# 1AC R2

### 1AC – Environment

#### Advantage 1 is the environment –

#### Space tourism is coming and will scale up.

Pultarova ‘21 [Tereza Pultarova; Senior Writer @ Space.com, Master's in Science from the International Space University, Bachelor's in Journalism, Master's in Cultural Anthropology from Prague's Charles University; 07-26-2021; “The rise of space tourism could affect Earth's climate in unforeseen ways, scientists worry”; Space.com; https://www.space.com/environmental-impact-space-tourism-flights; Accessed 12-03-2021] AK

Northern Sky Research predicts that the number of space tourism flights will skyrocket over the next decade, from maybe 10 a year in the near future to 360 a year by 2030, Kasaboski said. This estimate is still far below the growth rate that space tourism companies like Virgin Galactic and Blue Origin envision for themselves.

"Demand for suborbital tourism is extremely high," Kasaboski said. "These companies virtually have customers waiting in a line, and therefore they want to scale up. Ultimately, they would want to fly multiple times a day, just like short-haul aircraft do."

#### It’s uniquely dangerous – kills the ozone layer, heats the planet, and is terminally unsustainable.

Noor ‘21 [Dharna Noor; the Boston Globe's climate producer, staff writer at Earther, Gizmodo's climate vertical; 07-19-2021; “Space Tourism Is a Waste”; Gizmodo; https://gizmodo.com/space-tourism-is-a-waste-1847285820; Accessed 12-03-2021] AK

If these billionaires get their way, there will be more of these flights in the future. Virgin Galactic has said it already has $80 million in deposits and sales plunked down for its flights. All three of these men are gunning to make “space tourism” a thing. But it comes with a major cost to the rest of us.

For the super-rich, a few minutes spent experiencing weightlessness and viewing the curvature of the Earth could leave humanity footing an ever-larger carbon pollution bill. It also reflects the increasingly unsustainable levels of inequality and concentration of power, which, coupled with the climate crisis, will lock in suffering for billions. That’s nothing to celebrate.

Neither Bezos nor Branson has been particularly forthcoming about the environmental impact of their flights. But then that’s precisely the problem. The initial climate impact of an individual space tourist flight may be comparatively small, but they will add up. And each flight signals something more ominous to come.

We know those impacts can be large in part because they emit pollution directly into the stratosphere. Studies show this can deplete the ozone layer that protects us from harmful ultraviolet rays and that the world has worked so hard to restore. (For its part, Blue Origin claims its effect on the ozone layer will be minimal.)

Then there are greenhouse emissions to worry about. The VSS Unity winged spaceship that Branson took to space runs on a combination of nitrous oxide and hydroxyl-terminated polybutadiene (HTPB). HTPB is made out of butadiene, which is a byproduct of using steam crackers to turn petroleum or natural gas into ethylene—a highly polluting process that releases emissions that are both toxic and planet-heating.

Bezos’ New Shepard rocket, made by his company Blue Origin, runs on a combination of liquid oxygen and liquid hydrogen. Though neither of those emit carbon when they’re burned, producing liquid hydrogen usually does. Compressing and liquifying the oxygen for the fuel is also an energy-intensive process that, if not done using renewables, results in carbon pollution.

Refining and burning these fuels isn’t just the equivalent of a tank of gas for your car. They’re not even necessarily equal to using jet fuel to hop a coast-to-coast flight.

“The Virgin Galactic flight carried six passengers and reached an altitude of 53 miles [85.3 kilometers], and from information provided by Virgin Galactic, we can estimate that carbon emissions per passenger mile are about 60 times that of a business class flight,” Peter Kalmus, a climate scientist at NASA’s Jet Propulsion Laboratory, said, adding that “more research is needed to understand the full climate impact.”

Branson has said that the emissions from his flight will be offset by investing in projects that suck up carbon elsewhere. But planting trees and encouraging regenerative agriculture doesn’t undo the damage of his joy ride. Forestry offset projects have also proven to be both ineffective and unjust. Blue Origin, meanwhile, has focused on how much less polluting Bezos’ flight will be than Branson’s was.

These flights to the edge of space will add to Bezos’ and Branson’s individual carbon impacts, which are already cartoonishly large thanks to their propensity for behavior such as regularly flying private. (A single private jet trip can emit nearly double the amount of carbon than the average American does in an entire year). But though infuriating, there aren’t that many of these flights taking off, so the overall environmental effects aren’t that big.

“Contemporary attempts to boost suborbital and orbital space tourism (such as those attempted by Virgin Galactic and Blue Origin) are still at an early stage of development,” said Nikolaos Iliopoulos, a doctoral candidate in sustainability at the University of Tokyo who researches space travel’s environmental impact. “Thus, as of today, space tourism presents limited socio-environmental impacts as space tourism vehicles travel to the orbit and back.”

But in the near future, Branson and Bezos as well as Musk want that to change. Branson’s Virgin Atlantic wants to “open space to everyone.” Bezos’ Blue Origin wants to “increase access to space.” And Musk’s SpaceX wants to “make humanity multi-planetary.”

Though these companies all make it sound like the missions are for the masses, the price tags say otherwise. A yet-unnamed person, for instance, paid $28 million to be a passenger on Bezos’ Tuesday trip up to space. (They subsequently and improbably had a scheduling conflict, and an investment firm CEO’s 18-year-old son will take the seat instead.) Future Virgin Galactic flights are priced between $200,000 and $250,000.

Rich people are already responsible for a disproportionate amount of carbon emissions. Just 1% of the global population is responsible for half of the world’s commercial flight emissions. That doesn’t even account for the even more elite select few who can fly private.

“When you look at the aviation sector, private jets are so much worse on a per passenger basis than a regular plane full of economy class passengers just because fewer people are traveling on each one,” said Clare Lakewood, senior legal director at the Center for Biological Diversity. “You put just one or two people in a rocket, and you’ve got something orders of magnitude worse that would supersize the carbon footprints of people that already have the largest ones.”

Globally, individuals in the richest 1% are already responsible for 175 times more greenhouse gas pollution than the average person in the bottom 10%. If space tourism takes off, it could make these disparities even worse.

Don’t get me wrong, there are good reasons for space travel. Without it, we wouldn’t have satellites that help us track dangerous weather and our changing climate. Learning about other planets is important, too, not only for its own sake but also because it helps us understand our own. Observing Venus and Mars has helped scientists better understand the climate crisis on Earth. The search for life beyond Earth also can’t happen without sending probes out into the solar system. Space exploration can even help us understand the beginning of the universe, allowing us better understand our place in it.

But space exploration is not the same as space tourism. While the former is conducted for the worthy goal of understanding what’s beyond our atmosphere, the latter only serves the interest of the super-rich who want a thrill and the billionaires who own the companies that can provide it. It’s one of the most glaring illustrations of rising inequality. What’s more, it could widen the gap further by worsening the climate crisis and forcing the most vulnerable to suffer the impacts while the rich snap space selfies.

Even if we create truly clean fuels someday, using them for space tourism to enriches billionaires is still not sustainable. Concentrated wealth is concentrated power, and concentrated power is bad for the Earth. We’ve seen the democratic decay and the planetary danger posed by putting so much money in the hands of the few. Musk has ignored labor regulations and bullied California officials during the pandemic. (Hundreds of his employees got covid-19.) Bezos has pretended to give a damn about the climate with his venture capital fund—which will inevitably enrich him further—even as Amazon helps oil companies more efficiently extract fossil fuels. Lining the pockets of these men through space tourism will further corrode what we hold dear.

