## Case

### 1NC – Solvency

#### Massive public sector alt cause PTD expansion is only a temporary solution, and the plan kills private sector innovation – Westwood inserts blue.

1AC Babcock 19 (, H., 2019. THE PUBLIC TRUST DOCTRINE, OUTER SPACE, AND THE GLOBAL COMMONS: TIME TO CALL HOME ET. [online] Lawreview.syr.edu. Available at: <https://lawreview.syr.edu/wp-content/uploads/2019/09/H-Babcock-Article-Final-Document-v2.pdf#page=67> [Accessed 15 December 2021] Professor Babcock served as general counsel to the National Audubon Society from 1987-91 and as deputy general counsel and Director of Audubon’s Public Lands and Water Program from 1981-87. Previously, she was a partner with Blum, Nash & Railsback, where she focused on energy and environmental issues, and an associate at LeBoeuf, Lamb, Leiby & MacRae where she represented utilities in the nuclear licensing process. From 1977-79, she served as a Deputy Assistant Secretary of Energy and Minerals in the U.S. Department of the Interior. Professor Babcock has taught environmental and natural resources law as a visiting professor at Pace University Law School and as an adjunct at the University of Pennsylvania, Yale, Catholic University, and Antioch law schools. Professor Babcock was a member of the Standing Committee on Environmental Law of the American Bar Association, and served on the Clinton-Gore Transition Team.)-rahulpenu

INTRODUCTION Space exploration is heating up. Governments and private interests are on a fast track to develop technologies to send people and equipment to celestial bodies, like the moon and asteroids, to extract their untapped resources.1 Near-space is rapidly filling up with public and private satellites, causing electromagnetic interference problems and dangerous space debris from collisions and earlier launches.2 The absence of a global management system for the private commercial development of outer space resources will allow these near space problems to be exported further into the galaxy.3 Moreover, without a governing authority or rules controlling entry or limiting despoliation, outer space could turn into the “Wild West” of the twenty-first century.4 Space treaties executed in the last century espoused the principle that space should be developed for the benefit of all mankind and banned both private ownership and militarization of space resources.5 But, they left development of a system for managing non-military activities in outer space to another day.6 Private commercial interests, which would be absorbing the risks and paying the high costs of space development, oppose any management scenario premised on that principle, as it would enable less developed countries to free ride on their investments.7 These interests, unsurprisingly, support privatizing outer space.8 But acceding to their wishes by establishing a system of property-based rules would transport Earth’s current division between haves and have-nots into outer space, and could lead to destabilizing hostilities—the exact consequences that the early treaty drafters hoped to avoid.9 To date, most scholars in this area have focused on developing management systems premised on private ownership or possession of the surface of some celestial body.10 This Article explores an alternative concept, the commons, in which no individual owns the property in question or can exclude others from it. Viewing property as a commons is closer to the principles set out in the various space treaties than implementation of a private property regime, and also offers a workable property regime. This Article demonstrates these conclusions by showing similarities between a large, Earth-bound commons, like the ocean and outer space, and how various commons management scenarios allow equitable use of resources, while preventing their despoliation and devolution into hostile disputes over entitlements to them. However, each of these commons management scenarios is flawed in some way and runs a similar risk to management approaches for private property of allowing the resource to be over-used or inequitably distributed. The public trust doctrine (**PTD**), an ancient doctrine that governments and individuals have used effectively for centuries to protect the public’s interests in terrestrial common pool resources (CPR) **and** to **fill** regulatory **gaps**, can be helpful in both respects.11 An examination of the doctrine identifies **commonalities** **between** outer **space** **and** **terrestrial** public trust **resources**.12 The **ease** and **low** **cost** of its implementation and enforcement, as well as its infinite malleability, are additional reasons to select it as a stopgap measure with some modification.13 This Article’s structure is straight forward. Part I acquaints the reader with the problem. It explains why the need to develop a management regime for space is becoming increasingly critical as advancing technology is allowing more and more private commercial interests to play at the edge of outer space with attendant negative externalities. 14 Soon these technological advances will allow private commercial interests to invade outer space with the potential for similar adverse impacts.15 Part II examines the international legal framework governing those activities and finds it lacks any capacity to regulate activities in outer space, in part because it is riddled with ambiguities and contradictions when it comes to ownership of outer space and its resources. Part III turns to that problem by discussing two types of property: private property and property owned in common with others. It examines the key features of each as well as their positive and negative attributes, how each might function in outer space, and what the consequences might be if one or the other prevailed. Because any property arrangement that results in its appropriation by the owner and the exclusion of others violates international space law, Part III also identifies various less-thanfull fee property arrangement, like leases and easements, to see if these problems can be avoided and concludes they cannot.16 It then examines property held in common to determine its viability under international space law and finds it consistent. Part IV investigates various approaches to managing property in outer space, be it held in private ownership or in common. Different approaches for managing private property in space are explored, including the right of first possession, tradable property claims, and establishing an exclusive economic zone, as well for managing an open access commons, such as the application of stewardship principles, norms, and the PTD. Each approach is evaluated in terms of its consistency with international law; its ability to promote and protect a sustainable, equitable, non-monopolistic, non-hostile environment in outer space; its efficiency; and its cost effectiveness. Only the PTD, which has been used for centuries to protect the public’s interests in CPRs and has demonstrated its ability to adapt to new circumstances, may be able to meet these goals.17 This Article finds commonalities between outer space and Earth-bound public trust resources, like the oceans. Additionally, the doctrine’s open access purpose resonates with language found in international treaties governing activities in outer space.18 This Article concludes that using the PTD will lead to a durable, equitable management regime in a commons where the wealthy are neither able to accumulate and control the resources that outer space has to offer nor over-exploit and deplete them. However, neither the doctrine nor ownership in common supplies any incentives for development, which may lead private enterprises to question whether development of outer space resources is worth the risks and costs.19 But, limited use of private property management approaches, like lotteries and tradable development claims—a form of overlapping hybridity between one type of property, a commons, and a management regime from another, private property—may fill this gap.20 This Article’s contribution to the literature on managing outer space resources and commons theory is using the PTD to bridge the gap between them and to suggest a hybrid management approach that melds commons theory with private property incentives.

#### They kill development incentives and infinite malleability ensures circumvention – no 1AR turns – the “PTD solves development” stuff presumes a PTD that includes private property rights which isn’t the aff OR they’re extra-T which is a voting issue for limits bc there are infinite things they can defend on top of the res to kill neg ground – Westwood inserts blue.

1AC Babcock 19 (, H., 2019. THE PUBLIC TRUST DOCTRINE, OUTER SPACE, AND THE GLOBAL COMMONS: TIME TO CALL HOME ET. [online] Lawreview.syr.edu. Available at: <https://lawreview.syr.edu/wp-content/uploads/2019/09/H-Babcock-Article-Final-Document-v2.pdf#page=67> [Accessed 15 December 2021] Professor Babcock served as general counsel to the National Audubon Society from 1987-91 and as deputy general counsel and Director of Audubon’s Public Lands and Water Program from 1981-87. Previously, she was a partner with Blum, Nash & Railsback, where she focused on energy and environmental issues, and an associate at LeBoeuf, Lamb, Leiby & MacRae where she represented utilities in the nuclear licensing process. From 1977-79, she served as a Deputy Assistant Secretary of Energy and Minerals in the U.S. Department of the Interior. Professor Babcock has taught environmental and natural resources law as a visiting professor at Pace University Law School and as an adjunct at the University of Pennsylvania, Yale, Catholic University, and Antioch law schools. Professor Babcock was a member of the Standing Committee on Environmental Law of the American Bar Association, and served on the Clinton-Gore Transition Team.)-rahulpenu

F. The Public Trust Doctrine (PTD) as a Gap Filling, Place-Holding Management Approach506 The PTD offers both an approach for managing an open access commons and a gap-filling tool until a regulatory regime is adopted.507 The doctrine is based on the idea that the “sovereign holds certain common properties in trust in perpetuity for the free and unimpeded use of the general public.”508 The public’s right to access and use trust resources is never lost, and neither the government nor private individuals can alienate or otherwise adversely affect those resources unless for a comparable public purpose.509 The resources the doctrine protects “have long been part of a ‘taxonomy of property’ [that recognizes] the division of natural wealth into private and public property.”510 “The doctrine places on governments ‘an affirmative, ongoing duty to safeguard the long-term preservation of those resources for the benefit of the general public,’”511 thus limiting the sovereign’s power on behalf of both present and future individuals.512 It directs the government to manage trust resources for public benefit, not private gain.513 It applies to private as well as public resources and is used to preserve the public’s access to CPRs.514 Government agencies have the non-rescindable power to revoke uses of trust resources that are inconsistent with the doctrine.515 This effectively places a permanent easement over trust resources that burdens their ownership with an overriding public interest in the preservation of those resources.516 However, trust resources can be alienated in favor of private ownership, if the alienation will still serve the public’s interest in those resources and not interfere with trust uses of the remaining land.517 The PTD, therefore, protects the “people’s common heritage,”518 just as Article 11 of the Moon Treaty protects outer space as part of the common heritage of mankind.519 The doctrine also appears to be infinitely malleable. Original uses of the doctrine were restricted to only that “aspect of the public domain below the low-water mark on the margin of the sea and the great lakes, the waters over those lands, and the waters within rivers and streams of any consequence,”520 and covered only traditional uses of those lands, like fishing and navigation.521 Over time, the scope and application of the doctrine broadened to protect more public resources and different uses.522 Thus, the **doctrine** expanded to protect new trust resources, such as dry sand beaches, inland lakes, groundwater, dry riverbeds, and wildlife,523 and passive uses of those resources, like scientific study.524 The original link to navigable water and tidelands disappeared.525 Supporters of the doctrine successfully advocated that it be applied to “wildlife, parks, cemeteries, and even works of fine art,”526 while arguing more recently its application to the atmosphere.527 A doctrine that imposes a perpetual duty on the sovereign to preserve trust resources, prevents their alienation for private benefit, assures public access to them, and can be invoked by anyone seems particularly useful as a management tool in outer space.528 The fact that **public** **access** to trust resources is so **central** to the doctrine **makes** it **reflective**, not contradictory, **of** international space **law’s** **bar** **against** **appropriation** of outer space and of the principle of space being the “province of all mankind.”529 It **avoids** the problems of alienation and **exclusion** associated with any of the management approaches associated with some form of private property and requires neither the creation of a new administrative authority nor the presence of a close-knit group of like-minded people.530 Members of the public, both rich and poor, can invoke and enforce the doctrine as easily as the sovereign.531 It is cost effective to the extent that no separate apparatus is required to implement it, and the doctrine has shown itself to be highly adaptable and innovative as different needs arise.532 It could also fill the gap in international law with respect to managing celestial property. Therefore, of all the management approaches studied here, the PTD seems the most suited to keep order in space until a regulatory regime is imposed. However, the doctrine provides no incentives for development of trust resources; rather, it might be used to limit or curtail that development, making it an imperfect, perhaps even counter-productive solution by itself to the extent that such development might be beneficial.533 Modifying the doctrine to allow limited use of private property management approaches, like tradable development claims, might buffer that effect—a form of overlapping hybridity between one type of property, a commons, and a management regime from another, private property, enabled by application of the PTD. CONCLUSION “Only a legal system that accommodates both the human need for resources and the necessary preservation of mankind’s common heritage can fulfill these criteria.”534 The future is now with regard to the development of outer space and its resources—it is no longer a question of whether humans will engage in these activities, but how soon they will. Technically advanced countries and private commercial enterprises are probing outer space and preparing for landing on an asteroid or the moon to extract their resources.535 Speculators are selling deeds to the moon’s surface and preparing to exploit the tourism potential that space offers.536 But, the legal framework for managing these initiatives is almost nonexistent.537 International treaties came into being before all this activity began in earnest and national laws that might apply are stunted by jurisdictional quandaries like the absence of national boundaries in outer space.538 Thus, there is an urgency to figure out how to control what happens in outer space before its resources are irreparably damaged or permanently monopolized by powerful countries and individuals. In the absence of regulation, much of the current debate centers on what property regime should be applied in outer space.539 The assumption is that by only allowing private property rights in space, countries and commercial enterprises will undertake the risks and costs of space development.540 However, unless international space law changes, it may prevent this from happening. If it changes, strong management controls will be necessary to prevent destruction or over-consumption of celestial resources, as well as monopolization and competitive behavior by participants, which could lead to hostilities and inequities. This Article examines various private property regimes, including those of less than full fee ownership, to see if any would avoid the conflict with the international prohibition on appropriation of outer space and its resources. It concludes that none will because each retains the right to exclude and each is insensitive to the treaties’ equity concerns. In contrast, considering outer space to be common is consistent with international space law in both respects. Hypothesizing that private property in outer space may yet prevail, this Article investigates different private property management approaches, such as the right of first possession, lotteries, and tradable development rights, to see if any would be cost effective, easy to implement and equitable, and would also prevent over-consumption, monopolization or the slide into rivalrous behavior. The Article concludes that each comes up short in some respect. Social norms as a management tool for property held in common, although compliant with international law, are also not up to the task. Instead, although ancient, the PTD, with its malleability, easy and cost-effective implementation and enforcement, non-consumption principle, and consistency with the goals that animate international space treaties, seems best suited to the task of protecting the public’s interests in the global commons that is outer space as it has done for centuries in Earth-bound commons. But, as its principal terrestrial use has been to protect trust resources from development, the doctrine needs some modification to encourage development of celestial resources. Hence, this Article suggests that modifying the PTD to allow the application of private property management tools, like tradable development rights, will not only allow development, but also will assure that when it happens, it will not be just profitable for a few, but will also be sustainable and equitable.

