# Framework

#### Plan Text: The appropriation of outer space by private entities is unjust.

#### I value morality, as per the evaluative term, ‘ought’ in the resolution.

#### The standard is maximizing expected wellbeing.

#### Prefer utilitarianism because

#### 1] State obligations –governments can only act on aggregates.

Robert **Goodin 90**, [professor of philosophy at the Australian National University college of arts and social sciences], “The Utilitarian Response,” pgs 141-142,

My larger argument turns on the proposition thatthere is something special about the situation of public officials that makes utilitarianism more probable for them than private individuals. Before proceeding with the large argument, I must therefore say what it is that makes it so special about public officials and their situations that make it both more necessary and more desirable for them to adopt a more credible form of utilitarianism.Consider, first, the argument from necessity. Public officials are obliged to make their choices under uncertainty, and uncertainty of a very special sort at that. All choices – public and private alike – are made under some degree of uncertainty, of course. But in the nature of things, private individuals will usually have more complete information on the peculiarities of their own circumstances and on the ramifications that alternative possible choices might have for them. Public officials, in contrast, are relatively poorly informed as to the effects that their choices will have on individuals, one by one. What they typically do know are generalities: averages and aggregates. They know what will happen most often to most people as a result of their various possible choices, but that is all.That is enough to allow public policy-makers to use the utilitarian calculus– assuming they want to use it at all – to choose general rules or conduct.

#### [2] Extinction outweighs

**Pummer 15** [Theron, Junior Research Fellow in Philosophy at St. Anne's College, University of Oxford. “Moral Agreement on Saving the World” Practical Ethics, University of Oxford. May 18, 2015]

There appears to be lot of disagreement in moral philosophy. Whether these many apparent disagreements are deep and irresolvable, I believe there is at least one thing it is reasonable to agree on right now, whatever general moral view we adopt: that it is very important to reduce the risk that all intelligent beings on this planet are eliminated by an enormous catastrophe, such as a nuclear war. How we might in fact try to reduce such existential risks is discussed elsewhere. My claim here is only that we – whether we’re consequentialists, deontologists, or virtue ethicists – should all agree that we should try to save the world. According to consequentialism, we should maximize the good, where this is taken to be the goodness, from an impartial perspective, of outcomes. Clearly one thing that makes an outcome good is that the people in it are doing well. There is little disagreement here. If the happiness or well-being of possible future people is just as important as that of people who already exist, and if they would have good lives, it is not hard to see how reducing existential risk is easily the most important thing in the whole world. This is for the familiar reason that there are so many people who could exist in the future – there are trillions upon trillions… upon trillions. There are so many possible future people that reducing existential risk is arguably the most important thing in the world, even if the well-being of these possible people were given only 0.001% as much weight as that of existing people. Even on a wholly person-affecting view – according to which there’s nothing (apart from effects on existing people) to be said in favor of creating happy people – the case for reducing existential risk is very strong. As noted in this seminal paper, this case is strengthened by the fact that there’s a good chance that many existing people will, with the aid of life-extension technology, live very long and very high quality lives. You might think what I have just argued applies to consequentialists only. There is a tendency to assume that, if an argument appeals to consequentialist considerations (the goodness of outcomes), it is irrelevant to non-consequentialists. But ***that is a huge mistake.*** Non-consequentialism is the view that there’s more that determines rightness than the goodness of consequences or outcomes; ***it is not the view that the latter don’t matter***. Even John Rawls wrote, “All ethical doctrines worth our attention take consequences into account in judging rightness. One which did not would simply be irrational, crazy.” ***Minimally plausible versions of deontology and virtue ethics must be concerned in part with promoting the good***, from an impartial point of view. They’d thus imply very strong reasons to reduce existential risk, at least when this doesn’t significantly involve doing harm to others or damaging one’s character. What’s even more surprising, perhaps, is that even if our own good (or that of those near and dear to us) has much greater weight than goodness from the impartial “point of view of the universe,” indeed even if the latter is entirely morally irrelevant, we may nonetheless have very strong reasons to reduce existential risk. Even egoism, the view that each agent should maximize her own good, might imply strong reasons to reduce existential risk. It will depend, among other things, on what one’s own good consists in. If well-being consisted in pleasure only, it is somewhat harder to argue that egoism would imply strong reasons to reduce existential risk – perhaps we could argue that one would maximize her expected hedonic well-being by funding life extension technology or by having herself cryogenically frozen at the time of her bodily death as well as giving money to reduce existential risk (so that there is a world for her to live in!). I am not sure, however, how strong the reasons to do this would be. But views which imply that, if I don’t care about other people, I have no or very little reason to help them are not even minimally plausible views (in addition to hedonistic egoism, I here have in mind views that imply that one has no reason to perform an act unless one actually desires to do that act). To be minimally plausible, egoism will need to be paired with a more sophisticated account of well-being. To see this, it is enough to consider, as Plato did, the possibility of a ring of invisibility – suppose that, while wearing it, Ayn could derive some pleasure by helping the poor, but instead could derive just a bit more by severely harming them. Hedonistic egoism would absurdly imply she should do the latter. To avoid this implication, egoists would need to build something like the meaningfulness of a life into well-being, in some robust way, where this would to a significant extent be a function of other-regarding concerns (see chapter 12 of this classic intro to ethics). But once these elements are included, we can (roughly, as above) argue that this sort of egoism will imply strong reasons to reduce existential risk. Add to all of this Samuel Scheffler’s recent intriguing arguments (quick podcast version available here) that most of what makes our lives go well would be undermined if there were no future generations of intelligent persons. On his view, my life would contain vastly less well-being if (say) a year after my death the world came to an end. So obviously if Scheffler were right I’d have very strong reason to reduce existential risk. ***We should also take into account moral uncertainty.*** What is it reasonable for one to do, when one is uncertain not (only) about the empirical facts, but also about the moral facts? I’ve just argued that there’s agreement among minimally plausible ethical views that we have strong reason to reduce existential risk – not only consequentialists, but also deontologists, virtue ethicists, and sophisticated egoists should agree. But even those (hedonistic egoists) who disagree should have a significant level of confidence that they are mistaken, and that one of the above views is correct. Even if they were 90% sure that their view is the correct one (and 10% sure that one of these other ones is correct), they would have pretty strong reason, from the standpoint of moral uncertainty, to reduce existential risk. Perhaps most disturbingly still, even if we are only 1% sure that the well-being of possible future people matters, it is at least arguable that, from the standpoint of moral uncertainty, reducing existential risk is the most important thing in the world. Again, this is largely for the reason that there are so many people who could exist in the future – there are trillions upon trillions… upon trillions. (For more on this and other related issues, see this excellent dissertation). Of course, it is uncertain whether these untold trillions would, in general, have good lives. It’s possible they’ll be miserable. It is enough for my claim that there is moral agreement in the relevant sense if, at least given certain empirical claims about what future lives would most likely be like, ***all minimally plausible moral views would converge on the conclusion that we should try to save the world***. While there are some non-crazy views that place significantly greater moral weight on avoiding suffering than on promoting happiness, for reasons others have offered (and for independent reasons I won’t get into here unless requested to), they nonetheless seem to be fairly implausible views. And even if things did not go well for our ancestors, I am optimistic that they will overall go fantastically well for our descendants, if we allow them to. I suspect that most of us alive today – at least those of us not suffering from extreme illness or poverty – have lives that are well worth living, and that things will continue to improve. Derek Parfit, whose work has emphasized future generations as well as agreement in ethics, described our situation clearly and accurately: “We live during the hinge of history. Given the scientific and technological discoveries of the last two centuries, the world has never changed as fast. We shall soon have even greater powers to transform, not only our surroundings, but ourselves and our successors. If we act wisely in the next few centuries, humanity will survive its most dangerous and decisive period. Our descendants could, if necessary, go elsewhere, spreading through this galaxy…. Our descendants might, I believe, make the further future very good. But that good future may also depend in part on us. If our selfish recklessness ends human history, we would be acting very wrongly.” (From chapter 36 of On What Matters)