#### Warming causes extinction and turns every impact.

Cribb ‘17 [Julian; Principal of JCA, Fellow of the Australian Academy of Technological Sciences and Engineering, former Director, National Awareness, CSIRO, “The Baker,” Surviving the 21st Century Chapter 4, pg 91-94, dml]

This event, known as the Palaeocene-Eocene Thermal Maximum or PETM, happened only about ten million years after the dinosaurs were smashed by an asteroid impact. This ‘hyperthermal’ period took place quite suddenly (in geological terms)—in less than 2000 years—and lasted for about 170,000 years before the planet again cooled. The heat spike was accompanied by a major wipe-out of ocean life in particular, though most small land mammals survived. Investigating the records of old marine sediments Zeebe was able to show there had been a sharp, 70 %, leap in atmospheric CO 2 concentrations at the time. However, he concluded there was only sufficient carbon available to force the climate to warm by 1–3 °C and that some other mechanism must have been triggered by the initial warming, which then drove the Earth’s temperature to fever pitch, up by another 4–6 °C (Zeebe et al. 2009). This process is the ‘ runaway global warming ‘ which now menaces us.

The significance of PETM is that it appears that about the same volume of carbon was dumped by natural processes into the Earth’s atmosphere and oceans as humans are currently dumping with the burning of fossil fuels and clearing of the world’s forests—about 3 trillion tonnes in all—and it was this that triggered the hyperthermal surge in planetary heating.

As to the mechanism that could suddenly release a huge amount of extra carbon into the atmosphere and oceans and project global temperatures up by 6–9 °C, the most likely explanation is the one described at the start of this chapter—the rapid melting and escape of billions of tonnes of frozen methane, CH 4 , currently locked in tundra and seabed sediments. This phenomenon, dubbed the “clathrate gun ” (Kennett et al. 2003), is now linked by scientists not only with the PETM event but also, according to palaeontologist Peter Ward, with the Great Death of the Permian, the worst annihilation in the history of life on Earth (Ward 2008). The significance of the clathrates is that they consist of methane, a gas that is 72 times more powerful than CO 2 as a climate forcing agent in the short run, and 25 times stronger over a century or so. The clathrates could be released by a process known as ‘ ocean overturning ’, a shift in global current patterns caused by moderate warming, which brings warmer water from the surface down into the depths, to melt the deposits of frozen gas. Unlocking several trillion tonnes of methane would cause global temperatures to rocket upwards sharply. Once such a process gets under way, most experts consider, warming will happen so fast it is doubtful if humans could do anything to stop it even if they instantly ceased all burning of fossil fuels.

This ‘double whammy’ of global warming caused by humans releasing three trillion tonnes of fossil carbon which then precipitates an uncontrollable second phase driven by the melting of all or part of the five trillion tonnes of natural methane deposits (Buff et & Archer 2004) is the principal threat to civilisation in the twenty-first century and, combined with nuclear conflict (Chap. 4), to the survival of the human species.

The IPCC’s fifth report states that the melting of between 37 and 81 % of the world’s tundra permafrost is ‘virtually certain’ adding “There is a high risk of substantial carbon and methane emissions as a result of permafrost thawing ” ((IPCC 2014a), p. 74). This could involve the venting of as much as 920 billion tonnes of carbon. However, the Panel did not venture an estimate for methane emissions from the melting of the far larger seabed clathrates and a number of scientists have publicly criticised the world’s leading climate body for remaining so close-lipped about this mega-threat to human existence. The IPCC’s reticence is thought to be founded on a lack of adequate scientific data to make a pronouncement with confidence—and partly to fear of the mischief which the fossil fuels lobby would make of any premature estimates. However, it critics argue, by the time we know for sure that the Arctic and seabed methane is escaping in large volumes, it will be too late to do anything about it.

The difficulty is that no-one knows how quickly the Earth will heat up, as this depends on something that cannot be scientifically predicted: the behaviour of the whole human species and the timeliness with which we act. Failure to abolish carbon emissions in time will make a 4–5 °C rise in temperature likely. As to what that may mean, here are some eminent opinions :

• Warming of 5 °C will mean the planet can support fewer than 1 billion people—Hans-Joachim Shellnhuber, Potsdam Institute for Climate Impact Research (Kanter 2009)

• With temperature increases of 4–7 °C billions of people will have to move and there will be very severe conflict—Nicholas Stern, London School of Economics (Kanter 2009)

• Food shortages, refugee crises, flooding of major cities and entire island nations, mass extinction of plants and animals, and a climate so drastically altered it may be dangerous for people to work or play outside during the hottest times of the year—IPCC Fifth Assessment (IPCC 2014b)

• Corn and soybean yields in the US may decrease by 63–82 %—Schlenker and Roberts, Arizona State University (Schlenker & Roberts 2009a)

• Up to 35% of the Earth’s species will be committed to extinction—Chris Thomas, University of Leeds (Thomas et al. 2004)

• Total polar melting combined with thermal expansion could involve sea levels eventually rising by 65 m (180 ft), i.e. to the 20th floor of tall buildings, drowning most of the world’s coastal cities and displacing a third or more of the human population (Winkelmann et al. 2015)

• Intensified global instability, hunger, poverty and conflict. Food and water shortages, pandemic disease, disputes over refugees and resources, and destruction by natural disasters in regions across the globe—Chuck Hagel, US Secretary for Defence (Hagel 2014)

• “Almost inconceivable challenges as human society struggles to adapt… billions of people forced to relocate.… worsening tensions especially over resources… armed conflict is likely and nuclear war is possible”— Kurt Campbell, Center for Strategic and International Studies (Campell et al. 2007).

• “Unless we get control of (global warming), it will mean our extinction eventually”—Helen Berry, Canberra University (Snow & Hannam 2014).

#### Independently, ozone depletion causes extinction.

Southampton University ‘20 [University of Southampton; a public research university; 05-27-2020; “Erosion of ozone layer responsible for mass extinction event”; ScienceDaily; https://www.sciencedaily.com/releases/2020/05/200527150158.htm; Accessed 12-03-2021] AK

Now, scientists have found evidence showing it was high levels of UV radiation which collapsed forest ecosystems and killed off many species of fish and tetrapods (our four limbed ancestors) at the end of the Devonian geological period, 359 million years ago. This damaging burst of UV radiation occurred as part of one of the Earth's climate cycles, rather than being caused by a huge volcanic eruption.

The ozone collapse occurred as the climate rapidly warmed following an intense ice age and the researchers suggest that the Earth today could reach comparable temperatures, possibly triggering a similar event. Their findings are published in the journal Science Advances.

The team collected rock samples during expeditions to mountainous polar-regions in East Greenland, which once formed a huge ancient lake bed in the arid interior of the Old Red Sandstone Continent, made up of Europe and North America. This lake was situated in the Earth's southern hemisphere and would have been similar in nature to modern day Lake Chad on the edge of the Sahara Desert.

Other rocks were collected from the Andean Mountains above Lake Titicaca in Bolivia. These South American samples were from the southern continent of Gondwana, which was closer to the Devonian South Pole. They held clues as to what was happening at the edge of the melting Devonian ice sheet, allowing a comparison between the extinction event close to the pole and close to the equator.

Back in the lab, the rocks were dissolved in hydrofluoric acid, releasing microscopic plant spores (like pollen, but from fern like plants that didn't have seeds or flowers) which had lain preserved for hundreds of millions of years. On microscopic examination, the scientists found many of the spores had bizarrely formed spines on their surface -- a response to UV radiation damaging their DNA. Also, many spores had dark pigmented walls, thought to be a kind of protective 'tan', due to increased and damaging UV levels.

The scientists concluded that, during a time of rapid global warming, the ozone layer collapsed for a short period, exposing life on Earth to harmful levels of UV radiation and triggering a mass extinction event on land and in shallow water at the Devonian-Carboniferous boundary.

Following melting of the ice sheets, the climate was very warm, with the increased heat above continents pushing more naturally generated ozone destroying chemicals into the upper atmosphere. This let in high levels of UV-B radiation for several thousand years.