#### Aff is insufficient for space sustainability AND they’re not a radical reconceptualization of sustainability, but the same “dominant conceptualization” their ev criticizes – Westwood inserts blue.

1AC Aganaba-Jeanty 16 (, T., 2016. Space Sustainability and the Freedom of Outer Space. [online] Taylor & Francis. Available at: <https://www.tandfonline.com/doi/full/10.1080/14777622.2016.1148463> [Accessed 15 December 2021] Timiebi is an assistant professor of Space and Society, in the School for the Future of Innovation in Society, an affiliate faculty with the Interplanetary Initiative, a senior global futures scientist with the Global Futures Lab, and holds a courtesy appointment at the Sandra Day O’Connor College of Law, all at Arizona State University. Timiebi was a post-doctoral fellow and is a senior fellow at the Centre for International Governance Innovation (CIGI) based in Waterloo, Ontario Canada where she focused on environmental and space governance. Timiebi was Executive Director of the World Space Week Association coordinating the global response to the UN 1999 declaration that World Space Week should be celebrated Oct 4-10 annually. She is currently on the Advisory Board for the Space Generation Advisory Council supporting the UN Programme on Space Applications. She is also on the Science Advisory Board of World View Enterprises and the SETI Institute. - pp. 10-13.)-rahulpenu

---Critique of status quo polices for space sustainability

---New regimes key

---Sustainability needs to be in law

---Perm VS Global South Ks

Definitions of space sustainability The Secure World Foundation defines space sustainability as “ensuring that all humanity can continue to use outer space for peaceful purposes and socioeconomic benefit.”39 It is also described as “the ability of all humanity to continue to use outer space for peaceful purposes and socioeconomic benefit over the long term.” It is proposed that, read together, these broad definitions take as their premise that: (1) all humanity thus far is using space for peaceful purposes and for socioeconomic benefit; (2) this use is threatened; (3) measures must be taken to protect it; and (4) all humanity currently possesses the ability, in the sense of having a skill or the capacity, to ensure space sustainability for peaceful purposes. Under this conceptualization, the negative effect of not using space sustainably is primarily economic.40 Bearing in mind the governmental origins of space exploitation, where market economics did not play a primary role in decision making, the growing focus on the economic perspective in space affairs acknowledges Carolyn Deere’s opinion that problems emerge in the international domain from an absence of powerful economic interests.41 Of course, as more space applications are developed, economic interests become more prevalent in that market protectionism then underlies the rationales for many positions taken. Space sustainability is also conceptualized as defining good behavior, its boundaries, and disincentives for negative behavior in space.42 Space sustainability then becomes a much more limited political concept calling for specific measures to strengthen norms.43 Some notable examples follow: An International Code of Conduct—the European Union proposed a non-binding voluntary code whose purpose is “security, safety, sustainability” for all space activities providing for general measures on space operations and space debris.44 The Scientific and Technical Subcommittee of UNCOPUOS working group objective of establishing guidelines for the long-term sustainability of outer space activities. Proposed International Civil Aviation Organization for Space—the establishment of an international organization focused on space safety and the establishment of binding safety standards similar to the International Civil Aviation Organization.45 Industry efforts for a global space situational awareness database Group of Governmental Experts (GGE) on Transparency and Confidence Building Measures. Depending on the forum for discussion and in line with the previously mentioned initiatives, the concept of space sustainability is also used interchangeably with the following: (1) space security, which entails access to space and freedom from threats;46 (2) space stability addressing space situational awareness;47 (3) space safety, which is protection from all unreasonable levels of risk (primarily protection of humans or human activities);48 and (4) responsible uses of space.49 These all reflect the two components of space sustainability as described by the founder of Secure World Foundation: “the first is the physical environment, which includes management of space debris, electromagnetic and physical crowding and congestion, and space weather.... The second component is the political environment, and includes promoting stability and preventing conflict between nations.”50 Bearing this in mind and notwithstanding the potential confusion caused by the interchangeability of terms used, at the core of all proposals conceptualizing space sustainability or related concepts are the notions that: (1) space assets are kept safe and secure, and that the assets are not harmed or interfered with; (2) peaceful space activities continue as free from purposeful/intentional or unintentional harmful interference; (3) the space environment is preserved for peaceful uses; and (4) international cooperative efforts are required. These four points are understood to be the current core conditions for and of space sustainability. It must be acknowledged that space sustainability, in this context, is severed from the ecological roots of sustainable development. Rationale for space sustainability The proposed baseline conditions for the current conception for space sustainability coincide with Gallagher’s analysis of the logic for space cooperation as “Space Governance for Global Security” where all space actors seek “to secure the space domain for peaceful use; to protect space assets from all hazards; and to derive maximum value from space for security, economic, civil, and environmental ends.”51 Based on this understanding, the current conception of and rationale for space sustainability ties more clearly to global security than to sustainable development. This logic emphasizes that “the more different countries, companies, and individuals depend on space for a growing array of purposes, the more they need equitable rules, shared decision-making procedures, and effective compliance mechanisms to maximize the benefits that they all can gain from space, while minimizing risks from irresponsible space behaviors or deliberate interference with legitimate space activities.”52 While it is acknowledged that such a need exists, the difficulty in reaching agreement on how to bring it about is one reason why some states are more focused on producing a dialogue on long-term sustainability. This is seen in the proliferation of reports outlining best practices and options that enhance sustainability through increased information sharing, as well as a focus on technical issues rather than on the creation of any new legal regimes. To minimize some of the risks of non-sustainable space use, Weeden53 proposes a three-pillar technical approach to space sustainability: (1) debris mitigation; (2) debris removal; and (3) space traffic management. This is conjoined with an immediate need for data in support of conjunction assessment and collision avoidance. This emphasis on data sharing/collection includes enabling research into potential solutions to the problem of space debris, and enhancing transparency and cooperation among states. Weeden also suggests that this narrow approach to space sustainability serves both to educate space actors about the severity of the space debris problem and to provide stability to reduce the likelihood of conflict. A common approach to data also serves as verification for a potential code of conduct in space, setting the stage for future space governance models. These proposals follow the logic of sustainability for global security. While this logic is in line with the dominant conceptualization of benefit sharing and freedom of outer space, the position taken in this article is that it does not adequately speak to sustainability from the perspective of aspirant space states. To do so requires a significantly broader discussion and solutions aimed towards aligning space law and policy with the sustainable development paradigm, if understood as being an inclusive paradigm and not focused on the individualistic/self-interested nature of the current conception of sustainable development. A systemic, sustainable development law approach calls for a conscious engagement with the web of overlapping social, environmental, cultural, and legal frameworks, as well as cultural considerations, economic policies, expectations, players, and interests.54 Bearing in mind current U.S. space policy,55 such a broad overarching objective may not be achievable as part of the dialogue on the “Long Term Sustainability of Outer Space Activities,” but U.S. policy regarding preservation of the space environment nevertheless offers insights because international initiatives congruent with it are likely to garner the most support. Schrogl56 proposed that sustainability is rendered to threats and risks to satellite operations. This approach acknowledges the intersection of multiple issue areas: environment, security, mobility, knowledge, resources, and energy. This intersection of issue areas is more akin to the wider discourse of sustainability development of and on the Earth, and prompts a discussion of value to emerging and aspirant space actors. Otherwise, the dominant conceptualization of space sustainability removes any focus upon providing for the needs of those not among the most advanced space nations. This problem is highlighted in Peter and Rathgeber’s definition of space sustainability: Sustainable space activities can be seen as activities (in space, from space, through space and towards space) that meet the needs of the present space actors without comprising the ability of future generations to meet their own needs of performing space related operations safely.57 Peter and Rathgeber claim that the emergence of new institutional space actors, particularly from the south, is putting a greater pressure on the space environment and that the participation of the south in space sustainability efforts is unsatisfactory.58 Yet, the role of less-advanced nations in sustainability initiatives is more so on the receiving end in that advanced nations seek to engage newcomers to space during the early phase of the development of future directives and codes of conduct for sustainable space activities; that is,not really to seek their input, but to ensure compliance by the less-advanced nations.59 Their space activities are judged as either threats to or consistent with space sustainability, rather than as part of articulating the content of space sustainability.60 This indicates that, for national space programs of established space nations, a truly international focus on space sustainability is not a priority**.** It is interesting to note, at this juncture in the discussion, a fundamental provision proposed by a group of developing states during the development of the U.N. Space Benefits Declaration.61 (1) All States should pursue their activities in Outer Space with due regard to the need to preserve Outer Space, in such a way as not to hinder its continued utilization and exploration. (2) States should pay attention to all aspects related to the protection and preservation of the Outer Space environment, especially those potentially affecting the Earth’s environment. (3) States with relevant space capabilities and with programs for the utilization and exploration of outer space should share with developing countries on an equitable basis the scientific and technological knowledge necessary for the proper development of programs oriented to the more rational utilization and exploration of Outer Space.62 Paragraph 3 is fundamental and truly revealing when read in the light of the analysis of Schrogl.63 Schrogl claims that the declaration takes up the problem of space debris, which might endanger future space utilization to a significant extent. However, he also states that “the wish [of the Developing countries] to be informed about debris prevention measures voiced. . . is reasonable but actually needs no mentioning since these technological developments are discussions and documented publicly to the greatest extent.”64

### 1NC – Space War

#### Elmer needs to cut more cards for y’all– massive public alt cause OR they’re massively extra T, and their ev destroys the aff – Westwood is blue.