# Advantage

#### Now onto my first advantage, Space Occupation

#### Space is already almost filled to the brim

**Baker 21** (Harry is a U.K.-based staff writer at Live Science.He is also interested in evolution, climate change, robots, space exploration, environmental conservation and anything that's been fossilized, 11-14-21, “How many satellites orbit Earth?” https://www.livescience.com/how-many-satellites-orbit-earth)

Human-made satellites were once rare in low Earth orbit (LEO), with just a handful of them rotating around the planet at the dawn of the Space Age in the 1950s. But now, there are thousands of satellites swarming around [Earth](https://www.livescience.com/earth.html), with even more waiting to join them.So, to put an exact number on it, how many satellites are orbiting Earth, and how many might join them in the near future? And once all of these satellites are spaceborne, what types of problems might they cause? After the Soviet Union launched [Sputnik](https://www.space.com/17563-sputnik.html), the world's first human-made satellite, in 1957, a slow but steady stream of satellites entered LEO, with between 10 and 60 launched annually until the 2010s, Supriya Chakrabarti, a professor of physics at the University of Massachusetts Lowell, wrote in an article published on [Space.com](https://www.space.com/how-many-satellites-are-orbiting-earth), a Live Science sister site. Since then, that rate has skyrocketed, with more than 1,300 new satellites launched into LEO in 2020 and more than 1,400 satellites launched in 2021, Chakrabarti wrote. In total, there were around 7,500 active satellites in LEO as of September 2021, according to the United Nations' [Outer Space Objects Index](https://www.unoosa.org/oosa/osoindex/index.jspx?lf_id=). **Related:** [**Does the moon rotate?**](https://www.livescience.com/does-moon-rotate.html)The number of satellites in LEO, a region that spans up to 1,424 miles .

