. And Musk’s SpaceX has done a tremendous job so far of sharply reducing the cost of escaping Earth’s gravity well, primarily via deep vertical integration of the firm. It produces a whopping 70 percent of its components in-house, as opposed to the 1,200 different suppliers in the outsourced supply chain of its main competitor, the Boeing–Lockheed Martin partnership known as the United Space Alliance. Each of these suppliers extracts their own profit margin from every contract in the chain, jacking up the cost per launch to $460 million. SpaceX, by comparison, charges NASA and its other clients just $62 million per launch, and Musk says he has slashed the marginal cost of a reused Falcon 9 booster launch to a mere $15 million. Well done, Elon. Or, rather, well done to all the engineers, logistical experts, and other workers who have done most of the labor, allowing SpaceX to revolutionize the business model of getting to space. There is not really any mention of the enormous challenges of the atmosphere’s low pressure and toxic composition, the preponderance of deadly perchlorates in the soil, or the lack of magnetosphere to protect against solar and cosmic radiation. The current atmosphere of Mars is too thin to support most life: its pressure is only about 1 percent that of Earth. Only hypopiezotolerant microbes (those that live in low-pressure environments), such as ones that are lofted by winds into Earth’s stratosphere, would be able to survive. The atmosphere is also 95 percent carbon dioxide — fine for plants (if the pressure were able to be raised) but not for animals. Musk does say that once Mars is warmed up, “we would once again have a thick atmosphere and liquid oceans.” Bioremediation using bacteria to clean up perchlorates already occurs on Earth, but we are talking about an entire planet here. There is no discussion of how any of this might happen, over what time period, and who would pay for it. Same with the construction of an artificial magnetosphere. Dealing with the perchlorates alone would likely be profoundly more challenging and expensive than the relatively straightforward process of decarbonizing Earth’s economy. A 2018 NASA study found that there is insufficient CO2 and H2O from the Martian soil, polar ice caps, and minerals in the upper crust to get anywhere close to thickening the atmosphere and using it like a blanket to warm up the planet. All these sources combined would still only boost the pressure to about 7 percent of that of Earth. Carbon-bearing minerals deep in the crust might have enough CO2 to achieve the needed pressure, but nothing is known about their extent, and recovering them with current technology would be colossally energy intensive. Another idea is to direct comets or asteroids to crash into Mars and release their greenhouse gases that way. Again, these are fantastical ideas that will be impractical for many, many generations yet to come. NASA astronauts in space. (NASA) And there is likely no way of ever overcoming Mars’s low gravity. If you added all the mass of Venus to that of Mars, smashing the planets together, even then, you would still not quite achieve Earth’s gravity. It is true that we do not know what the physiological effects of 38 percent of Earth’s gravity are, either on humans or other life. We have two data points: Earth gravity, what we call 1G, and the 0G microgravity of the International Space Station (ISS). But from studies of astronauts who have spent extended periods aboard the ISS, we know that 0G is extremely bad for human health. Muscles atrophy. Tendons and ligaments begin to fail. Facial and finger muscles, which cannot be worked out via onboard gyms or treadmills, weaken. The spine lengthens, with astronauts gaining an inch or two in height and suffering from back pain. Bones demineralize, losing density at a rate of 1 percent per month. As Christopher Wanjek, a former NASA science writer and author of 2020 book Spacefarers — which is an optimistic volume on the viability of manned space travel — notes: “To visualize how bad that bone loss is, consider the fact that the major obstacle to fully recycling urine into drinking water on the ISS is that the filters get clogged daily with calcium deposits.” Wanjek writes how the rate of vision loss is such that a crew to Mars would need to pack eyeglasses with various prescriptions for “each phase of their gradual, inevitable, and permanent vision loss.” Kidneys get confused by blood not being where it’s supposed to be and think there is an excess, so they start to remove what they believe to be excess water. The blood thickens, driving a reduced production of red blood cells, which in turn drives anemia, shortness of breath, lethargy, and greater likelihood of infection. Perhaps worst of all, brain compression resulting from microgravity negatively impacts regions responsible for fine motor movement and executive function — deteriorations that could be permanent. A range of interventions, including exercise, drugs, and compression clothing can shave the sharp edges off some of these effects, but ultimately, the solution on a spacecraft is the simulation of gravity via centrifugal force — a spinning ship. This is not something that you can do with a whole planet. It is for this reason that Venus, with its gravity not too far off that of Earth, may actually be a better terraforming candidate than Mars — one day — despite its currently inhospitable atmosphere. The Real Business of SpaceX Isn’t Mars. One has to suspect that Musk knows all this. We have a hint of this when, at one point in his paper, Musk concedes that it will be difficult to fund his vision just by slashing the cost of getting to space. He admits that SpaceX expects to generate substantial cash flow from launching lots of satellites and servicing the International Space Station for NASA. Additional help for bankrolling the Mars project might come from the emergence of a market for really fast transportation of things or people around the world by rocket: cargo could be transported anywhere on Earth in forty-five minutes, and a trip from New York to Tokyo could take a mere twenty-five minutes (so long as takeoff and landing takes place where the tremendous noise, as he puts it in hip-CEO-speak, “is not a super-big deal”). As a result, one gets the impression by reading between the lines that a self-sustaining Martian city is all just an impressive marketing maneuver taking advantage of most people’s sense of adventure and wonder; of our species’ ancient need to wander and explore. The real business of SpaceX was never a Martian colony but rather servicing a mature satellite market, stealing government space contracts from the likes of Boeing, and kicking off a terrestrial rocket transport sector. The dream of Mars is, in this case, not really any different from the adman’s fiction of romance and aspiration that sells a can of Pepsi or a Jeep. The dream of Mars is, in this case, not really any different from the adman’s fiction of romance and aspiration that sells a can of Pepsi or a Jeep. None of this is to suggest that establishing an outpost on Mars for the purposes of scientific exploration should not be attempted, even in the next couple of decades. But an outpost, as Musk himself makes clear, does not approach a self-sustaining city, and still less a multi-planetary species. Because humans do need to exit Earth at some point in order to maintain the species, if we are to establish genuinely self-sustaining colonies, then terraforming will likely be necessary one day, as well as interstellar generation ships that take us to habitable exoplanets far beyond the solar system. For all of this, we will have to figure out how to take our ecology with us. We are not really the collection of individuals we thought we were, but rather are deeply embedded within our ecosystems. Indeed, each of us is a microbial ecosystem whose edges are vague. Where does the bacterial, fungal, and viral multitude that is “me” stop and my equally microbiological environment begin? This does not mean that Earth will be the only home we ever have, but it does mean that the antiseptic, forestless, riverless Starship Enterprise would leave its inhabitants very sick before too long. How much of our ecology do we need to take with us, though? We just don’t know yet. The science of ecology is very much still a young discipline. This is where fantastical science-fiction conceptions of vast ships made from hollowed out asteroids and packed with different biomes fills the gap of what we do not know. Likewise for novels like Becky Chambers’s To be Taught, if Fortunate, in which, instead of terraforming other worlds, adapting them to our needs, we genetically alter our bodies via “somaforming” to adapt ourselves to their conditions. Plainly, then, there is no rush for any of this, even as there is a moral imperative for us, one day in the distant future, to permanently exit Earth. Our colonization of other worlds is akin to the building of the grandest cathedral we have ever envisaged: a project that will take centuries, or more likely millennia, many millennia. This is nothing that a private company can deliver. There is no near-term return on investment; indeed, there is no aim of profitability at all, but rather of our species’ survival through the eons.