Lead researcher Professor John Marshall, of the University of Southampton's School of Ocean and Earth Science, who is a National Geographic Explorer, comments: "Our ozone shield vanished for a short time in this ancient period, coinciding with a brief and quick warming of the Earth. Our ozone layer is naturally in a state of flux -- constantly being created and lost -- and we have shown this happened in the past too, without a catalyst such as a continental scale volcanic eruption."

During the extinction, plants selectively survived, but were enormously disrupted as the forest ecosystem collapsed. The dominant group of armoured fish became extinct. Those that survived -- sharks and bony fish -- remain to this day the dominant fish in our ecosystems.

These extinctions came at a key time for the evolution of our own ancestors, the tetrapods. These early tetrapods are fish that evolved to have limbs rather than fins, but still mostly lived in water. Their limbs possessed many fingers and toes. The extinction reset the direction of their evolution with the post-extinction survivors being terrestrial and with the number of fingers and toes reduced to five.

Professor Marshall says his team's findings have startling implications for life on Earth today: "Current estimates suggest we will reach similar global temperatures to those of 360 million years ago, with the possibility that a similar collapse of the ozone layer could occur again, exposing surface and shallow sea life to deadly radiation. This would move us from the current state of climate change, to a climate emergency."

#### Space tourism is uniquely bad – irreversibly heats the stratosphere and hurts ag yields.

Pultarova ‘21 [Tereza Pultarova; Senior Writer @ Space.com, Master's in Science from the International Space University, Bachelor's in Journalism, Master's in Cultural Anthropology from Prague's Charles University; 07-26-2021; “The rise of space tourism could affect Earth's climate in unforeseen ways, scientists worry”; Space.com; https://www.space.com/environmental-impact-space-tourism-flights; Accessed 12-03-2021] AK

For Karen Rosenlof, senior scientist at the Chemical Sciences Laboratory at the U.S. National Oceanic and Atmospheric Administration (NOAA), the biggest problem is that rockets pollute the higher layers of the atmosphere — the stratosphere, which starts at an altitude of about 6.2 miles (10 kilometers), and the mesosphere, which goes upward from 31 miles (50 km).

"You are emitting pollutants in places where you don't normally emit it," Rosenlof told Space.com. "We really need to understand. If we increase these things, what is the potential damage?"

So far, the impact of rocket launches on the atmosphere has been negligible, according to Martin Ross, an atmospheric scientist at the Aerospace Corporation who often works with Rosenlof. But that's simply because there have not been that many launches.

"The amount of fuel currently burned by the space industry is less than 1% of the fuel burned by aviation," Ross told Space.com. "So there has not been a lot of research, and that makes sense. But things are changing in a way that suggests that we should learn about this in more detail."

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"Demand for suborbital tourism is extremely high," Kasaboski said. "These companies virtually have customers waiting in a line, and therefore they want to scale up. Ultimately, they would want to fly multiple times a day, just like short-haul aircraft do."

The rate of rocket launches delivering satellites into orbit is expected to grow as well. But Kasaboski sees bigger potential for growth in space tourism.

"It's like the difference between a cargo flight and a passenger flight," Kasaboski said. "There's a lot more passengers that are looking to fly."

The problem is, according to Ross, that the scientific community has no idea and not enough data to tell at what point rocket launches will start having a measurable effect on the planet's climate. At the same time, the stratosphere is already changing as the number of rocket launches sneakily grows.

"The impacts of these [rocket-generated] particles are not well understood even to an order of magnitude, the factor of 10," Ross said. "The uncertainty is large, and we need to narrow that down and predict how space might be impacting the atmosphere."

NASA's space shuttle Atlantis launches on July 8, 2011, kicking off STS-135, the final mission of the shuttle program.

Space shuttle's ozone holes

So far, the only direct measurements of the effects of rocket launches on chemical processes in the atmosphere come from the space shuttle era. In the 1990s, as the world was coming together to salvage the damaged ozone layer, NASA, NOAA and the U.S. Air Force put together a campaign that looked at the effects of the emissions from the space shuttle's solid fuel boosters on ozone in the stratosphere.

"In the 1990s, there were significant concerns about chlorine from solid rocket motors," Ross said. "Chlorine is the bad ~~guy~~ to ozone in the stratosphere, and there were some models which suggested that ozone depletion from solid rocket motors would be very significant."

The scientists used NASA's WB 57 high-altitude aircraft to fly through the plumes generated by the space shuttle rockets in Florida. Reaching altitudes of up to 60,000 feet (19 km), they were able to measure the chemical reactions in the lower stratosphere just after the rockets' passage.

"One of the fundamental questions was how much chlorine is being made in these solid rocket motors and in what form," David Fahey, the director of the Chemical Sciences Laboratory at NOAA, who led the study, told Space.com. "We measured it several times and then analyzed the results. At that time, there were not enough space shuttle launches to make a difference globally, but locally one could deplete the ozone layer due to this diffuse plume [left behind by the rocket]."

The space shuttle retired 10 years ago, but rockets generating ozone-damaging substances continue launching humans and satellites to space today.

In fact, in 2018, in its latest Scientific Assessment of Ozone Depletion, which comes out every four years, the World Meteorological Organization included rockets as a potential future concern. The organization called for more research to be done as the number of launches is expected to increase.

Worse than geoengineering

Rosenlof's team studies the broader effects of human-made substances in the higher layers of the atmosphere using powerful NOAA supercomputers. The work is akin to predicting the proverbial butterfly effect, the influence of minuscule changes in the chemistry of the air tens of miles above Earth on climate and weather patterns on the ground. For her, black carbon, or soot, emitted by rockets burning hydrocarbon fuels, is of particular concern.

"The problem with soot is that it absorbs ultraviolet light, and that means that it could heat the stratosphere," Rosenlof said. "When you start heating the stratosphere, the layer above the troposphere [closest to the ground], you start changing the motion in the stratosphere. You are changing the energy transfer, and that could actually affect what is happening on the ground."

Rosenlof points out that many of the particles generated by some rockets have been of interest to scientists due to the possible effects they could have on the global climate in a different context — that of geoengineering, the deliberate tampering with the atmosphere with the aim of stopping or mitigating global warming.

Rosenlof recently co-authored a paper that used the same powerful NOAA supercomputers to model what the scientists call a climate intervention. The team was interested in the climate effects of dispersing sulfur dioxide particles, which are known to reflect light away from Earth, in combination with soot (which is also part of rocket emissions) in the lower stratosphere. Soot absorbs energy from sunlight and pushes the sulfur dioxide aerosol particles to a higher altitude by warming up the surrounding air. At that higher altitude, the sulfur dioxide can start its climate-cooling work. The experiment modeled what would happen when 1.1 million tons of sunlight-reflecting sulfur dioxide mixed with 11,000 tons of black carbon were released in the upper troposphere by aircraft over a 10-day period.

The study didn't find any significant negative effects on weather on Earth. Yet, those results do not dispel Rosenlof's concerns about the possible risks associated with the growing number of rocket launches.

Altering the jet stream

"Black carbon in the geoengineering experiment that we did isn't as high as the stuff from these rockets," she said. "The problem is that the higher you go, the longer something lasts. Neither of them is ideal, because either of them would produce heating in places where we don't have heating right now."

According to Maggi, the soot particles generated by hybrid rocket engines are extremely small and light-weight. In fact, when he and his colleagues tried to measure the soot output of hybrid rocket engines in a laboratory, they couldn't reliably do it with precision because of the particles' minuscule size.

"We were able to measure the particle output from solid rocket motors," Maggi said. "These are about a micron in size, and there [are] a lot of them. But because they are large, they fall to the ground more quickly. In hybrid rocket engines, we were not able to collect the soot from the plume because it's extremely fine, a few nanometres in size."

Maggi fears these particles could, in fact, stay in the stratosphere forever.

"They have the same size as the carbon emitted by aircrafts," Maggi said. "And we know that there is a layer of carbon in the atmosphere at the flight level of aircrafts which is staying there. It's very likely that particles coming from rocket motors will do the same."

