I affirm **Resolved: The appropriation of outer space by private entities is unjust**.

I offer the following definitions:

Appropriation is defined as “the action of taking something for one's own use, typically without the owner's permission”

Outer space is defined as “the physical universe beyond the earth's atmosphere”

Private entity is defined by Upcounsel as “a partnership, corporation, individual, nonprofit organization, company, or any other organized group that is not government-affiliated”

Unjust is defined as “not based on or behaving according to what is morally right and fair”

The value for this round is **morality**. The criterion is **following deep ecology**.

Spanne 21 Autumn Spanne, July 26, 2021 https://www.treehugger.com/what-is-deep-ecology-philosophy-principles-and-criticism-5191550 Columbia University Graduate School of Journalism, University of California, Santa Cruz, Western New Mexico University Autumn is an independent journalist and educator who writes about climate, biodiversity, and sustainability, as well as environmental justice and policy. Næss conceived of two types of environmentalism. One he called the “shallow ecology movement.” This movement, he said, “is concerned with fighting against pollution and resource depletion,” but with its central objective [being] “the health and affluence of people in the developed countries.” Shallow ecology looked to technological fixes like recycling, innovations in intensive agriculture, and increased energy efficiency—all capable of significant impacts, but not, in Næss’s view, capable of reversing the damage that industrial systems were doing to the planet. Only by deeply questioning these systems and pursuing a complete transformation of the ways people interacted with the natural world could humans achieve just, long-term protection of ecological systems. The other environmentalism Næss called the “long-range deep ecology movement,” [is] a deep question[s]ing of the causes of environmental destruction and a reimagin[es]ing of human systems based on values that preserve ecological diversity and the cultural diversity they supported. Deep ecology, Næss wrote, involved an “ecological egalitarianism” in which all life on Earth had a right to exist and thrive, and assumed an “anti-class posture.” It, too, was concerned with pollution and resource depletion, but also wary of unintended social consequences, such as pollution controls causing a price rise on basic goods, thus reinforcing class differences and inequalities. In 1984, a little over a decade after the introduction of deep ecology, Næss and American philosopher and environmentalist George Sessions, a Spinoza scholar, went on a camping trip to Death Valley. There in the Mojave Desert, they revised Næss’s earlier articulated principles of deep ecology into a concise platform that emphasize[s]d even more than previous iterations the value of all life on Earth. They hoped this new version would achieve universal relevance and galvanize a movement. These are the eight principles as they were published the following year by Sessions and sociologist Bill Devall in the book "Deep Ecology: Living As If Nature Mattered." 1. The well-being and flourishing of human and nonhuman life on Earth have value in themselves (synonyms: inherent worth, intrinsic value, inherent value). These values are independent of the usefulness of the nonhuman world for human purposes. 2. Richness and diversity of life forms contribute to the realization of these values and are also values in themselves. 3. Humans have no right to reduce this richness and diversity except to satisfy vital needs. 4. Present human interference with the nonhuman world is excessive, and the situation is rapidly worsening. 5. The flourishing of human life and cultures is compatible with a substantial decrease in the human population. The flourishing of nonhuman life requires such a decrease. 6. Policies must therefore be changed. The changes in policies affect basic economic, technological, and ideological structures. The resulting state of affairs will be deeply different from the present. 7. The ideological change is mainly that of appreciating life quality (dwelling in situations of inherent worth) rather than adhering to an increasingly higher standard of living. There will be a profound awareness of the difference between big and great. 8. Those who subscribe to the foregoing points have an obligation directly or indirectly to participate in the attempt to implement the necessary changes.

Reasons to prefer:

1) Humans are just another part of the integrated whole of nature. We can’t give humanity special moral status if there is no relevant division between humans and the rest of nature.

Nelson 08 Michael P. Nelson, Encyclopedia of Environmental Ethics and Philosophy – 2nd/ 7/18/2008 18:08 Page 206, http://www.uky.edu/OtherOrgs/AppalFor/Readings/240%20-%20Reading%20-%20Deep%20Ecology.pdf the biosphere does not consist[s] of discrete entities but rather internally related individuals that make up an ontologically unbroken whole. Both principles are rooted in an intuitive epistemology reminiscent of Descartes' ''clear and distinct'' criteria—once you grasp them, their truth is beyond doubt. The first principle, biocentric egalitarianism—known also by other phrases that combine biocentric, biospherical, and ecological with equality and egalitarianism (Naess 1973, p. 95; Devall and Sessions 1985, pp. 67-69)—holds that biota have equal intrinsic value; it denies differential valuation of organisms. In the words of Naess, ''the equal right to live and blossom is an intuitively clear and obvious value axiom'' (1973, p. 96 [Naess's emphasis]). In the words of the sociologist Bill Devall, writing with George Sessions, ''all organisms and entities in the ecosphere, as parts of the interrelated whole, are equal in intrinsic worth'' (1985, p. 67). Naess shrewdly preempts invariable attacks on this idea of the equal worth of all organisms by adding the qualifier ''in principle'' because ''any realistic praxis necessitates some killing, exploitation, and suppression'' (1973, p. 95). This qualifier has not, however, staved off criticisms of biocentric egalitarianism. The valuing of human beings over other life forms in the teleology of a great chain of being (Lovejoy 1936) has been a key feature of the European–North American intellectual tradition—and, to the dismay of deep ecologists, also a feature of some prominent variants of environmental ethics (Birch and Cobb 1981; Bookchin 1982; Rolston 1988). Biocentric egalitarianism aims directly at this target. By denying humans special moral consideration, Deep Ecology is not just nonanthropocentric, but anti-anthropocentric (Watson 1983). Sessions has categorically rejected any differential axiology on the grounds that hierarchies of value lay the groundwork for claims of moral superiority. Quoting John Rodman (1977, p. 94), Sessions cautions that any comparative axiology merely reinstates a ''pecking order in this moral barnyard'' (Sessions 1985, p. 230). At a 1979 conference devoted to reminding philosophers of the purpose of their discipline (namely, deep questioning), Sessions warned environmental ethicists of the temptation of looking to a metaphysics based on intensity of sentience. ''The point is not whether humans in fact do have the greatest degree of sentience on this planet (although dolphins and whales might provide a counterinstance), deep ecologists argue that the degree of sentience is irrelevant in terms of how humans relate to the rest of Nature'' (Sessions 1985, p. 18). The second principle is metaphysical holism. One can apprehend ontological interconnectedness through enlightenment or ''self-realization'' (Devall and Sessions 1985, pp. 67–69; Naess 1987). As Fox says, ''It is the idea that we can make no firm ontological divide in reality between the human and the nonhuman realms. . . . [T]o the extent that we perceive boundaries, we fall short of deep ecological consciousness'' (Fox 1984, p. 196). Through this awakening, the ontological boundaries of the self extend outward, incorporating more and more of the lifeworld into the self. This insight discloses that there is in reality only one big Self, the lifeworld, a notion developed in the article ''The World Is Your Body'' (Watts 1966). This method of self-realization is identification: By recognizing the intrinsic worth of other living beings, one recognizes the solidarity of all life forms. Naess, upon watching a flea immolate itself in an acid bath under a microscope, empathized with the suffering flea, identified with it, and thereby felt deeply connected with the entire lifeworld (1987, p. 36). Once ontological boundaries between living beings are recognized as illusory, one realizes that biospherical interests are one's own. Devall and Sessions assert that ''if we harm the rest of Nature then we are harming ourselves.