#### Private Companies are adding satellites to the little space we have left.

**Stoddard 21 (**Catherine is a Senior Manager in the Forensic, Litigation Support and Valuation Services for Dixon Hughes Goodman, November 16, 2021, “Thousands of satellites, space junk surround Earth and it’s a problem, astronomers say” https://www.fox10phoenix.com/news/thousands-of-satellites-space-junk-surround-earth-and-its-a-problem-astronomers-say)

Since the launch of Sputnik 1 in 1957, the lower orbit around the Earth has become an increasingly congested environment with more than 2,200 satellite launches to date. Those satellites – along with launch vehicle components and debris from mechanical disintegration, collisions and explosions – now fill this region with a “fog” of space debris.And it’s getting busier. In the last few weeks, SpaceX has launched 60 new satellites as part of its Starlink programme. This brings the total to currently around 400 Starlink satellites in low Earth orbit as part of a programme that aims to bring cheap, satellite-based internet access to everyone. Eventually, this programme could place nearly 12,000 satellites in orbit around the Earth. With Amazon, Canada’s Telesat and others planning satellite constellations of similar scale, low Earth orbit is becoming ever more crowded. The debris ranges in size from a few microns to many metres. Stuart Grey, an aerospace engineer at the University of Strathclyde.

#### Too many satellites cause ozone depletion

**Pultarova 21** (She worked as a reporter at the Engineering and Technology magazine, freelanced for a range of publications including Live Science, Space.com, Professional Engineering, Via Satellite and Space News, June 07, 2021, “Air pollution from reentering megaconstellation satellites could cause ozone hole 2.0” https://www.space.com/starlink-satellite-reentry-ozone-depletion-atmosphere)

where We have 54 tonnes (60 tons) of meteoroid material coming in every day," Boley, one of the authors of a paper published May 20 in the journal Scientific Reports, told Space.com. "With the first generation of Starlink, we can expect about 2 tonnes (2.2

tons) of dead satellites reentering Earth's atmosphere daily. But meteoroids are mostly rock, which is made of oxygen, magnesium and silicon. These satellites are mostly aluminum, which the meteoroids contain only in a very small amount, about 1%."have a significant potential to change the chemistry of the upper atmosphere compared to its natural state. But not only that. The burning of aluminum is known to produce aluminum oxide, also known as alumina, which can trigger further unexplored side effects. "Alumina reflects light at certain wavelengths and if you dump enough alumina into the atmosphere, you are going to create scattering and eventually change the albedo of the planet," Boley said. Albedo is the measure of the amount of light that is reflected by a material. In fact, increasing Earth's albedo by pumping certain types of chemicals into the higher layers of the atmosphere has been proposed as a possible geoengineering solution that could slow down global warming. However, Boley said, the scientific community has rejected such experiments because not enough is known about their possible side effects. "Now it looks like we are going to run this experiment without any oversight or regulation," Boley said. "We don't know what the thresholds are, and how that will change the upper atmosphere." The Cygnus re-supply vehicle, which delivers cargo to the International Space Station, burning up in the atmosphere during its reentry. The Cygnus re-supply vehicle, which delivers cargo to the International Space Station, burning up in the atmosphere during its reentry. (Image credit: ESA/Alexander Gerst)The aluminum from re-entering satellites also has a potential to damage the ozone layer, a problem well known to humanity, which has been successfully solved by widespread bans on the use of chlorofluorocarbons, chemicals used in the past in aerosol sprays and refrigerators.

#### Ozone Depletion hurts Biodiversity

**EPA 21** (The Environmental Protection Agency is an independent executive agency of the United States federal government tasked with environmental protection matters, October 18, 2021, “Health and Environmental Effects of Ozone Layer Depletion” https://www.epa.gov/ozone-layer-protection/health-and-environmental-effects-ozone-layer-depletion