**The legal playing field right now allows private companies to claim resources in space – that is likely to be modeled by other countries and will culminate in systemic exploitation of outer space.**

Matt **Williams**,(reporter)12-11-20**17**, "Trump signs an executive order allowing mining the moon and asteroids," No Publication, https://phys.org/news/2020-04-trump-moon-asteroids.html//ak//

In 2015, the Obama administration signed the U.S. Commercial Space Launch Competitiveness Act (CSLCA, or H.R. 2262) into law. This bill was intended to "facilitate a pro-growth environment for the developing commercial space industry" by making it legal for American companies and citizens to own and sell resources that they extract from asteroids and off-world locations (like the moon, Mars or beyond).¶ On April 6th, the Trump administration took things a step further by signing an executive order that formally recognizes the rights of private interests to claim resources in space. This order, titled "Encouraging International Support for the Recovery and Use of Space Resources," effectively ends the decades-long debate that began with the signing of the Outer Space Treaty in 1967.¶ This order builds on both the CSLCA and Space Directive-1 (SD-1), which the Trump administration signed into law on December 11th, 2017. It establishes that "Americans should have the right to engage in commercial exploration, recovery, and use of resources in outer space, consistent with applicable law," and that the United States does not view space as a "global commons."¶ The Outer Space Treaty¶ This order puts an end to decades of ambiguity regarding commercial activities in space, which were technically not addressed by the Outer Space or Moon treaties. The former, formally known as "The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies", was signed by the U.S., the Soviet Union, and the U.K. in 1967 at the height of the Space Race.¶ Apollo 11’s Saturn V rocket prior to the launch July 16, 1969. Screenshot from the 1970 documentary “Moonwalk One.” Credit: NASA/Theo Kamecke/YouTube¶ The purpose of it was to provide a common framework governing the activities of all the major powers in space. In addition to banning the placement or testing of nuclear weapons in space, the Outer Space Treaty established that the exploration and use of outer space would be carried out for the benefit "of all mankind."¶ As of June 2019, the treaty has been signed by no less than 109 countries, while another 23 have signed it but have not yet completed the ratification process. At the same time, there has been an ongoing debate regarding the full meaning and implications of the treaty. Specifically, Article II of the treaty states: "Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means."¶ As the language is specific to national ownership, there has never been a legal consensus on whether or not the treaty's prohibitions apply to private appropriation, as well. Because of this, there are those who argue that property rights should be recognized on the basis of jurisdiction rather than territorial sovereignty.¶ The Moon Treaty¶ Artist’s illustration of the new spacesuit NASA is designing for Artemis astronauts. It’s called the xEMU,, or Exploration Extravehicular Mobility Unit. Credit: NASA¶ Attempts to address this ambiguity led the United Nations to draft the supplemental "Agreement Governing the Activities of States on the Moon and Other Celestial Bodies" aka "The Moon Treaty" or "Moon Agreement." Like the Outer Space Treaty, this agreement stipulated that the moon should be used for the benefit of all humanity and that non-scientific activities should be governed by an international framework.¶ However, to date, only 18 countries have ratified the Moon Treaty, which does not include the U.S., Russia, or any other major power in space (save for India). In addition, only 17 of the 95 member states who signed the Outer Space Treaty have become signatories on the Moon Treaty. This latest order, titled "Executive Order on Encouraging International Support for the Recovery and Use of Space Resources," addresses this very issue, stating:¶ "Uncertainty regarding the right to recover and use space resources, including the extension of the right to commercial recovery and use of lunar resources, however, has discouraged some commercial entities from participating in this enterprise. Questions as to whether the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (the "Moon Agreement") establishes the legal framework for nation states concerning the recovery and use of space resources have deepened this uncertainty, particularly because the United States has neither signed nor ratified the Moon Agreement."¶ The administration considers this act to be complimentary to SD-1, which emphasizes the importance of commercial partners in Project Artemis and NASA's plan to explore Mars and beyond. "Successful long-term exploration and scientific discovery of the moon, Mars, and other celestial bodies will require partnership with commercial entities to recover and use resources, including water and certain minerals, in outer space," the directive states.¶ Return to the moon¶ Infographic of the evolution of lunar activities on the surface and in orbit. Credit: NASA¶ After Artemis III accomplishes the long-awaited goal of sending the first astronauts to the moon since the end of the Apollo era, NASA's plans will shift toward the long-term aim of creating a "sustainable program" of lunar exploration. This will include the creation of the Lunar Gateway (an orbital habitat) as well as the Lunar Base Camp on the surface of the moon.¶ These two habitats and research stations will allow for long-term stays on the moon, a wide array of scientific experiments, and even the ability to conduct on-site refueling. Combined with a reusable lunar lander, lunar rovers and other non-expendable elements, they will also facilitate regular missions to the moon and an overall reduction in costs.¶ For years, prospectors and space mining companies like Planetary Resources and Deep Space Industries have been advocating for reforms that would allow for the commercial exploitation of space. Similarly, people like Peter Diamandis (founder of X Prize and HeroX) and science communicator Neil DeGrasse Tyson have been saying for years that the first trillionaires will make their fortunes from asteroid mining.¶ Incidentally, NASA and HeroX recently launched the "Honey, I Shrunk the NASA Payload" challenge, which is offering $160,000 to the team that can come up with a solution to miniaturize payloads to the point where they are "similar in size to a new bar of soap"—100 x 100 x 50 mm (3.9 x 3.9 x 1.9 inches) and weighing no more than 0.4 kg (0.8 lbs).¶ The purpose of this challenge is to significantly reduce the cost of sending payloads to the moon in support of future lunar missions. However, it could also enable a new generation of mini-rovers that would explore the lunar surface for resources. As the hosts indicate on the challenge site:¶ The JPL-led challenge is seeking tiny payloads no larger than a bar of soap for a miniaturized Moon rover. Credit: NASA¶ "We need to develop practical and affordable ways to identify and use lunar resources so that our astronaut crews can become more independent of Earth… Imagine a rover the size of your Roomba crawling the moon's surface. These small rovers developed by NASA and commercial partners provide greater mission flexibility and allow NASA to collect key information about the lunar surface."¶ It is not hard to imagine at all that miniature rover's would also enable commercial entities the ability to explore asteroids and the lunar surface for resources that could be harvested and processed for export back to Earth. However, not everyone is so excited by this recent move or the prospects that it entails.¶ Dissenting Views¶ In fact, Russia's space agency (Roscosmos) officially condemned the executive order and likened it to colonialism. These sentiments were summed up in a statement issued by Sergey Saveliev, Roscosmos' deputy director-general on international cooperation:¶ "Attempts to expropriate outer space and aggressive plans to actually seize territories of other planets hardly set the countries (on course for) fruitful cooperation. There have already been examples in history when one country decided to start seizing territories in its interest—everyone remembers what came of it."¶ Artist’s impression of a lunar base. Credit: Newspace2060¶ Saveliev is hardly alone in drawing parallels between the NewSpace industry (or Space Race 2.0) and the age of imperialism (ca. 18th to 20th century). Last year, Dr. Victor Shammas of the Work Research Institute at Oslo Metropolitan University and independent scholar Tomas Holen produced a study that appeared in Palgrave Communications (a publication maintained by the journal Nature).¶ Titled, "One giant leap for capitalist kind: private enterprise in outer space," Shammas and Holen assert that the commercial exploitation of space will benefit human beings disproportionately. At the heart of this effort are Elon Musk, Jeff Bezos, and other Silicon Valley-billionaires that—contrary to their humanist pretenses—are looking to expand their wealth while taking advantage of the fact that there is little to no oversight in this area.¶ "In this regard," they wrote, "SpaceX and related ventures are not so very different from maritime colonialists and the trader-exploiters of the British East India Company." For the record, the East India Company operated with impunity in India while it was under British rule, effectively making them the real governing authority over the nation and its people.¶ Credit: NASA/JPL/911Metallurgist/NeoMam Studios¶ Could asteroid mining, lunar mining, and other off-world concerns become the new colonialism? Could various companies staking claims to bodies, planets, and moons set off a period of conflict and cutthroat politics similar to what existed during the 18th to early 20th centuries? Or could this be the beginning of "post-scarcity" for humanity and an economic revolution?¶ And is this condemnation by Russian authorities merely an expression of lament because they don't feel well-positioned to take advantage and will that change if the Russian equivalent of a Musk or Bezos emerges? And what might we expect from countries like China and India that have been making significant strides in space for years?¶ All valid questions, and one which will have to be explored with greater energy and commitment now that the U.S. has officially declared that the moon and space are "open for business." It also wouldn't be surprising if certain charlatans try to push the whole "buy land on the moon" scam with greater vigor, too.