1AC Perez 21 Veronica Delgado-Perez. 12/14/21. Argument | The Commercialization of Space Risks Launching a Militarized Space Race. <https://www.theintlscholar.com/periodical/12/14/2020/analysis-commercialization-space-risk-international-law-military-space-race> [Veronica Delgado-Perez is a Staff Writer at The International Scholar.] // CVHS SR

Fundamentals of the Final Frontier It is a geopolitical imperative to determine what, if any, commercial activities and use of extraterrestrial resources are permitted within the confines of international law. Without clear-cut agreements on what activity is recognized by international law, the world will undoubtedly see states push the boundaries ever further in an attempt to gain the edge over geopolitical competitors — even more-so in an era of renewed great power competition. Yet to date, there exists no comprehensive treaty or legal reference to commercial activity in space. However, this should come as no surprise. It has only been since the turn of the century that technology and markets have progressed to the point where commercial space exploration and exploitation has become possible. Only recently have experts and analysts of geopolitics and international law begun to seriously examine questions surrounding the legal framework that would govern extraterrestrial resource-mining and other commercial activities. In the last decade, the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) dealt with commercial aspects in outer space. In one of their last reports, the Committee expressed that the era of the commercial utilization of outer space’s resources is intrinsically linked to the escalation of international competition over resources, which could threaten international peace and security. By encouraging the international community to engage in outer space’s activities for the benefit of humankind as a whole, “some delegations” have expressed that states should avoid the promotion of laws and regulations related to the commercialization of outer space, arguing that it should be considered the heritage of all humanity. In that regard, states must then ensure that domestic law on the use of outer space complies with international space law, which means that states should respect the principles outlined in the Outer Space Treaty and ensure that national regulations do not contravene international provisions. Even though the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies (which entered into force in 1967), refers to the exploration and use of outer space, it does not address questions of a commercial nature, which compromises the ability of states and international actors to address new challenges to extraterrestrial activities. In several provisions, the treaty highlights that these activities may be carried out for peaceful purposes and the benefit of all people, reaffirming that outer space is not subject to national appropriation. Were outer space not considered a global commons, that would imply that the resources and results of commercial exploration may fall within the jurisdiction of a country. It is thus incumbent upon Washington — and its commercial enterprises — to demonstrate how American commercial exploration of space benefits other countries and complies with international space law, or otherwise to adhere to the spirit of past treaties which emphasize the impartiality of outer space until such time as the law is clarified. International Law is Adrift in Space The potential benefits of commercial space exploration cannot be ignored. From an economic standpoint, the space industry would generate a significant economic boon for both states and private companies, due to the abundance and variety of resources — particularly scarce minerals that are difficult to extract on Earth. As one example of the vastness of resources held in outer space, one asteroid has the potential to contain more than the total supply of platinum extracted throughout the history of mankind. It may very well open the door to an advanced era of space navigation, building extraterrestrial infrastructure that facilitates the exploration and use of space’s resources, and extra-planetary human habitation. Inevitably, there are significant drawbacks to the commercialization of space exploration. These can vary, for instance, from the commercial dominance of space’s natural resources only by those states with the technical and financial capital to support space missions, to geopolitical competition over extraterrestrial resources that threatens world peace and security, to the potential for the monopolization of extraterrestrial resources by states and private companies. As was the case during the Cold War, the Soviet Union and the United States began a Space Race in which they struggled to achieve supremacy in space exploration and domination of science. Today, the number of space powers has increased thanks to continual advancements in flight, combustion, and fueling technologies. In the three decades since the end of the Cold War, technologically advanced countries like China, Japan, and France which previously had no space program have successfully navigated to the top tier of space-faring agencies and programs. In 2018, the U.S. allocated $41 billion to space programs, followed by China at $5.8 billion, and Russia at $3.1 billion. Collectively, the three major space powers control almost 65% of the global industry, showing space powers are monopolizing space and reinforcing the inequality gap between states that do not have sufficient economic and technological capacity to invest. With new actors on the game stage, conflicts of interest may arise. There is a risk that each actor adopts a kind of short-term Realist approach to space policy — one which is driven by self-interest in reaping the greatest benefits of extraterrestrial exploration and commercialization while controlling access to others. If unmitigated, states may choose to militarize outer space to gain a strategic edge over competitors and adversaries. This process has already begun. Under the Trump administration, the Pentagon established the U.S. Space Force as a new branch of the Armed Forces to protect the country and allied interests in space. Already, Delta 4 — one of the U.S. Space Force’s missions — conducts strategic and theater missile warnings, manages weapon systems, and provides information to missile defense forces. The measure shows that for the U.S., outer space is not only a domain of scientific exploration but has the potential to become increasingly securitized. With the impending expiration of the Strategic Arms Reduction Treaty (START) between the U.S. and Russia on February 5, 2021, a number of security dilemmas could arise. If the world’s two largest nuclear powers do not edge toward extending the treaty, Washington and Moscow risk returning to the era of unrestricted expansion of launch platforms and strategically-deployed nuclear warheads — potentially with the aid of military infrastructure in space. Although President-elect Biden has expressed his interest in negotiating an extension of New START, how Moscow and Washington might proceed remains an open question. Bilateral progress towards a new arms-control regime would require establishing limits on the number and range of long- and mid-range missiles, establishing measures to limit the expansion of traditional missile deployment to space, and banning the deployment of nuclear weapons and weapons of mass destruction in outer space. More than the risk of the securitization of space, state, and private actors could begin to claim exclusive legal rights over the resources they discover. Indeed, the U.S. Commercial Space Launch Competitiveness Act, which came into force in 2015, expressly recognizes the right of U.S. Citizens to possess, own, transport, use, and sell space resources. By this means, domestic law already acknowledges the legal claim to property by individuals, which is prohibited by international law. Under the Outer Space Treaty, states renounced any traditional form of acquisition of territories and agreed not to foray unilaterally into space to extend their national policies on Earth or to exercise any kind of sovereignty over celestial bodies or resources. The absence of a modern international treaty that addresses these issues should be received with grave concern, as there is significant potential for risk to become reality. Existing UN treaties lack the technological context and foresight to address legal questions regarding the potential for commercial exploration and exploitation of outer space or its resources. During the sixties and seventies, when international instruments like the Outer Space treaty were conceived, the principal aim of states was to support and expand the scale of the state’s national capacity for operation in space and the development of legal instruments to guide state’s international cooperation in the peaceful exploration of outer space. These instruments were never designed to respond to commercial questions over mining or tourism in space, private investment in space activities, or the emergence of non-state private enterprises operating in space. As a result, private enterprises operating in the vacuum of space also float in an unstable legal vacuum which threatens to implode in geopolitical competition. Beyond Stars and States In an increasingly commercial outer space in which there are no set limits to the exploitation of resources or claim to property, states and private companies will inevitably pursue the development of new extraterrestrial industries to suit their geoeconomic interests. If unchecked, the legal protection of outer space as a domain of exploration for the benefit of all humanity would functionally fail. To protect investments and profit from national space industries, states would likely resort to military force to protect and secure private assets. Over time, space would ultimately become a fourth border domain over which states claim, exercise, and defend sovereignty — including through the use of force. The challenge is thus to prevent the circumstances that could lead to space-borne conflict before it is made possible. Notwithstanding, commercial exploration and the use of natural resources need not lead to predation among actors involved in space. The potential rewards — both technological and environmental — that could come from investment in the harvesting of resources in space are immense. International law cannot afford to wait for the security dilemma posed by commercial activity in space to manifest before addressing it but must anticipate and proactively adopt measures to address future issues that govern extraterrestrial human activity. The only remedy for the lack of legal governance over commercial activity in space is the creation of new international laws through a comprehensive international treaty on commercial operations in space. The new treaty must expressly regulate commercial activities by states and private companies, enshrine an international liability and compensation regime covering damages caused with workable sanction provisions, and reinforce norms that restrict any militarization of outer space. The international community should focus its efforts on establishing a legal regime, with mandatory provisions (rather than non-binding resolutions, observations, commentaries, and conclusions) which generate both international responsibility and provide enforceable sanctions in the event of violations. The effort should be borne out by expanding the scope and strengthening the oversight powers of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS), rather than creating a new organ with redundant bureaucracy. Beyond the tasks of encouraging space research programs, studying space activities, and addressing legal questions, COPUOS should be granted the necessary powers to perform control and oversight monitoring functions. Experience has taught the international community that cooperative arrangements between states and international organizations can prevent competition for resources from escalating to kinetic conflict. Through cooperation, there is a chance to preserve extraterrestrial resources for future generations, secure an equitable allocation of resources and benefits with a mind to each country’s specific needs, and prevent the expansion of geopolitical conflict to the domain of space. Space powers must recognize the value in partnering with other states to advance the development of space programs more efficiently. It should be clear now that all nations could reap the benefits of collective action, exploration, and commercialization of resources from beyond Earth’s atmosphere while preventing a drawn-out international conflict to the final frontier. The will of states not to jeopardize the fundamental basis of international law must be reflected in coordination and surveillance efforts to ensure that the advantages derived from space exploration allow humanity to continue evolving.

### 1NC – Congetstion

#### Their internal link is about space surveillance in the ‘50s NOT modern SSN – even if squo tracking is imperfect – it’s good enough to not trigger missile radars – *hold the line* – their warrant is *one line* that says the phrase *once* – Westwood inserts blue.

1AC Hoots 15 (Felix; Fall 2015; Distinguished Engineer in the System Analysis and Simulation Subdivision, Ph.D. in Mathematics from Auburn University, M.S. in Mathematics from Tennessee Tech University; Crosslink, “Keeping Track: Space Surveillance for Operational Support,” <https://aerospace.org/sites/default/files/2019-04/Crosslink%20Fall%202015%20V16N1%20.pdf>)