Reduced ozone levels as a result of ozone depletion mean less protection from the sun’s rays and more exposure to UVB radiation at the Earth’s surface. Studies have shown that in the Antarctic, the amount of UVB measured at the surface can double during the annual ozone hole. Ozone layer depletion increases the amount of UVB that reaches the Earth’s surface. Laboratory and epidemiological studies demonstrate that UVB causes non-melanoma skin cancer and plays a major role in malignant melanoma development. In addition, UVB has been linked to the development of cataracts, a clouding of the eye’s lens. Because all sunlight contains some UVB, even with normal stratospheric ozone levels, it is always important to protect your skin and eyes from the sun. See a more detailed explanation of health effects linked to UVB exposure. EPA uses the Atmospheric and Health Effects Framework model to estimate the health benefits of stronger ozone layer protection under the Montreal Protocol. Updated information on the benefits of EPA’s efforts to address ozone layer depletion is available in a 2015 report, Updating Ozone Calculations and Emissions Profiles for Use in the Atmospheric and Health Effects Framework Model. UVB radiation affects the physiological and developmental processes of plants. Despite mechanisms to reduce or repair these effects and an ability to adapt to increased levels of UVB, plant growth can be directly affected by UVB radiation. Indirect changes caused by UVB (such as changes in plant form, how nutrients are distributed within the plant, timing of developmental phases and secondary metabolism) may be equally or sometimes more important than damaging effects of UVB. These changes can have important implications for plant competitive balance, herbivory, plant diseases, and biogeochemical cycles. Phytoplankton form the foundation of aquatic food webs. Phytoplankton productivity is limited to the euphotic zone, the upper layer of the water column in which there is sufficient sunlight to support net productivity. Exposure to solar UVB radiation has been shown to affect both orientation and motility in phytoplankton, resulting in reduced survival rates for these organisms. Scientists have demonstrated a direct reduction in phytoplankton production due to ozone depletion-related increases in UVB. UVB radiation has been found to cause damage to early developmental stages of fish, shrimp, crab, amphibians, and other marine animals. The most severe effects are decreased reproductive capacity and impaired larval development. Small increases in UVB exposure could result in population reductions for small marine organisms with implications for the whole marine food chain. Increases in UVB radiation could affect terrestrial and aquatic biogeochemical cycles, thus altering both sources and sinks of greenhouse and chemically important trace gases (e.g., carbon dioxide, carbon monoxide, carbonyl sulfide, ozone, and possibly other gases). These potential changes would contribute to biosphere-atmosphere feedbacks that mitigate or amplify the atmospheric concentrations of these gases. Synthetic polymers, naturally occurring biopolymers, as well as some other materials of commercial interest are adversely affected by UVB radiation. Today's materials are somewhat protected from UVB by special additives. Yet, increases in UVB levels will accelerate their breakdown, limiting the length of time for which they are useful outdoors.

#### Biodiversity loss risks extinction and turns all impacts.

Torres 16 (Phil Torres, ounding director of the X-Risks Institute, an affiliate scholar at the Institute for Ethics and Emerging Technologies, 4-11-2016, “Biodiversity loss: An existential risk comparable to climate change“, Bulletin of the Atomic Scientists, https://thebulletin.org/2016/04/biodiversity-loss-an-existential-risk-comparable-to-climate-change/, accessed 7-22-2019)

Such considerations warrant decoupling biodiversity loss from climate change, because the former has been consistently subsumed by the latter as a mere effect. Biodiversity loss is a distinct environmental crisis with its own unique syndrome of causes, consequences, and solutions—such as restoring habitats, creating protected areas (“biodiversity parks”), and practicing sustainable agriculture.

The sixth extinction. The repercussions of biodiversity loss are potentially as severe as those anticipated from climate change, or even a nuclear conflict. For example, according to a 2015 study published in Science Advances, the best available evidence reveals “an exceptionally rapid loss of biodiversity over the last few centuries, indicating that a sixth mass extinction is already under way.” This conclusion holds, even on the most optimistic assumptions about the background rate of species losses and the current rate of vertebrate extinctions. The group classified as “vertebrates” includes mammals, birds, reptiles, fish, and all other creatures with a backbone.

The article argues that, using its conservative figures, the average loss of vertebrate species was 100 times higher in the past century relative to the background rate of extinction. (Other scientists have suggested that the current extinction rate could be as much as 10,000 times higher than normal.) As the authors write, “The evidence is incontrovertible that recent extinction rates are unprecedented in human history and highly unusual in Earth’s history.” Perhaps the term “Big Six” should enter the popular lexicon—to add the current extinction to the previous “Big Five,” the last of which wiped out the dinosaurs 66 million years ago.

But the concept of biodiversity encompasses more than just the total number of species on the planet. It also refers to the size of different populations of species. With respect to this phenomenon, multiple studies have confirmed that wild populations around the world are dwindling and disappearing at an alarming rate. For example, the 2010 Global Biodiversity Outlook report found that the population of wild vertebrates living in the tropics dropped by 59 percent between 1970 and 2006.

The report also found that the population of farmland birds in Europe has dropped by 50 percent since 1980; bird populations in the grasslands of North America declined by almost 40 percent between 1968 and 2003; and the population of birds in North American arid lands has fallen by almost 30 percent since the 1960s. Similarly, 42 percent of all amphibian species (a type of vertebrate that is sometimes called an “ecological indicator”) are undergoing population declines, and 23 percent of all plant species “are estimated to be threatened with extinction.” Other studies have found that some 20 percent of all reptile species, 48 percent of the world’s primates, and 50 percent of freshwater turtles are threatened. Underwater, about 10 percent of all coral reefs are now dead, and another 60 percent are in danger of dying.

Consistent with these data, the 2014 Living Planet Report shows that the global population of wild vertebrates dropped by 52 percent in only four decades—from 1970 to 2010. While biologists often avoid projecting historical trends into the future because of the complexity of ecological systems, it’s tempting to extrapolate this figure to, say, the year 2050, which is four decades from 2010. As it happens, a 2006 study published in Science does precisely this: It projects past trends of marine biodiversity loss into the 21st century, concluding that, unless significant changes are made to patterns of human activity, there will be virtually no more wild-caught seafood by 2048.