2) Humanity's anthropocentric bias means we need to reject human centric mindsets in order to have clear moral discussion. **Smith no date**, Penelope Smith, eco-thinker "Animal Communication Specialist", no date, http://www.anaflora.com/animalliberty/articles/penelope/pene-2.html Many humans have an attitude that restricts their ability to understand or empathize with non-human animals and other life forms and has some serious consequences for all life on this planet. It is called anthropocentrism, or viewing man as the center or final aim of the universe. I refer to this in my book, Animal Talk, as the "human superiority complex" considering humans as superior to or the pinnacle of all forms of life. From the anthropocentric view, "[non-human beings that are most like humans are usually considered more intelligent, for example, chimpanzees who learn to use sign language or dolphins who signal word or thought comprehension through touching electronic devices in their tanks. Animals or other life forms that don't express themselves in human ways by language or in terms easily comprehensible by common human standards are often considered less developed, inferior, more primitive or mechanistic, and usually of less importance than humans. This viewpoint has been used to justify using animals as objects for human ends. Since humans are the superior creatures, "dumb, unfeeling" non-humans can be disregarded, mistreated, subjugated, killed or whole species eliminated without much concern for their existence in itself, only their usefulness or lack of it to humankind. Many humans, as they see other animals are more like them in patterns of behavior and expression of intelligence, begin to respect them more and treat them with more regard for their rights. However, this does not transcend the trap of anthropocentrism. To increase harmony of life on Earth, all beings need to be regarded as worthy of respect, whether seen as different or similar to the human species. The anthropocentric view toward animals echoes the way in which many humans have discriminated against other humans because they were of different cultures, races, religions, or sexes. Regarding others as less intelligent or substandard has commonly been used to justify domination, cruelty or elimination of them. Too often people label what they don't understand as inferior, dumb, or to be avoided, without attempting to understand a different way of being. More enlightened humans look upon meeting people, things or animals that are different than themselves as opportunities to expand their understanding, share new realities, and become more whole."

3) Anthropocentrism is the root of all oppression.

Best 07 (Associate Professor, Departments of Humanities and Philosophy University of Texas, El Paso [Steven, Charles Patterson, The Eternal Treblinka: Our Treatment of Animals and the Holocaust New York: Lantern Books, 2002, 280 pp])

While a welcome advance over the anthropocentric conceit that only humans shape human actions, the environmental determinism approach typically fails to emphasize the crucial role that animals play in human history, as well as how the human exploitation of animals is a key cause of hierarchy, social conflict, and environmental breakdown. A core thesis of what I call "animal standpoint theory" is that animals have been key driving and shaping forces of human thought, psychology, moral and social life, and history overall. More specifically, animal standpoint theory argues that the oppression of human over human has deep roots in the oppression of human over animal. In this context, Charles Patterson's recent book, The Eternal Treblinka: Our Treatment of Animals and the Holocaust, articulates the animal standpoint in a powerful form with revolutionary implications. The main argument of Eternal Treblinka is that the human domination of animals, such as it emerged some ten thousand years ago with the rise of agricultural society, was the first hierarchical domination and laid the groundwork for patriarchy, slavery, warfare, genocide, and other systems of violence and power. A key implication of Patterson's theory is that human liberation is implausible if disconnected from animal liberation, and thus humanism -- a speciesist philosophy that constructs a hierarchical relationship privileging superior humans over inferior animals and reduces animals to resources for human use -- collapses under the weight of its logical contradictions. Patterson lays out his complex holistic argument in three parts. In Part I, he demonstrates that animal exploitation and speciesism have direct and profound connections to slavery, colonialism, racism, and anti-Semitism. In Part II, he shows how these connections exist not only in the realm of ideology – as conceptual systems of justifying and underpinning domination and hierarchy – but also in systems of technology, such that the tools and techniques humans devised for the rationalized mass confinement and slaughter of animals were mobilized against human groups for the same ends. Finally, in the fascinating interviews and narratives of Part III, Patterson describes how personal experience with German Nazism prompted Jewish to take antithetical paths: whereas most retreated to an insular identity and dogmatic emphasis on the singularity of Nazi evil and its tragic experience, others recognized the profound similarities between how Nazis treated their human captives and how humanity as a whole treats other animals, an epiphany that led them to adopt vegetarianism, to become advocates for the animals, and develop a far broader and more inclusive ethic informed by universal compassion for all suffering and oppressed beings. The Origins of Hierarchy "As long as men massacre animals, they will kill each other" –Pythagoras It is little understood that the first form of oppression, domination, and hierarchy involves human domination over animals. Patterson's thesis stands in bold contrast to the Marxist theory that the domination over nature is fundamental to the domination over other humans. It differs as well from the social ecology position of Murray Bookchin that domination over humans brings about alienation from the natural world, provokes hierarchical mindsets and institutions, and is the root of the long-standing western goal to "dominate" nature. In the case of Marxists, anarchists, and so many others, theorists typically don't even mention human domination of animals, let alone assign it causal primacy or significance. In Patterson's model, however, the human subjugation of animals is the first form of hierarchy and it paves the way for all other systems of domination such as include patriarchy, racism, colonialism, anti-Semitism, and the Holocaust. As he puts it, "the exploitation of animals was the model and inspiration for the atrocities people committed against each other, slavery and the Holocaust being but two of the more dramatic examples." Hierarchy emerged with the rise of agricultural society some ten thousand years ago. In the shift from nomadic hunting and gathering bands to settled agricultural practices, humans began to establish their dominance over animals through "domestication." In animal domestication (often a euphemism disguising coercion and cruelty), humans began to exploit animals for purposes such as obtaining food, milk, clothing, plowing, and transportation. As they gained increasing control over the lives and labor power of animals, humans bred them for desired traits and controlled them in various ways, such as castrating males to make them more docile. To conquer, enslave, and claim animals as their own property, humans developed numerous technologies, such as pens, cages, collars, ropes, chains, and branding irons. The domination of animals [that] paved the way for the domination of humans. The sexual subjugation of women, Patterson suggests, was modeled after the domestication of animals, such that men began to control women's reproductive capacity, to enforce repressive sexual norms, and to rape them as they forced breeding in their animals. Not coincidentally, Patterson argues, slavery emerged in the same region of the Middle East that spawned agriculture, and, in fact, developed as an extension of animal domestication practices. In areas like Sumer, slaves were managed like livestock, and males were castrated and forced to work along with females. In the fifteenth century, when Europeans began the colonization of Africa and Spain introduced the first international slave markets, the metaphors, models, and technologies used to exploit animal slaves were applied with equal cruelty and force to human slaves. Stealing Africans from their native environment and homeland, breaking up families who scream in anguish, wrapping chains around slaves' bodies, shipping them in cramped quarters across continents for weeks or months with no regard for their needs or suffering, branding their skin with a hot iron to mark them as property, auctioning them as servants, breeding them for service and labor, exploiting them for profit, beating them in rages of hatred and anger, and killing them in vast numbers – all these horrors and countless others inflicted on black slaves were developed and perfected centuries earlier through animal exploitation. As the domestication of animals developed in agricultural society, humans lost the intimate connections they once had with animals. By the time of Aristotle, certainly, and with the bigoted assistance of medieval theologians such as St. Augustine and Thomas Aquinas, western humanity had developed an explicitly hierarchical worldview – that came to be known as the "Great Chain of Being" – used to position humans as the end to which all other beings were mere means. Patterson underscores the crucial point that the domination of human over human and its exercise through slavery, warfare, and genocide typically begins with the denigration of victims But the means and methods of dehumanization are derivative, for speciesism provided the conceptual paradigm that encouraged, sustained, and justified western brutality toward other peoples. "Throughout the history of our ascent to dominance as the master species," Patterson writes, "our victimization of animals has served as the model and foundation for our victimization of each other. The study of human history reveals the pattern: first, humans exploit and slaughter animals; then, they treat other people like animals and do the same to them." Whether the conquerors are European imperialists, American colonialists, or German Nazis, western aggressors engaged in wordplay before swordplay, vilifying[ed] their victims – Africans, Native Americans, Filipinos, Japanese, Vietnamese,

