# OFF

### NC

T – Appropriation

#### Interp—the aff may not defend a subset of appropriation.

#### Appropriation is a generic indefinite singular.

**Cohen 01**

Ariel Cohen (Ben-Gurion University of the Negev), “On the Generic Use of Indefinite Singulars,” Journal of Semantics 18:3, 2001 <https://core.ac.uk/download/pdf/188590876.pdf>

\*IS generic = Indefinite Singulars

French, then, expresses the two types of reading differently. In English, on¶ the other hand, generic BPs are ambiguous between inductivist and normative¶ readings. But even in English there is one type of generic that can express only¶ one of these readings, and this is the IS generic. While BPs are ambiguous¶ between the inductivist and the rules and regulations readings, ISs are not. In¶ the supermarket scenario discussed above, only (44.b) is true:¶ (44) a. A banana sells for $.49/lb.¶ b. A banana sells for $1.00/lb.¶ The normative force of the generic IS has been noted before. Burton-Roberts¶ (1977) considers the following minimal pair:¶ (45) a. Gentlemen open doors for ladies.¶ b. A gentleman opens doors for ladies.¶ He notes that (45.b), but not (45.a), expresses what he calls “moral necessity.”7¶ Burton-Roberts observes that if Emile does not as a rule open doors for ladies, his mother could utter [(45.b)] and thereby successfully imply that Emile was not, or was¶ not being, a gentleman. Notice that, if she were to utter. . . [(45.a)] she¶ might achieve the same effect (that of getting Emile to open doors for¶ ladies) but would do so by different means. . . For [(45.a)] merely makes a¶ generalisation about gentlemen (p. 188).¶ Sentence (45.b), then, unlike (45.a), does not have a reading where it makes¶ a generalization about gentlemen; it is, rather, a statement about some social¶ norm. It is true just in case this norm is in effect, i.e. it is a member of a set of¶ socially accepted rules and regulations.¶ An IS that, in the null context, cannot be read generically, may receive a¶ generic reading in a context that makes it clear that a rule or a regulation is¶ referred to. For example, Greenberg (1998) notes that, out of the blue, (46.a)¶ and (46.b) do not have a generic reading:¶ (46) a. A Norwegian student whose name ends with ‘s’ or ‘j’ wears green¶ thick socks.¶ b. A tall, left-handed, brown haired neurologist in Hadassa hospital¶ earns more than $50,000 a year.¶ However, Greenberg points out that in the context of (47.a) and (47.b),¶ respectively, the generic readings of the IS subject are quite natural:¶ (47) a. You know, there are very interesting traditions in Norway, concerning the connection between name, profession, and clothing. For¶ example, a Norwegian student. . .¶ b. The new Hadassa manager has some very funny paying criteria. For¶ example, a left-handed. . .¶ Even IS sentences that were claimed above to lack a generic reading, such¶ as (3.b) and (4.b), may, in the appropriate context, receive such a reading:¶ (48) a. Sire, please don’t send her to the axe. Remember, a king is generous!¶ b. How dare you build me such a room? Don’t you know a room is¶ square?

#### Their plan violates. Rules readings are always generalized – specific instances are not consistent.

**Cohen 01**

Ariel Cohen (Ben-Gurion University of the Negev), “On the Generic Use of Indefinite Singulars,” Journal of Semantics 18:3, 2001 https://core.ac.uk/download/pdf/188590876.pdf

In general, as, again, already noted by Aristotle, rules and definitions are not relativized to particular individuals; it is rarely the case that a specific individual¶ forms part of the description of a general rule.¶ Even DPs of the form a certain X or a particular X, which usually receive¶ a wide scope interpretation, cannot, in general, receive such an interpretation in the context of a rule or a definition. This holds of definitions in general, not¶ only of definitions with an IS subject. The following examples from the Cobuild¶ dictionary illustrate this point:¶ (74) a. A fanatic is a person who is very enthusiastic about a particular¶ activity, sport, or way of life.¶ b. Something that is record-breaking is better than the previous¶ record for a particular performance or achievement.¶ c. When a computer outputs something it sorts and produces information as the result of a particular program or operation.¶ d. If something sheers in a particular direction, it suddenly changes¶ direction, for example to avoid hitting something.

#### That outweighs—only our evidence speaks to how indefinite singulars are interpreted in the context of normative statements like the resolution. This means throw out aff counter-interpretations that are purely descriptive

#### Vote neg:

#### 1] Precision –any deviation justifies the aff arbitrarily jettisoning words in the resolution at their whim which decks negative ground and preparation because the aff is no longer bounded by the resolution.

#### 2] Limits—specifying a type of appropriation offers huge explosion in the topic since space is, quite literally, infinite.

#### Drop the debater to preserve fairness and education – use competing interps –reasonability invites arbitrary judge intervention and a race to the bottom of questionable argumentation

#### Hypothetical neg abuse doesn’t justify aff abuse, and theory checks cheaty CPs

#### No RVIs—it’s their burden to be topical.

## NC

#### Private company mining key for innovation – lower cost of space travel

Heise, 18 -- Managing Notes Editor, Michigan Journal of International Law

[Jack, "Space, the Final Frontier of Enterprise: Incentivizing Asteroid Mining Under a Revised International Framework, 40 Mich. J. Int'l L. 189, 2018, <https://repository.law.umich.edu/mjil/vol40/iss1/5>, accessed 6-24-21]

While sovereign governments do hold some of the purse strings relevant to asteroid mining companies and the space economy as a whole, private companies are increasingly displacing national space agencies.35 A private space economy that is increasingly independent from sovereign governments tends to undermine the factual framework upon which the original OST relied.36 Specifically, Article VI assigns responsibility for nongovernmental entities to national governments, the implicit assumption likely being that private entities would be acting at the behest of a sovereign.37 This concern is increasingly unsubstantiated in an environment in which private, independent companies are ascendant.38

C. Global Benefits of Asteroid Mining

Asteroid mining has the potential to facilitate space travel, an outcome the OST holds to be in the interest of humanity as a whole.39 The potential of asteroid mining to reduce the cost of spaceflight, moreover, could facilitate the growth of the space economy. Asteroid mining thus aligns with another stated purposes of the OST in the sense that an expanded space economy could provide substantial benefits to all mankind.40 First, in seeking to face the challenges posed by space travel, the public sector space race gave rise to numerous technological innovations, ranging from LEDs to emergency blankets to memory foam.41 It seems likely that the private space race would result in a similar degree of innovation, the products of which could benefit people across the globe.

Second, a successful mission to Mars could provide benefits beyond a mere sense of interplanetary accomplishment. NASA suggests that, given the parallels between the formation and evolution of Mars and Earth, a voyage there could help “us learn more about our own planet’s history and future.”42 The scientific advancements from such a mission cannot currently be anticipated and are difficult to predict, but “expand[ing] the frontiers of knowledge” in this manner could well bring benefits to all mankind.43

Third, the development of asteroid mining technology could also help advance asteroid diversion tactics. The development of the technology required to conduct successful asteroid mining operations could “help us to divert any incoming asteroids.”44 This is of great importance since NASA recently eliminated its Asteroid Redirect Mission due to funding cuts;45 NASA’s project was hailed by some scientists as a “critical step in demonstrating we can protect our planet from a future asteroid impact . . . .”46 Asteroid mining could step in and fill an important void. While the probability of an Armageddon-causing impact is low, the effects of an impact would be extremely severe.47 Even some mitigation of this risk as a byproduct of asteroid mining would be a benefit to humanity as a whole.

Finally, reduced launch costs could facilitate measures to combat global climate change. One proposed solution for canceling out predicted increases in average worldwide temperature is to “prevent[] . . . about 1% of incoming solar radiation—insolation—from reaching the Earth. This could be done by scattering into space from the vicinity of Earth an appropriately small fraction of total insolation.”48 Asteroid mining could facilitate such measures in that “[t]echnologies that could greatly decrease the cost of space-launch could make a telling difference in the practicality of all types of spacedeployed scattering systems of scales appropriate to insolation modulation.”49 There are certainly intermediate measures to combat climate change that ought to be taken first, but asteroid mining would facilitate this expedited solution. While some of the benefits of asteroid mining would doubtless accrue primarily to those nations with asteroid mining companies within their borders, the benefits noted in this section—space exploration as a general proposition, technological and scientific development, improvement of asteroid diversion technology, and facilitated means of swiftly countering climate change—would inure substantially to the benefit of all mankind.