Catastrophic consequences for civilization. The consequences of this rapid pruning of the evolutionary tree of life extend beyond the obvious. There could be surprising effects of biodiversity loss that scientists are unable to fully anticipate in advance. For example, prior research has shown that localized ecosystems can undergo abrupt and irreversible shifts when they reach a tipping point. According to a 2012 paper published in Nature, there are reasons for thinking that we may be approaching a tipping point of this sort in the global ecosystem, beyond which the consequences could be catastrophic for civilization.

As the authors write, a planetary-scale transition could precipitate “substantial losses of ecosystem services required to sustain the human population.” An ecosystem service is any ecological process that benefits humanity, such as food production and crop pollination. If the global ecosystem were to cross a tipping point and substantial ecosystem services were lost, the results could be “widespread social unrest, economic instability, and loss of human life.” According to Missouri Botanical Garden ecologist Adam Smith, one of the paper’s co-authors, this could occur in a matter of decades—far more quickly than most of the expected consequences of climate change, yet equally destructive.

Biodiversity loss is a “threat multiplier” that, by pushing societies to the brink of collapse, will exacerbate existing conflicts and introduce entirely new struggles between state and non-state actors. Indeed, it could even fuel the rise of terrorism. (After all, climate change has been linked to the emergence of ISIS in Syria, and multiple high-ranking US officials, such as former US Defense Secretary Chuck Hagel and CIA director John Brennan, have affirmed that climate change and terrorism are connected.)

The reality is that we are entering the sixth mass extinction in the 3.8-billion-year history of life on Earth, and the impact of this event could be felt by civilization “in as little as three human lifetimes,” as the aforementioned 2012 Nature paper notes. Furthermore, the widespread decline of biological populations could plausibly initiate a dramatic transformation of the global ecosystem on an even faster timescale: perhaps a single human lifetime.

The unavoidable conclusion is that biodiversity loss constitutes an existential threat in its own right. As such, it ought to be considered alongside climate change and nuclear weapons as one of the most significant contemporary risks to human prosperity and survival.

#### Causes extinction – coral reefs provide shelter, healthcare developments, and 80% of the world’s oxygen

Kevin Loria 18, health reporter for Consumer Reports, 4/12/18, “The quest to save the fragile reefs Earth’s oceans depend on,” https://www.businessinsider.com/coral-reef-bleaching-ocean-acidification-solutions-2018-4

Repairing reefs matters to our survival on Earth.

**If reefs collapse, the rippling effects could leave** much of the ocean lifeless**. Human and animal populations that depend on fishing would be** devastated, as would places that rely on tourism dollars from ocean activities. **Beachfront communities that need reefs to protect them from** storm surges **would be left far more exposed.**

**We’ve also found new** cancer drugs, painkillers, and antiviral therapies **from organisms that live in reefs. Without them many potential discoveries could be lost.**

Michael Crosby, a marine scientist and the president of Mote Laboratory and Aquarium, is blunt about how the dire situation affects everyone.

“You like to breathe?” he asked. “Estimates are that up to **80% of the oxygen you are breathing in right now comes from the ocean**. It doesn’t come from the land.

"**In order for you to continue to breathe, you have to have a healthy ocean**,” Crosby said.

#### Rockets being tested and launched this frequently for commercial use significantly increases emissions and quickens climate change

Gammon 21 (Katherine Gammom, I’m an award-winning independent science journalist based in Santa Monica, California. My interests range from culture and nature in public lands to the lives of scientists to the complexity of baby brains. Before I became a professional journalist, I served in the Peace Corps in Bulgaria, and attended MIT and Princeton University. My work has appeared in *The New York Times, The Atlantic, WIRED, The Guardian, Undark, Popular Science, MIT Technology Review, Nature, Hakai*and beyond. Every year I try to gain some new reporting or writing skill. Some of the fellowships I’ve received include a [2020 Society for Environmental Journalists fellowship](https://www.sej.org/fej-grantees-winter-2019),  [2017 Columbia University Reporting Fellowship on Early Childhood Development](https://dartcenter.org/events/2017/03/reporting-resources-early-childhood-experience-developing-brain),  [2014 National Health Journalism Fellowship](https://www.centerforhealthjournalism.org/users/kategammon), [2013 MIT Knight Science Bootcamp](http://ksj.mit.edu/seminars-news/news/2013-food-boot-camp-fellows-announced), the [2012 Woods Hole Ocean Science Journalism Fellowship](http://www.whoi.edu/news-release/whoi-announces-2012-ocean-science-journalism-fellows), a [2013 National Press Foundation Fellowship](https://sciwrite.mit.edu/news/katharine-gammon-receives-national-press-foundation-fellowship), a 2011 Fellowship from the National Institute on Drug Abuse, and others. I recently [won an award](https://medium.com/scishortform/best-shortform-science-writing-january-march-2019-76f09d256db7) for an investigation I wrote for *The Guardian* about the ecological recovery of Joshua Tree National Park after the government shutdown. “How the billionaire space race could be one giant leap for pollution”, The Gaurdian, July 19, 2021,<https://www.theguardian.com/science/2021/jul/19/billionaires-space-tourism-environment-emissions>)//SD