The accumulation of these particles over years and decades is what worries the scientists. Just as the current climate crisis started relatively slowly as the amount of carbon released into the atmosphere grew, the pollution in the stratosphere may only start causing harm some years down the road.

Rosenlof added that in the long term, injecting pollutants into the stratosphere could alter the polar jet stream, change winter storm patterns or affect average rainfall.

"You might go from 25 inches [64 centimeters] a year to 20 inches [51 cm] a year in some places, which maybe doesn't sound like that big of a deal unless you are a farmer trying to grow your wheat right there," Rosenlof said. "Then a subtle change in rainfall can impact your crop yields."

**Yield increases are key to avoid food shortages, which go nuclear.**

**FDI 12**. A Research Institute providing strategic analysis of Australia’s global interests; citing Lindsay Falvery, PhD in Agricultural Science and former Professor, University of Melbourne. “Food and Water Insecurity: International Conflict Triggers & Potential Conflict Points.” May 25. <http://www.futuredirections.org.au/workshop-papers/537-international-conflict-triggers-and-potential-conflict-points-resulting-from-food-and-water-insecurity.html>

There is a growing appreciation that the conflicts in the next century will **most likely** be fought over a lack of resources.

Yet, in a sense, this is not new. Researchers point to the **French and Russian revolutions** as conflicts induced by a lack of food. More recently, **Germany’s World War Two efforts** are said to have been inspired, at least in part, by its perceived need to gain access to more food. Yet the general sense among those that attended FDI’s recent workshops, was that the **scale** of the problem in the future could be **significantly greater** as a result of population pressures, changing weather, urbanisation, migration, loss of arable land and other **farm inputs**, and increased affluence in the developing world.

In his book, Small Farmers Secure Food, Lindsay Falvey, a participant in FDI’s March 2012 workshop on the issue of food and conflict, clearly expresses the problem and why countries across the globe are starting to take note.

He writes (p.36), “…if people are hungry, especially in cities, **the state is not stable** – riots, violence, breakdown of law and order and migration result.” ¶ “Hunger feeds anarchy.”

This view is also shared by Julian Cribb, who in his book, The Coming Famine, writes that if “large regions of the world run short of food, land or water in the decades that lie ahead, then **wholesale, bloody wars are liable to follow**.”

He continues: “An increasingly credible scenario for **World War 3** is not so much a confrontation of super powers and their allies, as a **festering, self-perpetuating chain of resource conflicts**.” He also says: “The wars of the 21st Century are less likely to be global conflicts with sharply defined sides and huge armies, than a scrappy mass of failed states, rebellions, civil strife, insurgencies, terrorism and genocides, sparked by bloody competition over dwindling resources.”

As another workshop participant put it, people do not go to war to kill; they go to war over resources, either to protect or to gain the resources for themselves.

Another observed that hunger results in passivity not conflict. Conflict is over resources, not because people are going hungry.

A **study** by the **I**nternational **P**eace **R**esearch **I**nstitute indicates that where **food security** is an issue, it is more **likely** to result in some form of conflict. **Darfur, Rwanda, Eritrea and the Balkans** experienced such wars. Governments, especially in developed countries, are increasingly aware of this phenomenon. The UK Ministry of Defence, the CIA, the US **C**enter for **S**trategic and **I**nternational **S**tudies and the Oslo Peace Research Institute, **all identify** famine as a potential trigger for conflicts and possibly even **nuclear war**.

#### Extinction.

Starr ’17 (Steven; director of the University of Missouri’s Clinical Laboratory Science Program, senior scientist at the Physicians for Social Responsibility, Associate member of the Nuclear Age Peace Foundation, expert in the environmental consequences of nuclear war; 1/9/17; “Turning a Blind Eye Towards Armageddon — U.S. Leaders Reject Nuclear Winter Studies”; <https://fas.org/2017/01/turning-a-blind-eye-towards-armageddon-u-s-leaders-reject-nuclear-winter-studies/>; Federation of American Scientists; accessed 11/24/18; TV)