#### Low-cost of travel needed for future space colonization

**Morrison 14**

[Chris Morrison – Ph. D Student, B.S., “Why Access to Space Needs To and IS Getting Cheaper,” American Nuclear Society, 11-02-2014,<http://anstd.ans.org/access-to-space-gateway-to-the-moon-mars-and-beyond/>]

If you look into the night you can see the Moon our nearest neighbor. Humans have been there a few times but we aim to “shoot to the moon” more permanently and sustainably. We can see Mars, a planet which sits in the cross hairs of our exploration with its raw resources and atmosphere which could be used to build a civilization. We see other places in our Solar System and beyond that every science fiction movie advertises as our future homes, as places where humanity can unabashedly grow without the looming threat of global catastrophe and scarcity of resources. The future of humanity is in the stars, but how do we move toward it? Governments seem ambivalent, and today it seems with the retirement of the shuttle and lack of a sustained space vision that we are less capable of spaceflight than we were in the days of our parents. Are we going anywhere anytime soon? Any object that has traveled into space is worth its weight in gold. For the past 30 years the price to go to Earth orbit has been $10,000 a pound ($20,000 a kg). Any mission to Mars or the Moon must first travel through the gateway of Earth orbit meaning that economically, our ambitions to travel beyond stand as unsustainable pots of gold at the end of the rainbow. The **staggering cost** of spaceflight has been the single biggest deterrent to extending our reach beyond Earth orbit. Only light-weight robotic missions are even fiscally capable of being implemented. During the early 1990’s the Space Exploration Initiative quoted $500 billion as the cost of a human Mars mission. The many permutations of Mars missions considered by NASA ever since have not been able to lower the bill. There is **no way** to become a space faring civilization with costs this high. Perhaps flags and footprints can be left, but not a sustainable system capable of sprouting a colony on another world. Yet there is a change in the wind. Namely a new company called SpaceX is driving costs down. SpaceX’s Falcon 9 rocket currently boasts a cost per pound to orbit of $1,800. The falcon heavy, a rocket in development, claims a cost less than $1,000 per pound (less than 1/10th the traditional cost). Even more exciting, the company is working on saving and reusing parts of the rocket to drive the cost down by another factor of 10. To put it in context, imagine you’re an astronaut traveling into orbit. The cost of launching you, and your support equipment with Russia is around $70 million. With SpaceX the cost has been reduced to below $7 million and has potential to drop to under $700,000. You might ask why is the cost of spaceflight so exorbitant and how can one company make such a difference? The major factor is sustained vision. John F. Kennedy was the leader of the space age. His leadership and consistent goal of reaching the moon provided the stability required for the Apollo program. Unfortunately after president Kennedy, no leader emerged with a sustained vision for humanity in space. Today there are approximately 500 different visions for US spaceflight in congress. Leaders consistently **fight** over the destination, (Moon, Mars, or Asteroid) the budget, the location of the jobs supporting the mission, etc. Typically projects only last the stretch of a political cycle. It’s no wonder that government contractors have to charge so much. When projects are consistently being canceled, moved, and re-prioritized, a manager must charge many times the actual cost to cover the **risk** that they may lose their contract the next day. Elon Musk the founder and CEO of SpaceX is a man with a vision. As early as 2000 he set his sights on extending humanity’s reach to Mars. He began by attempting to raise money for the Mars Oasis project to place a greenhouse full of plants on Mars. He ultimately learned from the Mars Oasis project that access to space was too expensive to accomplish his goal. He then shifted his focus to create SpaceX to develop cheap access to space and ultimately access to Mars. The Space Shuttle is one of the most advanced spacecraft systems in existence. The shuttle’s liquid oxygen, liquid hydrogen staged combustion cycle engines achieved a vacuum specific impulse of 450 seconds, quite a feat of engineering. The Falcon 9 uses a less advanced gas generator cycle, kerosene liquid oxygen cycle and only achieves a specific impulse in the lower 300’s. Yet, just like the difference between a sports car and a work truck, the simpler technology with lower performance costs less and can get the job done. Whereas the shuttle focused on pushing the performance of the system the Falcon 9 focused on cost and manufacturing. Everything at SpaceX is focused on scalability. Every part from the engines to the tanks to the rocket fairings are built like LEGO pieces that can be mixed and matched. The Falcon Heavy Rocket is literally three Falcon 9 rockets strapped together. In contrast the Space Shuttle was designed by a concert of seven different companies with highly distinct systems resulting in a marvel of system engineering but couldn’t deliver on the original promise of cheap, repeatable access to space. Reusability is the true key piece of the puzzle. With sustained leadership and a focus on scalability the price of space access can drop by a factor of 10. To drop the price by a factor of 100 the rocket must be reusable.

#### Space colonization solves extinction – nuclear war, pandemics, climate change

Baum 09 – (Seth, visiting scholar at Columbia University's Center for Research on Environmental Decisions, PhD candidate in Geography with a focus on risk analysis, “Cost–benefit analysis of space exploration: Some ethical considerations,” Space Policy Volume 25, Issue 2, May 2009, Pages 75-80, science direct)

Another non-market benefit of space exploration is reduction in the risk of the extinction of humanity and other Earth-originating life. Without space colonization, the survival of humanity and other Earth-originating life becomes extremely difficult- perhaps impossible- over the very long-term. This is because the Sun, like all stars, changes in its composition and radiative output over time. The Sun is gradually converting hydrogen into helium, thereby getting warmer. In approximately 500 million to one billion years, this warming is projected to render Earth uninhabitable to life as we know it [25–26]. Humanity, if it still exists on Earth then, could conceivably develop technology by then to survive on Earth despite these radical conditions. Such technology may descend from present proposals to “geoengineer” the planet in response to anthropogenic climate change [27–28].3 However, the Sun later- approximately seven billion years later- loses mass that spreads into Earth’s orbit, causing Earth to slow, be pulled into the Sun, and evaporate. The only way life could survive on Earth may be if Earth, by sheer coincidence (the odds are on the order of one in 105 to one in 106 [29]) happens to be pulled out of the solar system by a star system that passes by. This process might enable life to survive on Earth much longer, although the chance of this is quite remote. While space colonization would provide a hedge against these very long-term astrological threats, it would also provide a hedge against the more immediate threats that face humanity and other species. These threats include nuclear warfare, pandemics, anthropogenic climate change, and disruptive technology [30]. Because these threats would generally only affect life on Earth and not life elsewhere,4 self-sufficient space colonies would survive these catastrophes, enabling life to persist in the universe. For this reason, space colonization has been advocated as a means of ensuring long-term human survival [32–33]. Space exploration projects can help increase the probability of long-term human survival in other ways as well: technology developed for space exploration is central to proposals to avoid threats from large comet and asteroid impacts [34–35]. However, given the goal of increasing the probability of long-term human survival by a certain amount, there may be more cost-effective options than space colonization (with costs defined in terms of money, effort, or related measures). More cost-effective options may include isolated refuges on Earth to help humans survive a catastrophe [36] and materials to assist survivors, such as a how-to manual for civilization [37] or a seed bank [38]. Further analysis is necessary to determine the most cost-effective means of increasing the probability of long-term human survival.

### NC

Alaska Model CP

#### CP: States ought to establish an international space body modeled on the International Seabed Authority. This new international space body ought to license outer space resources and levy a royalty on production and mandate that revenues are deposited in a Space Resource Fund that pays a yearly dividend to every citizen on Earth.