The launch of Sputnik on October 4, 1957, marked the beginning of the Space Age. It also marked the beginning of an intense space race that brought a remarkable rate of rocket launches. In a very short time, the number of objects in orbit grew dramatically. This created a host of strategic challenges, including the need for space surveillance. In particular, the Air Force needed a way to prevent false alarms as satellites came within view of missile-warning radars, while the Navy needed a way to alert deployed units of possible reconnaissance by satellites overhead. These needs led to the establishment of a military mission to maintain a catalog of all Earth-orbiting objects—active payloads, rocket bodies, and debris—along with detailed information about trajectory and point of origin. Such a catalog could be used to filter normal orbital passages from potential incoming missiles and predict the passage of suspected spy satellites. The first catalog was relatively small in comparison with today’s version, which lists more than 22,000 items (as of May 2015). Also, the current version supports much more than the original military mission—and Aerospace is helping to extend its utility even further. The Space Catalog The Space Catalog is maintained by the Joint Space Operations Center (JSpOC) at Vandenberg Air Force Base, part of U.S. Strategic Command. One of the missions of JSpOC is to detect, track, and identify all artificial objects in Earth orbit. A key component of this mission is the Space Surveillance Network, a worldwide system of ground-based radars along with ground-based and orbital telescopes. The radars are used primarily for tracking near-Earth satellites with orbital period of 225 minutes or less, as well as some eccentric orbits that come down to near-Earth altitudes as they go towards their perigee. Ground-based telescopes are used for tracking more distant satellites, with orbital period greater than 225 minutes, and space-based sensors are used to track both near and distant satellites. The JSpOC tasks these sensors to track specific satellites and to record data such as time, azimuth, elevation, and range. This data is used to create orbital element sets or state vectors that represent the observed position of the satellite. The observed position can then be compared with the predicted position. The dynamic models used for predicting satellite motion are not perfect; factors such as atmospheric density variation caused by unmodeled solar activity can cause the predicted position to gradually stray from the true position. The observations are used to correct the predicted trajectory so the network can continue to track the satellite. This process of using observations to correct and refine an orbit in an ongoing feedback loop is called catalog maintenance, and it continues as long as the satellite remains in orbit. Ideally, the process is automatic, with manual inter vention only required when satellites maneuver or get near to reentry due to atmospheric drag. Sometimes, however, more effort is required. For example, a sensor may encounter a satellite trajectory that does not correspond well to anything in the catalog. Such observations are known as partially correlated observations if they are somewhat close to a known orbit or uncorrelated observations (or uncorrelated tracks) if they are far from any known orbit. Also, if a satellite is not tracked for five days, it is placed on an attention list for manual intervention. In that case, an analyst will attempt to match the wayward satellite to one of these partially correlated or uncorrelated tracks. If that effort succeeds, then the element sets are updated, and the object is returned to automatic catalog maintenance. On the other hand, if the satellite cannot be matched to a partially correlated or uncorrelated track, the satellite information continues to age. If it reaches 30 days without a match, the satellite is placed on the lost list. Risk Prediction One of the most visible uses of the catalog is to warn about collision risks for active payloads. This function predicts potential close approaches three to five days in advance to allow time to plan avoidance maneuvers, if necessary. Unplanned maneuvers may disturb normal operations and deplete resources for future maneuvers, so one would like to have high confidence in the collision-risk predictions. The reliability of the predictions depends directly on the accuracy of the orbit calculation, which in turn depends on the quality and quantity of the tracking data, which is limited by the capability of the Space Surveillance Network. Simply put, there are not enough tracking resources in the network to achieve high-quality orbits for every object in the catalog. Furthermore, many smaller objects can only be tracked by the most sensitive radars, and this tracking is infrequent. Most objects in the catalog are considered debris, which can neither maneuver nor broadcast telemetry. On the other hand, some satellite operators depend exclusively on the satellite catalog to know where their satellites are, and users of the satellite orbital data depend on the catalog to know when the satellites will be within view. This situation creates a challenging problem in balancing Space Surveillance Network resources to support the collision-warning task (tracking as many potential hazards as possible) while also providing highly accurate support to operational satellites (tracking the spacecraft as precisely as possible). The practical solution is to perform collision risk assessment using a large screening radius to ensure no close approaches are missed despite lower-quality predictions. Once an object is identified as having a potentially close approach, then the tasking level is raised, with the expectation that more tracking data will be obtained to refine the collision risk calculations. When the danger has passed, the object reverts to a normal tracking level. Collisions and spontaneous breakups do happen. The first satellite breakup occurred on June 29, 1961, when residual fuel in an Ablestar rocket body exploded, creating 296 trackable pieces of debris. Since that time, there have been more than 200 satellite breakups, the most notable being the missile intercept of the Fengyun-1C satellite, which created more than 3300 trackable fragments. In most cases, these breakups are first detected by the phased-array radars in the Space Surveillance Network. When multiple objects are observed where only one was expected, the downstream sensors are alerted, but no tasking is issued because specific debris orbits are not yet established. Tracks are taken and tagged as uncorrelated. Analysts at JSpOC then attempt to link uncorrelated tracks from different sensors to form a candidate orbit. Subsequent tracking improves the orbit to the point that the object can be named and numbered and moved into the catalog for automatic maintenance.

#### The Rogoway ev is terrible – 1] Double bind - It’s about ICBM launches which the aff scenario isn’t OR the aff gets rid of early-warning satellites bc they’re an unfair appropriation of outer space which makes their impacts inevitable 2] Says there’s a 30 minute reaction time before counter-launch – that’s enough time for double-checking retaliation – their scenario is not miscalc, but active retaliation – hold them to a higher explanation for how conflict happens than a 2 second blip at the top of the 1ar.

### 1NC – Turn -- Heg

#### US collapse is inevitable

Freier 17 (Nathan, Project Director & Principal Author of the DoD Risk Assessment, “At Our Own Peril: DoD Risk Assessment in a Post-Primacy World”, *Department of Defense*, https://ssi.armywarcollege.edu/pdffiles/PUB1358.pdf)

Both inside and outside the United States, a great number of analysts and opinionmakers are questioning the continued strength of U.S. commitment to its commonly recognized security obligations. At the same time, the study team found through extensive interactions with key defense stakeholders that the maintenance of the U.S. position as a dominant global power is untenable without both active maintenance and expansion of meaningful security partnerships worldwide.16 The world has grown accustomed to U.S. leadership. Yet, there are real fears that a combination of effective counter-U.S. resistance and deliberate, unilateral U.S. hesitation and restraint have both diminished American leverage and eroded many of the key advantages essential to the United States maintaining and leading its historically strong network of alliances and partnerships.17 According to General David Petraeus, “The paradox of the moment is that, just as the threats to the world order [the United States] created have grown ever more apparent, American resolve about its defense has become somewhat ambivalent.”18 In the end, the study team found this objective to be at the same time potentially the United States’ single greatest competitive advantage, as well as its single greatest vulnerability.19 Going forward, senior U.S. decision-makers will need to carefully account 46 for the strength of U.S. relationships, the reliability of individual U.S. partners, and the degree and merit of partner contributions to collective defense and security.20 Underwrite a Stable, Resilient, and Rules-Based International Order. Senior U.S. decision-makers naturally feel an obligation to preserve the U.S. global position within a favorable international order while protecting the United States and its people from consequential aggression, attack, or disruption.21 Before September 11, 2001 (9/11), this had very specific implications for DoD. Prior to 9/11, the operative international order felt comfortable to U.S. strategists, as they or their predecessors had—over the previous 55 years—largely been responsible for its construction and maintenance.22 Up to 9/11, that operative order was perceived to be dominated by the well-practiced, often-predictable competitive and cooperative relationships between states. In reality, while global security affairs were likely considerably more complex than perceived in the immediate post-Cold War period and through 9/11, this classically realist frame or lens was nonetheless the aperture through which U.S. policymakers and senior military leaders understood the world and its distribution of power.23 Since 9/11, however, U.S. perceptions of both the complexity of the contemporary order (or disorder) and its inherent hazards have grown more sophisticated, uncertain, unsettling, and confounding.24 The next section describes the contemporary post-primacy environment in detail. While the United States still clings to significant political, economic, and military leverage, that leverage is increasingly exhibiting less reach, durability, and endurance. In short, the rules-based global order that the United States built and sustained for 7 decades is under enormous stress. The greatest source of stress lies in an inherent dynamism in the character and velocity of consequential change in strategic conditions. General Petraeus is instructive here as well. He recently observed: Americans should not take the current international order for granted. It did not will itself into existence. [The United States] created it. Likewise, it is not self-sustaining. [The United States has] sustained it. If [the United States] stops doing so, it will fray and, eventually, collapse.25 U.S. adjustment to the post-primacy era has been uneven at best. What can be perceived by foreign rivals or domestic partisan opposition as fecklessness on the part of those charged with U.S. foreign and security policy might instead simply be confusion— confusion about the proximate source and nature of consequential hazards, the risks associated with action or inaction against them, and the stability of the foundation upon which past best practice has most often ably averted military catastrophe, contagious insecurity, and uncontrolled disorder.26 Today, past best practice is increasingly ineffective. Revisionist or revolutionary powers such as China, Russia, Iran, and North Korea demonstrate a penchant for paralyzing, counter-U.S. gray zone competition.27 Vulnerable states are also falling victim to more organic networked rejectionist forces and movements that effectively challenge the legitimate exercise of political authority wherever they emerge. The growth, persistent presence, and corrosive impact of these stateless environmental forces lead to noticeable spikes in terrorism, insurgency, and civil conflict, and undermine the U.S.-led 47 order often less by purpose than by implication. In reality, the “rules” in “rules-based” are failing and the United States is struggling to keep pace.28

#### Allies are losing faith in American leadership and China will take over as a global hegemon

Heer 18 (Jeet, former editor at the New Republic and journalist who’s written for The National Post, The New Yorker, and The Paris Review, “Are We Witnessing the Fall of the American Empire?”, *The New Republic*, https://newrepublic.com/article/147319/witnessing-fall-american-empire)

But America won’t lose its dominance if these new powers accept the rules the United States has set down. Brookings Institute fellow Thomas Wright notes in his new book, All Measures Short of War, that during the long interlude between the collapse of the Soviet Union and the election of Donald Trump, many American leaders thought they could get rising powers to buy into the American-led global system.

“Normally, the U.S. order would collapse upon the decline of the United States and the rise of a country like China,” he wrote. “But some U.S. strategists, scholars, and leaders believed they were creating an order that would become indispensable to rising powers because it transcended old notions of the national interest. Even after America had declined or reduced its leadership role, non-Western powers would need its rules and institutions to grow economically, to reassure other countries about their power, and to tackle common problems.”

For Wright, the real problem is that China is not, as American leaders had hoped, assenting to the American-led order. Rather, China is starting to assert itself as a regional power with an identity quite distinct from the liberal international order. China is challenging the liberal order by building islands in the South China Sea (as a display of force) and by eliminating term limits on President Xi Jinping (thus forestalling any political liberalization).

But Wright also notes that in terms of economic strength and military capabilities, the U.S. is maintaining or extending its advantage. “With enough political will, the United States could choose to have the most military might overall in almost any crisis or conflict,” Wright contends. “Finally, when compared on a global scale of relative power, it is clear that the United States is surpassing most other nations. The GDP gap between the United States and Russia is growing, and the United States has outperformed European countries following the financial crisis.”

Thus, America is not facing imperial decline so much as a period of renewed inter-imperial conflict, with newly emboldened regional powers like China and Russia eager to challenge the global hegemon. And the country is in a much weaker position to fend them off, due to the damage Trump is doing to the third pillar of the American empire: cultural dominance.

Most analysts, including McCoy and Wright, agree that American hegemony has always relied heavily on other countries’ consent. The American model is an attractive one to many of the world’s people, and democratic countries have long valued America as an ally. “The American empire was built by people who recognized that often the best way to exert power was through non-coercive means,” Cooper, of The Week, wrote. “Trump represents a different tradition—a pinched, ignorant, aggressive, insecure tradition, one that insists only military force and chest-thumping belligerence matters.”

Trump has alienated America’s allies by denigrating NATO, threatening a trade war, and nuclear brinksmanship. According to a Gallup poll conducted in 134 countries and released earlier this year, faith in American leadership has plummeted sharply to a new low of 30 percent, compared to 48 percent in 2016 while Barack Obama was president and 34 percent in George W. Bush’s final year. “When you factor in the 43% who disapprove of America’s leadership,” Quartz reported, “Trump now has a global net approval rating lower than Russia’s Vladimir Putin and China’s Xi Jinping.”

American power rests on a sturdy economic and military foundation that took many generations to build. It’ll take more than one president to destroy it. What Trump can do, though, is destroy allies’ faith in America. And that, combined with the growing ambition of China and Russia, could destabilize the entire world.