The detonation of an atomic bomb with this explosive power will instantly ignite fires over a surface area of three to five square miles. In the recent studies, the scientists calculated that the blast, fire, and radiation from a war fought with 100 atomic bombs could produce direct fatalities comparable to all of those worldwide in World War II, or to those once estimated for a “counterforce” nuclear war between the superpowers. However, the long-term environmental effects of the war could significantly disrupt the global weather for at least a decade, which would likely result in a vast global famine. The scientists predicted that nuclear firestorms in the burning cities would cause at least five million tons of black carbon smoke to quickly rise above cloud level into the stratosphere, where it could not be rained out. The smoke would circle the Earth in less than two weeks and would form a global stratospheric smoke layer that would remain for more than a decade. The smoke would absorb warming sunlight, which would heat the smoke to temperatures near the boiling point of water, producing ozone losses of 20 to 50 percent over populated areas. This would almost double the amount of UV-B reaching the most populated regions of the mid-latitudes, and it would create UV-B indices unprecedented in human history. In North America and Central Europe, the time required to get a painful sunburn at mid-day in June could decrease to as little as six minutes for fair-skinned individuals. As the smoke layer blocked warming sunlight from reaching the Earth’s surface, it would produce the coldest average surface temperatures in the last 1,000 years. The scientists calculated that global food production would decrease by 20 to 40 percent during a five-year period following such a war. Medical experts have predicted that the shortening of growing seasons and corresponding decreases in agricultural production could cause up to two billion people to perish from famine. The climatologists also investigated the effects of a nuclear war fought with the vastly more powerful modern thermonuclear weapons possessed by the United States, Russia, China, France, and England. Some of the thermonuclear weapons constructed during the 1950s and 1960s were 1,000 times more powerful than an atomic bomb. During the last 30 years, the average size of thermonuclear or “strategic” nuclear weapons has decreased. Yet today, each of the approximately 3,540 strategic weapons deployed by the United States and Russia is seven to 80 times more powerful than the atomic bombs modeled in the India-Pakistan study. The smallest strategic nuclear weapon has an explosive power of 100,000 tons of TNT, compared to an atomic bomb with an average explosive power of 15,000 tons of TNT. Strategic nuclear weapons produce much larger nuclear firestorms than do atomic bombs. For example, a standard Russian 800-kiloton warhead, on an average day, will ignite fires covering a surface area of 90 to 152 square miles. A war fought with hundreds or thousands of U.S. and Russian strategic nuclear weapons would ignite immense nuclear firestorms covering land surface areas of many thousands or tens of thousands of square miles. The scientists calculated that these fires would produce up to 180 million tons of black carbon soot and smoke, which would form a dense, global stratospheric smoke layer. The smoke would remain in the stratosphere for 10 to 20 years, and it would block as much as 70 percent of sunlight from reaching the surface of the Northern Hemisphere and 35 percent from the Southern Hemisphere. So much sunlight would be blocked by the smoke that the noonday sun would resemble a full moon at midnight. Under such conditions, it would only require a matter of days or weeks for daily minimum temperatures to fall below freezing in the largest agricultural areas of the Northern Hemisphere, where freezing temperatures would occur every day for a period of between one to more than two years. Average surface temperatures would become colder than those experienced 18,000 years ago at the height of the last Ice Age, and the prolonged cold would cause average rainfall to decrease by up to 90%. Growing seasons would be completely eliminated for more than a decade; it would be too cold and dark to grow food crops, which would doom the majority of the human population. NUCLEAR WINTER IN BRIEF The profound cold and darkness following nuclear war became known as nuclear winter and was first predicted in 1983 by a group of NASA scientists led by Carl Sagan. During the mid-1980s, a large body of research was done by such groups as the Scientific Committee on Problems of the Environment (SCOPE), the World Meteorological Organization, and the U.S. National Research Council of the U.S. National Academy of Sciences; their work essentially supported the initial findings of the 1983 studies. The idea of nuclear winter, published and supported by prominent scientists, generated extensive public alarm and put political pressure on the United States and Soviet Union to reverse a runaway nuclear arms race, which, by 1986, had created a global nuclear arsenal of more than 65,000 nuclear weapons. Unfortunately, this created a backlash among many powerful military and industrial interests, who undertook an extensive media campaign to brand nuclear winter as “bad science” and the scientists who discovered it as “irresponsible.” Critics used various uncertainties in the studies and the first climate models (which are primitive by today’s standards) as a basis to criticize and reject the concept of nuclear winter. In 1986, the Council on Foreign Relations published an article by scientists from the National Center for Atmospheric Research, who predicted drops in global cooling about half as large as those first predicted by the 1983 studies and described this as a “nuclear autumn.” The nuclear autumn studies were later shown to be deeply flawed, but the proof came too late to stop a massive smear campaign that effectively discredited the initial studies. Nuclear winter was subject to criticism and damning articles in the Wall Street Journal and Time magazine. In 1987, the National Review called nuclear winter a “fraud.” In 2000, Discover Magazine published an article that described nuclear winter as one of “The Twenty Greatest Scientific Blunders in History.” The endless smear campaign was successful; the general public, and even most anti-nuclear activists, were left with the idea that nuclear winter had been scientifically disproved. REJECTION BY LEADERS Yet the scientists did not give up. In 2006, they returned to their labs to perform the research I have previously described. Their new research not only upheld the previous findings but also found that the earlier studies actually underestimated the environmental effects of nuclear war. Dr. Robock of Rutgers and Dr. Toon of the University of Colorado have spent years attempting to bring official attention to their work and get follow-up research studies done by appropriate agencies in the federal government. In a recent (2016) interview, Dr. Toon stated: The Department of Energy and the Department of Defense, which should be investigating this problem, have done absolutely nothing. They have not published a single paper, in the open literature, analyzing this problem … We have made a list of where we think the important issues are, and we have gone to every [federal] agency we can think of with these lists, and said “Don’t you think someone should study this?” Basically, everyone we have tried so far has said, “Well that’s not my job.” In the same interview, Dr. Robock also noted: The Department of Homeland Security really should fund this. They will fund you to study one terrorist bomb in New York City. When you explain to them that a war between India and Pakistan is a much greater threat to the U.S. homeland than one terrorist bomb, as horrible as that is, they respond with “Oh, well that’s not my job, go talk to some other program manager” — who, of course, doesn’t exist. After the more recent series of studies were published in 2007 and 2008, Drs. Robock and Toon also made a number of requests to meet with members of the Obama administration. The scientists offered to brief Cabinet members and the White House staff about their findings, which they assumed would have a great impact upon nuclear weapons policy. Their offers were met with indifference. Finally, after several years of trying, Drs. Robock and Toon were allowed an audience with John Holdren, Senior Advisor to President Barack Obama on Science and Technology. Dr. Robock also eventually met with Rose Gottemoeller, then Under Secretary of State for Arms Control and International Security. Dr. Robock has written to me that, after these meetings, he and Dr. Toon were left with the impression that neither Holdren nor Gottemoeller think the nuclear winter research “is correct.” But it is not only Holdren and Gottemoeller who reject the nuclear winter research. Greg Mello, of the Los Alamos Study Group, cites a source who confirms that the group that determines the “full range of activities related to the development, production, maintenance (upkeep) and elimination (retirement, disassembly and disposal) of all United States nuclear weapons — the members of the U.S. Nuclear Weapons Council — have stated that “the predictions of nuclear winter were disproved years ago.” The members of the U.S. Nuclear Weapons Council include: Under Secretary of Defense for Acquisition, Technology, and Logistics Vice Chairman of the Joint Chiefs of Staff Under Secretary for Nuclear Security of the Department of Energy Under Secretary of Defense for Policy Commander of the United States Strategic Command It is important to understand that some members of this group — especially the Commander of the U.S. Strategic Command (USSTRATCOM) — also develop the policies that guide the use of nuclear weapons. Perhaps General John Hyten, Head of USSTRATCOM, who is in charge of the U.S. nuclear triad, and General Paul Selva, Vice Chairman of the Joint Chiefs of Staff, the second highest ranking officer in the United States, have never seen or heard of the 21st century nuclear winter studies. Perhaps when they hear a question about “nuclear winter,” they only remember the smear campaigns done against the early studies. Or, maybe, they just choose not to accept the new scientific research on nuclear winter, despite the fact that it has withstood the criticism of the global scientific community. Regardless, the rejection of nuclear winter research by the top leaders of the United States raises some profoundly important questions: Do U.S. military and political leaders fully understand the consequences of nuclear war? Do they realize that even a “successful” nuclear first-strike against Russia could cause most Americans to die from nuclear famine? In 2010, Drs. Toon and Robock wrote in Physics Today: We estimate that the direct effects of using the 2012 arsenals would lead to hundreds of millions of fatalities. The indirect effects would likely eliminate the majority of the human population. In 2013, Drs. Toon and Robock wrote in the Bulletin of Atomic Scientists that: A nuclear war between Russia and the United States, even after the arsenal reductions planned under New START, could produce a nuclear winter. Hence, an attack by either side could be suicidal, resulting in Self-Assured Destruction. RENEWED COLD WAR Although president-elect Trump appears to favor a return to the policy of détente with Russia, many if not most U.S. political leaders appear to support the Obama administration’s policies of direct confrontation with Putin’s Russia. Mainstream corporate media, including the editorial boards of The New York Times and The Washington Post, routinely engage in anti-Russian and anti-Putin rhetoric that surpasses the hate speech of the McCarthy era. Under President Obama, the United States has renewed the Cold War with Russia, with little or no debate or protest, and has subsequently engaged in proxy wars with Russia in Ukraine and Syria, as well as threatening military action against China in the South China Sea. In response to what NATO leaders describe as Russia’s “dangerous and aggressive actions,” NATO has built up a “rapid-response force” of 40,000 troops on the Russian border in the Baltic States and Poland. This force includes hundreds of tanks, armored vehicles, and heavy artillery. NATO troops stationed in Estonia are within artillery range of St. Petersburg, the second largest city of Russia. The United States has deployed its Aegis Ashore Ballistic Missile Defense (BMD) system in Romania and is constructing another such BMD system in Poland. The Mark 41 launch system used in the Aegis Ashore systems can be used to launch a variety of missiles, including long-range nuclear-armed cruise missiles. In other words, the United States has built and is building launch sites for nuclear missiles on the Russian border. This fact has been widely reported on Russian TV and has infuriated the Russian public. In June, Russian President Putin specifically warned that Russia would be forced to retaliate against this threat. While Russian officials maintain that its actions are normal and routine, Russia now appears to be preparing for war. On October 5, 2016, Russia conducted a nation-wide civil defense drill that included 40 million of its people being directed to fallout shelters. Reuters reported two days later that Russia had moved its Iskander nuclear-capable missiles to Kaliningrad, which borders Poland. While the United States ignores the danger of nuclear war, Russian scholar Stephen Cohen reports that the danger of war with the United States is the leading news story in Russia. Cohen states: Just as there is no discussion of the most existential question of our time, in the American political class — the possibility of war with Russia — it is the only thing being discussed in the Russian political class . . . These are two different political universes. In Russia, all the discussion in the newspapers, and there is plenty of free discussion on talk show TV, which echoes what the Kremlin is thinking, online, in the elite newspapers, and in the popular broadcasts, the number 1, 2, 3, and 4 topics of the day are the possibility of war with the United States. Cohen goes on to say: I conclude from this that the leadership of Russia actually believes now, in reaction to what the United States and NATO have said and done over the last two years, and particularly in reaction to the breakdown of the proposed cooperation in Syria, and the rhetoric coming out of Washington, that war is a real possibility. I can’t remember when, since the Cuban Missile Crisis, that the Moscow leadership came to this conclusion in its collective head. Perhaps this narrative will change under president-elect Trump. However, he is inheriting a situation fraught with danger, which retains the possibility of direct military conflict with Russia in Ukraine and Syria, as well as increasingly militarized confrontation with China in the South China Sea. My own personal assessment of the state of the nuclear danger today is that it is profound. The United States is sleepwalking towards nuclear war. Our leaders have turned a blind eye to the scientifically predicted consequences of nuclear war, and our military appears to be intent on making “Russia back down.” This is a recipe for unlimited human disaster. It is still not too late to seek dialogue, diplomacy, and détente with Russia and China, and to create a global dialogue about the existential dangers of nuclear war. We must return to the understanding that nuclear war cannot be won and must not be fought. This can be achieved if our political and military leaders listen to the warnings from the scientific community about the long-term global environmental consequences of nuclear war. President-elect Trump and President Putin must publically acknowledge and discuss the peer-reviewed studies that predict a U.S.-Russian nuclear war will likely wipe out most of the human race. All nations and peoples have a vested interest in eliminating the nuclear arsenals that continue to threaten their existence.