#### Solves inequality

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[Morgan, and Kevin Orrman-Rossiter, PhD candidate, History & Philosophy of Science, The University of Melbourne, "All of humanity should share in the space mining boom," Conversation, 4-17-16, https://theconversation.com/all-of-humanity-should-share-in-the-space-mining-boom-57740, accessed 6-25-21]

One solitary asteroid might be worth trillions of dollars in platinum and other metals. Exploiting these resources could lead to a global boom in wealth, which could raise living standards worldwide and potentially benefit all of humanity. There are already companies, such as Planetary Resources, hoping to make mining in space a reality. Peter Diamondis, co-founder of Planetary Resources and founder of the XPrize Grand Challenges, believes that the benefits to humanity give us a moral imperative to explore and utilise space. He has also declared “there are twenty-trillion-dollar checks up there, waiting to be cashed!” However, behind the utopian rhetoric and dazzling dreams of riches lie some very real problems. Ownership and the Outer Space Treaty The framework of international space law is given by the Outer Space Treaty (OST), which entered into force in 1967. Among its main principals, the OST includes these statements: the exploration and use of outer space shall be carried out for the benefit and in the interests of all countries and shall be the province of all mankind and, outer space is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means Because the OST is generally interpreted as preventing anything like private fee-simple ownership, it is sometimes claimed to be an obstacle to commercial ventures in space. But such claims simply do not hold water. There are numerous terrestrial examples where resources are profitably exploited in the absence of fee-simple ownership. Governments routinely licence companies to engage in timber extraction, mining, offshore oil exploration and other activities, receiving royalties payments on production. In the United States, revenues from such royalties totalled some US$13.5 billion dollars in 2014 from federally owned or managed lands alone. Nevertheless, some proponents of mining in outer space argue for serious modification or an end to the Outer Space Treaty and claim, against the evidence, that without fee-simple ownership, there is no incentive for commercial exploitation. The Unites States’ Space Act of 2015 was just one volley – and a deliberately vague one at that – in this ongoing international debate. A balanced approach? The riches exist, but how will humanity benefit from mining in outer space, or for that matter, other global commons such as the deep sea floor? Behind the lofty rhetoric of benefits to humanity, there is a dark shadow of voodoo economics, the shambling, walking dead figure of trickle down economics– and the possibility of a world where a few trillionaires enjoy the view from space while others barely eke a living on its surface. Yet we do suggest that commercial interests and profit seeking can be a healthy part of the exploration of outer space. Yet outer space is not the Wild West frontier of Frederick Jackson Turner, nor do we live in the Gold Rush days of Jack London’s tale of greed and death. In the common heritage of space, with multiple state and private actors engaging in exploration and potentially exploitation, international cooperation and oversight will benefit all. The Alaskan model There is a balanced, pragmatic approach that will promote commercial and profit driven activities, while also producing tangible benefits to all of humanity. Importantly, this pragmatic approach has a well established precedent that has existed for nearly 40 years. And this comes not from a social democracy or left-wing ideology, but was the brainchild of a libertarian, Republican governor of Alaska, Jay Hammond. That model is the Alaska Permanent Fund Corporation (APFC) created in 1976, and its unique “citizen’s dividend”. The APF is a resource wealth fund, which derives its revenue primarily from leases on oil fields. In 1977, Hammond suggested that “rather than permitting government to spend all public monies earned through the exploitation of the public’s resources for what government thinks best, let’s grant shares to Alaskans.” The first dividend payment was made in 1982, and in 2015 that payment amounted to US$2,072. Linking a citizen’s dividend to a sovereign wealth fund was unique, but the idea of a citizen’s dividend has a long and venerable tradition. One of the earliest advocates was no less than the political theorist and American Revolutionary, Thomas Paine. International body How would this work for outer space? We need an international body similar to the International Seabed Authority, which was established by the United Nations Convention on the Law of the Sea, or the International Telecommunications Union, which allocates satellite orbits. This would provide the stable business and investment environment that entrepreneurs seek by ensuring international law and obligations are met. This body could license outer space resources and levy a royalty on production, which is part of standard business practice between petroleum and other mining companies and governments here on Earth. In turn, these revenues, or a significant portion thereof, would be deposited in a Space Resource Fund, possibly under the aegis of the World Bank. And every single citizen on Earth, say aged 18 or above, would receive a dividend on a yearly basis as their rightful share as owners of the common province of humankind. Crucially, we are not suggesting redistribution, which has been an obstacle to the International Seabed Authority and the Moon Treaty in the past, but a fair share dividend of wealth that truly belongs to everyone. Our model doesn’t provide a handout, or a welfare cheque, or charity from a trillionaire philanthopist; it pays every owner in a global commons a share of what is rightfully theirs. Even tiny dividends by the standards of the world’s wealthy nations would make a difference for some developing world farmers. If there truly are trillions of dollars out there, then this might be something fundamentally world changing. We accept that Larry Page and Sir Richard Branson – founding investors and advisors in Planetary Resources – and its founders Eric Anderson and Peter Diamandis, truly want humanity to benefit from outer space, and that they truly believe in corporate social responsibility and a sustainable future. We would encourage them to embrace the idea that the sky really does belong to all of us, as the common “province of all mankind”. By paying rent for the right to exploit resources in space and royalties on production, the same way oil companies pay to exploit oil in the Gulf of Mexico, they’ll be engaging in business as usual. They will have bought the right to make a potentially enormous profit and prove they really are responsible global citizens. And they’d get a citizen’s dividend cheque too.

#### Inequality leads to biodiversity loss

**Mikkelson et al. 07**

(Geregory M. Mikkelson, Andrew Gonzalez, Garry D. Peterson, “Economic Inequality Predicts Biodiversity Loss,” Plos One, 05-16-2007,<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0000444>)

Among both countries and states, we found **striking relationships** between income inequality and biodiversity loss. As [Figure 1](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0000444#pone-0000444-g001) shows, societies with more unequal distributions of income experience greater losses of biodiversity. After other variables have been taken into account, the country-level Gini ratio of household income inequality in 1989 has a highly significant power relationship with the number of threatened plant and vertebrate species in 2004 (P = 6.4×10−6). The estimated inequality exponent is 1.76, which means that a 1% increase in the Gini ratio is associated with an almost 2% rise in the number of threatened species. Inequality is even more significant (P = 1.1×10−6) after removing statistical outliers (Brazil, Jamaica, Kyrgyzstan, Malaysia, and New Zealand). Alternative models confirm this link between economic inequality and biodiversity loss (see [Table 1](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0000444#pone-0000444-t001) and [Materials and methods](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0000444#s4)).We tested the appropriateness of our socioeconomic variables in two ways. First, we tried all possible time lags for which our data allow a sample size of at least 20. The results support our original choices of time lag, and indicate how the strength of the relationship between economic inequality and biodiversity loss varies across different time lags. For most time lags, this relationship is stronger than those found between biodiversity loss and either human population size or affluence. See [Table S1](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0000444#pone.0000444.s001) in the supplementary information for more information. Second, we checked how well changes over time in socioeconomic variables, rather than values at a single time, explain biodiversity loss. Except for the change in per capita GDP at the country level, such changes do not correlate significantly with threatened or declining species (P-value of change in inequality = 0.16 for countries and 0.98 for US states).

Finally, we did one more check on the robustness of our results at the country scale, and one more on the appropriateness of our dependent variable at the US state scale. For countries, we tested whether inequality remains significant after controlling for geography, and for the demise of communist regimes. Dummy variables were used to indicate whether a country is in Africa, Asia, Australasia, Europe, or Latin America; and whether it is ex-communist or not. (An additional dummy variable for North America was not required, since only one country in our analysis – the US – is in that continent.) In a power model with the biophysical and socioeconomic variables used in the main analysis, plus the five geographic and one historical dummy variable just mentioned, the Gini ratio in 1989 still has a statistically significant, positive relationship with the number of threatened species in 2004 (P = 0.03).