Iraqis, and other unfortunates – with opprobrious terms such as "rats," "pigs," "swine," "monkeys," "beasts," and "filthy animals." Once perceived as brute beasts or sub-humans occupying a lower evolutionary rung than white westerners, subjugated peoples were treated accordingly; once characterized as animals, they could be hunted down like animals. The first exiles from the moral community, animals provided a convenient discard bin for oppressors to dispose the oppressed. The connections are clear: "For a civilization built on the exploitation and slaughter of animals, the `lower' and more degraded the human victims are, the easier it is to kill them." Thus, colonialism, as Patterson describes, was a "natural extension of human supremacy over the animal kingdom." For just as humans had subdued animals with their superior intelligence and technologies, so many Europeans believed that the white race had proven its superiority by bringing the "lower races" under its command. There are important parallels between speciesism and sexism and racism in the elevation of white male rationality to the touchstone of moral worth. The arguments European colonialists used to legitimate exploiting Africans – that they were less than human and inferior to white Europeans in ability to reason – are the very same justifications humans use to trap, hunt, confine, and kill animals. Once western norms of rationality were defined as the essence of humanity and social normality, by first using non-human animals as the measure of alterity, it was a short step to begin viewing odd, different, exotic, and eccentric peoples and types as non- or sub-human. Thus, the same criterion created to exclude animals from humans was also used to ostracize blacks, women, and numerous other groups from "humanity." The oppression of blacks, women, and animals alike was grounded in an argument that biological inferiority predestined them for servitude.

To clarify weighing: Solely human-centric impacts carry no weight because it's already inherently unjust to arbitrarily benefit humans at the expense of the non-human world

Contention 1: Emissions

Reaching space emits greenhouse gases, fueling climate change

Noor 21 https://gizmodo.com/space-tourism-is-a-waste-1847285820 Dharna Noor is the Boston Globe's climate producer. Prior to joining the Boston Globe's climate team, Dharna worked as a staff writer at Earther, Gizmodo's climate vertical, where she also co-produced a season of the podcast Drilled on the fossil fuel industry's influence on education. Before that, she led the climate team at the Real News Network. Her writing has also appeared in publications including In These Times, Jacobin Magazine, and Truthout, and was also featured in a 2021 book from The New Press called The World We Need. She has been interviewed on podcasts and radio programs such as the Times Radio, Vox's Tell Me More, the Insurgents, and NPR's Living on Earth. 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[s] 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 [rockets] emit pollution directly into the stratosphere. Studies show this can deplete the ozone layer that protects us from harmful [UV] 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). [which] 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 [is] 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 [emits carbon]. 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['s] 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." "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." 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[s] 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. But couldn't space tourism be the beginning of space colonization, helping us to ensure we have a livable future even if the climate crisis makes Earth uninhabitable? These billionaires want us to think so. SpaceX wants to colonize Mars as a space outpost for when life on Earth is no longer tenable. Bezos wants to build colonies orbiting Earth to support billions of people. But put simply, these proposals are absurd. They're not going to come to fruition, and they're certainly not going to create a sustainable alternative to life on Earth, a planet that has all the life support systems we need if billionaires would just stop wasting them. "We are not going to build large-scale sustainable human civilization on Mars anytime soon, certainly not on any timescale remotely relevant to stopping climate breakdown," said Kalmus. "It will be far easier to stop climate breakdown on Earth than it would be to build large-scale civilization on Mars, where there isn't even air to breathe."