### 1AC – Debris

#### Advantage 2 is space debris –

#### Increased space tourism pushes debris over the brink – that wrecks satellites.

Tehrani ‘21 [James Tehrani; Spark‘s editor-in-chief, an award-winning writer and editor; 04-01-2021; “Space Junk: A Safety and Sustainability Problem Moving at 18,000 MPH”; Spark; https://sphera.com/spark/space-junk-a-safety-and-sustainability-problem-moving-at-18000-mph/; Accessed 12-26-2021] AK

Most of the current debris is found in the low Earth orbit (LEO), which is about 600 to 1,200 miles (1,000 to 2,000 kilometers) above the planet. NASA calls LEO an “orbital space junkyard.” The junk isn’t sitting idly in a landfill; it is moving around at speeds up to 18,000 mph (29,000 kph), or 23 times the speed of sound.

While the Inter-Agency Space Debris Coordination Committee was designed to coordinate space debris efforts, there are currently no international laws in place regarding removing space debris. Since a single satellite can cost between $50 million and $400 million, the risk of damage from space debris to a satellite is clearly significant. And as more debris is left behind, there is obviously more risk of collisions, especially when space tourism picks up. The orbiting junk was explored in the 2013 film “Gravity,” starring George Clooney and Sandra Bullock; it’s known as the Kessler Effect.

Don Kessler, the former NASA scientist who studied space debris even told the Guardian back in 2011 in regard to formulating a plan to deal with space junk: “The longer you wait to do this, the more expensive it’s going to be. … This scenario of increasing space debris will play out even if we don’t put anything else in orbit,” he said.

On that point, the European Space Agency has contracted with a Swiss startup called ClearSpace that plans to launch its first mission to remove space debris in 2025.

The Gravity of the Situation

Without a doubt, space debris is an Operational Risk; even the International Space Station has to dodge space junk at times. Former NASA Administrator Jim Bridenstine even tweeted last September that the “Space Station has maneuvered 3 times in 2020 to avoid debris. In the last 2 weeks, there have been 3 high concern potential conjunctions. Debris is getting worse!” Some of the larger debris that doesn’t burn up re-entering the atmosphere (about one object per day) even crashes back on Earth. Since most of the Earth’s surface is covered in water, it’s not surprisingly that most of the junk winds up in oceans, so the risk to humans is statistically very low. That doesn’t mean nil though.

For example, there is debris from Russian Proton rockets that has been found in Siberia, including that of old fuel tanks containing toxic fuel residue, which can be harmful to plants, animals and humans.

The environmental risks of space junk need to be explored further. A piece of space junk floating through the ocean is certainly not nearly as concerning as our plastic problem, but it’s nothing to ignore either.

LCA Leads the Way

Just as more and more companies are assessing the Life Cycle Assessment (LCA) of their products and services from cradle to grave on Planet Earth, it stands to reason that LCA could be just as important in outer space. That’s especially true when you consider space tourism is poised to blast off to become a potential $1.5 billion industry by 2028. The more activity, the more debris.

#### Space debris causes nuclear miscalc – countries interpret collisions as pre-emptive strikes.

Beauchamp ‘14 [Zack Beauchamp; a senior correspondent at Vox, where he covers global politics and ideology, and a host of Worldly, Vox's podcast on foreign policy and international relations; 04-21-2014; “How space trash could start a nuclear war”; Vox; https://www.vox.com/2014/4/21/5625246/space-war-china-north-korea-iran; Accessed 12-26-2021] AK

Countries who might hypothetically fight a war with the United States hate that space dominance, which gives the US a real strategic edge. Some have developed anti-satellite (ASAT) weapons, usually missiles that shoot into space. Zenko thinks ASAT weapons are really dangerous, particularly those owned by China, North Korea, and Iran. The threat comes from both deliberate use and the risk of a misunderstanding that could spiral out of control.

The "greatest threat to international space security," in Zenko's view, is a Chinese accident. China is seriously investing in ASAT weaponry, which it has tested by blowing up old satellites in low earth orbit, one of the places place where satellites live. These explosions create debris, which can travel tens of thousands of miles per hour and shred up other satellites and spacecraft.

If debris from a Chinese test destroys a US military satellite, the US could mistake it as a preemptive strike against its space capabilities — some of which are designed to detect nuclear missile launches. If the US thinks China is trying to take out its ability to detect a nuclear launch, things could get very bad, very quickly.

#### Satellites are key to biodiversity conservation.

Pettorelli ‘19 [Dr. Nathalie Pettorelli; a Senior Research Fellow at the Institute of Zoology, Zoological Society of London, the editor-in-chief of Remote Sensing in Ecology and Conservation and a senior editor for Journal of Applied Ecology; 09-25-2019; “Satellite Remote Sensing’s role in Biodiversity Conservation”; Medium; https://medium.com/science-uncovered/satellite-remote-sensings-role-in-biodiversity-conservation-fbce22a7133c; Accessed 12-26-2021] AK

Regional to global land cover products derived from the information captured by sensors onboard long-term satellite missions, such as Landsat, the Terra and Aqua Earth Observing System satellites, and the Polar­orbiting Operational Environmental Satellite series, are widely accessible and offer a relatively inexpensive and veriﬁable means of deriving complete spatial coverage of environmental information for large areas in a consistent manner that may be updated regularly. Very high spatial resolution commercial optical sensors have provided new opportunities for habitat mapping at a ﬁner spatial scale than previously possible. Hyperspectral imagery has improved opportunities for plant species identiﬁcation, soil properties monitoring, and habitat mapping, as well as plant condition assessment. Instruments such as synthetic aperture radar (SAR) and light detection and ranging (LiDAR) are increasingly being used in ecology and natural resource management, and provide signiﬁcant opportunities for estimating aboveground biomass and the structure of woody vegetation.

Today, the archive of terrestrial satellite imagery from the Landsat system spans more than four decades at spatial resolutions of 15–82 m. Spatial resolutions across all sensors range from roughly 50 cm to 10 km, with bimonthly information available for several sensors. Developments in satellite and sensor technology, as well as progress in techniques and algorithms to process satellite remote sensing images, are relatively rapid and continuous. New combinations of satellite remote sensing data with methodologies such as support vector machines and multisensor image fusion are constantly tested for application, while investigations for developing new indices to monitor vegetation have been occurring for decades. Satellite remote sensing has moreover been successfully applied to address a variety of questions relevant to environmental management, including, but not limited to: landscape change monitoring; representativeness assessment; fragmentation assessment and monitoring; and climate change impact analysis. In recent decades, numerous studies have also highlighted the key role of satellite data in wildlife management, with success stories reported in macroecology, plant ecology, animal population dynamics, habitat selection and habitat use studies, movement ecology, and palaeoecology.