We have thus demonstrated a striking correlation between economic inequality and biodiversity loss. While our findings cohere with previous work showing links between inequality and human health [[16]](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0000444#pone.0000444-Wilkinson1), they contrast with previous research suggesting that the overall size of an economy (i.e., population times per capita GDP or income) is the primary driver of environmental impacts [[9]](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0000444#pone.0000444-York1), [[26]](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0000444#pone.0000444-Naidoo1). According to one cross-country analysis of per capita GDP and threatened species, the numbers of threatened species in most taxa follow a U-shaped pattern: first falling, but then rising, with increasing per capita GDP [[26]](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0000444#pone.0000444-Naidoo1). This is the opposite of the hump-shaped “environmental Kuznets” relationship expected by many economists between affluence and its environmental impacts. We used very similar data on threatened and total species; and we also allowed for detection of monotonic, U- shaped, and hump-shaped relationships; by adding a quadratic term for GDP PPP per capita. Nevertheless, we did not find any such patterns. This may be partly due to sample size (45 countries in our analysis, as opposed to more than 100 [[26]](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0000444#pone.0000444-Naidoo1)). But the previous study also did not include inequality or allow for a time lag between socioeconomic causes and biological effects, as we have. If such research confirms a causal relationship, it may help to predict future impacts of the rising inequality that most countries, as well as US states, have suffered over recent decades [[17]](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0000444#pone.0000444-Pitt1), [[18]](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0000444#pone.0000444-United1). For example, given that the Gini ratio in the US rose by 5% from 1989 to 1997, the country-level power model described in [Table 1](https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0000444#pone-0000444-t001) suggests that we should expect a **roughly 9% increase** in the number of threatened plant and vertebrate species there by 2012. And we might expect the 3% rise in British inequality from 1989 to 1996 to result in a 5% increase in threatened species there by 2011. In general, unless current trends toward greater inequality are r**eversed**, it may become **increasingly** hard to **conserve** the rich variety of the living world. Conversely, if we can learn to share economic resources more fairly with fellow members of our own species, it may help us to share ecological resources more fairly with our fellow species.

#### Biodiversity loss causes extinction and magnifies all other impacts

Torres 16

Phil Torres (Affiliate Scholar at Institute for Ethics and Emerging Technologies. He has been a visiting scholar at the Centre for the Study of Existential Risk at the University of Cambridge and is currently based at Leibniz Universität Hannover), “Biodiversity loss: An existential risk comparable to climate change,” *Bulletin of the Atomic Scientists,* 4/11/16 https://thebulletin.org/2016/04/biodiversity-loss-an-existential-risk-comparable-to-climate-change/

But there is another existential threat that the Bulletin overlooked in its Doomsday Clock announcement: biodiversity loss. This phenomenon is often identified as one of the many consequences of climate change, and this is of course correct. But biodiversity loss is also a contributing factor behind climate change. For example, deforestation in the Amazon rainforest and elsewhere reduces the amount of carbon dioxide removed from the atmosphere by plants, a natural process that mitigates the effects of climate change. So the causal relation between climate change and biodiversity loss is bidirectional. Furthermore, there are myriad phenomena that are driving biodiversity loss in addition to climate change. Other causes include ecosystem fragmentation, invasive species, pollution, oxygen depletion caused by fertilizers running off into ponds and streams, overfishing, human overpopulation, and overconsumption. All of these phenomena have a direct impact on the health of the biosphere, and all would conceivably persist even if the problem of climate change were somehow immediately solved. Such considerations warrant decoupling biodiversity loss from climate change, because the former has been consistently subsumed by the latter as a mere effect. Biodiversity loss is a distinct environmental crisis with its own unique syndrome of causes, consequences, and solutions—such as restoring habitats, creating protected areas (“biodiversity parks”), and practicing sustainable agriculture. The sixth extinction. The repercussions of biodiversity loss are potentially as severe as those anticipated from climate change, or even a nuclear conflict. For example, according to a 2015 study published in Science Advances, the best available evidence reveals “an exceptionally rapid loss of biodiversity over the last few centuries, indicating that a sixth mass extinction is already under way.” This conclusion holds, even on the most optimistic assumptions about the background rate of species losses and the current rate of vertebrate extinctions. The group classified as “vertebrates” includes mammals, birds, reptiles, fish, and all other creatures with a backbone. The article argues that, using its conservative figures, the average loss of vertebrate species was 100 times higher in the past century relative to the background rate of extinction. (Other scientists have suggested that the current extinction rate could be as much as 10,000 times higher than normal.) As the authors write, “The evidence is incontrovertible that recent extinction rates are unprecedented in human history and highly unusual in Earth’s history.” Perhaps the term “Big Six” should enter the popular lexicon—to add the current extinction to the previous “Big Five,” the last of which wiped out the dinosaurs 66 million years ago. But the concept of biodiversity encompasses more than just the total number of species on the planet. It also refers to the size of different populations of species. With respect to this phenomenon, multiple studies have confirmed that wild populations around the world are dwindling and disappearing at an alarming rate. For example, the 2010 Global Biodiversity Outlook report found that the population of wild vertebrates living in the tropics dropped by 59 percent between 1970 and 2006. The report also found that the population of farmland birds in Europe has dropped by 50 percent since 1980; bird populations in the grasslands of North America declined by almost 40 percent between 1968 and 2003; and the population of birds in North American arid lands has fallen by almost 30 percent since the 1960s. Similarly, 42 percent of all amphibian species (a type of vertebrate that is sometimes called an “ecological indicator”) are undergoing population declines, and 23 percent of all plant species “are estimated to be threatened with extinction.” Other studies have found that some 20 percent of all reptile species, 48 percent of the world’s primates, and 50 percent of freshwater turtles are threatened. Underwater, about 10 percent of all coral reefs are now dead, and another 60 percent are in danger of dying. Consistent with these data, the 2014 Living Planet Report shows that the global population of wild vertebrates dropped by 52 percent in only four decades—from 1970 to 2010. While biologists often avoid projecting historical trends into the future because of the complexity of ecological systems, it’s tempting to extrapolate this figure to, say, the year 2050, which is four decades from 2010. As it happens, a 2006 study published in Science does precisely this: It projects past trends of marine biodiversity loss into the 21st century, concluding that, unless significant changes are made to patterns of human activity, there will be virtually no more wild-caught seafood by 2048. Catastrophic consequences for civilization. The consequences of this rapid pruning of the evolutionary tree of life extend beyond the obvious. There could be surprising effects of biodiversity loss that scientists are unable to fully anticipate in advance. For example, prior research has shown that localized ecosystems can undergo abrupt and irreversible shifts when they reach a tipping point. According to a 2012 paper published in Nature, there are reasons for thinking that we may be approaching a tipping point of this sort in the global ecosystem, beyond which the consequences could be catastrophic for civilization. As the authors write, a planetary-scale transition could precipitate “substantial losses of ecosystem services required to sustain the human population.” An ecosystem service is any ecological process that benefits humanity, such as food production and crop pollination. If the global ecosystem were to cross a tipping point and substantial ecosystem services were lost, the results could be “widespread social unrest, economic instability, and loss of human life.” According to Missouri Botanical Garden ecologist Adam Smith, one of the paper’s co-authors, this could occur in a matter of decades—far more quickly than most of the expected consequences of climate change, yet equally destructive. Biodiversity loss is a “threat multiplier” that, by pushing societies to the brink of collapse, will exacerbate existing conflicts and introduce entirely new struggles between state and non-state actors. Indeed, it could even fuel the rise of terrorism. (After all, climate change has been linked to the emergence of ISIS in Syria, and multiple high-ranking US officials, such as former US Defense Secretary Chuck Hagel and CIA director John Brennan, have affirmed that climate change and terrorism are connected.) The reality is that we are entering the sixth mass extinction in the 3.8-billion-year history of life on Earth, and the impact of this event could be felt by civilization “in as little as three human lifetimes,” as the aforementioned 2012 Nature paper notes. Furthermore, the widespread decline of biological populations could plausibly initiate a dramatic transformation of the global ecosystem on an even faster timescale: perhaps a single human lifetime. The unavoidable conclusion is that biodiversity loss constitutes an existential threat in its own right. As such, it ought to be considered alongside climate change and nuclear weapons as one of the most significant contemporary risks to human prosperity and survival.