Schultz 21 Isaac Schultx, Science writer at Gizmodo, previously of Atlas Obscura, December 10, 2021

https://gizmodo.com/jeff-bezos-space-joyride-emitted-a-lifetime-s-worth-of-1848196182 Social media erupted this week when a single passage from this year's World Inequality Report went viral comparing the carbon footprint of a short space joyride to a lifetime's worth of emissions for the world's poorest. The statistic perfectly encapsulates the unequal distribution of between those who cause climate damage and those who suffer from it. The report doesn't name the two billionaires most often associated with space travel: Elon Musk and Jeff Bezos. Musk's SpaceX has been launching plenty of rockets, though none for tourism purposes yet. Bezos' Blue Origin has, though, including sen[t]ding the CEO himself in a heavily covered event in July. (Richard Branson, a third billionaire, has also sent himself to the edge of space.) All of those flights have carbon costs alongside their fiscal ones. A few viral posts misinterpreted what the passage in the report was saying, so to set the record straight, this is what that section said: An 11-minute flight emits no fewer than 75 tonnes of carbon per passenger once indirect emissions are taken into account (and more likely, in the 250-1,000 tonnes range). At the other end of the distribution, about one billion individuals emit less than one tonne per person per year. Over their lifetime, this group of one billion individuals does not emit more than 75 tonnes of carbon per person. Though the passage doesn't reference Jeff Bezos' venture to the brink of (but not quite) space, it is a close enough substitute for that 11-minute benchmark put forward by the report. (To be clear, Blue Origin relies on fuel that itself doesn't emit carbon dioxide when burned but is made through a very carbon-intensive process.) And the team made very conservative estimates, too, noting that the actual range of emissions was probably much higher than 75 tons per person. What the report shows is that the carbon cost of a few minutes of weightlessness equals the lifetime carbon output of an individual in the bottom billion. It highlights unequal contributions made by someone who commutes in a private jet or, say, has a business devoted to launching rockets versus subsistence farmers. What's more, those who can afford space flight will largely be insulated from the climate damage their trips cause while those in poor countries will be forced to bear the brunt of those impacts. After returning to Earth, Bezos said he realized we have "one planet, and we share it and it's fragile." While flying on a Blue Origin rocket may have opened his eyes to that, it doesn't negate the fact that space tourism isn't a very equal way to share the planet's resources. The report also noted that the top 1% wealthiest individuals emit about 110 tons of carbon emissions per year, an extreme number dwarf by the top .1% (467 tons) and the top .01% (2,530 tons). So all high-altitude flights aside, the wealthiest individuals still produce many times more carbon pollution in an average year than an individual in the bottom billion does in a lifetime. Blue Origin's next flight is planned for Saturday, when the football player-turned-talk show host Michael Strahan will climb aboard a rocket alongside four paying customers.

And there are limited regulations on rocket fuel pollution, exacerbating impacts

Mortillaro 21 [Nicole Mortillaro, Cbc News. "Rocket launches could be affecting our ozone layer, say experts". 4-22-2021. CBC. https://www.cbc.ca/news/science/rocket-launches-environment-1.5995252. Accessed 7-18-2021]

Rocket launches are a breathtaking culmination of human ingenuity as they propel us into the future, but there is a growing concern that not enough research has been done on their effect on the environment. While some may be worried about potential greenhouse gas emissions that's not the main issue. Instead, it's ozone depletion and the potential effects in our upper atmosphere, specifically the stratosphere, along with concerns about toxic fuels. The problem has flown under the radar, according to Martin Ross, an atmospheric scientist at The Aerospace Corporation, because people still think of rocket launches as rare. But it's time to face the fact that we may be entering a boom era, he said. "One of the arguments that people have used in the past was to say that we don't really need to pay attention to rockets or to the space industry, or the space industry is small, and it's always going to be small," Ross said. "But I think the developments that we're seeing the past few years show that … space is entering this very rapid growth phase like aviation saw in the '20s and '30s." Black soot in the atmosphere The stratosphere

is an important weather driver for Earth's systems, and that's where some particles from rocket launches are ending up. The ozone layer, which helps protect us from the sun's harmful ultraviolet rays, is also located in the stratosphere. In 1990, the Montreal Protocol was signed into law, bann[ed]ing harmful ozone-depleting substances, such as chlorofluorocarbons (CFCs), used in things like refrigerators and air conditioners, after it was revealed that the ozone layer was being stripped away by these chemicals. While the protocol touched on airlines, there was no mention of the aerospace industry. But now some industry experts are concerned that with no oversight, we could be in for a problem. There are different types of rocket propellants. Some, like liquid oxygen and liquid hydrogen, produce mainly water vapour and have little environmental impact. These were used in past shuttle launches and even in the Apollo-era Saturn V vehicles. Then there are those that produce alumina particles in the stratosphere, such as those in solid rocket boosters, which were also used in past shuttle launches, and are still being used today by some launch companies. Finally, there are those that [and] deposit black soot in the stratosphere, such as kerosene used in SpaceX's Falcon 9 and Russia's Soyuz rockets. It's the alumina and black soot that is most concerning to experts. "The atmosphere is complex," said Jessica Dallas, a PhD candidate at the Australian Centre for Space Engineering Research, in New South Wales. "We don't have a complete understanding of atmospheric circulation and how all of the mechanisms in the atmosphere actually work. And so that means that we also don't have a good idea of what happens when we're injecting these particles into the stratosphere." Dallas, who wrote a comprehensive analysis of research on rocket propellants, said that she's concerned that there haven't been studies on how these particles interact in our atmosphere. "Things tend to stay in the stratosphere for a long time, because there's actually a very low rate of mixing [lower in the atmosphere]," she said. "So what you're having is black particles being deposited into the stratosphere and then they're staying in the stratosphere for something like three or four years … whereas with the alumina particles, they sort of stay a little more locally, because they're larger and heavier." Dawn of the new space age While experts say these rocket emissions aren't a pressing problem now, there's concern they will become one as the industry grows. Launches into space are far from rare: In 2016, there were roughly 80; in 2018, there were about 111, marking the first time since 1990 that there were more than 100 launches. Since then, there have been close to 100 launches annually, and as of April 20, there have already been 30 launches this year, with half of them from the United States alone. And there doesn't seem to be any indication of it slowing down. On the contrary: with more and more countries getting involved in the "new space race," smaller and cheaper satellites and NASA and commercial entities like SpaceX and Blue Origin eyeing the moon and possibly Mars, there is likely to be an increase in launches. In a 2018 report by The Aerospace Corporation's Center for Space Policy and Strategy, the authors compared the potential of atmospheric rocket emissions to that of orbital space debris — another problem that wasn't tackled when it was small half a century ago. Today, spent rocket engines, defunct satellites or debris from collisions are a threat to satellites and even the International Space Station. Several space agencies, including NASA and the European Space Agency, as well as private companies, are trying to develop ways to either collect it or mitigate it. "If the potential magnitude of the space debris problem had been recognized early in the space age, and coordinated international actions had been taken at the time to address it, space debris may not have become the significant risk we face today," the authors wrote. "Today, launch vehicle emissions present a distinctive echo of the space debris problem." Aside from the atmospheric impacts, there's also the danger to the environment here on Earth. Producing some fuels, such as hydrazine used mainly in satellites, is highly toxic and carcinogenic. There's also a risk of spills. But there are some companies trying to develop fuel that may not only be less toxic here on Earth, but also in the atmosphere.