**Increasing the number of satellites from private companies like SpaceX would massively increase the risk of dangerous space debris.**

**Scheer and Moss 20** [(Roddy Scheer and Doug Moss, ) “The Good, The Bad &amp; The Ugly: Satellites &amp; The Environment,” Emagazine https://www.newsbreak.com/news/2178042533743/the-good-the-bad-the-ugly-satellites-the-environment, 8-13-2020//Ak//

Putting satellites up into the ionosphere—the layer of our atmosphere extending from 50-600 miles above the surface where a high concentration of ions and free electrons facilitate the reflection of radio waves—isn’t anything new. The Soviets beat us to the punch when they launched the first satellite, Sputnik, in 1957, but these days there are over 9,000 satellites overhead, the majority from U.S. companies and government agencies. But with Elon Musk’s SpaceX poised to launch tens of thousands of new ones in the next few years, many people wonder whether putting all this technology overhead is such a good idea. One concern is that all this hardware eventually breaks down and shed parts. Peter Greenstreet of the Institute of Physics reports that this so-called “space junk” orbits at some 7.5 kilometers per second—so fast that even the tiniest pieces create a potential hazard for space stations and other man-made or natural objects making the same rounds.

**That debris risks a nightmare scenario known as the Kessler syndrome – debris from private space flight ensures massive satellite destruction.**

**Thompson 20** [(Clive, author of Coders: The Making of a New Tribe and the Remaking of the World, a columnist for Wired magazine, and a contributing writer to The New York Times Magazine) “Monetizing the Final Frontier The strange new push for space privatization,” December 3, 2020 <https://newrepublic.com/article/160303/monetizing-final-frontier>//ak //

“Physics tells us that two things can’t occupy the same space at the same time or else bad things happen,” Jah said dryly. Indeed, there’s already been one collision that produced sprawling orbital pollution. In 2009, a satellite owned by the U.S. firm Iridium slammed into a decommissioned Russian government satellite at more than 26,000 mph. The crash produced 2,300 pieces of debris, spraying off in all directions. And debris is a particularly gnarly problem in space, because when it’s traveling at thousands of miles an hour, even a marble-size chunk is like a bullet, capable of rendering a damaged satellite inoperable and unsteerable—the owner can no longer fire its boosters to guide it into a higher or lower orbit. There are currently an estimated 500,000 marble-size chunks up there. Decades of space travel by governments left plenty of refuse, ranging from parts of rocket boosters to stray bits of scientific experiments. One particularly grim vision of the future that haunts astronomers is the “Kessler syndrome,” proposed by the astrophysicist Donald Kessler in 1978. Kessler hypothesized that space clutter could reach a tipping point: One really bad collision could produce so much junk that it would trigger a chain reaction of collisions. This disaster scenario would leave hundreds of satellites eventually destroyed, and create a ring of debris that would make launching any new satellites impossible, forever. “Near space is finite—it’s a finite resource,” Jah said. “So now you have this growing trash problem that isn’t being remediated.... And if we exceed the capacity of the environment to carry all this traffic safely, then it becomes unusable.” That’s why a growing chorus of critics are already making the case that space is the next major environmental area to protect, after the oceans and land on Earth. “People seem to really treat resources in space as being infinite,” said Erika Nesvold, an astrophysicist who’s the cofounder of The JustSpace Alliance. “As we’ve seen, people don’t really intuitively understand exponential growth.” That’s the dilemma in a nutshell: The available room in the sky is limited, but the plans for growth are exponential. SpaceX isn’t the only New Space firm looking to toss up satellites. Satellite and rocket start-ups are now lining up en masse, atop new waves of investment. There are satellites geared up to connect to “the internet of things” so companies can communicate among proprietary networks of household devices. There are floating cameras pointing down—so as to gather “geospatial intelligence,” which is to say data streamed from “the vantage point you get from satellites looking down on Earth and giving us information about our planet,” as the venture capitalist Anderson told me. And new forms of satellite vision are emerging all the time, such as cameras that can see at night, or are specially designed to see agriculture. Experiments abound, and so satellite launches will inevitably multiply in their wake. Part of what makes near-Earth orbit so chaotic is that it is, at the moment, remarkably unregulated—not unlike the internet of the early ’90s. An American firm has to get permission from the Federal Communications Commission to launch a satellite, but once it’s in orbit, there’s no federal agency that can compel it to move out of the path of a collision. Satellite owners generally don’t like to move if they can avoid it, because their satellites have a limited amount of fuel; any movement decreases their usable lifespan. On top of that, there are dozens of nations shooting satellites into low-Earth orbit—but no international body coordinating their flight paths. Last fall, the European Space Agency realized one of SpaceX’s new Starlink satellites was on a dangerously close path to an ESA satellite. SpaceX said it had no plans to move the satellite; so the ESA decided to fire its thrusters and get clear. This high-stakes negotiation was conducted via email. What’s more, space debris is extremely hard to source. If a British satellite slams into yours, you can probably figure out who hit you. But if your satellite is wrecked by a random piece of junk, nobody has any clue where that debris came from. It is, in this way, a neat parallel to the problem of C02, where a ceaseless barrage of tiny commercial decisions creates a sprawling problem—one that’s all but designed to ensure that everyone who caused it can deny responsibility. And damage is asymmetric: A company with a small $60,000 satellite could smash into a wildly expensive one paid for by U.S. taxpayers. “A National Reconnaissance Office satellite is at least a billion dollars, if not more, so they have a lot more to lose if something hits a satellite,” Bhavya Lal, a researcher at the IDA Science and Technology Policy Institute, noted. “As more private activity starts to happen, there’s more chances of that loss of control, too.” One might dismiss all this anxiety as a sort of sci-fi version of hippie environmentalism—except that even the administrator of NASA is deeply worried about the chaos and destruction likely to be sown by commercial activity in near-Earth orbit. Jim Bridenstine, the Trump-appointed head of NASA, is as pro-market as one can be. He praises SpaceX every chance he gets; he talks about privatizing the space station. But when I asked him about the looming danger of space debris, during a press-conference call, he conceded that it’s a huge, unresolved issue.