The role of satellites in providing critical information for improving the design and implementation of mitigation and adaptation tools to reduce the current rate of biodiversity loss is clear, with satellite remote sensing data now being used to help identify new protected areas, to inform translocation planning, and to monitor and predict potential invasions. Satellite remote sensing has also proven key to track anthropogenic pressures on biodiversity and our natural capital, in both the terrestrial and marine realms: oil exploration activities, eutrophication, illegal fishing, and oil spills and run­offs are among the many threats that can be detected from space. Satellite remote sensing has thus literally opened up the possibility of addressing questions on scales inaccessible to ground based methods alone, facilitating the development of an integrated approach to natural resource management, where both threats and consequences can be evaluated.

#### Biodiversity loss causes extinction and is a threat multiplier.

Torres ‘16 [Phil Biologist, conservationist, science advocate & educator. 2 years based in Amazon rainforest, now exploring science around the world. “[Biodiversity Loss: An Existential Risk Comparable to Climate Change](http://futureoflife.org/2016/05/20/biodiversity-loss/)” <http://futureoflife.org/2016/05/20/biodiversity-loss/>]

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](http://www.ncbi.nlm.nih.gov/pubmed/26601195) 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](https://www.cbd.int/gbo3) 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](http://commondreams.org/views/2016/02/10/biodiversity-loss-and-doomsday-clock-invisible-disaster-almost-no-one-talking-about) 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](http://bit.ly/1ssxx5m) 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](http://science.sciencemag.org/content/314/5800/787) 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.

48% of the world’s primates are threatened with extinction.

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](http://www.nature.com/nature/journal/v486/n7401/full/nature11018.html) 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](http://thebulletin.org/climate-change-and-syrian-uprising) to the emergence of ISIS in Syria, and multiple high-ranking US officials, such as former US Defense Secretary [Chuck Hagel](http://www.defense.gov/News-Article-View/Article/603441)and CIA director [John Brennan](http://www.cnsnews.com/news/article/cnsnewscom-staff/cia-director-cites-impact-climate-change-deeper-cause-global), 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.

#### Increased space debris makes future space exploration impossible.

Webb ‘18 [(Amy Webb is a professor at the NYU Stern School of Business and is the chief executive of the Future Today Institute, a strategic foresight and research group in Washington, D.C.), “Space Oddities: We Need a Plan to Stop Polluting Space Before It’s Too Late” WIRED Science April 12, 2018 https://www.wired.com/story/we-need-a-plan-to-stop-polluting-space-before-its-too-late/] TDI

Space is our next dumping ground. As many as 170 million fragments of metal and astro debris necklace Earth. That includes 20,000 pieces larger than a softball, and 500,000 about the size of a marble, according to NASA. Old satellites, like Tiangong-1, are the biggest and highest-profile lumps of rubbish, but most of it comes from rocket parts and even lost astronaut tools. Size doesn’t always matter—a fleck of paint, orbiting at a high velocity, cracked the Space Shuttle's windshield.

This debris will pose a navigation hazard for many centuries to come. At least 200 objects roar back into the atmosphere each year, including pieces of solar panels and antennas and fragments of metal. All of them pose dangers for future astronauts: One plum-sized piece of gnarled space trash traveling faster than a speeding bullet could rip a five-foot hole into a spacecraft. And that collision, then, would hatch its own spectacle of shrapnel, which would join the rushing river of junk already circling the planet.

It’s not just Americans doing the dumping. China and Russia each have dozens of decommissioned satellites overhead, though the US certainly does it with style. Like everyone, I marveled at the successful launch of SpaceX’s Falcon Heavy rocket, whose cargo included Elon Musk’s Tesla Roaster and a mannequin driver named Starman. I’ll admit, I teared up listening to David Bowie as the rockets separated from the payload. It was an incredible technological achievement, one proving that the system could someday transport people and goods—perhaps real cars, and real people—into space.

Now that Tesla and its driver are overhead, in America’s junkyard in the sky. To be sure, space is big. Really big. Most debris soars about 1,250 miles above the Earth’s surface, so you have better odds scoring a seat on Virgin Galactic’s maiden voyage than witnessing Starman crash into your next door neighbor’s house. But it’s our behavior back here on Earth—our insistence on sending things up, without really thinking how to safely contain or send them back down—that should concern you.

We weren’t always so short-sighted. Ancient Native Americans lived by the Seventh Generation Principal, a way of long-term thinking that considered how every decision would affect their descendants seven generations into the future. In Japan, Buddhist monks devoted part of their daily rituals and work to ensuring the longevity of their communities, even planting and tending to bamboo forests, which would eventually be harvested, treated and used to repair temple roofs many decades hence. With each new generation, we live life faster than our ancestors. As a result, we spend less time thinking about the farther future of humanity.

We now have our sights set on colonizing Mars, mining asteroids for research and commerce, and venturing out to the furthest reaches of our galaxy. Space is no longer the final frontier; we’re already exploring it. Our current approach is about getting there, rather than considering what “getting there” could mean for future generations of humans, not to mention other life in the universe.

Where all that junk winds up isn’t something we can predict accurately. We could be unintentionally wreaking havoc on civilizations far away from Earth, catalyzing future intergalactic wars. Or, we might cause far less scintillating problems. Space junk could start to behave in unpredictable ways, reflecting sunlight the wrong direction, or changing our atmosphere, or impacting the universe in ways that don’t fit into our current understanding of physics.

Last week—30 years after my friends and I created an imaginary net to capture space debris—SpaceX launched RemoveDEBRIS, its own prototype, an experimental net to collect junk in orbit. It’s a neat idea, but even as middle schoolers, we knew it was an impractical one. Individual nets can’t possibly scale to address the hundreds of millions of particles of debris already in orbit.

The challenge is that all of our space agencies are inextricably tied to national governments and militaries. Seeking a global agreement on how to mitigate debris would involve each country divulging exactly what it was launching and when—an unlikely scenario. The private sector could collaborate to build grand-scale orbital cleaners, but their commercial interests are driven by immediate launches. Given all the planned launches in our near future, we don’t have much time to wait. We must learn to be better stewards of our own planet—and commit to very long-term thinking—before we try to colonize any others.

### 1AC – Solvency

#### Thus, the plan –

#### States should ban the appropriation of outer space for commercial space tourism by private entities.

Parkinson ‘21 [Stuart Parkinson; Executive Director of Scientists for Global Responsibility, written on climate science and policy for 30 years, PhD in climate science; 07-20-2021; “Space tourism: environmental vandalism for the super-rich”; Scientists for Global Responsibility (UK); http://space4peace.org/space-tourism-environmental-vandalism-for-the-super-rich/; Accessed 12-24-2021] AK

Against this backdrop, we have billionaires travelling in the inaugural flights of their space tourism corporations. On 11 July, Richard Branson flew in Virgin Galactic’s SpaceShipTwo craft, while on 20 July, Jeff Bezos travelled in Blue Origin’s New Shepard. These activities take the climate impacts of flying to considerably more damaging level.

Let’s look at the New Shepard space-craft. Prof Mike Berners-Lee of Lancaster University – a leading expert in carbon footprint analysis – has estimated that a single flight results in emissions of at least 330 tCO2e. With four passengers, this means each one is responsible for over 82 tCO2e – over 20 times the sustainable level for a whole year! And note, this is a conservative estimate. It does not include the additional heating effects of emissions at high altitude, the carbon footprint of developing and manufacturing the space-craft, or the emissions of running the Blue Origin corporation. Furthermore, the fuel combination used by the latest generation of New Shepard craft now includes liquid hydrogen – a higher carbon fuel than those used in Prof Berners-Lee’s calculations.