Greenhouse gases destroy coral reefs and phytoplankton, curbing oxygen production

Hoegh-Guldberg et al 17 Ove Hoegh-Guldberg et al '17, Elvira S. Poloczanska, William Skirving, and Sophie Dove

https://www.frontiersin.org/articles/10.3389/fmars.2017.00158/full

In the latter case, even lower greenhouse gas emission scenarios (such as Representative Concentration Pathway RCP 4.5) are likely drive the elimination of most warm-water coral reefs by 2040–2050. Cold-water corals are also threatened by warming temperatures and ocean acidification although evidence of the direct effect of climate change is less clear. Evidence that coral reefs can adapt at rates which are sufficient for them to keep up with rapid ocean warming and acidification is minimal, especially given that corals are long-lived and hence have slow rates of evolution. Conclusions that coral reefs will migrate to higher latitudes as they warm are equally unfounded, with the observations of tropical species appearing at high latitudes "necessary but not sufficient" evidence that entire coral reef ecosystems are shifting. On the contrary, coral reefs are likely to degrade rapidly over the next 20 years, presenting fundamental challenges for the 500 million people who derive food, income, coastal protection, and a range of other services from coral reefs.

Petrovskii et al 18 Sergei Petrovskiia , Yadigar Sekercib & Ezio Venturinoc a Department of Mathematics, University of Leicester, University Road, Leicester LE1 7RH, U.K. b Department of Mathematical Education, Amasya University, 05100 Amasya, Turkey c Dipartimento di Matematica, Universit`a di Torino, via Carlo Alberto 10, 10123 Torino, Italy https://www2.le.ac.uk/departments/mathematics/extranet/staff-material/staff-profiles/sp237/conferences/jtb-17-post-review-version

The net oxygen production by phytoplankton is known to depend[s] on the water temperature and hence can be [is] disrupted by warming. We address this issue theoretically by considering a mathematical model of the plankton-oxygen system. The model is generic and can account for a variety of biological factors. We first show that sustainable oxygen production by phytoplankton is only possible if the net production rate is above a certain critical value. This result appears to be robust to the details of model parametrization. We then show that, once the effect of zooplankton is taken into account (which consume oxygen and feed on phytoplankton), the plankton-oxygen system can only be stable if the net oxygen production rate is within a[n] certain intermediate range (i.e., not too low and not too high). Correspondingly, we conclude that a[n] sufficiently large increase in the water temperature is likely to push[ing] the system out of the safe range, which may result[ing] in ocean anoxia and even a global oxygen depletion.