# Case

## General

#### Turn -Commercial mining solves extinction from scarcity, o-pop, climate change, terror, war, shortages, inequality, war, and disease- timeframe is mere decades- only mining solves BUT now is key

Pelton, 17 -- a member of the Executive Board of the International Association for the Advancement of Space Safety

[Dr. Joseph N., former Chairman of the Board of Trustees and Vice President and Dean of the International Space University as well as the Director Emeritus of the Space and Advanced Communications Research Institute (SACRI) at George Washington University, The New Gold Rush: The Riches of Space Beckon!, Springer, 2017, accessed 1-9-22]

The entrepreneurs are taking over. The hopeful statements in this book and the hard economic and technical data that backs them up are more than a minority opinion. It is a topic of growing interest at the World Economic Forum, where business and political heavyweights meet in Davos, Switzerland, to discuss how to stimulate new patterns of global economic growth. It is even the growing view of a group that call themselves “space ethicists.” Here is how Christopher J. Newman, at the University of Sunderland in the United Kingdom has put it: Space ethicists have offered the view that space exploration is not only desirable; it is a duty that we, as a species, must undertake in order to secure the survival of humanity over the longer term. Expanding both the resource base and, eventually, the habitats available for humanity means that any expenditure on space exploration, far from being viewed as frivolous, can legitimately be rationalized as an ethical investment choice. (Newman) On the other hand there are space ethicists and space exobiologists who argue that humans have created ecological ruin on the planet—and now space debris is starting to pollute space. These countervailing thoughts by the “no growth” camp of space ethicists say we have no right to colonize other planets or to mine the Moon and asteroids—or at least no right to do so until we can prove we can sustain life here on Earth for the longer term. However, for most who are planning for the new space economy the opinion of space philosophers doesn’t really float their boat. Legislators, bankers, and aspiring space entrepreneurs are far more interested in the views of the super-rich capitalists called the space billionaires. A number of these billionaires and space executives have already put some very serious money into enterprises intent on creating a new pathway to the stars. No less than five billionaires with established space ventures—Elon Musk, Paul Allen, Jeff Bezos, Sir Richard Branson, and Robert Bigelow—have invested millions if not billions of dollars into commercializing space. They are developing new technologies and establishing space enterprises that can bring the wealth of outer space down to Earth. This is not a pipe dream, but will increasingly be the economic reality of the 2020s. These wealthy space entrepreneurs see major new economic opportunities. To them space represents the last great frontier for enterprising pioneers. Thus they see an ever-expanding space frontier that offers opportunities in low-cost space transportation, satellite solar power satellites to produce clean energy 24h a day, space mining, space manufacturing and production, and eventually space habitats and colonies as a trajectory to a better human future. Some even more visionary thinkers envision the possibility of terraforming Mars, or creating new structures in space to protect our planet from cosmic hazards and even raising Earth’s orbit to escape the rising heat levels of the Sun in millennia to come. Some, of course, will say this is sci-fi hogwash. It can’t be done. We say that this is what people would have said in 1900 about airplanes, rocket ships, cell phones and nuclear devices. The skeptics laughed at Columbus and his plan to sail across the oceans to discover new worlds. When Thomas Jefferson bought the Louisiana Purchase from France or Seward bought Alaska, there were plenty of naysayers that said such investment in the unknown was an extravagant waste of money. A healthy skepticism is useful and can play a role in economic and business success. Before one dismisses the idea of an impending major new space economy and a new gold rush, it might useful to see what has already transpired in space development in just the past five decades. The world’s first geosynchronous communications satellite had a throughput capability of about 500 kb / s. In contrast, today’s state of the art Viasat 2 —a half century later— has an impressive throughput of some 140 Gb/s. This means that the relative throughput is nearly 300,000 greater, while its lifetime is some ten times longer (Figs. 1.1 and 1.2 ). Each new generation of communications satellite has had more power, better antenna systems, improved pointing and stabilization, and an extended lifetime. And the capabilities represented by remote sensing satellites, meteorological satellites , and navigation and timing satellites have also expanded their capabilities and performance in an impressive manner. When satellite applications first started, the market was measured in millions of dollars. Today commercial satellite services exceed a quarter of a billion dollars. Vital services such as the Internet, aircraft traffic control and management, international banking, search and rescue and much, much more depend on application satellites. Those that would doubt the importance of satellites to the global economy might wish to view on You Tube the video “If There Were a Day Without Satellites?” [ 2 ]. Let’s check in on what some of those very rich and smart guys think about the new space economy and its potential. (We are sorry to say that so far there are no female space billionaires, but surely this, too, will come someday soon.) Of course this twenty-first century breakthrough that we call the New Space economy will not come just from new space commerce. It will also come from the amazing new technologies here on Earth. Vital new terrestrial technologies will accompany this cosmic journey into tomorrow. Information technology, robotics, artificial intelligence and commercial space travel systems have now set us on a course to allow us humans to harvest the amazing riches in the skies—new natural resources, new energy, and even totally new ways of looking at the purpose of human existence. If we pursue this course steadfastly, it can be the beginning of a New Space renaissance. But if we don’t seek to realize our ultimate destiny in space, Homo sapiens can end up in the dustbin of history—just like literally millions of already failed species. In each and every one of the five mass extinction events that have occurred over the last 1.5 billion years on Earth, some 50–80 % of all species have gone the way of the T. Rex, the woolly mammoth, and the Dodo bird along with extinct ferns, grasses and cacti. On the other hand, the best days of the human race could be just beginning. If we are smart about how we go about discovering and using these riches in the skies and applying the best of our new technologies, it could be the start of a new beginning for humanity. Konstantin Tsiokovsky, the Russian astronautics pioneer, who first conceived of practical designs for spaceships, famously said: “A planet is the cradle of mankind, but one cannot live in a cradle forever.” Well before Tsiokovsky another genius, Leonardo da Vinci, said, quite poetically: “Once you have tasted flight, you will forever walk the earth with your eyes turned skyward, for there you have been, and there you will always long to return.” The founder of the X-Prize and of Planetary Resources, Inc., Dr. Peter Diamandis, has much more brashly said much the same thing in quite different words when he said: “The meek shall inherit the Earth. The rest of us will go to Mars.” The New Space Billionaires Peter Diamandis is not alone in his thinking. From the list of “visionaries” quoted earlier, Elon Musk, the founder of SpaceX; Sir Richard Branson, the founder of Virgin Galactic; and Paul Allen, the co-founder of Microsoft and the man who financed SpaceShipOne, the world’s first successful spaceplane have all said the future will include a vibrant new space economy. They, and others, have said that we can, we should and we soon shall go into space and realize the bounty that it can offer to us. The New Space enterprise is today indeed being led by those so-called space billionaires, who have an exciting vision of the future. They and others in the commercial space economy believe that the exploitation of outer space may open up a new golden age of astral abundance. They see outer space as a new frontier that can be a great source of new materials, energy and various forms of new wealth that might even save us from excesses of the past. This gold rush in the skies represents a new beginning. We are not talking about expensive new space ventures funded by NASA or other space agencies in Europe, Japan, China or India. No, these efforts which we and others call New Space are today being forged by imaginative and resourceful commercial entrepreneurs. These twenty-first century visionaries have the fortitude and zeal to look to the abundance above. New breakthroughs in technology and New Space enterprises may be able to create an “astral life raft” for humanity. Just as Columbus and the Vikings had the imaginative drive that led them to discover the riches of a new world, we now have a cadre of space billionaires that are now leading us into this New Space era of tomorrow. These bold leaders, such as Paul Allen and Sir Richard Branson, plus other space entrepreneurs including Jeff Bezos of Amazon and Blue Origin, and Robert Bigelow, Chairman of Budget Suites and Bigelow Aerospace, not only dream of their future in the space industry but also have billions of dollars in assets. These are the bright stars of an entirely new industry that are leading us into the age of New Space commerce. These space billionaires, each in their own way, are proponents of a new age of astral abundance. Each of them is launching new commercial space industries. They are literally transforming our vision of tomorrow. These new types of entrepreneurial aerospace companies—the New Space enterprises—give new hope and new promise of transforming our world as we know it today. The New Space Frontier What happens in space in the next few decades, plus corresponding new information technologies and advanced robotics, will change our world forever. These changes will redefine wealth, change our views of work and employment and upend almost everything we think we know about economics, wealth, jobs, and politics. These changes are about truly disruptive technologies of the most fundamental kinds. If you thought the Internet, smart phones, and spandex were disruptive technologies, just hang on. You have not seen anything yet. In short, if you want to understand a transition more fundamental than the changes brought to the twentieth century world by computers, communications and the Internet, then read this book. There are truly riches in the skies. Near-Earth asteroids largely composed of platinum and rare earth metals have an incredible value. Helium-3 isotopes accessible in outer space could provide clean and abundant energy. There is far more water in outer space than is in our oceans. In the pages that follow we will explain the potential for a cosmic shift in our global economy, our ecology, and our commercial and legal systems. These can take place by the end of this century. And if these changes do not take place we will be in trouble. Our conventional petro-chemical energy systems will fail us economically and eventually blanket us with a hydrocarbon haze of smog that will threaten our health and our very survival.