**In particular, climate oriented satellites that are currently in orbit are key to adapting to and preventing global warming, especially in developing countries. These measures become impossible with so much private sector debris.**

**Alonso 18** [(Elisa Jiménez Alonso, communications consultant with Acclimatise, climate resilience organization) “Earth Observation of Increasing Importance for Climate Change Adaptation,” Acclimatise, May 2, 2018, <https://www.acclimatise.uk.com/2018/05/02/earth-observation-of-increasing-importance-for-climate-change-adaptation/ak//>

Earth observation (EO) satellites are playing an increasingly important role in assessing climate change. By providing a constant and consistent stream of data about the state of the climate, EO is not just improving scientific outcomes but can also inform climate policy.¶ Managing climate-related risks effectively requires accurate, robust, sustained, and wide-ranging climate information. Reliable observational climate data can help scientists test the accuracy of their models and improve the science of attributing certain events to climate change. Information based on projections from models and historic data can help decision makers plan and implement adaptation actions.¶ Providing information in data-sparse regions¶ Ground-based weather and climate monitoring systems only cover about 30% of the Earth’s surface. In many parts of the world such data is incomplete and patchy due to poorly maintained weather stations and a general lack of such facilities.¶ EO satellites and rapidly improving satellite technology, especially data from open access programmes, offer a valuable source information for such **data-sparse regions**. This is especially important since countries and regions with a lack of climate data are often particularly vulnerable to climate change impacts.¶ International efforts for systematic observation¶ The importance of satellite-based observations is also recognised by the international community. Following the recommendations of the World Meteorological Organization’s (WMO) Global Climate Observing System (GCOS) programme, the UNFCCC strongly encourages countries that support space agencies with EO programmes to get involved in GCOS and support the programme’s implementation. The Paris Agreement highlights the need for and importance of effective and progressive responses to the threat of climate change based on the best available scientific knowledge. This implies that climate knowledge needs to be strengthened, which includes continuously improving systematic observations of the Earth’s climate.¶ To meet the need of such systematic climate observations, GCOS developed the concept of the Essential Climate Variable, or ECV. According to WMO, an ECV “is a physical, chemical or biological variable or a group of linked variables that critically contributes to the characterization of Earth’ s climate.” In 2010, 50 ECVs which would help the work of the UNFCCC and IPCC were defined by GCOS. The ECVs, which can be seen below, were identified due to their relevance for characterising the climate system and its changes, the technical feasibility of observing or deriving them on a global scale, and their cost effectiveness.¶ The 50 Essential Climate Variables as defined by GCOS.¶ One effort supporting the systemic observation of the climate is the European Space Agency’s (ESA) Climate Change Initiative (CCI). The programme taps into its own and its member countries’ EO archives that have been established in the last three decades in order to provide a timely and adequate contribution to the ECV databases required by the UNFCCC.¶ Robust evidence supporting climate risk management¶ Earth observation satellites can observe the entire Earth on a daily basis (polar orbiting satellites) or continuously monitor the disk of Earth below them (geostationary satellites) maintaining a constant watch of the entire globe. Sensors can target any point on Earth even the most remote and inhospitable areas which helps monitor deforestation in vast tropical forests and the melting of the ice caps.¶ Without insights offered by EO satellites there would not be enough evidence for decision makers to base their climate policies on, increasing the risk of **maladaptation**. Robust EO data is an invaluable resource for collecting climate information that can inform climate risk management and make it more effective.

**Space debris disproportionally affects developing countries – climate change and falling debris ravages countries who played no role in creating this crisis.**

Anél **Ferreira-Snyman**, March 20**13**, [Professor of Law, [University of South Africa](https://scholar.google.com/citations?view_op=view_org&hl=en&org=10976511949285581406)],Institute of Foreign and Comparative Law, https://www.jstor.org/stable/pdf/23644687.pdf?refreqid=excelsior%3Aa1967e39b015b325681ae4df0973545c//Ak//

As African states realise the socio-economic and human security benefits of space applications and thus become increasingly involved in space activities, the issue of space debris will inevitably also become a greater concern for these states. The consequences of damage as a result of satellites being involved in accidents with space debris will be especially serious for the developing states which have limited resources.175 There is also a possibility of environmental damage on the territories of the developing states as a result of falling space debris. It is, therefore, imperative that more African states (including states not involved in space activities) become parties to and comply with the space treaties. They should further increase their representation in the UNCOPUOS in order to have stronger bargaining power and influence in this Committee, by presenting a united African position on space issues.17 which is based on the idea of international equity, environmental degradation has its origin mainly in industrialised countries and they should, therefore, be primarily responsible for eradicating environmental pollution. These countries usually also have greater capacity to respond to environmental problems and they should, therefore, assist developing countries in accessing relevant resources and technologies to achieve sustainable development.179 As a result of the difference in the social, economic, and ecological circumstances of states, the environmental standards applied to industrialised and developing countries cannot be the same, hence the need for a differentiated approach.180 In the context of outer space, non-space-faring nations insist that the space faring nations (thus mainly industrialised countries) that have caused (and continue to cause) the current levels of space pollution, should bear the main responsibility to improve the situation, so as to guarantee the possibility of future space activity (including that of developing states). Space-faring nations are obviously in a better position to take the necessary action in this regard.181 Although the principle of 'common but differentiated responsibilities' is not included in any of the outer space treaties, Viikari submits that the space sector might be more receptive to the principle in future in view of the general movement towards creating multilateral accountability.182 She suggests the creation of a space fund as an expression of the ideals of common but differentiated responsibilities. The fund can be used for the benefit of future generations. Such a fund is in conformity with the notion, referred to earlier, that states are the trustees of mankind's common¶ resources

**Climate change is responsible for devastating consequences that disproportionately target marginalized populations in developing countries – it is the largest structural violence impact.**

(Abrahm **Lustgarten, 2020**- senior environmental reporter at ProPublica, “HOW CLIMATE MIGRATION WILL RESHAPE AMERICA,” 15 September 2020, New York Times, https://www.nytimes.com/interactive/2020/09/15/magazine/climate-crisis-migration-america.html)//ak//