Reduction in oxygen production is detrimental to all life

And climate change is causing a mass ecosphere die off

Lovvorn 16 Jonathan Lovvorn, Senior Vice President & Chief Counsel for Animal Protection Litigation, The Humane Society of the United States, Fall, 2016, Climate Change Beyond Environmentalism Part I: Intersectional Threats and the Case for Collective Action, Georgetown Environmental Law Review, 29 Geo. Envtl. L. Rev. 1 These impacts are important to understand and internalize, as the world's wild life is already disappearing because of climate change. This is not something coming in five, ten or twenty years; it is underway right now. Natural populations of non-human[s] animals are literally the canaries in the coalmine--showing us what is coming for human animals in short order. The plight of wildlife in an era of climate change is already recognized as critically important to national environmental organizations because of the loss of biodiversity and the elimination of entire species. Although major animal protection groups recognize and decry the impacts of climate change generally, they have not yet engaged the [*41] issue of climate change, nor do they appear to have internalized the massive suffering and loss of animal life that is already well underway across the globe. As discussed herein, the impending deaths of billions of wild and other animals due to climate change should be a top priority for the animal protection movement--especially given its recent trend toward quantification of suffering in making strategic decisions. So the question becomes, as with climate impacts on other social movements, why are animal advocates (and the general public) not more activated by the huge loss of wildlife due to climate change? The answer, once again, has to do with the language of climate change. And the solution is, once again, to redefine how we talk about and conceptualize this loss in a way that resonates beyond the halls of conservation biology departments. For example, the majority of this discussion concerning the impacts of climate change on wildlife will proceed in the environmental language of "species loss"--a method of quantifying climate change impacts that is fundamentally different from how we describe climate impacts on humans, thereby masking the full impacts of climate change. Unfortunately, there is limited scientific source material from which a description of total wildlife lives at risk from climate change might be constructed. Although as discussed below, there does appear to be enough raw data to offer some gross translations from predictions about likely loss of "species" to the number of animal "lives" at risk, this entire inquiry is one that is desperately in need of additional exploration and quantification. Sadly, this lack of concrete quantification is perhaps the best (or worst) example of how the current language of climate change hampers efforts to change climate policy in the U.S. and abroad. Nevertheless, this discussion shall proceed with the blunt tools at hand, which even in the abstract language of "species loss" paint an extremely grim picture of the impacts of climate change upon animals. The basic contours of species loss from climate change are relatively well-known, and have been introduced to the wider public through highly influential [*42] works like Elizabeth Kolbert's 2014 book "The Sixth Extinction." Species loss is not a new phenomenon, nor is it the exclusive provenance of climate change. Conservation biologists estimate that a normal (that is, absent human intervention) background rate of extinction is less than one species for every million species, each year. However, this rate has dramatically increased over the last 50 years. Famed conservation biologist E.O. Wilson estimated that we were losing species at a rate of 27,000 per year or three per hour in 1992, and that rate has now increased to the point at which "current extinction rates are 1,000 times higher than natural background rates of extinction, and future rates are likely to be 10,000 higher." Since 1970, more than half of the world's birds, reptiles, mammals, fish, and amphibians have been lost, with 39% of land species extinguished, 39% of marine species extinguished, and 76% of freshwater species extinguished. Globally, between 12% and 30% of all bird, mammal, reptile, and amphibian species are considered "threatened or vulnerable." In 2000, the Nature Conservancy issued a comprehensive report concluding that North America has a broader diversity of ecosystems than any other place on Earth, but that a third of the estimated 200,000 species of birds, mammals, reptiles, and amphibians on the continent are at risk of extinction. This unprecedented period of species loss has led conservation scientists to declare that the world has entered a new "epoch," and dubbed it the "Anthropocene" because it marks the period in which human influence on global ecosystems is pronounced enough to define the trajectory of all life on the planet. The moniker is considered appropriate because "[a]s a driver of global change, humanity has outstripped geology." As explained by Paul J. Crutzen, who popularized the concept of the Anthropocene: The Anthropocene could be said to have started in the latter part of the eighteenth century, when analyses of air trapped in polar ice showed the beginning of growing global concentrations of carbon dioxide and methane. This date also happens to coincide with James Watt's design of the steam engine in 1784. [*43] The Anthropocene is now an influential concept in a number of fields (scientific, social scientific, and humanities) because it undermines the idea that nature is separate and apart from human civilization--a binary that's been fundamental to Western science and philosophy since Ancient Greece. The notion that nature is outside of civilization is also baked into mainstream thinking about conservation and, especially, environmental laws. As explained by Jedediah Purdy in his recent book After Nature: A Politics for the Anthropocene, federal initiatives like national parks, wildlife refuges, and the Endangered Species Act are premised on the notion that "human beings can save everything, if only we limit our incursions into ecologically important places. This proved unrealistic. The human impact on habitat is so pervasive that, in practice, the question is not how to save everything, but what to save and why, a question that the ESA gives scant help in addressing." The rate of species loss has become so great that conservation scientists increasingly believe that the sixth mass extinction event in Earth's history, as measured by rate of biodiversity loss suddenly and sharply spiking, is already underway. Mass extinction events are ordinarily defined as "times when the Earth loses more than three-quarters of its species in a geologically short interval, as has happened only five times in the past 540-million years or so." An increasing chorus of scientists have concluded that "[t]he evidence is incontrovertible that recent extinction rates are unprecedented in human history and highly unusual in Earth's history," and that "global society has started to destroy species of other organisms at an accelerating rate, initiating a mass extinction episode unparalleled for 65 million years." Outside the circle of climate change denial politics, there is no question that climate change is one of the key drivers of this mass extinction event. Although a number of other anthropogenic factors have contributed (exploitation, conventional pollution, habitat destruction), human-caused climate change is poised to be the overwhelming driver both in terms of magnitude and geographic scale. This should not be much of a surprise from a historical perspective. Non [*44] anthropogenic climate change has been a key driver of previous mass extinction events throughout the Earth's history. The most famous mass extinction event--the Cretaceous-Tertiary extinction, which killed off large numbers of land and marine species, including all non-avian dinosaurs about 66 million years ago--is thought to have been triggered by an asteroid impact off the Yucatan peninsula (the "Chicxulub Asteroid"). The devastating global effect was not from the impact itself but rather because "the impact release of large quantities of water, dust, and climate-forcing gases" that "dramatically alter[ed] the climate system," causing "a catastrophic impact winter." The specific environmental alterations through which current climate change manifests itself to the detriment of wildlife are well-known, and have already been discussed in reference to the human victims of climate change. As with its other impacts, climate change affects wildlife through a complex and interrelated set of mechanisms. Some are direct--that is, where it's literally too hot for a species adapted to a certain temperature range to survive, and there is no way for them to migrate. Some are indirect but straightforward--that is, where key habitat is destroyed by sea level rise or wildfire, or where warming allows parasites to survive through winters and therefore reproduce at a rate that consumes host plants that are staple food sources for animal species. A complete discussion of the myriad ways in which climate change is affecting wildlife populations is beyond the scope of this paper, but a few key areas are worth discussion--not only because of their significance for wildlife but because they are concrete examples of how particular wild species are already being affected, not some future projections of what could happen in 2050 or beyond. For example, oceanic species--and particularly birds--are already being hard hit by climate change for the simple reason that over 90% of warming due to GHG emissions is being absorbed into the world's oceans. Over the last few years there have been increasing, and increasingly alarming, mass die-offs of birds and other marine species that are unprecedented and suggest that the mass destruction of wildlife is a precursor to other forthcoming climate change damage more directly affecting people. For example, in January 2016 the U.S. Fish and Wildlife Service reported that "[t]housands of dead and dying murres have been [*45] washing up on beaches this year, from California to the Gulf of Alaska," and that surviving murres "have turned up at inland locations this winter, and have been observed swimming and presumably foraging in openings in rivers and lakes--both of which are unusual behaviors for seabirds." The murre die-off follows many other similar events, including the thousands of dead short-tailed shearwaters that washed up on the shores of Tasmania in 2013 and 2014, as well as the death of thousands of Cassin's auklets in 2015 spread across a vast area of the West Coast from San Francisco to British Columbia. According to reports, "[o]n some beaches