## Debris

1. **McKnight 17 is a card focused on solutions that are being developed in the squo to deal with cluttering – their own card takes out the argument that we won’t be able to deal with mass amounts of debris**
2. **Their link chain is at a disconnect – Johnson 13 and Biggs 18 are speaking about debris because of military space development. These cards have nothing to do with private companies.**
3. **Biggs is mistagged – it doesn’t mention space debris and it talks about redundancy. It literally states that the loss of one or two satellites won’t have any impact.**

**No space arms race – we would have seen it already with the creation of space force**

**Grego 19**

(Laura Grego –Union of Concerned Scientists, “Creating a Space Force Would Trigger a Space Arms Race and Threaten US Satellite Security, Science Group Says,” Union of Concerned Scientists, 12-09-2019, <https://www.ucsusa.org/about/news/space-force-would-trigger-arms-race>)

A congressional conference committee has agreed to include the creation of a space force in a must-pass defense bill in exchange for paid parental leave benefits for federal workers. What is missing from the debate over the horse trade, according to the Union of Concerned Scientists (UCS), is the fact that a space force is a very bad idea. Below is a statement by Laura Grego, a physicist and senior scientist in the Global Security Program at UCS. “At best a space force is a distraction from what is necessary to ensure space security in the face of rapid technological and geopolitical changes. At worst, it would prompt a space arms race that would threaten U.S. military and civilian satellites, not protect them. Diplomacy, not bureaucratic reorganization is urgently needed. “The Pentagon insists that keeping space predictable and safe is the core purpose of whatever reorganization they do. To be sure, that mission is important and stabilizing, but it doesn’t need a new military service. Creating a new military service focused on space will create bureaucratic incentives to hype the space weapons threat and build new weapons. Pentagon officials emphasize that Russia and China are developing anti-satellite technology, but they leave out the fact that the United States is far ahead in sophistication as well as capacity of such technology. “Testing anti-satellite technology, much less engaging in an actual conflict in space, can have profound ripple effects. “We all would be better off with international agreements that constrain conduct and particularly dangerous technologies in space. The international community has struggled to overcome ideological divisions to reach agreements, but the benefits of continuing to try are obvious.

#### Risks are overestimated

**Wattles 19**

[ Jackie Wattles – Reporter, “Space junk poses terrifying threats. Here’s what that means for SpaceX’s megaconstellation,”: CNN Business, 05-30-2019, <https://www.cnn.com/2019/05/30/tech/spacex-starlink-space-junk-debris/index.html>]

SpaceX fired [60 small satellites](http://www.cnn.com/2019/05/15/tech/spacex-starlink-internet-satellites-first-launch/index.html) into orbit last week, the first installment of an internet-beaming [megaconstellation](http://www.cnn.com/2019/05/23/business/spacex-starliner-revenue-business-case/index.html) that the company hopes will grow to include thousands of satellitesin just a few years. Elon Musk’s space company is just one of several with its eyes on beaming broadband to Earth from space. Companies including Amazon [(AMZN)](https://money.cnn.com/quote/quote.html?symb=AMZN&source=story_quote_link) and [OneWeb](http://www.cnn.com/2019/03/13/tech/oneweb-space-debris-junk-low-earth-orbit/index.html) also have similar plans. Looking ahead, [a lot could go wrong for them](http://www.cnn.com/2019/05/23/business/spacex-starliner-revenue-business-case/index.html) — financially or technologically. The most nightmarish calamity, however unlikely, wouldn’t just impact their businesses. It could set back all of human civilization. Imagine this scenario: A single satellite loses power and smashes, uncontrolled, into anothersatellite. They explode, sending plumes of junk charging through space at [23 times](https://www.nasa.gov/mission_pages/station/news/orbital_debris.html) the speed of sound. A piece of that debris slams into another satellite, and it sets off a chain reaction that obliterates everything orbiting in nearby altitudes. In low-Earth orbit, that could include multibillion-dollar networks like Starlink, the [International Space Station](https://www.nasa.gov/mission_pages/station/news/orbital_debris.html), spy satellites and [Earth-imaging](https://www.cnn.com/2015/03/12/tech/mci-planet-labs-doves/index.html) technology. Nothing would remain except an impenetrable graveyard of rubbish that could ground rocket launches for years, maybe even [centuries](https://www.nasa.gov/news/debris_faq.html). In the rarest of situations, [all satellite technology](http://www.bbc.com/future/story/20130609-the-day-without-satellites) could be done for. GPS services wouldcut out; weather tracking technology would be lost, potentially grounding commercial flights worldwide; satellite television and phone service would be gone; the loss in bandwidth couldclog ground-based systems and jam up internet and phone services. From there, [economies](https://phys.org/news/2017-05-space-junk-satellites-economies.html) could be crippled. Such a scenario remains **highly, *highly* unlikely**. Space is huge and satellites are still far from “crowded” up there. But the price of space travel is plummeting, meaning loads of new satellites are going up each year, while the risk of collisions climbs exponentially higher, explains Jonathan McDowell, an astronomer at the Harvard-Smithsonian Center for Astrophysics. “If you put up 10 times the [current total] number of satellites, the risk isn’t just ten times as big — it’s 100 times bigger,” McDowell told CNN Business, describing the risk of a collision. While a single crash might not lead to a doomsday scenario, any incident can create problems. Musk, for his part, says SpaceX takes the problem very seriously: “We are taking great pains to make sure there’s not an orbital debris issue,” he told reporters during a recent conference call. Each active Starlink satellite will be able to automatically dodge traceable pieces of debris headed their way, Musk said. The satellites will also save enough fuel at the end of their lives so that they can intentionally plunge back toward Earth to get out of the way of new devices, SpaceX says. Even if a satellite unexpectedly dies, it’ll be in such a low altitude that gravity will naturally pull it out of orbit in one-to-five years, according to the company. The Federal Communications Commission, which approves satellites for launch, approved of SpaceX’s designs and [said](https://docs.fcc.gov/public/attachments/DA-19-342A1.pdf) its Starlink satellites have “**zero, or near zero” risk of collision** while operational. The first 60 Starlink satellites have now been in orbit about a week, and everything seems to be going smoothly. **No** malfunctioning satellites or failed propulsion systems have been reported.

SpaceX’s debris mitigation plan **matches or exceeds** expert guidelines on best practices. SpaceX competitor OneWeb also has [plans](https://www.cnn.com/2019/03/13/tech/oneweb-space-debris-junk-low-earth-orbit/index.html) to ensure its satellites don’t become spaceborne garbage.With spaceflight growing cheaper and more common, however, businesses with all types of [goals](https://www.nbcnews.com/mach/science/startup-wants-put-huge-ads-space-not-everyone-board-idea-ncna960296) (and little stake in whether or not space stays safe) can afford to send something into orbit. Yet no formal international rules or punishments exist to hold satellite operators accountable for debris creation or general carelessness in space. Some countries, [including the United States](https://www.fcc.gov/document/fcc-launches-review-rules-mitigate-orbital-space-debris), are considering stricter regulations. For now, companies and organizations mostly have to take it upon themselves to research and invest in being good patrons of space. “It’s like any kind of environmental stewardship,” Kelso said. There isn’t always a business incentive to do the right thing, but “you don’t want to reach the point where you’re saying, ‘Gee, I wish we did this earlier.’”