August besieged **California** with a heat unseen in generations. A surge in air-conditioning broke the state’s electrical grid, leaving a population already ravaged by the coronavirus to work remotely by the dim light of their cellphones. By midmonth, the state had **recorded** possibly **the hottest temperature ever measured on earth — 130 degrees in Death Valley** — and an otherworldly storm of lightning had cracked open the sky. From Santa Cruz to Lake Tahoe, thousands of bolts of electricity exploded down onto withered grasslands and forests, some of them already hollowed out by climate-driven infestations of beetles and kiln-dried by the worst five-year drought on record. Soon, **California was on fire.** Over the next two weeks, 900 blazes incinerated six times as much land as all the state’s 2019 wildfires combined, forcing 100,000 people from their homes. Three of the largest fires in history burned simultaneously in a ring around the San Francisco Bay Area. Another fire burned just 12 miles from my home in Marin County. I watched as towering plumes of smoke billowed from distant hills in all directions and air tankers crisscrossed the skies. Like many Californians, I spent those weeks worrying about what might happen next, wondering how long it would be before an inferno of 60-foot flames swept up the steep, grassy hillside on its way toward my own house, rehearsing in my mind what my family would do to escape. But I also had a longer-term question, about what would happen once this unprecedented fire season ended. Was it finally time to leave for good? I had an unusual perspective on the matter. For two years, I have been studying how climate change will influence global migration. My sense was that **of all the devastating consequences of a warming planet** — changing landscapes, pandemics, mass extinctions — [**the potential movement of hundreds of millions of climate refugees across the planet**](https://www.nytimes.com/interactive/2020/07/23/magazine/climate-migration.html) **stands to be among the most important**. I traveled across four countries to witness how rising temperatures were driving climate refugees away from some of the poorest and hottest parts of the world. I had also helped create an enormous computer simulation to analyze how global demographics might shift, and now I was working on a data-mapping project about migration here in the United States. So it was with some sense of recognition that I faced the fires these last few weeks. In recent years, summer has brought a season of fear to California, with ever-worsening wildfires closing in. But this year felt different. The hopelessness of the pattern was now clear, and the pandemic had already uprooted so many Americans. Relocation no longer seemed like such a distant prospect. Like the subjects of my reporting, climate change had found me, its indiscriminate forces erasing all semblance of normalcy. Suddenly I had to ask myself the very question I’d been asking others: Was it time to move? I am far from the only American facing such questions**. This summer has seen more fires, more heat, more storms — all of it making life increasingly untenable** in larger areas of the nation. Already, **droughts** regularly **threaten** food c**rops across the West, while destructive floods inundate towns and fields from the Dakotas to Maryland,** [collapsing dams in Michigan](https://www.nytimes.com/2020/05/21/climate/dam-failure-michigan-climate-change.html) and [raising the shorelines of the Great Lakes](https://www.nytimes.com/2019/08/24/us/great-lakes-water-levels.html#:~:text=Though%20water%20levels%20have%20always,warmer%20temperatures%20and%20increased%20evaporation.&text=MICH.,-CANADA). **Rising seas and increasingly violent hurricanes are making thousands of miles of American shoreline nearly uninhabitable**. As California burned, Hurricane Laura pounded the Louisiana coast with 150-mile-an-hour winds, killing at least 25 people; it was the 12th named storm to form by that point in 2020, another record. Phoenix, meanwhile, endured 53 days of 110-degree heat — 20 more days than the previous record. For years, Americans have avoided confronting these changes in their own backyards. The decisions we make about where to live are distorted not just by politics that play down climate risks, but also by expensive subsidies and incentives aimed at defying nature. In much of the developing world, vulnerable people will attempt to flee the emerging perils of global warming, seeking cooler temperatures, more fresh water and safety. But here **in the United States, people have largely gravitated toward environmental danger, building along coastlines** from New Jersey to Florida and settling across the cloudless deserts of the Southwest. I wanted to know if this was beginning to change. Might Americans finally be waking up to how climate is about to transform their lives? And if so — if a great domestic relocation might be in the offing — was it possible to project where we might go? To answer these questions**, I interviewed more than four dozen experts: economists and demographers, climate scientists and insurance executives, architects and urban planners, and I mapped out the danger zones that will close in on Americans over the next 30 years.** The maps for the first time combined exclusive climate data from the Rhodium Group, an independent data-analytics firm; wildfire projections modeled by United States Forest Service researchers and others; and data about America’s shifting climate niches, an evolution of work first published by The Proceedings of the National Academy of Sciences last spring. (See a detailed analysis of the maps.) What I found was a nation on the cusp of a great transformation. Across the United States, some **162 million people** — nearly one in two — **will** most likely **experience a decline in the quality of their environment, namely more heat and less water**. For 93 million of them, the changes could be particularly severe, and by 2070, our analysis suggests, if carbon emissions rise at extreme levels, at least four million Americans could find themselves living at the fringe, in places decidedly outside the ideal niche for human life. **The cost of resisting the new climate reality is mounting.** Florida officials have already acknowledged that defending some roadways against the sea will be unaffordable. And the nation’s federal flood-insurance program is for the first time requiring that some of its payouts be used to retreat from climate threats across the country. It will soon prove too expensive to maintain the status quo. By 2070, some 28 million people across the country could face Manhattan-size megafires. In Northern California, they could become an annual event. Then what? One influential 2018 study, published in The Journal of the Association of Environmental and Resource Economists, suggests **that one in 12 Americans in the Southern half of the country will move toward California, the Mountain West or the Northwest** over the next 45 years because of climate influences alone. **Such a shift** in population **is likely to increase poverty and widen the gulf between the rich and the poor. It will accelerate rapid**, perhaps chaotic, **urbanization of cities ill-equipped for the burden, testing their capacity to provide basic services** and amplifying existing inequities. **It will** eat away at prosperity, **deal**ing **repeated economic blows to coastal**, rural and Southern **regions**, **which could in turn push entire communities to the brink of collapse. This** process **has already begun in** rural **Louisiana and** coastal **Georgia, where low-income and Black and Indigenous communities face environmental change on top of poor health and extreme poverty**. Mobility itself, global-migration experts point out, is often a reflection of relative wealth, and as some move, **many** others **will be left behind.** Those who stay risk becoming trapped as the land and the society around them ceases to offer any more support. There are signs that the message is breaking through. Half of Americans now rank climate as a top political priority, up from roughly one-third in 2016, and three out of four now describe climate change as either “a crisis” or “a major problem.” This year, Democratic caucusgoers in Iowa, where tens of thousands of acres of farmland flooded in 2019, ranked climate second only to health care as an issue. A poll by researchers at Yale and George Mason Universities found that even Republicans’ views are shifting: One in three now think climate change should be declared a national emergency. **Policymakers**, having left America unprepared for what’s next, now **face brutal choices about which communities to save** — often at exorbitant costs — **and which to sacrifice. Their decisions will** almost inevitably make the nation more **divide**d, **with those worst off relegated to a nightmare future** in which they are left to fend for themselves. Nor will these disruptions wait for the worst environmental changes to occur. **The wave begins when individual perception of risk starts to shift**, when the environmental threat reaches past the least fortunate and rattles the physical and financial security of broader, wealthier parts of the population. It begins when even places like California’s suburbs are no longer safe. **It has already begun**. Let’s start with some basics. Across the country, it’s going to get hot. Buffalo may feel in a few decades like Tempe, Ariz., does today, and Tempe itself will sustain 100-degree average summer temperatures by the end of the century**. Extreme humidity** from New Orleans to northern Wisconsin **will** make summers increasingly unbearable, **turn**ing otherwise seemingly survivable **heat waves into debilitating health threats.