the Cassin's auklet death toll was a hundred times greater than any bird die-off ever tallied there, and six times worse per kilometer than the body count recorded after the 1989 Exxon Valdez oil spill in Prince William Sound, Alaska." The U.S. Geological Survey determined that "[t]here's very little evidence of food in their GI [gastrointestinal] tracts or stomachs," while a scientist at California's Farallon Institute postulated that "the most likely scenario is that the deaths are related to a massive blob of warm water that heated the North Pacific last year and contributed to California's drought and to 2014 being the hottest year on record." These recent mass marine bird mortality events have been accompanied by a host of similar mass deaths of other ocean species, including the death of millions of starfish from Mexico to Alaska in 2014 and 2015, the mass stranding and deaths of pilot whales off the coast of India in January 2016, the 2015 mass stranding and deaths of fin, humpback, and gray whales in Alaska, and the mass stranding and deaths of Guadalupe Fur Seals--a species that is already listed as threatened under the federal Endangered Species Act--on California beaches in 2015 due to warming ocean temperatures. While it is still too early for scientists to conclusively tie these recent mass mortality events directly to [*46] climate change, the increasing magnitude and frequency of such events is impossible to ignore. The high-profile and ongoing extirpation of Polar Bears and Adelie Penguins due to climate change induced melting ice caps, rising sea levels, and changing coastlines is well-documented, and requires little elaboration. For polar bears, "climate warming is causing progressive unidirectional changes to sea ice distribution, structure, and patterns of breakup and freeze-up," which is depriving them of the sea ice they need as a platform from which to hunt seals to maintain viable subpopulations in the wild. Low genetic diversity, future loss of habitat, and reduced populations of some potential prey species could magnify the impact of current climate warming, posing a profound threat to polar bear survival." The story for Adelie Penguins is much the same, since polar, coastal and wetland ecosystems are especially vulnerable to climate change and are suffering some of the earliest impacts. Further from shore, there are other alarming reports suggesting the impacts of climate change are already well-underway for the world's terrestrial wildlife. The plight of amphibians is one well-known example, including the sudden loss of more than 70% of all Central American amphibian species--which triggered some of the earliest alarm bells that a human-caused mass extinction was taking place. The likely cause of this mass amphibian die-off was a fungus widely hypothesized to have been enabled by minor changes in climate. The climate-disease connection is not confined to just amphibians in tropical climates. In fact, the spread of parasites and pathogens out of the tropics into colder-weather areas as those areas gradually warm presents some of the most dangerous threats to wildlife, humans, and domestic animals who have not developed an immune [*47] response. Pathogens currently on the march into new territories, with the aid of climate change, include Lyme disease and Bubonic plague. The most notable of recent upland mass mortality events was the death of more than 200,000 endangered Saiga Antelope in Central Asia in the spring of 2015. The deaths had scientists puzzled for months, until they discovered that a slight increase in average temperature attributed to climate change had transformed normally harmless gut microbes into a deadly bacteria that decimated the population. The mass death of these animals, and the relatively small shift in temperature necessary to transform harmless microbes into a widespread mortality vector, is a frightening example of how the world's wildlife populations may be far more vulnerable to small, indirect impacts of climate change than originally thought, and that the loss of such wildlife from climate change is occurring much sooner than anticipated. These recent mass marine and terrestrial die-offs are consistent with a 2015 study from a team of researchers at Yale, Berkeley, Dartmouth, and other universities finding recent shifts in the frequency, magnitude, and cause of mass mortality events for wildlife across the globe. Defining mass mortality events as those that result in the death of 90% of a population, more than a billion individuals, or 700 or more tons of dead biomass, the study looked at more than 700 such events since 1940. The study concluded that, overall, "fishes were the largest contributor of reported MMEs," and that mass mortality events are "increasing in frequency and--for birds, fishes, and marine invertebrates--in [*48] severity as well." The study recommended additional analysis of such mass death events among wildlife populations "because the severity of extreme weather-related events such as heat waves, heavy precipitation, and drought is expected to increase in the future as a result of climate change." The actual level of mortality for all wildlife populations from climate change will be closely tied to each population's capacity to migrate in order to stay within tolerable conditions. Examples already abound of species substantially shifting their range as average temperatures rise--in fact, "modern climate change is reshuffling the geographic distributions of plant and animal species worldwide." Conversely, those species that are isolated on literal or figurative islands are in trouble. "Islands" can be natural topographical features--that is, actual islands, or high-altitude mountain peaks with no connectivity at the same elevation. They can also be created by humans, including habitat fragmented by human land use (roads, lumber, agriculture), border walls, and legal protections that are limited to circumscribed geographic areas that lack protected migration corridors. All of this uncertainty makes prediction and quantification of wildlife loss from climate change a necessarily inexact science. A 2004 estimate in Nature found that, under pessimistic assumptions about adaptability, 22-31% of species would be irreversibly on the path to extinction by 2050 if warming were kept to a minimum, and 38-52% if it were allowed to increase. Under optimistic assumptions, the ranges were 9-13% at low warming and 21-32% at high warming. The average it extrapolated was 24% of all species would be headed for extinction by 2050. A 2015 meta-analysis--widely regarded as the most up to date and conservative estimate of species loss from climate change--noted that "current predictions about extinction risks vary widely, suggesting anywhere from 0 to 54% of species could become extinct from climate change." After synthesizing all existing studies on the topic, the meta-analysis concluded that 5.2% of species [*49] will go extinct at the global policy target of 2 degrees Celsius (now widely regarded as unobtainable); 8.5% at 3 degrees Celsius; and 16% (or one in six) at the current "business as usual" trajectory. But the rate of loss was non-linear between different areas of the world. North America and Europe returned the lowest numbers at 5% and 6% respectively whereas South America faces a whopping 23% loss prediction and Australia and New Zealand falling in between at 14%.

Contention 2: Water and Land Pollution

Space debris falling to Earth poses an environmental threat

Hutagalung et al 20 J M Hutagalung et al 2020 IOP Conf. Ser.: Earth Environ. Sci. 456 012081 J M Hutagalung1,* , C I Tobing1 , J Debastri1 and R T Amanda1 1 Lecture, Faculty of Law, University of Bhayangkara Jakarta Raya, Jl. Raya Perjuangan, Bekasi Utara, West Java, 17143 Indonesia https://iopscience.iop.org/article/10.1088/1755-1315/456/1/012081/pdf
Space debris includes any manufactured object in space that serves no practical purpose, includes nonfunctional spacecraft, unused fuel and dead batteries from satellite break-ups, paint flakes, rocket bodies and mission-related debris (including human refuse). As stated earlier, the harmful characteristic of space debris comes from its self-generating nature or the cascade effect, or Kessler syndrome [9]. When orbital debris collides with other space objects, the result is more debris. Eventually, some chain reactions of collisions could potentially harm some of the most valuable orbits. According to the cascade effect hypothesis, even if humans add no additional debris to the Earth's orbit, the amount of orbital debris could still grow exponentially, based on the amount that previously exists [10]. On outer space, even a significantly microscopic object can cause significant harm to anything it collides with. For example, a half-millimeter chip can puncture a spacesuit, and a marble-size object can knock a satellite off. Aside from the economic loss, the secondary impacts for many on-ground operational systems that rely on satellites remain, nonetheless. A collided-with satellite means that the ground systems that depend on it must immediately provide backup or suffer a stoppage until the satellite is repaired or replaced. Services outages due to the collision could plunge anywhere between mere broadcast outages to full out global crises. Virtually all modern communications, commercial and scientific interests are similarly threatened by collisions [10]. Aside from the remaining man-made fragments and elements from satellite launch, space debris also possesses another environmental harm to the earth. This is due to the nuclear materials that often used in satellite activities. In 1978, when a Soviet satellite malfunctioned and fell to Earth, radioactive debris scattered over northern Canada [6].