#### No debris cascades—This ev answers all aff warrants

Fange 2017 (Daniel Von Fange, Web Application Engineer, Founder and Owner of LeanCoder, Full Stack, Polyglot Web Developer, “Kessler Syndrome is Over Hyped”, 5/21/2017, http://braino.org/essays/kessler\_syndrome\_is\_over\_hyped/)

Kessler Syndrome is overhyped. A chorus of online commenters great any news of upcoming low earth orbit satellites with worry that humanity will to lose access to space. I now think they are wrong.

What is Kessler Syndrome?

Here’s the popular view on Kessler Syndrome. Every once in a while, a piece of junk in space hits a satellite. This single impact destroys the satellite, and breaks off several thousand additional pieces. These new pieces now fly around space looking for other satellites to hit, and so exponentially multiply themselves over time, like a nuclear reaction, until a sphere of man-made debris surrounds the earth, and humanity no longer has access to space nor the benefits of satellites.

It is a dark picture.

Is Kessler Syndrome likely to happen?

I had to stop everything and spend an afternoon doing back-of-the-napkin math to know how big the threat is. To estimate, we need to know where the stuff in space is, how much mass is there, and how long it would take to deorbit.

The orbital area around earth can be broken down into four regions.

Low LEO

- Up to about 400km. Things that orbit here burn up in the earth’s atmosphere quickly - between a few months to two years. The space station operates at the high end of this range. It loses about a kilometer of altitude a month and if not pushed higher every few months, would soon burn up. For all practical purposes, Low LEO doesn’t matter for Kessler Syndrome. If Low LEO was ever full of space junk, we’d just wait a year and a half, and the problem would be over.

High LEO - 400km to 2000km. This where most heavy satellites and most space junk orbits. The air is thin enough here that satellites only go down slowly, and they have a much farther distance to fall. It can take 50 years for stuff here to get down. This is where Kessler Syndrome could be an issue.

Mid Orbit - GPS satellites and other navigation satellites travel here in lonely, long lives. The volume of space is so huge, and the number of satellites so few, that we don’t need to worry about Kessler here.

GEO - If you put a satellite far enough out from earth, the speed that the satellite travels around the earth will match the speed of the surface of the earth rotating under it. From the ground, the satellite will appear to hang motionless. Usually the geostationary orbit is used by big weather satellites and big TV broadcasting satellites. (This apparent motionlessness is why satellite TV dishes can be mounted pointing in a fixed direction. You can find approximate south just by looking around at the dishes in your northern hemisphere neighborhood.) For Kessler purposes, GEO orbit is roughly a ring 384,400 km around. However, all the satellites here are moving the same direction at the same speed - debris doesn’t get free velocity from the speed of the satellites. Also, it’s quite expensive to get a satellite here, and so there aren’t many, only about one satellite per 1000km of the ring. Kessler is not a problem here.

How bad could Kessler Syndrome in High LEO be?

Let’s imagine a worst case scenario.

An evil alien intelligence chops up everything in High LEO, turning it into 1cm cubes of death orbiting at 1000km, spread as evenly across the surface of this sphere as orbital mechanics would allow. Is humanity cut off from space?

I’m guessing the world has launched about 10,000 tons of satellites total. For guessing purposes, I’ll assume 2,500 tons of satellites and junk currently in High LEO. If satellites are made of aluminum, with a density of 2.70 g/cm3, then that’s 839,985,870 1cm cubes. A sphere for an orbit of 1,000km has a surface area of 682,752,000 square KM. So there would be one cube of junk per .81 square KM. If a rocket traveled through that, its odds of hitting that cube are tiny - less than 1 in 10,000.

So even in the worst case, we don’t lose access to space.

Now though you can travel through the debris, you couldn’t keep a satellite alive for long in this orbit of death. Kessler Syndrome at its worst just prevents us from putting satellites in certain orbits.

In real life, there’s a lot of factors that make Kessler syndrome even less of a problem than our worst case though experiment.

* Debris would be spread over a volume of space, not a single orbital surface, making collisions orders of magnitudes less likely.
* Most impact debris will have a slower orbital velocity than either of its original pieces - this makes it deorbit much sooner.
* Any collision will create large and small objects. Small objects are much more affected by atmospheric drag and deorbit faster, even in a few months from high LEO. Larger objects can be tracked by earth based radar and avoided.
* The planned big new constellations are not in High LEO, but in Low LEO for faster communications with the earth. They aren’t an issue for Kessler.
* Most importantly, all new satellite launches since the 1990’s are required to include a plan to get rid of the satellite at the end of its useful life (usually by deorbiting)

So the realistic worst case is that insurance premiums on satellites go up a bit. Given the current trend toward much smaller, cheaper micro satellites, this wouldn’t even have a huge effect.

I’m removing Kessler Syndrome from my list of things to worry about.

## Multilateralism

1. **Their Pelton 17 card is literally a neg card lol – I read the same card because there is a section of about 1800 words that talk about the benefits of private space entities and their appropriation.**

**Space cooperation doesn’t lead to broader relations.**

**Sterner 15** (Eric Sterner is a fellow at the George C. Marshall Institute. He held senior staff positions for the U.S. House Science and Armed Services committees and served in DoD and as NASA’s associate deputy administrator for policy and planning, “Talk and Cooperation in Space” 8/6/2015 <https://spacenews.com/op-ed-china-talk-and-cooperation-in-space/>)

How might cooperation with China benefit the United States? Some hold that cooperation in space helps promote cooperation on Earth. Writing in SpaceNews in 2013, Michael Krepon argued “The more they cooperate in space, the less likely it is that their competition on Earth will result in military confrontation. The reverse is also true.” That sentiment is widespread and flows from the nobility of exploration. **If only it were so.** Unfortunately, a country’s space behavior appears to have little affect on its terrestrial actions. Russia’s multidecadal human spaceflight partnership with the United States did not prevent it from invading and destabilizing Ukraine when it moved toward a closer relationship with the European Union, many of whose members are Russian partners in the International Space Station. Space cooperation **has not, and will not**, prevent the continued worsening of the security environment in Europe, which flows from Russian behavior on Earth, not in space. **Space cooperation with China is similarly unlikely to moderate its behavior**. Tensions in Asia derive from China’s insistence on pressing unlawful territorial claims in the Pacific, most recently by transforming disputed coral reefs into would-be military bases. Ironically, civilian space technology has proved critical in documenting these aggressive moves. To further demonstrate the civil space cooperation does not promote cooperation on Earth, we need look no further than recent history. The NASA administrator’s visit to China in the fall of 2014 nearly coincided with China’s hacking of NOAA, with whom Beijing has a “partnership” in studying climate change. Military confrontation flows from the interaction of hard power in pursuit of competing national interests. Space cooperation falls into the realm of soft power. It has value in strengthening relationships among like-minded states with similar interests. China’s aggressiveness toward its neighbors, its human rights record and its cyberattacks on the United States strongly demonstrate that it and the United States are **not of like minds**. This is not the result of insufficient space cooperation, but of divergent national interests. The United States is a status quo power; China is not.

#### Multilateralism can’t stop conflict

Bordachev 13 (Timofei, Doctor of Political Science, is the Director of the Center for Comprehensive International and European Studies at the Higher School of Economics, “Political Tsunami Hits Hard,” 6/30, http://eng.globalaffairs.ru/number/Political-Tsunami-Hits-Hard-16054)

The financial crisis in the United States, which in 2008 went global, and the continuing efforts by countries around the world to fight its effects have highlighted four most important tendencies in international affairs. First, pretty obvious is the conflict between the growing economic unity of the world and its worsening political fragmentation. The rise of sovereign ambitions and attempts to address all problems at the national level has come into conflict with financial and economic globalization and exacerbates crisis trends. Second, democratization in international politics and greater independence of individual states play an ever greater role. This “in-depth unfreezing” for the first time manifested itself in China’s soaring global ambitions and in the national interests and requests of other Asian countries. Turkey, a stable ally of the West in NATO and a EU aspirant waiting patiently in the antechamber, is trying on the guise of a regional power ever more often. In the meantime, the need for taking into account the ever larger range of opinions quickly erodes the international institutions that emerged in the Cold War era. This is seen not just in the sphere of security: the United Nations efficiency has largely fallen victim to the first phase of the global geopolitical catastrophe of the 1990s. Third, the growing international weight of the new countries and attempts by the old-timers, who won the Cold War, to preserve the hard-won status quo bring back the conservative interpretations of such terms as “sovereignty” and “sovereign rights.” Not only the leaders of new-comers to world politics, or the United States, traditionally concerned about its sovereignty, but quite respectable heads of European states, too, start talking about the protection of national interests. Finally, military power is ever more frequently employed by major powers as a tool to address foreign policy issues. EU countries and the United States used force and threats to use force back at the time when they were getting their hands on the assets of the former USSR. However, they were faced with a very limited set of tasks then. It never occurred to anyone in the West to say in 1999 that the purpose of NATO’s operation against Yugoslavia was to force Slobodan Milosevic to resign or, still worse, to put him to death by some untraditional way of hanging. The need for using military force with or without reason merely confirms that the international community has no other means to prevent the emergence or escalation of conflicts.