** **Fresh water will** also **be in short supply**, not only in the West but also in places like Florida, Georgia and Alabama, where droughts now regularly wither cotton fields. **By 2040**, according to federal government projections, **extreme water shortages will be** nearly **ubiquitous** west of Missouri. The Memphis Sands Aquifer, a crucial water supply for Mississippi, Tennessee, Arkansas and Louisiana, is already overdrawn by hundreds of millions of gallons a day. Much of the Ogallala Aquifer — which supplies nearly a third of the nation’s irrigation groundwater — could be gone by the end of the century. **It can be difficult to see the challenges clearly because so many factors are in play**. At least **28 million Americans are likely to face megafires** like the ones we are now seeing in California, in places like Texas and Florida and Georgia. At the same time, **100 million Americans** — largely in the Mississippi River Basin from Louisiana to Wisconsin — **will increasingly face humidity so extreme that working outside** or playing school sports **could cause heatstroke. Crop yields will be decimated** from Texas to Alabama and all the way north through Oklahoma and Kansas and into Nebraska. **The challenges are so widespread and so interrelated that Americans seeking to flee one could well run into another.** I live on a hilltop, 400 feet above sea level, and my home will never be touched by rising waters. But by the end of this century, if the more extreme projections of eight to 10 feet of sea-level rise come to fruition, the shoreline of San Francisco Bay will move three miles closer to my house, as it subsumes some 166 square miles of land, including a high school, a new county hospital and the store where I buy groceries. The freeway to San Francisco will need to be raised, and to the east, a new bridge will be required to connect the community of Point Richmond to the city of Berkeley. The **Latino, Asian and Black communities who live in the most-vulnerable low-lying districts will be displaced first**, but research from Mathew Hauer, a sociologist at Florida State University who published some of the first modeling of American climate migration in the journal Nature Climate Change in 2017, suggests that the toll will eventually be far more widespread: Nearly one in three people here in Marin County will leave, part of the roughly 700,000 who his models suggest may abandon the broader Bay Area as a result of sea-level rise alone. From Maine to North Carolina to Texas, **rising sea levels are not just chewing up shorelines but** also **raising rivers and swamping** the subterranean **infrastructure** of coastal communities, making a stable life there all but impossible. Coastal high points will be cut off from roadways, amenities and escape routes, and even far inland, saltwater will seep into underground drinking-water supplies. Eight of the nation’s 20 largest metropolitan areas — Miami, New York and Boston among them — will be profoundly altered, indirectly affecting some 50 million people. Imagine large concrete walls separating Fort Lauderdale condominiums from a beachless waterfront, or dozens of new bridges connecting the islands of Philadelphia. Not every city can spend $100 billion on a sea wall, as New York most likely will. Barrier islands? Rural areas along the coast without a strong tax base? They are likely, in the long term, unsalvageable. In all, Hauer projects that 13 million Americans will be forced to move away from submerged coastlines. Add to that the people contending with wildfires and other risks, and the number of Americans who might move — though difficult to predict precisely — could easily be tens of millions larger. Even 13 million climate migrants, though, would rank as the largest migration in North American history. The Great Migration — of six million Black Americans out of the South from 1916 to 1970 — transformed almost everything we know about America, from the fate of its labor movement to the shape of its cities to the sound of its music. What would it look like when twice that many people moved? What might change? Americans have been conditioned not to respond to geographical climate threats as people in the rest of the world do. It is natural that rural Guatemalans or subsistence farmers in Kenya, facing drought or scorching heat, would seek out someplace more stable and resilient. Even a subtle environmental change — a dry well, say — can mean life or death, and without money to address the problem, migration is often simply a question of survival. By comparison, **Americans** are richer, often much richer, and more insulated from the shocks of climate change. They **are distanced from the food and water sources they depend on, and they are part of a culture that sees every problem as capable of being solved by money. So even as the average flow of the Colorado River — the water supply for 40 million Western Americans and the backbone of the nation’s vegetable and cattle farming** — has declined for most of the last 33 years, the population of Nevada has doubled. At the same time, **more than 1.5 million people have moved to the Phoenix metro area, despite its dependence on that same river** (and the fact that temperatures there now regularly hit 115 degrees). Since Hurricane Andrew devastated Florida in 1992 — and even as that state has become a global example of the threat of sea-level rise — more than five million people have moved to Florida’s shorelines, driving a historic boom in building and real estate. The sense that money and technology can overcome nature has emboldened Americans. Where money and technology fail, though, it inevitably falls to government policies — and government subsidies — to pick up the slack. Thanks to federally subsidized canals, for example, water in part of the Desert Southwest costs less than it does in Philadelphia. The federal National Flood Insurance Program has paid to rebuild houses that have flooded six times over in the same spot. And federal agriculture aid withholds subsidies from farmers who switch to drought-resistant crops, while paying growers to replant the same ones that failed. Farmers, seed manufacturers, real estate developers and a few homeowners benefit, at least momentarily, but the gap between what the climate can destroy and what money can replace is growing. Perhaps no market force has proved more influential — and more misguided — than the nation’s property-insurance system. From state to state, readily available and affordable policies have made it attractive to buy or replace homes even where they are at high risk of disasters, systematically obscuring the reality of the climate threat and fooling many Americans into thinking that their decisions are safer than they actually are. Part of the problem is that most policies look only 12 months into the future, ignoring long-term trends even as insurance availability influences development and drives people’s long-term decision-making. Even where insurers have tried to withdraw policies or raise rates to reduce climate-related liabilities, state regulators have forced them to provide affordable coverage anyway, simply subsidizing the cost of underwriting such a risky policy or, in some cases, offering it themselves. The regulations — called Fair Access to Insurance Requirements — are justified by developers and local politicians alike as economic lifeboats “of last resort” in regions where climate change threatens to interrupt economic growth. While they do protect some entrenched and vulnerable communities, the laws also satisfy the demand of wealthier homeowners who still want to be able to buy insurance. At least 30 states, including Louisiana, Massachusetts, North Carolina and Texas, have developed so-called FAIR plans, and today they serve as a market backstop in the places facing the highest risks of climate-driven disasters, including coastal flooding, hurricanes and wildfires. In an era of climate change, though, such policies amount to a sort of shell game, meant to keep growth going even when other obvious signs and scientific research suggest that it should stop. That’s what happened in Florida. Hurricane Andrew