What about SpaceShipTwo? Although this craft emits markedly less direct carbon emissions per flight than New Shepard, as SGR discussed back in 2016, it uses a fuel combination which emits significant levels of black carbon into the upper atmosphere. Research by the University of Colorado indicates that this can damage the stratospheric ozone layer – not only leading to higher levels of damaging ultra-violet radiation reaching the Earth’s surface, but also causing a global heating effect likely to be considerably greater than that from the carbon emissions alone.

And the aim of these journeys? A few minutes of ‘zero-gravity’ experience and a nice view. It is hard to see this as anything more than environmental vandalism for the super-rich.

Virgin Galactic claims to want to launch a “new age of clean and sustainable access to space”– but they and the others in the space tourism industry clearly fail to understand the level of their own climate impacts, the rapidly increasing severity of the climate emergency, or the scale of action needed to cut carbon emissions to a sustainable level. If governments are serious about trying to prevent ‘dangerous’ climate change, then there is an important step to take immediately: ban space tourism.

#### Profit motives and corporate overconfidence mean careless decisions – turns and CPs are wrong

Cook ‘21 [Kevin Cook; author of “The Burning Blue: The Untold Story of Christa McAuliffe and NASA’s Challenger Disaster”; 07-22-2021; “The Case Against Space Tourism”; WSJ; https://www.wsj.com/articles/blue-origin-spacex-bezos-musk-galactic-branson-tourism-space-11626968962; Accessed 12-16-2021] AK

The intrepid astro-billionaires admit there are risks involved, but they don’t dwell on them. So far only Mr. Musk, whose company is widely admired by NASA insiders, has emphasized the risks. Speaking of his plans to send crews to Mars before the end of the decade, he said, “a bunch of people will probably die in the beginning.” Mr. Musk is right. Space travel is dangerous, and a question worth asking is: How many will die?

The last time there was talk about sending an ordinary person into space, NASA was doing the talking. In 1985 Christa McAuliffe beat out more than 11,000 other applicants to win a seat on the space shuttle Challenger. Almost overnight, she became a national celebrity: America’s teacher in space.

NASA had a journalist-in-space program ready to go, with applicants including Walter Cronkite and Norman Mailer. “They are probably taking a journalist on the principle that Earth could not but be improved having one fewer on it,” George Will quipped at the time.

When reporters asked McAuliffe whether she was nervous about rocketing into orbit, she repeated what she had been told: that the shuttle was as safe as a passenger jet. In fact, like today’s Blue Origin, SpaceX, and Virgin Galactic vehicles, the space shuttle was an engineering experiment in progress.

After several scrubs due to weather and technical glitches, Challenger blasted off on Jan. 28, 1986, one of the coldest mornings ever recorded at Cape Canaveral, Fla. The rubber O-rings that sealed the shuttle’s million-pound rocket boosters didn’t work as well in cold weather—a fact known to NASA’s managers and engineers—but nobody shared that information with the crew.

The O-rings failed, leading to an explosion over Cape Canaveral that millions of Americans will never forget. McAuliffe and her six crewmates didn’t die instantly; Challenger’s crew compartment, sheared from the rest of the shuttle, rose for another 20 seconds, then fell for more than two minutes before crashing into the Atlantic at 207 miles an hour. During those excruciating minutes the crew behaved heroically, trying to save the mission and one another. But the space shuttle, despite its early successes, was an experimental vehicle. So are today’s commercial spaceships.

Yet wealthy hobbyists are lining up to ride in them. One bidder paid $28 million to join Mr. Bezos on a coming Blue Origin mission. Hundreds more have bid $200,000 to $250,000 for a ride on the next Virgin Galactic flight. One social-media influencer, whose seat will be paid for by her employer, the International Institute for Astronautical Sciences, claims the near future of space travel will be about more than “sending engineers to space; we’re going to be sending poets and communicators and artists and athletes.” There is talk of in-flight ping-pong and champagne.

There is little talk of the Challenger or the Columbia, which burned up on re-entry in 2003, killing seven more astronauts. Both disasters led to investigations and reforms, and by the time the shuttle program ended in 2011, U.S. astronauts had helped build the International Space Station, the shuttle era’s crowning achievement. All three of today’s space-tourism firms plan to zoom clients to the space station and back no later than next year.

It is easy to imagine a near future in which these companies are moving quickly to outdo one another. Corporate concerns might soon match the pressures NASA executives faced when they chose to launch Challenger on the worst possible day. During a teleconference the night before Challenger’s launch, engineers recommended waiting for warmer weather. One boss told a holdout to “take off your engineering hat and put on your management hat.” The engineers caved in; the shuttle blew up.

What happens if the billionaires’ early triumphs lead to a similar sort of overconfidence and corner-cutting? Suppose one of their companies takes the lead in citizen spacefaring. How intense will the pressure on the others become? How soon might some harried executive say, “SpaceX is launching today. How long do you want me to wait?” That’s a prescription for the kind of decision-making that gets astronauts—or ordinary people in space suits—killed.

### 1AC – Framework

#### The standard is maximizing expected well-being.

#### Extinction outweighs under any framework – moral uncertainty.

Pummer ‘15 — (Theron Pummer, Junior Research Fellow in Philosophy at St. Anne's College, University of Oxford, “Moral Agreement on Saving the World“, Practical Ethics University of Oxford, 5-18-2015, Available Online at http://blog.practicalethics.ox.ac.uk/2015/05/moral-agreement-on-saving-the-world/, accessed 7-2-2018, HKR-AM) \*\*we do not endorse ableist language=

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)

**Pleasure and pain are intrinsically valuable and disvaluable.**

**Moen ‘16** [Ole Martin Moen, Research Fellow in Philosophy at University of Oslo “An Argument for Hedonism” Journal of Value Inquiry (Springer), 50 (2) 2016: 267–281] SJDI

Let us start by observing, empirically, that a widely shared judgment about intrinsic value and disvalue is that pleasure is intrinsically valuable and pain is intrinsically disvaluable. On virtually any proposed list of intrinsic values and disvalues (we will look at some of them below), pleasure is included among the intrinsic values and pain among the intrinsic disvalues**.** This inclusion makes intuitive sense, moreover, for there is something undeniably good about the way pleasure feels and something undeniably bad about the way pain feels, and neither the goodness of pleasure nor the badness of pain seems to be exhausted by the further effects that these experiences might have. “Pleasure” and “pain” are here understood inclusively, as encompassing anything hedonically positive and anything hedonically negative.2 The special value statuses of pleasure and pain are manifested in how we treat these experiences in our everyday reasoning about values**.** If you tell me that you are heading for the convenience store, I might ask: “What for?” This is a reasonable question, for when you go to the convenience store you usually do so, not merely for the sake of going to the convenience store, but for the sake of achieving something further that you deem to be valuable**.** You might answer, for example: “To buy soda.” This answer makes sense, for soda is a nice thing and you can get it at the convenience store. I might further inquire, however: “What is buying the soda good for?” This further question can also be a reasonable one, for it need not be obvious why you want the soda. You might answer: “Well, I want it for the pleasure of drinking it.” If I then proceed by asking “But what is the pleasure of drinking the soda good for?” the discussion is likely to reach an awkward end. The reason is that the pleasure is not good for anything further; it is simply that for which going to the convenience store and buying the soda is good.3 As Aristotle observes**:** “We never ask [~~a man~~] what ~~his~~ end is in being pleased, because we assume that pleasure is choice worthy in itself.”4 Presumably, a similar story can be told in the case of pains, for if someone says “This is painful!” we never respond by asking: “And why is that a problem?” We take for granted that if something is painful, we have a sufficient explanation of why it is bad. If we are onto something in our everyday reasoning about values, it seems that pleasure and pain are both places where we reach the end of the line in matters of value.

#### Util is a lexical pre-requisite to any other framework: Threats to bodily security and life preclude the ability for moral actors to effectively utilize and act upon other moral theories since they are in a constant state of crisis that inhibit the ideal moral conditions which other theories presuppose – so, util comes first and my offense outweighs theirs under their own framework.