#### States will always act in their own interests

Gray 7 (Colin S. Gray, Director of the Centre for Strategic Studies within the Department of Politics and International Relations at the University of Reading, 6/11/07, War, Peace, and International Relations, p. 277)

What is known with confidence about this most vital, yet variable, condition known as peace? Strategic history suggests strongly that peace cannot be constructed by means of institutional engineering. Such construction can be useful to polities that wish to use it. Institutions and procedures that facilitate communication, perhaps improve mutual understanding, and provide mechanisms for interstate arbitration have roles to play on behalf of order. But those roles will be fulfilled only when the political players are prepared to negotiate and compromise. There is nothing magically transformative about participation in international institutions. States, as well as other security communities that generally are not represented in the UN, frequently prefer to act unilaterally, or with allies, in defence of their vital interests. In most of those situations, international political architecture and its norms and procedures can be of only limited value for international order. The existence of the UN facilitates multinational efforts to contain, limit and even halt a war, should the belligerent parties agree to be contained, limited and prevented from fighting to a finish. The story was the same for the Concert System in the nineteenth century and the League of Nations in the twentieth. The functioning of such institutions must reflect their political contexts. They have been as helpful for international order as their leading members would permit. An international institution constructed to advance the prospects for good order and peace can be used or abused on behalf of disorder and war. States can behave in the UN in such a way as to block decisions for collective action to suppress disorderly behaviour. International institutions, with the UN as the prime example, cannot themselves contribute in a vital way to a more orderly world. Rather, they should be viewed as the faithful products of world order and disorder. States determined to cooperate will use the good offices and fora of those institutions. States determined upon conflict will use them as an arena for propaganda and coalition-building and, if need be, will employ their rules to paralyse the international community. Michael Howard explains why world peace cannot be constructed by the invention, or reform, of institutions: The establishment of a global peaceful order thus depends on the creation of a world community sharing the characteristics that make possible domestic order, and this will require the widest possible diffusion of those characteristics by the societies that already possess them. World order cannot be created simply by building international institutions and organizations that do not arise naturally out of the cultural disposition and historical experience of their members. Their creation and operation require at the very least the existence of a transnational elite that not only shares the same cultural norms but can render those norms acceptable within their own societies and can where necessary persuade their colleagues to agree to the modifications necessary to make them acceptable. (Howard, 2001: 105) This is a fair summary of historical experience. Just as peace cannot be constructed by ingenious institution-building, nor can it be mandated by law, custom or norms. When obedience to those restraints is predicted to work towards results sharply contrary to states’ national interests, they will be ignored.

#### Multilateralism fails—*diverging interests* and a *lack of faith* guarantee cooperation is at best superficial

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Yet, tightening the rules for financial market regulation is not the only field where the G-20 is failing. Despite the mantra-like repetition of memoranda of understanding, the trade ministers of the G-20 have not been able to overcome their conflicts of interest and reach a settlement in the Doha Round of the World Trade Organization (WTO). What are the reasons for this failure?Although the G-20 managed to prevent a revival of protectionist measures on a broad front in the midst of the crisis, there is a large gap between the announcements of the G-20 and quantifiable results in trade policy. There is not one final communiqué that lacks a clear statement stressing the importance of the WTO and the necessity to conclude the Doha Round. Nonetheless, the reality of trade policy looks very different. All the states that are preventing the conclusion of the Doha Round through their vetoes are members of the G-20.

Despite there being little public information available on the reasons for the deadlock in the Doha Round, it is known that the US, Brazil, and China are blocking its conclusion. The emerging economies Brazil and China oppose the US’s demand for the complete elimination of tariffs on industrial goods. Conversely, the US resists the request to comprehensively abandon subsidies to the agricultural sector.Thus, the Doha Round is not concluded because three important members of the G-20 no longer believe in multilateral solutions and would rather engage in preferential agreements. For experts in the field of international trade, this is a paradox. There is a broad consensus that a single rulebook for international trade would facilitate economic growth and contribute to a worldwide increase in prosperity. This, however, cannot be said for the currently popular free trade agreements. So why are the countries in the G-20 incapable of further developing the common rules for international trade? One explanation is the lack of a hegemonic power that is willing to guarantee compliance with the rules of the game, but at the same time establish a system that provides member countries with sufficient economic benefits. In any event, this is how the postwar economy emerged: The US enforced the system of Bretton Woods and made sure that the participation in this economic regime remained attractive. Of course, the Bretton Woods regime never was a truly global system, since member countries of the Council on Mutual Economic Assistance did not participate. Still, within the bipolar order of the Cold War, the US managed to keep the system open and stable.¶ After the collapse of the USSR and the following short-lived “unipolar moment” (Charles Krauthammer) of complete hegemony of the US, the multilateral order was being advanced until 1995, the founding year of the WTO. Since the turn of the millennium and the parallel emergence of a multipolar order, nearly all attempts to organize cooperation without hegemony (Bob Keohane) have failed. The present multipolar world is characterized by superficial cooperation. Global Governance, whether in policies to prevent further climate change or in economic policy, remains on hold. Even worse: The world is returning to regulation on the level of the nation-state and non-cooperation. The American political scientist Ian Bremmer refers to the resulting situation as “G-Zero,” an era in which groups such as the G-20 will no longer play a vital role. The negative perception of the international division of labor¶ Apparently, there is no such thing as an identity of interests of individual states, as assumed by the advocates of global regulation and global governance. In other words: The gap between the preferences of individual states is widening rather than narrowing. However, governments must respect the preferences of their societies in the formulation of policies if they do not wish to lose legitimacy. Then again, the different preferences of societies are the immediate result of severely diverging perceptions of the international division of labor. Even in the G-20, individual societies have very different perceptions of the effects of globalization and its economic effects.¶ In Europe and the US, many people are increasingly critical of the international division of labor, if not outright hostile to globalization. According to a number of surveys, only about one-fifth to one-third of the respondents in OECD countries see greater opportunities than risks in globalization. Even in Germany, numerous politicians and citizens have been critical of globalization, although Germany strongly benefits from open markets and the resulting intensification of international trade.¶ Without a political anchoring in the member states, the G-20 has no future¶ The unfavorable perceptions of globalization and the outlined asymmetric sovereignty have resulted in a standstill in the G-20. Instead of a further development of the multilateral order, at best the status quo will be preserved. This is why we can expect nothing substantial – at least in terms of economic policy and financial regulation – from the G-20 summit in St. Petersburg on September 5 and 6. The structural impediments to successful financial regulation and trade policies on a supranational level cannot be overcome by the heads of government and state of the G-20. At least there is some hope in those areas where the countries of the G-20 have identical interests. This applies primarily to measures to close down tax loopholes. In 2008, ambitious expectations of a comprehensive reorganization of international trade relations through the G-20 were raised. Unfortunately, the G-20 cannot and will not deliver on crisis prevention. Today, more modest goals will have to be set. The key obstacle to success in the further development of global rules in trade and finance can be found in the G-20 societies themselves. Perceptions about globalization need to be addressed by policy makers at the national level, as do the widespread reservations about the international division of labor in the OECD countries. If societies continue to show diverging preferences, the development of comprehensive global economic governance in the G-20 will be all but impossible.