reduced parts of cities to landfill and cost insurers nearly $16 billion in payouts. Many insurance companies, recognizing the likelihood that it would happen again, declined to renew policies and left the state. So the Florida Legislature created a state-run company to insure properties itself, preventing both an exodus and an economic collapse by essentially pretending that the climate vulnerabilities didn’t exist. As a result, Florida’s taxpayers by 2012 had assumed liabilities worth some $511 billion — more than seven times the state’s total budget — as the value of coastal property topped $2.8 trillion. Another direct hurricane risked bankrupting the state. Florida, concerned that it had taken on too much risk, has since scaled back its self-insurance plan. But the development that resulted is still in place. On a sweltering afternoon last October, with the skies above me full of wildfire smoke, I called Jesse Keenan, an urban-planning and climate-change specialist then at Harvard’s Graduate School of Design, who advises the federal Commodity Futures Trading Commission on market hazards from climate change. Keenan, who is now an associate professor of real estate at Tulane University’s School of Architecture, had been in the news last year for projecting where people might move to — suggesting that Duluth, Minn., for instance, should brace for a coming real estate boom as climate migrants move north. But like other scientists I’d spoken with, Keenan had been reluctant to draw conclusions about where these migrants would be driven from. Last fall, though, as the previous round of fires ravaged California, his phone began to ring, with private-equity investors and bankers all looking for his read on the state’s future. Their interest suggested a growing investor-grade nervousness about swiftly mounting environmental risk in the hottest real estate markets in the country. It’s an early sign, he told me, that the momentum is about to switch directions. “And **once this flips**,” he added, “**it’s likely to flip very quickly.”** In fact, the correction — a newfound respect for the destructive power of nature, coupled with a sudden disavowal of Americans’ appetite for reckless development — had begun two years earlier, when a frightening surge in disasters offered a jolting preview of how the climate crisis was changing the rules. On October 9, 2017, a wildfire blazed through the suburban blue-collar neighborhood of Coffey Park in Santa Rosa, Calif., virtually in my own backyard. I awoke to learn that more than 1,800 buildings were reduced to ashes, less than 35 miles from where I slept. Inchlong cinders had piled on my windowsills like falling snow. The Tubbs Fire, as it was called, shouldn’t have been possible. Coffey Park is surrounded not by vegetation but by concrete and malls and freeways. So insurers had rated it as “basically zero risk,” according to Kevin Van Leer, then a risk modeler from the global insurance liability firm Risk Management Solutions. (He now does similar work for Cape Analytics.) But Van Leer, who had spent seven years picking through the debris left by disasters to understand how insurers could anticipate — and price — the risk of their happening again, had begun to see other “impossible” fires. After a 2016 fire tornado ripped through northern Canada and a firestorm consumed Gatlinburg, Tenn., he said, “alarm bells started going off” for the insurance industry. What Van Leer saw when he walked through Coffey Park a week after the Tubbs Fire changed the way he would model and project fire risk forever. Typically, fire would spread along the ground, burning maybe 50 percent of structures. In Santa Rosa, more than 90 percent had been leveled. “The destruction was complete,” he told me. Van Leer determined that **the fire had jumped through the forest canopy, spawning 70-mile-per-hour winds that kicked a storm of embers into the modest homes of Coffey Park, which burned at an acre a second as homes ignited spontaneously from the radiant heat. It was the kind of thing that might never have been possible if California’s autumn winds weren’t getting fiercer and drier every year, colliding with intensifying, climate-driven heat and ever-expanding development. “It’s hard to forecast something you’ve never seen before,**” he said. For me, **the awakening to imminent climate risk** came with California’s rolling power blackouts last fall — an effort to pre-emptively avoid the risk of a live wire sparking a fire — which **show**ed me that all my notional perspective about **climate risk and** my own **life choices** were **on a collision course**. After the first one, all the food in our refrigerator was lost. When power was interrupted six more times in three weeks, we stopped trying to keep it stocked. All around us, small fires burned. Thick smoke produced fits of coughing. Then, as now, I packed an ax and a go-bag in my car, ready to evacuate. As former Gov. Jerry Brown said, it was beginning to feel like the “new abnormal.” It was no surprise, then, that California’s property insurers — having watched 26 years’ worth of profits dissolve over 24 months — began dropping policies, or that California’s insurance commissioner, trying to slow the slide, placed a moratorium on insurance cancellations for parts of the state in 2020. In February, the Legislature introduced a bill compelling California to, in the words of one consumer advocacy group, “follow the lead of Florida” by mandating that insurance remain available, in this case with a requirement that homeowners first harden their properties against fire. At the same time, participation in California’s FAIR plan for catastrophic fires has grown by at least 180 percent since 2015, and in Santa Rosa, houses are being rebuilt in the very same wildfire-vulnerable zones that proved so deadly in 2017. Given **that a new study projects a 20 percent increase in extreme-fire-weather days by 2035**, such practices suggest a special form of climate negligence. It’s only a matter of time before homeowners begin to recognize the unsustainability of this approach. Market shock, when driven by the sort of cultural awakening to risk that Keenan observes, can strike a neighborhood like an infectious disease, with fear spreading doubt — and devaluation — from door to door. It happened that way in the foreclosure crisis. By 2060 in Florida and elsewhere, the costs of sea-level rise and hurricanes will be compounded by knock-on economic challenges, from growing crime to falling productivity. Keenan calls the practice of drawing arbitrary lending boundaries around areas of perceived environmental risk “bluelining,” and indeed many of the neighborhoods that banks are bluelining are the same as the ones that were hit by the racist redlining practice in days past. This summer, climate-data analysts at the First Street Foundation released maps showing that **70 percent more buildings in the United States were vulnerable to flood risk than previously thought; most of the underestimated risk was in low-income neighborhoods**. Such neighborhoods see little in the way of flood-prevention investment. My Bay Area neighborhood, on the other hand, has benefited from consistent investment in efforts to defend it against the ravages of climate change. That questions of livability had reached me, here, were testament to Keenan’s belief that the bluelining phenomenon will eventually affect large majorities of equity-holding middle-class Americans too, with broad implications for the overall economy, starting in the nation’s largest state. Under the radar**, a new class of dangerous debt — climate-distressed mortgage loans — might already be threatening the financial system.