#### Hegemony is a terminally unsustainable fantasy based in a revisionist strategy of American exceptionalism – pursuit causes numerous failed states, financial crises, widening inequality, worldwide proliferation, anti-western terrorism, and emboldens adversaries – o/w on recency

Walt 19 Stephen Walt is the Robert and Renée Belfer Professor of International Affairs at the Harvard Kennedy School. [“The End of Hubris,” *Foreign Affairs*, Vol. 98, Iss. 3, (May/Jun 2019): 26-35, 4-16-2019, URL: <https://www.foreignaffairs.com/articles/2019-04-16/end-hubris>] DTS

IF IT AIN'T BROKE . . . In the nineteenth century, when the United States was weak, leaders from George Washington to William McKinley mostly avoided foreign entanglements and concentrated on building power domestically, expanding the country's reach across North America and eventually expelling the European great powers from the Western Hemisphere. In the first half of the twentieth century, U.S. presidents such as Wood- row Wilson and Franklin Roosevelt used the country's newfound strength to restore the balance of power in strategically critical regions outside the Western Hemisphere. But they let other great powers do most of the heavy lifting, and thus the United States emerged relatively unscathed-and stronger than ever-from the world wars that devastated Asia and Europe. Letting other states shoulder the burden was not possible during the Cold War, so the United States stepped up and led the alliances that contained the Soviet Union. American leaders paid lip service to democracy promotion, human rights, and other idealistic concerns, but U.S. policy was realist at its core. Through the Bretton Woods system and its successors, the United States also helped foster a more open world economy, balancing economic growth against the need for financial stability, national autonomy, and domestic legitimacy. Put simply, for most of U.S. history, American leaders were acutely sensitive to the balance of power, passed the buck when they could, and took on difficult missions when necessary. But when the Soviet Union collapsed and the United States found itself, as the former national security adviser Brent Scowcroftput it in 1998, "standing alone at the height of power . . . with the rarest opportunity to shape the world," U.S. leaders rejected the realism that had worked well for decades and tried to remake global politics in accordance with American values. A new strategy-liberal hegemony-sought to spread democracy and open markets across the globe. That goal is the common thread linking President Bill Clinton's policy of "engagement and enlargement," President George W. Bush's "freedom agenda," and President Barack Obama's embrace of the Arab revolts of 2010-11 and his declaration that "there is no right more fundamental than the ability to choose your leaders and determine your destiny." Such thinking won broad support from both political parties, the federal bureaucracies that deal with international affairs, and most of the think tanks, lobbies, and media figures that constitute the foreign policy establishment. At bottom, liberal hegemony is a highly revisionist strategy. Instead of working to maintain favorable balances of power in a few areas of vital interest, the United States sought to transform regimes all over the world and recruit new members into the economic and security institutions it dominated. The results were dismal: failed wars, financial crises, staggering inequality, frayed alliances, and emboldened adversaries. HEGEMONIC HUBRIS When Clinton took office in 1993, the United States was on favorable terms with the world's other major powers, including China and Russia. Democracy was spreading, Iraq was being disarmed, and Iran had no nuclear enrichment capacity. The Oslo Accords seemed to herald an end to the Israeli-Palestinian conflict, and Washington seemed well positioned to guide that process. The European Union was adding new members and moving toward a common currency, and the U.S. economy was performing well. Americans saw terrorism as a minor problem, and the U.S. military seemed unstoppable. The wind was at the country's back. Life was good. But those circumstances fueled a dangerous overconfidence among American elites. Convinced that the United States was "the indispensable nation," as Secretary of State Madeleine Albright famously put it in 1998, they believed they had the right, the responsibility, and the wisdom to shape political arrangements in every corner of the world. That vision turned out to be a hubristic fantasy. Repeated attempts to broker peace between the Israelis and the Palestinians all failed, and the two-state solution sought by three U.S. presidents is no longer a viable option. Al Qaeda attacked the U.S. homeland on September 11, 2001, and Washington responded by launching a global war on terrorism, including invasions of Afghanistan and Iraq. Those campaigns were costly failures and shattered the U.S. military's aura of invincibility. Much of the Middle East is now embroiled in conflict, and violent extremists operate from Africa to Central Asia and beyond. Meanwhile, India, Pakistan, and North Korea tested and deployed nuclear weapons, and Iran become a latent nuclear weapons state. The collapse of the U.S. housing market in 2008 exposed widespread corruption in the country's financial institutions and triggered the worst economic crisis since the Great Depression-a calamity from which the global economy has yet to fully recover. In 2014, Russia seized Crimea, and it has interfered in a number of other countries since then-and its relations with the West are now worse than at any time since the Cold War. China's power and ambitions have expanded, and cooperation between Beijing and Moscow has deepened. The eurozone crisis, the United Kingdom's decision to withdraw from the eu, and energetic populist movements have raised doubts about the eu's future. Democracy is in retreat worldwide; according to Freedom House, 2018 was the 13th consecutive year in which global freedom declined. Illiberal leaders govern in Hungary and Poland, and the Economist Intelligence Unit's annual Demoracy Index has downgraded the United States from a "full" to a "flawed" democracy. The United States was not solely responsible for all these adverse developments, but it played a major role in most of them. And the taproot of many of these failures was Washington's embrace of liberal hegemony. For starters, that strategy expanded U.S. security obligations without providing new resources with which to meet them. The policy of "dual containment," aimed at Iran and Iraq, forced the United States to keep thousands of troops on the Arabian Peninsula, an additional burden that also helped convince Osama bin Laden to strike at the U.S. homeland. Nato expansion committed Washington to defend weak and vulnerable new members, even as France, Germany, and the United Kingdom let their military forces atrophy. Equally important, U.S. efforts to promote democracy, the open-ended expansion of nato, and the extension of the alliance's mission far beyond its original parameters poisoned relations with Russia. And fear of U.S.-led regime change encouraged several states to pursue a nuclear deterrent-in the case of North Korea, successfully. When the United States did manage to topple a foreign foe, as it did in Afghanistan, Iraq, and Libya, the results were not thriving new democracies but costly occupations, failed states, and hundreds of thousands of dead civilians. It was delusional for U.S. leaders to expect otherwise: creating a functional democracy is a difficult process under the best of circumstances, but trying to do it in fractured societies one barely understands is a fool's errand. Finally, globalization did not deliver as promised. Opening up markets to trade and investment brought great benefits to lower and middle classes in China, India, and other parts of the developing world. It also further magnified the already staggering wealth of the world's richest one percent. But lower- and middle-class incomes in the United States and Europe remained flat, jobs in some sectors there fled abroad, and the global financial system became much more fragile. This sorry record is why, in 2016, when Trump called U.S. foreign policy "a complete and total disaster" and blamed out-of-touch and unaccountable elites, many Americans nodded in agreement. They were not isolationists; they simply wanted their government to stop trying to run the world and pay more attention to problems at home. Trump's predecessors seemed to have heard that message, at least when they were running for office. In 1992, Clinton's mantra was "It's the economy, stupid." In 2000, Bush derided Clinton's efforts at "nation building" and called for a foreign policy that was "strong but humble." Obama pledged to end foreign wars and focus on "nation building at home." These expressions of restraint were understandable, as surveys had repeatedly shown that a majority of Americans believed the country was playing the role of global policeman more than it should and doing more than its share to help others. According to the Pew Research Center, in 2013, 80 percent of Americans agreed that "we should not think so much in international terms but concentrate more on our own national problems and building up our strength and prosperity here at home," and 83 percent wanted presidents to focus more on domestic issues than on foreign policy. Clinton, Bush, and Obama all understood what the American people wanted. But they failed to deliver it. So has Trump. Although his Twitter feed and public statements often question familiar orthodoxies, the United States is still defending wealthy nato allies, still fighting in Afghanistan, still chasing terrorists across Africa, still giving unconditional support to the same problematic Middle Eastern clients, and still hoping to topple a number of foreign regimes. Trump's style as president is radically different from those of his predecessors, but the substance of his policies is surprisingly similar. The result is the worst of both worlds: Washington is still pursuing a misguided grand strategy, but now with an incompetent vulgarian in the White House.

### 1NC – Turn - Russia

#### IF they win an internal link to Russia war, it’s good –

#### Russia is modernizing to Surprise nuclear HEMP attack the United States

Peter Pry 1-25 (Peter Vincent Pry served on the staffs of the Commission to Assess the Threat to the United States from Electromagnetic Pulse Attack, the U.S. House Armed Services Committee, and the Central Intelligence Agency. He currently is director of the U.S. Nuclear Strategy Forum and president of EMPACT America, “The Russian Federation’s Military Doctrine, Plans, and Capabilities for Electromagnetic Pulse (EMP) Attack” WVW Broadcast Network, 1-25-21, https://www.worldviewweekend.com/news/article/russian-federations-military-doctrine-plans-and-capabilities-electromagnetic-pulse-emp)//babcii

“Super-EMP is a…first-strike weapon,” according to Aleksey Vaschenko, who describes Russian nuclear weapons specially designed to make extraordinarily powerful EMP fields as Russia’s means for defeating the United States in “A Nuclear Response To America Is Possible”: “The further direction of the work on the development of Super-EMP was associated with the increase of its kill effect by focusing Y-radiation, which should have resulted in an increase of the pulse’s amplitude. These properties of Super-EMP make it a first strike weapon, which is designed to disable the state and military command and control system, the economy, ICBMs, especially mobile based ICBMs, missiles on the flight trajectory, radar sites, spacecraft, energy supply systems, and so forth. So, Super-EMP is obviously offensive in nature and is a destabilizing first-strike weapon…The Russian nuclear component relies on the Super-EMP factor, which is the Russian response to U.S. nuclear blackmail.” Hypersonic Warheads: New HEMP Threat Russian development of hypersonic missile warheads is a dangerous new dimension of the nuclear and HEMP threat. Great speed (Mach 20, twenty times the speed of sound) and flying a flat trajectory, skimming along the top of the upper atmosphere, significantly reduces visibility to U.S. early-warning satellites and radars, while also reducing arrival time. Maneuvering makes hypersonic warheads more difficult to track and intercept, virtually impossible to intercept with existing U.S. National Missile Defenses. Former senior Defense Department official Dr. Mark Schneider writes, “The main reason for Russian hypersonic missiles is a nuclear surprise attack and America has no defense against it.” Four-star General John Hyten, then chief of the U.S. Strategic Command that controls the nuclear Triad (now Vice Chairman Joint Chief of Staff), agrees with Schneider: “Hypersonic capabilities are a significant challenge. We are going to need a different set of sensors to see hypersonic threats. Our enemies know that.” Russia deployed its first regiment of SS-19 ICBMs armed with hypersonic Avangard nuclear warheads at the end of December 2019. Hypersonic vehicles fly over most of their trajectory at 50-100 kilometers altitude: the optimum height-of-burst for Super-EMP warheads. Hypersonic weapons are potentially a new avenue for surprise nuclear HEMP attack that could defeat deterrence. We cannot see the attack coming and may not know against whom to retaliate, especially if HEMP attack blinds satellites and radars needed for early-warning and threat assessment. Hypersonically delivered HEMP attack could win World War III with a single electronic blow.