Last week [Virgin Galactic](https://www.theguardian.com/science/virgin-galactic) took Richard Branson past the edge of space, roughly 86 km up – part of a new space race with the Amazon billionaire Jeff Bezos, who aims to make a similar journey on Tuesday. Both very wealthy businessmen hope to vastly expand the number of people in space. “We’re here to make space more accessible to all,” [said Branson](https://www.reuters.com/lifestyle/science/virgin-galactics-branson-ready-space-launch-aboard-rocket-plane-2021-07-11/), shortly after his flight. “Welcome to the dawn of a new space age.” Already, people are buying tickets to space. Companies including [SpaceX](https://www.theguardian.com/science/spacex), Virgin Galactic and Space Adventures want to make space tourism more common. The Japanese billionaire Yusaku Maezawa spent an undisclosed sum of money with SpaceX in 2018 for a possible future private trip around the moon and back. And this June, an anonymous space lover paid $28m to fly on Blue Origin’s New Shepard with Bezos – though later backed out due to a [“scheduling conflict”](https://www.npr.org/2021/07/15/1016510564/blue-origin-space-18-year-old-bezos-oliver-daemen-netherlands). But this launch of a new private space industry that is cultivating tourism and popular use could come with vast environmental costs, says Eloise Marais, an associate professor of physical geography at University College London. Marais studies the impact of fuels and industries on the atmosphere. When rockets launch into space, they require a huge amount of propellants to make it out of the Earth’s atmosphere. For SpaceX’s Falcon 9 rocket, it is kerosene, and for Nasa it is liquid hydrogen in their new [Space](https://www.theguardian.com/science/space) Launch System. Those fuels emit a variety of substances into the atmosphere, including carbon dioxide, water, chlorine and other chemicals. The carbon emissions from rockets are small compared with the aircraft industry, she says. But they are increasing at nearly 5.6% a year, and Marais has been running a simulation for a decade, to figure out at what point will they compete with traditional sources we are familiar with. “For one long-haul plane flight it’s one to three tons of carbon dioxide [per passenger],” says Marais. For one rocket launch 200-300 tonnes of carbon dioxide are split between 4 or so passengers, according to Marais. “So it doesn’t need to grow that much more to compete with other sources.” Right now, the number of rocket flights is very small: in the whole of 2020, for instance, there were 114 attempted orbital launches in the world, according to Nasa. That compares with the airline industry’s more than 100,000 flights each day on average. But emissions from rockets are emitted right into the upper atmosphere, which means they stay there for a long time: two to three years. Even water injected into the upper atmosphere – where it can form clouds – can have warming impacts, says Marais. “Even something as seemingly innocuous as water can have an impact.” Closer to the ground, all fuels emit huge amounts of heat, which can add ozone to the troposphere, where it acts like a greenhouse gas and retains heat. In addition to carbon dioxide, fuels like kerosene and methane also produce soot. And in the upper atmosphere, the ozone layer can be destroyed by the combination of elements from burning fuels. “While there are a number of environmental impacts resulting from the launch of space vehicles, the depletion of stratospheric ozone is the most studied and most immediately concerning,” wrote Jessica Dallas, a senior policy adviser at the New Zealand Space Agency, in an analysis of [research on space launch emissions](https://www.sciencedirect.com/science/article/abs/pii/S0959652620302560) published last year. Another [report from 2019](https://aerospace.org/sites/default/files/2018-05/RocketEmissions_0.pdf) penned by the Center for Space Policy and Strategy likened the space emissions problem to that of space debris, which the authors say creates an existential risk to the industry. “Today, launch vehicle emissions present a distinctive echo of the space debris problem. Rocket engine exhaust emitted into the stratosphere during ascent to orbit adversely impacts the global atmosphere,” they wrote. “We just don’t know how large the space tourism industry could become,” says Marais. A new market report estimates that the global suborbital transportation and space tourism market is estimated to reach $2.58bn in 2031, growing 17.15% each year of the next decade. “The major driving factor for the market’s robustness will be focused efforts to enable space transportation, emerging startups in suborbital transportation, and increasing developments in low-cost launching sites,” the [report](https://www.prnewswire.com/news-releases/outlook-on-the-sub-orbital-transportation-and-space-tourism-global-market-to-2031---featuring-blue-origin-spacex-and-virgin-galactic-among-others-301333701.html) says. In the past, most space transportation has been focused on cargo supply missions to the International Space Station and satellite launch services, but currently, this focus has shifted to in-space transportation, planetary explorations, crewed missions, suborbital transportation and space tourism. Several companies, including SpaceX, Blue Origin and Virgin Galactic, have been focusing on developing platforms such as rocket-powered suborbital vehicles that will enable the industry to carry out suborbital transportation and space tourism.