** Lending data analyzed by Keenan and his co-author, Jacob Bradt, for a study published in the journal Climatic Change in June shows that small **banks are liberally making loans on environmentally threatened homes, but then quickly passing them along to federal mortgage backers**. At the same time, they have all but stopped lending money for the higher-end properties worth too much for the government to accept, suggesting that the banks are knowingly passing climate liabilities along to taxpayers as stranded assets. Once home values begin a one-way plummet, it’s easy for economists to see how entire communities spin out of control. The tax base declines and the school system and civic services falter, creating a negative feedback loop that pushes more people to leave. Rising insurance costs and the perception of risk force credit-rating agencies to downgrade towns, making it more difficult for them to issue bonds and plug the springing financial leaks. Local banks, meanwhile, keep securitizing their mortgage debt, sloughing off their own liabilities. Keenan, though, had a bigger point: All the structural disincentives that had built Americans’ irrational response to the climate risk were now reaching their logical endpoint**. A pandemic-induced economic collapse will** only **heighten** the vulnerabilities **and speed the transition**, reducing to nothing whatever thin margin of financial protection has kept people in place. Until now, the market mechanisms had essentially socialized the consequences of high-risk development. But as the costs rise — and the insurers quit, and the bankers divest, and the farm subsidies prove too wasteful, and so on **— the full weight of responsibility will fall on individual people**. And that’s when the real migration might begin. As I spoke with Keenan last year, I looked out my own kitchen window onto hillsides of parkland, singed brown by months of dry summer heat. This was precisely the land that my utility, Pacific Gas & Electric, had three times identified as such an imperiled tinderbox that it had to shut off power to avoid fire. It was precisely the kind of wildland-urban interface that all the studies I read blamed for heightening Californians’ exposure to climate risks. I mentioned this on the phone and then asked Keenan, “Should I be selling my house and getting — ” He cut me off: “Yes.” Americans have dealt with climate disaster before. The Dust Bowl started after the federal government expanded the Homestead Act to offer more land to settlers willing to work the marginal soil of the Great Plains. Millions took up the invitation, replacing hardy prairie grass with thirsty crops like corn, wheat and cotton. Then, entirely predictably, came the drought. From 1929 to 1934, crop yields across Texas, Oklahoma, Kansas and Missouri plunged by 60 percent, leaving farmers destitute and exposing the now-barren topsoil to dry winds and soaring temperatures. The resulting dust storms, some of them taller than skyscrapers, buried homes whole and blew as far east as Washington. The disaster propelled an exodus of some 2.5 million people, mostly to the West, where newcomers — “Okies” not just from Oklahoma but also Texas, Arkansas and Missouri — unsettled communities and competed for jobs. Colorado tried to seal its border from the climate refugees; in California, they were funneled into squalid shanty towns. Only after the migrants settled and had years to claw back a decent life did some towns bounce back stronger. The places migrants left behind never fully recovered. Eighty years later, Dust Bowl towns still have slower economic growth and lower per capita income than the rest of the country. **Dust Bowl survivors and their children are less likely to go to college and more likely to live in poverty. Climatic change made them poor, and it has kept them poor ever since. A Dust Bowl event will most likely happen again**. The Great Plains states today provide nearly half of the nation’s wheat, sorghum and cattle and much of its corn; the farmers and ranchers there export that food to Africa, South America and Asia**. Crop yields**, though, **will drop sharply with every degree of warming. By 2050,** researchers at the University of Chicago and the NASA Goddard Institute for Space Studies found**, Dust Bowl-era yields will be the norm**, even as demand for scarce water jumps by as much as 20 percent. **Another extreme drought would drive near-total crop losses worse than the Dust Bowl, kneecapping the broader economy**. At that point, the authors write, “abandonment is one option.” Corn and soy production will decrease with every degree of warming. By 2060, parts of Texas may experience a drop in yields of more than 92 percent. Projections are inherently imprecise, but the gradual changes to America’s cropland — plus the steady baking and burning and flooding — suggest that we are already witnessing a slower-forming but much larger replay of the Dust Bowl that will destroy more than just crops. In 2017, Solomon Hsiang, a climate economist at the University of California, Berkeley, led an analysis of the economic impact of climate-driven changes like rising mortality and rising energy costs, finding that **the poorest counties** in the United States — mostly across the South and the Southwest — **will** in some extreme cases **face damages** equal to **more than a third of their gross domestic products**. The 2018 National Climate Assessment also warns that the U.S. economy over all could contract by 10 percent. That kind of loss typically drives people toward cities, and researchers expect that trend to continue after the Covid-19 pandemic ends. In 1950, less than 65 percent of Americans lived in cities. By 2050, only 10 percent will live outside them, in part because of climatic change. By 2100, Hauer estimates, Atlanta, Orlando, Houston and Austin could each receive more than a quarter million new residents as a result of sea-level displacement alone, meaning it may be those cities — not the places that empty out — that wind up bearing the brunt of America’s reshuffling. The World Bank warns that **fast-moving climate urbanization leads to rising unemployment, competition for services and deepening poverty**. So what will happen to Atlanta — a metro area of 5.8 million people that may lose its water supply to drought and that our data also shows will face an increase in heat-driven wildfires? Hauer estimates that hundreds of thousands of climate refugees will move into the city by 2100, swelling its population and stressing its infrastructure. Atlanta — where poor transportation and water systems contributed to the state’s C+ infrastructure grade last year — already suffers greater income inequality than any other large American city**, making it a virtual tinderbox for social conflict.** One in 10 households earns less than $10,000 a year, and rings of extreme poverty are growing on its outskirts even as the city center grows wealthier. Atlanta has started bolstering its defenses against climate change, but in some cases this has only exacerbated divisions. When the city converted an old Westside rock quarry into a reservoir, part of a larger greenbelt to expand parkland, clean the air and protect against drought, the project also fueled rapid upscale growth, driving the poorest Black communities further into impoverished suburbs. That Atlanta hasn’t “fully grappled with” such challenges now, says Na’Taki Osborne Jelks, chair of the West Atlanta Watershed Alliance, means that with more people and higher temperatures, “the city might be pushed to what’s manageable.” So might Philadelphia, Chicago, Washington, Boston and other cities with long-neglected systems suddenly pressed to expand under increasingly adverse conditions. Once you accept that climate change is fast making large parts of the United States nearly uninhabitable, the future looks like this: With time, **the bottom half of the country grows inhospitable, dangerous and hot.** Something like **a tenth of the people who live in the South** and the Southwest — from South Carolina to Alabama to Texas to Southern California — decide to **move north** in search of a better economy and a more temperate environment. **Those who stay behind are disproportionately poor and elderly**. In these places**, heat alone will cause** as many as **80** additional **deaths per 100,000 people** — the nation’s opioid crisis, by comparison, produces 15 additional deaths per 100,000. **The most affected people, meanwhile, will pay 20 percent more for energy, and their crops will yield half as much food or in some cases virtually none at all**. That collective burden will drag down regional incomes by roughly 10 percent, amounting to one of the largest transfers of wealth in American history, as people who live farther north will benefit from that change and see their fortunes rise. The millions of people moving north will mostly head to the cities of the Northeast and Northwest, which will see their populations grow by roughly 10 percent, according to one model. Once-chilly places like Minnesota and Michigan and Vermont will become more temperate, verdant and inviting. Vast regions will prosper; just as Hsiang’s research forecast that Southern counties could see a tenth of their economy dry up, he projects that others as far as North Dakota and Minnesota will enjoy a corresponding expansion. Cities like Detroit, Rochester, Buffalo and Milwaukee will see a renaissance, with their excess capacity in infrastructure, water supplies and highways once again put to good use. One day, it’s possible that a high-speed rail line could race across the Dakotas, through Idaho’s up-and-coming wine country and the country’s new breadbasket along the Canadian border, to the megalopolis of Seattle, which by then has nearly merged with Vancouver to its north. Sitting in my own backyard one afternoon this summer, my wife and I talked through the implications of this looming American future. The facts were clear and increasingly foreboding. Yet there were so many intangibles — a love of nature, the busy pace of life, the high cost of moving — that conspired to keep us from leaving. Nobody wants to migrate away from home, even when an inexorable danger is inching ever closer. They do it when there is no longer any other choice.