#### That ionizes Van Allen belts and destroys all SATS

Peter Pry 20 (Peter Vincent Pry served on the staffs of the Commission to Assess the Threat to the United States from Electromagnetic Pulse Attack, the U.S. House Armed Services Committee, and the Central Intelligence Agency. He currently is director of the U.S. Nuclear Strategy Forum and president of EMPACT America, “Have Russia And China Already 'Militarized' Space?”, Real Clear Defense, July 16, 2020, https://www.realcleardefense.com/articles/2020/07/16/have\_russia\_and\_china\_already\_militarized\_space\_115469.html)//babcii

HEMP and SGEMP High-altitude EMP (HEMP) from a nuclear detonation in space propagates downward through the atmosphere, not through the vacuum of space, so no Russian or PRC satellites would be at risk from HEMP, unless the HEMP field is over China or Russia so satellite ground stations could be damaged—a highly unlikely scenario, that Moscow or Beijing would make a HEMP attack on themselves. Satellites are at risk from an exo-atmospheric detonation for HEMP from the gamma rays. If they reach the satellite and are close enough, they can damage satellites by a phenomenon called System Generated EMP (SGEMP).[[xiv]](https://www.realcleardefense.com/articles/2020/07/16/have_russia_and_china_already_militarized_space_115469.html#_edn14) But Russia and China have almost certainly hardened their satellites against SGEMP and other phenomena that might be generated by the worst-case SGEMP threat they plan to employ: a Super-EMP weapon which is designed specifically to produce powerful gamma rays. The U.S. hardens military satellites against SGEMP too, but probably not against the SGEMP produced by Super-EMP weapons, as the U.S. has no Super-EMP weapons. The U.S. does not even have simulators for Super-EMP weapons to test against this threat. China and Russia can further protect their LEO satellites (those most at risk) from SGEMP by timing the HEMP attack so their satellites are over-the-horizon and will not be illuminated by gamma rays. An exo-atmospheric nuclear detonation for HEMP can also damage LEO satellites by “pumping” the Van Allen belt with ionized particles, as happened after the 1962 STARFISH PRIME high-yield exo-atmospheric nuclear test that inadvertently damaged U.S. satellites.[[xv]](https://www.realcleardefense.com/articles/2020/07/16/have_russia_and_china_already_militarized_space_115469.html#_edn15) Satellites can be hardened to survive this environment too, and presumably would be if HEMP attack is an important military option, as it is for Russia and China. Ionization of the Van Allen belt is a much bigger threat to LEO satellites if the HEMP attack uses a high-yield weapon detonated above 100 kms HOB—and this too is another way of using a nuclear detonation in space to sweep the skies of U.S. satellites.

#### Increased ionizaiton prevents space col

Daniel **Baker 14**, Director of the Laboratory for Atmospheric and Space Physics, as well as a professor in atmospheric and planetary sciences, and in physics, at the University of Colorado-Boulder, "New Twists in Earth's Radiation Belts," American Scientist, 2014, https://www.americanscientist.org/article/new-twists-in-earths-radiation-belts.

The satellite carried a pioneering scientific payload, prepared at the State University of Iowa by a team of researchers led by James A. Van Allen. And the instruments on Explorer I made the first revolutionary discovery of the Space Age: Earth is enshrouded in doughnut-shaped rings, or toroids, of high-energy, high-intensity radiation. The discovery of those radiation belts—now called the Van Allen belts—revealed how Earth’s magnetic field interacts with the space environment around it. The field, generated by Earth’s molten metallic core and planetary spin, creates the magnetosphere, a magnetic bubble surrounding the planet; the size and shape of the magnetosphere change in response to the blowing of the solar wind, the constant stream of charged particles flowing from the Sun. The magnetosphere is crucial to life on Earth; it shields the atmosphere, as well as life on the surface, from damage by the solar wind and by even more energetic cosmic rays. But close in, Earth’s magnetic field lines trap and accelerate free-floating particles, largely protons and electrons, and bounce them back and forth between the poles of the planet. Those zones of trapped, agitated particles make up the Van Allen belts that Explorer I flew through. It was discovered that the belts took the form of two concentric rings: The inner belt extends from an altitude of about 1,000 to 6,000 kilometers above Earth, whereas the outer belt spans from about 13,000 to 60,000 kilometers. Earth’s Van Allen belts are imperfect shields, however. High-speed particles can leak from the belts and collide with molecules in the atmosphere, giving rise to aurora displays. If there is a major magnetic eruption on the Sun, the resulting outrush of particles may break through the outer magnetosphere and overload the Van Allen belts in more destructive ways. The rapid injection of particles into the belts can damage the circuitry and solar panels on satellites in orbit; swarms of protons and electrons released when solar wind particles crash into the atmosphere induce electrical currents that can overload terrestrial power systems and cause blackouts. Almost exactly a century preceding the Explorer I launch, on the night of August 28 to 29, 1859, people around the world got to witness what happens when an enormous solar storm overwhelms Earth’s magnetosphere. The New York Times reported that thousands of New Yorkers watched “the heavens…arrayed in a drapery more gorgeous than they have been for years.” An even more spectacular aurora display occurred on September 2, when the sky lit up as far south as Central America in the Northern Hemisphere. Disturbances in Earth’s magnetic field were so powerful that magnetometer readings were driven off their scales. Telegraph networks were unusable for nearly eight hours in most parts of the world due to high-energy particles in the atmosphere. In several regions, operators reported that their telegraphs were sparking from the electrical current induced by the aurora. Earth had experienced a one-two punch of solar storms the likes of which have not been recorded since. Humanity was just beginning to develop electrical technology in 1859. There were no high-power electrical lines crisscrossing the continents, nor were there sensitive satellites orbiting Earth. In 1989, just before the rise of the Internet and GPS systems, a smaller but still potent solar storm demonstrated the heightened risk. The 1989 storm induced huge ground currents that knocked out Quebec’s electrical power grid and caused problems at 200 sites in the United States, particularly in regions situated on igneous rock because it resists conduction and therefore flows current into nearby wires. If another solar event like the one in 1989 happened today it could disrupt global communications, causing chaos for days. Another 1859-style superstorm could knock out some power grids and communications networks for weeks or more. Our Sun operates on an 11-year cycle of activity, and today it is near the maximum of that pattern, meaning it could at any time produce large-scale events. In mid-July 2012, a solar storm of immense power narrowly missed the Earth; had it happened a week earlier, the planet might have been in the direct path of the blast. My colleagues and I are vigorously pursuing studies of space storms and the changes in our near-Earth space environment, which we lump under the term space weather. There is a pressing need for our technological society to understand in ever better detail the workings of the space environment around us. A clearer picture of the dynamics of the Van Allen belts is one important piece of this puzzle. Space Storm Damage What happens to satellites during space storms is of great practical importance. After the pioneering work of Van Allen and his coworkers in the United States, along with their counterparts in the Soviet Union, there was an explosion of interest in the use of space for human needs. Over just a few years in the late 1950s and early 1960s, space hardware went from technological demonstration and scientific curiosity to full-fledged societal imperatives. Earth satellites were launched into space to meet needs for communication, navigation, weather observations, remote Earth sensing, and military reconnaissance. Today the Earth is circled by spacecraft from just above our atmosphere to distances of tens of thousands of kilometers above Earth’s surface. It would be almost inconceivable to try to imagine our modern U.S. society without the capabilities provided by spacecraft systems. But any of the many hundreds of spacecraft operating in Earth orbits today can be damaged by space radiation if the circumstances are right. In 2003, 46 of the 70 satellite failures reported that year occurred during a geomagnetic storm in October. When high-energy protons and other ions hit orbiting spacecraft, they often leave ionization tracks in electronic chips. These tracks can upset spacecraft computer memories and otherwise disrupt sensitive electronics. As a result, satellite solar power panels may be damaged, optical tracker systems may become confused, and spacecraft command-and-control software may be scrambled. High-energy protons and ions may also injure, and potentially kill, astronauts who are in space during a major solar particle event. Manned launches have had to be rescheduled as a result, a major obstacle to long missions such as ones that might go to Mars. The high-energy protons in the inner Van Allen zone are especially a continuing risk to satellites and humans alike. Energetic electrons in the space environment can also be devastating to spacecraft. They can readily penetrate even thick spacecraft shielding and bury themselves in insulating materials, such as coaxial cables or electronics boards, deep within spacecraft systems. As charge builds up in the insulating materials, a powerful internal electrical discharge can occur, much like a miniature lightning strike. Numerous recent spacecraft failures have been attributed to this mechanism. Another space weather effect is known as surface charging. Lower energy electrons cannot penetrate the shielding but can accumulate on insulating satellite surfaces. As with interior insulators, charge buildup on the surface may lead to a powerful, disruptive discharge, generating electrical signals in the spacecraft’s vicinity that can scramble and disorient the satellite and its subsystems. A Third Belt In light of the world’s dependence on Earth-orbiting platforms, it must be realized that every one of these spacecraft fly through—essentially continuously—the high-energy radiation environment that Van Allen’s group discovered over five decades ago. Thus, one of the most enduring and persistent aspects of space weather is the hostile radiation belts girding the Earth. Probes have returned data showing that the Van Allen belts wax and wane in intensity, depending on both local conditions and Sun activity. Even 50-plus years after their discovery, we still need a deeper and more insightful comprehension of the Van Allen belts’ behavior.

#### Space col is key to avert extinction.

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Space colonization is not only the subject of fiction but of serious science too. The late physicist Stephen Hawking argued that unless colonies were established in space the human race would become extinct. There are several natural phenomena beyond our control that could spell our obliteration. Over a long enough period of time our planet is vulnerable to catastrophic meteorite strikes, or getting exposed to the deadly radiation of a nearby supernova explosion. As our Sun burns its fuel it will start to expand and, in a few million years, will scorch Earth. We can also self-destruct by waging nuclear war, or by tilting our planet’s climate towards a runaway greenhouse effect. Space colonization is therefore the ultimate insurance policy of long-term human survival[4]. Physics and Biology: how to solve the challenges of interstellar travel But colonizing space is hard. Three are the main problem categories for humans surviving away from Earth over an indefinite period of time. The first, and probably easiest to solve, is finding a place suitable for colonization. Our solar system provides several possible habitats, the most obvious ones being of course the Moon and Mars. The Jovian moons could also be colonization targets. The Artemis Project[5], a private venture to establish a permanent, self-sustainable human base on the Moon, has proposed the Jovian moon Europa as an alternative future habitat, given the possibility of a hot interior and a liquid ocean of water under the icy surface, both of which could provide for a sustainable human base. Colonizing the Solar System could be a stepping-stone for venturing to worlds beyond, of which there are aplenty. In 2009 NASA launched the Kepler space telescope to discover Earth-size planets orbiting other stars in habitable zones. More than 1,300 planets have been discovered so far, in about 440 star systems; the nearest planet may be “only” 12 light years away. Based on Kepler’s findings scientists estimate that there could be as many as 11 billion rocky, Earth-like planets orbiting habitable zones of Sun-like stars in our Galaxy. The possibilities for expanding humanity’s reach in the cosmos are truly astronomical.