#### Climate Change is existential

Ng ’19 [Yew-Kwang; May 2019; Professor of Economics at Nanyang Technology University, Fellow of the Academy of Social Sciences in Australia and Member of the Advisory Board at the Global Priorities Institute at Oxford University, Ph.D. in Economics from Sydney University; Global Policy, “Keynote: Global Extinction and Animal Welfare: Two Priorities for Effective Altruism,” vol. 10, no. 2, p. 258-266; RP]

Catastrophic climate change Though by no means certain, CCC causing global extinction is possible due to interrelated factors of non‐linearity, cascading effects, positive feedbacks, multiplicative factors, critical thresholds and tipping points (e.g. Barnosky and Hadly, [2016](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0005); Belaia et al., [2017](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0008); Buldyrev et al., [2010](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0016); Grainger, [2017](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0027); Hansen and Sato, [2012](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0029); IPCC [2014](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0031); Kareiva and Carranza, [2018](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0033); Osmond and Klausmeier, [2017](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0056); Rothman, [2017](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0066); Schuur et al., [2015](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0069); Sims and Finnoff, [2016](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0072); Van Aalst, [2006](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0079)).[7](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-note-1009_67) A possibly imminent tipping point could be in the form of ‘an abrupt ice sheet collapse [that] could cause a rapid sea level rise’ (Baum et al., [2011](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0006), p. 399). There are many avenues for positive feedback in global warming, including: the replacement of an ice sea by a liquid ocean surface from melting reduces the reflection and increases the absorption of sunlight, leading to faster warming; the drying of forests from warming increases forest fires and the release of more carbon; and higher ocean temperatures may lead to the release of methane trapped under the ocean floor, producing runaway global warming. Though there are also avenues for negative feedback, the scientific consensus is for an overall net positive feedback (Roe and Baker, [2007](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0065)). Thus, the Global Challenges Foundation ([2017](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0026), p. 25) concludes, ‘The world is currently completely unprepared to envisage, and even less deal with, the consequences of CCC’. The threat of sea‐level rising from global warming is well known, but there are also other likely and more imminent threats to the survivability of mankind and other living things. For example, Sherwood and Huber ([2010](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0071)) emphasize the adaptability limit to climate change due to heat stress from high environmental wet‐bulb temperature. They show that ‘even modest global warming could … expose large fractions of the [world] population to unprecedented heat stress’ p. 9552 and that with substantial global warming, ‘the area of land rendered uninhabitable by heat stress would dwarf that affected by rising sea level’ p. 9555, making extinction much more likely and the relatively moderate damages estimated by most integrated assessment models unreliably low. While imminent extinction is very unlikely and may not come for a long time even under business as usual, the main point is that we cannot rule it out. Annan and Hargreaves ([2011](https://onlinelibrary-wiley-com.proxy.lib.umich.edu/doi/full/10.1111/1758-5899.12647#gpol12647-bib-0004), pp. 434–435) may be right that there is ‘an upper 95 per cent probability limit for S [temperature increase] … to lie close to 4°C, and certainly well below 6°C’. However, probabilities of 5 per cent, 0.5 per cent, 0.05 per cent or even 0.005 per cent of excessive warming and the resulting extinction probabilities cannot be ruled out and are unacceptable. Even if there is only a 1 per cent probability that there is a time bomb in the airplane, you probably want to change your flight. Extinction of the whole world is more important to avoid by literally a trillion times.

#### AND causes nuclear war

Michael T. Klare 20, Michael T. Klare, The Nation’s defense correspondent, is professor emeritus of peace and world-security studies at Hampshire College and senior visiting fellow at the Arms Control Association in Washington, DC. Most recently, he is the author of All Hell Breaking Loose: The Pentagon’s Perspective on Climate Change., 1-13-2020, "How Rising Temperatures Increase the Likelihood of Nuclear War," Nation, https://www.thenation.com/article/archive/nuclear-defense-climate-change/