Space materials are either intentionally discarded in the ocean or end up leaking into them anyways

Mosher 17 Dave Mosher reported news and features stories about science and technology for Insider, with human and robotic spaceflight as the primary focus of his multimedia storytelling. Mosher joined Insider in April 2015 as a deputy editor to help launch Tech Insider and manage its science desk. He left the company in February 2021. Prior to being an Insider, Mosher directed Popular Science's website, was a Wired contributor, and worked for or with Scientific American, Popular Mechanics, Discover, Space.com, National Geographic News, Discovery Channel, Nature, Science, and other media outlets. https://www.businessinsider.com/author/dave-mosher The most remote location on Earth has many names: It's called Point Nemo (Latin for "no one") and the Oceanic Pole of Inaccessibility. Most precisely, its exact coordinates are 48 degrees 52.6 minutes south latitude and 123 degrees 23.6 minutes west longitude. The spot is about 1,450 nautical miles from any spot of land — and the perfect place to dump dead or dying spacecraft, which is why its home to what NASA calls its "spacecraft cemetery." "It'[i]s in the Pacific Ocean and is pretty much the farthest place from any human civilization you can find," NASA said. Bill Ailor, an aerospace engineer and atmospheric reentry specialist, put it another way: "It's a great place you can put things down without hitting anything," he said. To "bury" something in the cemetery, space agencies have to time a crash over that spot. Smaller satellites don't generally end up at Point Nemo, since, as NASA explains, "the heat from the friction of the air burns up the satellite as it falls toward Earth at thousands of miles per hour. Ta-da! No more satellite." The problem is larger objects, like Tiangong-1: the first Chinese space station, which launched in September 2011 and weighs about 8.5 tons. China lost control of the 34-foot-long orbital laboratory in March 2016, and it is now doomed to crash by early 2018. Where, exactly? No one yet knows. Ailor, who works for the nonprofit Aerospace Corporation, said his company likely won't generate a forecast until five days before the space station is expected to break apart in Earth's atmosphere. When it does, hundreds of pounds of the spacecraft — like titanium scaffolding and glass-fiber-wrapped fuel tanks [are] — could be falling at more than 180 miles per hour just before slamming into the ground (and thousands of miles per hour faster in the upper atmosphere). Since China doesn't have control of Tiangong-1, it can't assure the space station will disintegrate over Point Nemo. The dead-spacecraft dump[ed]ing zone Astronauts living aboard the International Space Station actually live closer to the graveyard of spacecraft than anyone else. This is because the ISS orbits about 250 miles above Earth — a[t]nd Point Nemo, when the orbital laboratory flies overhead. (The nearest island, meanwhile, is much farther away.) Between 1971 and mid-2016, space agencies all over the world dumped at least 260 spacecraft into the region, according to Popular Science. That tally has risen significantly since the year 2015, when the total was just 161, per Gizmodo. Buried under more than two miles of water is the Soviet-era MIR space station, more than 140 Russian resupply vehicles, several of the European Space Agency's cargo ships (like the Jules Verne ATV), and even a SpaceX rocket, according to Smithsonian.com.

Agence France-Presse 20 "Rocket fuel leak could've caused water pollution, killed marine life in Russia's Kamchatka region" October 6, 2020

https://www.firstpost.com/world/rocket-fuel-leak-couldve-caused-water-pollution-killed-marine-life-in-russias-kamchatka-region-8883911.html Water pollution in Russia's Kamchatka region that caused sea creatures to wash up dead on beaches prompted fears on Monday that rocket fuel stored in the region's military testing grounds could have leaked out. The water pollution came to light late last month after local surfers reported stinging eyes and said the water had changed colour and developed an odour. Officials later confirmed the surfers had suffered mild burns to their corneas. Then locals witnessed large numbers of dead sea creatures including seals, octopuses and sea urchins washed up onto a black-sanded beach popular with tourists. The regional governor, Vladimir Solodov, said Monday that the sea off the remote Kamchatka peninsula may have been contaminated with toxic chemicals as Greenpeace warned of an "ecological disaster" for marine life. Officials have said tests soon after found above-permitted levels of phenol and petroleum products. Experts were investigating whether this was linked to "spills of some toxic substances," Solodov said in a statement. He added that divers had confirmed the deaths of sea creatures and pollution appeared to be spread over a wide area. Officials are scrambling to come up with the cause after President Vladimir Putin in June reacted angrily to the late reporting of an oil leak in Arctic Siberia that poured thousands of tons of diesel into land and waterways. Ecology Minister Dmitry Kobylkin said in televised comments that Putin had ordered him to get to the bottom of the situation. Military sites The 38-year-old Kamchatka governor, dressed in an "I/We are the Pacific Ocean" T-shirt, vowed on Instagram to lead a "transparent" probe and sack any official who covered up the scale of the pollution. He said there would be checks on Tuesday at two military testing sites, Radygino and Kozelsky, that could be responsible, citing a "yellow film" on a local river. "Early tomorrow morning there will be inspections of two key test sites that are raising everyone's concerns," he said. Some experts have suggested that highly toxic rocket fuel could have leaked into the sea. The first test site, Radygino, is around 10 kilometres (miles) from the sea and was used for drills in August. Vladimir Burkanov, a biologist specialising in seals, in a comment published by Novaya Gazeta opposition newspaper suggested that old stores of rocket fuel kept in Radygino could have rusted and the fuel leaked into streams. The other site, Kozelsky, has been used to bury toxic chemicals and pesticides, according to the governor's website. Greenpeace said its team currently assessing the situation had seen patches of "yellowish foam" and murky water in several areas, with some pollution drifting towards a UNESCO-protected area of volcanoes. The group said it saw dead animals in one area. Ecology Minister Kobylkin said in televised comments that so far tests had only found slightly raised levels of iron and phosphates and suggested that the incident might not be manmade but caused by the stormy conditions and microorganisms altering the oxygen levels. Environmental inspectors and experts from a fisheries and oceanography research centre were set to continue tests. Greenpeace said it had contacted state ecological monitors, the armed forces and the Prosecutor General's Office urging an immediate investigation. Prosecutors and investigators announced they would carry out checks into whether a crime had been committed but have not released any findings. The emergencies ministry said it was using boats and drones to monitor the coastline but added that "no pollution is visible." Governor Solodov said it was a problem that the region had no unified system of environmental monitoring. The pristine peninsula is a popular destination for adventure tourism with its abundance of wildlife and live volcanoes. The incident came as authorities urged tourists not to visit a live volcano on Kamchatka, warning eruption could be imminent.

Materials necessary for appropriating space pollute the Earth, rocket fuel leaks into oceans, debris falls from space