#### Russia war good – we’d go first, we’d win, causes minimal damage, and they would surrender

David J. Lonsdale 19 (David Lonsdale is the Director of the Centre for Security Studies at the University of Hull, UK. 5/17/2019. “The 2018 Nuclear Posture Review: A return to nuclear warfighting?” https://www-tandfonline-com.proxy.lib.umich.edu/doi/full/10.1080/01495933.2019.1573074)

The important question is: what objectives would the U.S. pursue within a nuclear conflict, and how would they be achieved? It appears that the primary objectives sought would be damage limitation (an important component of warfighting) and the reestablishment of deterrence. This fits with the preliminary qualifying statement to this section of the review, in which it is stated that the U.S. would use nuclear weapons in compliance with the law of armed conflict.86 Indeed, the NPR is at pains to note that nuclear forces would only be used for defensive purposes. One assumes that this rules out counter-value targeting (deliberate attacks against enemy population centers). This leaves counterforce operations as the only option. Strikes against enemy nuclear forces and their command and control, in conjunction with active ballistic missile defenses (BMD), would help ensure damage limitation for the U.S. and its allies.87 A focus on counterforce options is reminiscent of later Cold War strategy, when the U.S. increasingly procured weapon systems with increased accuracy and penetrative capability designed for warfighting. Indeed, Lieber and Press argue that increases in accuracy and remote sensing have enhanced the potency of counterforce options, to the point that low-casualty counterforce options are possible for the first time.88 One can reasonably assume, although it is not explicitly noted in the review, that the restoration of deterrence would be achieved through a combination of intra-war deterrence by denial (as noted above in relation to counter-escalation strategies) and punishment for coercive purposes. Inclusion of the latter is premised on references to “unacceptable consequences” resulting from nuclear attack elsewhere in the NPR. 89 However, in the face of no counter-value targeting, it is reasonable to question how these costs would be inflicted. There are three possible answers, although none of them is discussed in the NPR. First, it may be that the enemy values highly their nuclear forces; so that the loss of them would inflict unacceptable costs. Alternatively, there may be an unwritten assumption that counterforce strikes would inevitably produce “bonus” counter-value damage. Much of the nuclear force infrastructure (including command and control, airbases, etc.) is within or near population centers. Thus, even a limited counterforce strike is likely to have a significant detrimental effect on counter-value targets. This assumption, however, is somewhat thrown into question by the stated desire to procure accurate limited-yield weapons and to operate within the norms of the war convention. Low-yield accurate weapons would be ideal for counterforce missions and would minimize damage to counter-value target sets. Thus, bonus damage is likely to be limited. Finally, although again not explicitly noted in the NPR, perhaps there is a return to the notion of attacking targets associated with political control. Yet again, though, concerns over collateral damage would likely restrict a campaign aimed at the means of political control. We are, thus, left with many questions concerning how the coercive effects of nuclear weapons would be administered. This is problematic, for as Thomas C. Schelling eloquently noted, “The power to hurt can be counted among the most impressive attributes of military force.” 90 It has to be concluded that the uncertainties in this area of strategy reflect either a paradox or incomplete strategic thinking in the NPR. Clarity on these matters would be welcome, especially as it would enhance deterrence credibility still further. Although countervailing is back on the agenda in the 2018 NPR, there is no mention of prevailing in a nuclear conflict. Indeed, the review quotes Defense Secretary Mattis, echoing the early thoughts of Brodie, that nuclear war can never be won, and thus must never be fought.91 This is both curious and disappointing from a warfighting perspective, and speaks to the need for the further development of strategic thinking in U.S. nuclear strategy under Trump. Damage limitation and the reestablishment of deterrence are perfectly admirable goals within the context of nuclear conflict. However, if the U.S. is to achieve its objectives in a post-deterrence environment, it must have a comprehensive theory of victory. Damage limitation and the reestablishment of deterrence are limited negative objectives. They do not provide a positive driving force for the use of nuclear weapons. To reiterate, victory refers to a policy objective that must be achieved in the face of the enemy. And, as Clausewitz reminds us, the will of the enemy must be broken by destroying his ability to resist, or putting him in such a position as his defeat is inevitable.92 If we consider the conditions under which U.S. nuclear weapons could be used, as stipulated by the 2018 NPR, then we can assume that an enemy power (likely Russia, China, North Korea, or a state-sponsored terror group) has launched a substantial attack on either the U.S. or one of its allies. We can think in terms of a Russian assault on the Baltic States, a North Korean attack on South Korea, or perhaps a Chinese invasion of Taiwan. Alternatively, the U.S. may have been subjected to a substantial strategic attack, involving either weapons of mass destruction (including biological or chemical) or a crippling cyberattack. In any of these scenarios, more expansive objectives would be required. As Lieber and Press note, “In some cases, wars may be triggered by events that compel U.S. leaders to pursue decisive victory, conquest, and/or regime change.” 93 Thus, in order to achieve its objectives, the U.S. would variously need to: punish an aggressor to reinstate deterrence; defeat enemy forces for damage limitation or to reclaim lost territory; and, in the North Korean case, presumably overthrow a communist regime. In some of these cases, damage limitation and the reestablishment of deterrence would not be enough. Enemy forces would have to be defeated, removed, destroyed, or coerced (to withdraw from allied territory). Any operations in pursuit of these goals would need a theory of victory built on a detailed understanding of the use of nuclear weapons in the service of military objectives; i.e., nuclear warfighting. This could include defeating enemy nuclear forces for force protection of U.S. and allied conventional forces. Alternatively, U.S. nuclear forces may be required to defeat regionally superior enemy conventional forces. And yet, as previously noted, the NPR rules out a return to nuclear warfighting. This is a significant disjuncture in U.S. nuclear strategy. It is even more curious when one considers the range of modern forces the Trump administration seeks to acquire under the 2018 NPR.

### 1NC – Turn –Econ

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1AC Dvorsky 15 George Dvorsky 6-4-2015 “What Would Happen If All Our Satellites Were Suddenly Destroyed?” <https://io9.gizmodo.com/what-would-happen-if-all-our-satellites-were-suddenly-d-1709006681> (Senior staff reporter at Gizmodo specializing in astronomy, space exploration, SETI, archaeology, bioethics, animal intelligence, human enhancement, and risks posed by AI and other advanced tech.)//Elmer

Lastly, there’s the [Kessler Syndrome](http://www.spacesafetymagazine.com/space-debris/kessler-syndrome/) to consider. This scenario was portrayed in the 2013 film Gravity. In the movie, a Russian missile strike on a defunct satellite inadvertently causes a cascading chain reaction that formed an ever-growing cloud of orbiting space debris. Anything in the cloud’s wake — including satellites, space stations, and astronauts — gets annihilated. Disturbingly, the Kessler Syndrome is a very real possibility, and the likelihood of it happening [is steadily increasing as more stuff gets thrown into space](http://io9.com/how-to-clean-up-deadly-space-junk-before-disaster-strik-1443463338). Given these grim prospects, it’s fair to ask what might happen to our civilization if any of these things happened. At the risk of gross understatement, the complete loss of our satellite fleet would instigate a tremendous disruption to our current mode of technological existence — disruptions that would be experienced in the short, medium, and long term, and across multiple [domains](https://io9.gizmodo.com/what-would-happen-if-all-our-satellites-were-suddenly-d-1709006681). Compromised Communications Almost immediately we’d notice a dramatic reduction in our ability to communicate, share information, and conduct transactions. “If our communications satellites are lost, then bandwidth is also lost,” [Jonathan McDowell](http://planet4589.org/) tells io9. He’s an astrophysicists and Chandra Observatory scientist who works out of the [Harvard-Smithsonian Center for Astrophysics](http://planet4589.org/jcm/cfa-www.harvard.edu). McDowell says that, with telecommunication satellites wiped out, the burden of telecommunications would fall upon undersea cables and ground-based communication systems. But while many forms of communication would disappear in an [instant](https://io9.gizmodo.com/what-would-happen-if-all-our-satellites-were-suddenly-d-1709006681), others would remain. All international calls and data traffic would have to be re-routed, placing tremendous pressure on terrestrial and undersea lines. Oversaturation would stretch the capacity of these systems to the limit, preventing many calls from going through. Hundreds of millions of Internet connections would vanish, or be severely overloaded. A similar number of cell phones would be rendered useless. In remote areas, people dependent on satellite for television, Internet, and radio would practically lose all service. “Indeed, a lot of television would suddenly disappear,” says McDowell. “A sizable portion of TV comes from cable whose companies relay programming from satellites to their hubs.” It’s important to note that we actually have a precedent for a dramatic — albeit brief — disruption in com-sat capability. Back in 1998, [there was a day in which a single satellite failed and all the world’s pagers stopped working](http://articles.latimes.com/1998/may/21/news/mn-52190). Get Out Your Paper Maps We would also lose the Global Positioning System. In the years since its inception, GPS has become ubiquitous, and a surprising number of systems have become reliant on it. “Apart from the fact that everyone has forgotten to navigate without GPS in their cars, many airplanes use GPS as well,” says McDowell. Though backup systems exist, airlines use GPS to chart the most fuel-efficient and expeditious routes. Without GPS and telecomm-sats, aircraft controllers would have tremendous difficulty communicating with and routing airplanes. Airlines would have to fall back to legacy systems and procedures. Given the sheer volume of airline traffic today, accidents would be all but guaranteed. Other affected navigation systems would include those aboard cargo vessels, supply-chain management systems, and transportation hubs driven by GPS. But GPS does more than just provide positioning — it also provides for timing. Ground-based atomic clocks can perform the same function, but GPS is increasingly being used to distribute the universal time standard via satellites. Within hours of a terminated service, any distributing networks requiring tight synchronization would start to suffer from “clock drift,” leading to serious performance issues and outright service outages. Such disruptions could affect everything from the power grid through to the financial sector. In the report, “[A Day Without Space: Economic and National Security Ramifications](http://marshall.org/wp-content/uploads/2013/08/Day-without-Space-Oct-16-2008.pdf),” Ed Morris, the Executive Director of the Office of Space Commerce at the Department of Commerce, writes: If you think it is hard to get work done when your internet connection goes out at the office, imagine losing that plus your cell [phone](https://io9.gizmodo.com/what-would-happen-if-all-our-satellites-were-suddenly-d-1709006681), TV, radio, ATM access, [credit cards](https://io9.gizmodo.com/what-would-happen-if-all-our-satellites-were-suddenly-d-1709006681), and possibly even your electricity. [...] Wireless services, especially those built to [CDMA standard](http://www.protocols.com/pbook/cellular.htm), would fail to hand off calls from one cell to the next, leading to dropped connections. Computer networks would experience slowdowns as data is pushed through finite pipelines at reduced bit rates. The same would be true for major networks for communication and entertainment, since they are all IP-based today and require ultra-precise timing to ensure digital traffic reaches its destination. The lack of effective synch would hit especially hard in banking, where the timing of transactions needs to be recorded. Credit card payments and bank accounts would likely freeze, as billions of dollars could be sucked away from businesses. A financial crash is not out of the question. The Loss of Military Capability The sudden loss of satellite capability would have a profound effect on the military. The Marshall Institute puts it this way: “Space is a critical enabler to all U.S. warfare domains,” including intelligence, navigation, communications, weather prediction, and warfare. McDowell describes satellite capability as as the “backbone” of the U.S. military. And as 21st century warfare expert [Peter W. Singer](http://www.pwsinger.com/biography.html) from [New America Foundation](https://www.newamerica.org/) tells io9, “He who controls the heavens will control what happens in the battles of Earth.” Singer summarized the military consequences of losing satellites in an email to us: Today there are some 1,100 active satellites which act as the nervous system of not just our economy, but also our military. Everything from communications to GPS to intelligence all depend on it. Potential foes have noticed, which is why Russia and China have recently begun testing a new generation of anti-satellite weapons, which in turn has sparked the U.S. military to recently budget $5 billion for various space warfare systems. What would happen if we lost access to space? Well, the battles would, as one U.S. military officer put it, take us back to the “pre digital age.” Our drones, our missiles, even our ground units wouldn’t be able to operate the way we plan. It would force a rewrite of all our assumptions of 21st century high tech war. We might have a new generation of stealthy battleships...but the loss of space would mean naval battles would in many ways be like the game of Battleship, where the two sides would struggle to even find each other. Moreover, and as McDowell explains to io9, the loss of satellite capability would have a profound effect on arms control capabilities. Space systems can monitor compliance; without them, we’d be running blind. “The overarching consideration is that you wouldn’t really know what’s going on,” says McDowell. “Satellites provide for both global and local views of what’s happening. We would be less connected, less informed — and with considerably degraded situational awareness.” Compromised Weather Prediction and Climate Science One great thing satellites have done for us is improve our ability to forecast weather. Predicting a slight chance of cloudiness is all well and good, but some areas, like India, Pakistan, and Bangladesh, are dependent on such systems to predict potentially hazardous monsoons. And in the U.S., the NOAA has estimated that, during a typical hurricane season, weather satellites save as much as $3 billion in lives and property damage. There’s also the effect on science to consider. Much of what we know about climate change comes from satellites. As McDowell explains, the first couple of weeks without satellites wouldn’t make much of a difference. But over a ten-year span, the lack of satellites would preclude our ability to understand and monitor such things as the ozone layer, carbon dioxide levels, and the distribution of polar ice. Ground-based and balloon-driven systems would help, but much of the data we’re currently tracking would suddenly become much spottier. “We’re quite dependent on satellites for a global view of what’s happening on our planet — and at a time when we really, really need to know what’s happening,” says McDowell. It’s also worth pointing out that, without satellites, we also wouldn’t be able to monitor space weather, such as incoming space storms. Time to Recover With all the satellites gone, both governmental and private interests would work feverishly to restore space-based capabilities. Depending on the nature of the satellite-destroying event, it could take decades or more to get ourselves back to current operational standards. It would take a particularly long time to recover from a Carrington Event, which would zap many ground-based electronic systems as well. The U.S. military is already thinking along these lines, which is why it’s working on the ability to quickly send up emergency assets, such as small satellites parked in Low Earth Orbit (LEO). Cube satellites are increasingly favored, as an easy-to-launch, affordable, and effective solution — albeit a short-term one. The U.S. Operationally Responsive State Office is currently working on the concept of emergency replenishment and the ability to “rapidly deploy capabilities that are good enough to satisfy warfighter needs across the entire spectrum of operations, from peacetime through conflict.” As for getting full-sized, geostationary satellites back into orbit, that would prove to be a greater challenge. It can take years to built a new satellite, which typically requires a big, costly rocket to get it into space. Lastly, if a Kessler Syndrome wipes out the satellites, that would present an entirely different recovery scenario. According to McDowell, it would take a minimum of 11 years for LEO to clear itself of the debris cloud; any objects below 500 km (310 miles) would eventually fall back to Earth. Thus, we would only be able to start re-seeding LEO in a little over a decade following a Kessler event. Unfortunately, the area above 600 km (372 miles) would remain out of touch for a practically indefinite period of time; objects orbiting at that height tend to stay there for a long, long time. We’d probably lose this band for good — unless we manually removed the debris field, using clean-up satellites or other techniques. It’s worth noting that a single Kessler event could hit the LEO zone or the GEO zone (geosynchronous orbit) but realistically not both; LEO debris could never reach GEO, and vice versa — though a spent rocket in GTO (geosynchronous transfer orbit) or SSTO (supersynchronous transfer orbit) passes through or near both zones and could potentially affect either of them. The spent rockets in GTO do not stay too close to the GEO arc for long due to orbital perturbations, so a GEO Kessler event is very unlikely to be triggered by one of them. Suffice to say, we should probably take the prospect of a Kessler Syndrome more seriously, and be aware of what could happen if we’re no longer able to use these spaces.