President Donald Trump may not accept the scientific reality of climate change, but the nation’s senior military leaders recognize that climate disruption is already underway, and they are planning extraordinary measures to prevent it from spiraling into nuclear war. One particularly worrisome scenario is if extreme drought and abnormal monsoon rains devastate agriculture and unleash social chaos in Pakistan, potentially creating an opening for radical Islamists aligned with elements of the armed forces to seize some of the country’s 150 or so nuclear weapons. To avert such a potentially cataclysmic development, the US Joint Special Operations Command has conducted exercises for infiltrating Pakistan and locating the country’s nuclear munitions. Most of the necessary equipment for such raids is already in position at US bases in the region, according to a 2011 report from the nonprofit Nuclear Threat Initiative. “It’s safe to assume that planning for the worst-case scenario regarding Pakistan’s nukes has already taken place inside the US government,” said Roger Cressey, a former deputy director for counterterrorism in Bill Clinton’s and George W. Bush’s administrations in 2011. Such an attack by the United States would be an act of war and would entail enormous risks of escalation, especially since the Pakistani military—the country’s most powerful institution—views the nation’s nuclear arsenal as its most prized possession and would fiercely resist any US attempt to disable it. “These are assets which are the pride of Pakistan, assets which are…guarded by a corps of 18,000 soldiers,” former Pakistani president Pervez Musharraf told NBC News in 2011. The Pakistani military “is not an army which doesn’t know how to fight. This is an army that has fought three wars. Please understand that.” A potential US military incursion in nuclear-armed Pakistan is just one example of a crucial but little-​discussed aspect of international politics in the early 21st century: how the acceleration of climate change and nuclear war planning may make those threats to human survival harder to defuse. At present, the intersections between climate change and nuclear war might not seem obvious. But powerful forces are pushing both threats toward their most destructive outcomes. In the case of climate change, the unbridled emission of carbon dioxide and other greenhouse gases is raising global temperatures to unmistakably dangerous levels. Despite growing worldwide reliance on wind and solar power for energy generation, the global demand for oil and natural gas continues to rise, and carbon emissions are projected to remain on an upward trajectory for the foreseeable future. It is highly unlikely, then, that the increase in average global temperature can be limited to 1.5 degrees Celsius, the aspirational goal adopted by the world’s governments under the Paris Agreement in 2015, or even to 2°C, the actual goal. After that threshold is crossed, scientists agree, it will prove almost impossible to avert catastrophic outcomes, such as the collapse of the Greenland and Antarctic ice sheets and a resulting sea level rise of 6 feet or more. Climbing world temperatures and rising sea levels will diminish the supply of food and water in many resource-deprived areas, increasing the risk of widespread starvation, social unrest, and human flight. Global corn production, for example, is projected to fall by as much as 14 percent in a 2°C warmer world, according to research cited in a 2018 special report by the UN’s Intergovernmental Panel on Climate Change (IPCC). Food scarcity and crop failures risk pushing hundreds of millions of people into overcrowded cities, where the likelihood of pandemics, ethnic strife, and severe storm damage is bound to increase. All of this will impose an immense burden on human institutions. Some states may collapse or break up into a collection of warring chiefdoms—all fighting over sources of water and other vital resources. A similar momentum is now evident in the emerging nuclear arms race, with all three major powers—China, Russia, and the United States—rushing to deploy a host of new munitions. This dangerous process commenced a decade ago, when Russian and Chinese leaders sought improvements to their nuclear arsenals and President Barack Obama, in order to secure Senate approval of the New Strategic Arms Reduction Treaty of 2010, agreed to initial funding for the modernization of all three legs of America’s strategic triad, which encompasses submarines, intercontinental ballistic missiles, and bombers. (New START, which mandated significant reductions in US and Russian arsenals, will expire in February 2021 unless renewed by the two countries.) Although Obama initiated the modernization of the nuclear triad, the Trump administration has sought funds to proceed with their full-scale production, at an estimated initial installment of $500 billion over 10 years. Even during the initial modernization program of the Obama era, Russian and Chinese leaders were sufficiently alarmed to hasten their own nuclear acquisitions. Both countries were already in the process of modernizing their stockpiles—Russia to replace Cold War–era systems that had become unreliable, China to provide its relatively small arsenal with enhanced capabilities. Trump’s decision to acquire a whole new suite of ICBMs, nuclear-armed submarines, and bombers has added momentum to these efforts. And with all three major powers upgrading their arsenals, the other nuclear-weapon states—led by India, Pakistan, and North Korea—have been expanding their stockpiles as well. Moreover, with Trump’s recent decision to abandon the Intermediate-Range Nuclear Forces (INF) Treaty, all major powers are developing missile delivery systems for a regional nuclear war such as might erupt in Europe, South Asia, or the western Pacific. All things being equal, rising temperatures will increase the likelihood of nuclear war, largely because climate change will heighten the risk of social stress, the decay of nation-states, and armed violence in general, as I argue in my new book, All Hell Breaking Loose. As food and water supplies dwindle and governments come under ever-increasing pressure to meet the vital needs of their populations, disputes over critical resources are likely to become more heated and violent, whether the parties involved have nuclear arms or not. But this danger is compounded by the possibility that several nuclear-armed powers—notably India, Pakistan, and China—will break apart as a result of climate change and accompanying battles over disputed supplies of water. Together, these three countries are projected by the UN Population Division to number approximately 3.4 billion people in 2050, or 34 percent of the world’s population. Yet they possess a much smaller share of the world’s freshwater supplies, and climate change is destined to reduce what they have even further. Warmer temperatures are also expected to diminish crop yields in these countries, adding to the desperation of farmers and very likely resulting in widespread ethnic strife and population displacement. Under these circumstances, climate-related internal turmoil would increase the risk of nuclear war in two ways: by enabling the capture of nuclear arms by rogue elements of the military and their possible use against perceived enemies and by inciting wars between these states over vital supplies of water and other critical resources.