1. **Collapse is inevitable and growth causes existential disease and warming. Independently, national space militarization is inevitable.**

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Less than two decades into the twenty-first century, it is evident that **capitalism has failed** as a social system. The world is mired in economic stagnation, financialization, and the most extreme inequality in human history, accompanied by mass unemployment and underemployment, precariousness, poverty, hunger, wasted output and lives, and what at this point can only be called a planetary ecological **“death spiral.”**1 The digital revolution, the greatest technological advance of our time, has rapidly mutated from a promise of free communication and liberated production into new means of surveillance, control, and displacement of the working population. The institutions of liberal democracy **are at the point of collapse**, while fascism, the rear guard of the capitalist system, is again on the march, along with patriarchy, racism, imperialism, and war. To say that capitalism is a failed system is not, of course, to suggest that its breakdown and disintegration is imminent.2 It does, however, mean that it has passed from being a historically necessary and creative system at its inception to being a historically unnecessary and destructive one in the present century. Today, more than ever, the world is faced with the epochal choice between “the revolutionary reconstitution of society at large and the common ruin of the contending classes.”3 Indications of this failure of capitalism are everywhere. Stagnation of investment punctuated by bubbles of financial expansion, which then inevitably burst, now characterizes the so-called free market.4 Soaring inequality in income and wealth has its counterpart in the declining material circumstances of a majority of the population. Real wages for most workers in the United States have barely budged in forty years despite steadily rising productivity.5 Work intensity has increased, while work and safety protections on the job have been systematically jettisoned. Unemployment data has become more and more meaningless due to a new institutionalized underemployment in the form of contract labor in the gig economy.6 Unions have been reduced to mere shadows of their former glory as capitalism has asserted totalitarian control over workplaces. With the demise of Soviet-type societies, social democracy in Europe has perished in the new atmosphere of “liberated capitalism.”7 The capture of the surplus value produced by overexploited populations in the poorest regions of the world, via the global labor arbitrage instituted by multinational corporations, is leading to an unprecedented amassing of financial wealth at the center of the world economy and relative poverty in the periphery.8 Around $21 trillion of offshore funds are currently lodged in tax havens on islands mostly in the Caribbean, constituting “the fortified refuge of Big Finance.”9 Technologically driven monopolies resulting from the global-communications revolution, together with the rise to dominance of Wall Street-based financial capital geared to speculative asset creation, have further contributed to the riches of today’s “1 percent.” Forty-two billionaires now enjoy as much wealth as half the world’s population, while the three richest men in the United States—Jeff Bezos, Bill Gates, and Warren Buffett—have more wealth than half the U.S. population.10 In every region of the world, inequality has increased sharply in recent decades.11 The gap in per capita income and wealth between the richest and poorest nations, which has been the dominant trend for centuries, is rapidly widening once again.12 More than 60 percent of the world’s employed population, some **two billion people**, now work in the impoverished informal sector, forming a massive global proletariat. The global reserve army of labor is some 70 percent larger than the active labor army of formally employed workers.13 Adequate **health care**, **housing**, **education**, and **clean water** and **air** are increasingly out of reach for large sections of the population, even in wealthy countries in North America and Europe, while transportation is becoming more difficult in the United States and many other countries due to irrationally high levels of dependency on the automobile and disinvestment in public transportation. Urban structures are more and more characterized by **gentrification** and **segregation**, with cities becoming the playthings of the well-to-do while marginalized populations are shunted aside. About half a million people, most of them children, are homeless on any given night in the United States.14 New York City is experiencing a major rat infestation, attributed to warming temperatures, mirroring trends around the world.15 In the United States and other high-income countries, life expectancy is in decline, with a remarkable resurgence of Victorian illnesses related to poverty and exploitation. In Britain, gout, scarlet fever, whooping cough, and even scurvy are now resurgent, along with tuberculosis. With inadequate enforcement of work health and safety regulations, black lung disease has returned with a vengeance in U.S. coal country.16 Overuse of antibiotics, particularly by capitalist agribusiness, is leading to an **antibiotic-resistance crisis**, with the dangerous growth of superbugs generating increasing numbers of deaths, which by mid–century could surpass annual cancer deaths, prompting the World Health Organization to declare a “global health emergency.”17 These dire conditions, arising from the workings of the system, are consistent with what Frederick Engels, in the Condition of the Working Class in England, called “social murder.”18 At the instigation of giant corporations, philanthrocapitalist foundations, and neoliberal governments, public education has been restructured around corporate-designed testing based on the implementation of robotic common-core standards. This is generating massive databases on the student population, much of which are now being surreptitiously marketed and sold.19 The corporatization and privatization of education is feeding the progressive subordination of children’s needs to the cash nexus of the commodity market. We are thus seeing a dramatic return of Thomas Gradgrind’s and Mr. M’Choakumchild’s crass utilitarian philosophy dramatized in Charles Dickens’s Hard Times: “Facts are alone wanted in life” and “You are never to fancy.”20 Having been reduced to **intellectual dungeons**, many of the poorest, most racially segregated schools in the United States are mere **pipelines for prisons or the military.**21 More than two million people in the United States are behind bars, a higher rate of incarceration than any other country in the world, **constituting a new Jim Crow.** The total population in prison is nearly equal to the number of people in Houston, Texas, the fourth largest U.S. city. African Americans and Latinos make up 56 percent of those incarcerated, while constituting only about 32 percent of the U.S. population. Nearly 50 percent of American adults, and a much higher percentage among African Americans and Native Americans, have an immediate family member who has spent or is currently spending time behind bars. Both black men and Native American men in the United States are nearly three times, Hispanic men nearly two times, more likely to die of police shootings than white men.22 Racial divides are now widening across the entire planet. Violence against women and the expropriation of their unpaid labor, as well as the higher level of exploitation of their paid labor, are integral to the way in which power is organized in capitalist society—and how it seeks to divide rather than unify the population. More than a third of women worldwide have experienced physical/sexual violence. Women’s bodies, in particular, are objectified, reified, and commodified as part of the normal workings of monopoly-capitalist marketing.23 The mass media-propaganda system, part of the larger corporate matrix, is now merging into a social media-based propaganda system that is more porous and seemingly anarchic, but more universal and more than ever favoring money and power. Utilizing modern marketing and surveillance techniques, which now dominate all digital interactions, vested interests are able to tailor their messages, largely unchecked, to individuals and their social networks, creating concerns about “fake news” on all sides.24 Numerous business entities promising technological manipulation of voters in countries across the world have now surfaced, auctioning off their services to the highest bidders.25 The elimination of net neutrality in the United States means further concentration, centralization, and control over the entire Internet by monopolistic service providers. Elections are increasingly prey to unregulated “dark money” emanating from the coffers of corporations and the billionaire class. Although presenting itself as the world’s leading democracy, the United States, as Paul Baran and Paul Sweezy stated in Monopoly Capital in 1966, “is democratic in form and plutocratic in content.”26 In the Trump administration, following a long-established tradition, 72 percent of those appointed to the cabinet have come from the higher corporate echelons, while others have been drawn from the military.27 War, engineered by the United States and other major powers at the apex of the system, has become perpetual in strategic oil regions such as the Middle East, and threatens to escalate into a global thermonuclear exchange. During the Obama administration, the United States was engaged in wars/bombings in seven different countries—Afghanistan, Iraq, Syria, Libya, Yemen, Somalia, and Pakistan.28 Torture and assassinations have been reinstituted by Washington as acceptable instruments of war against those now innumerable individuals, group networks, and whole societies that are branded as terrorist. A new Cold War and nuclear arms race is in the making between the United States and Russia, while Washington is seeking to place road blocks to the continued rise of China. The Trump administration has created a new space force as a separate branch of the military in an attempt to ensure U.S. dominance in the militarization of space. Sounding the alarm on the increasing dangers of a nuclear war and of climate destabilization, the distinguished Bulletin of Atomic Scientists moved its doomsday clock in 2018 to two minutes to midnight, the closest since 1953, when it marked the advent of thermonuclear weapons.29 Increasingly severe economic sanctions are being imposed by the United States on countries like Venezuela and Nicaragua, despite their democratic elections—or because of them. Trade and currency wars are being actively promoted by core states, while racist barriers against immigration continue to be erected in Europe and the United States as some 60 million refugees and internally displaced peoples flee devastated environments. Migrant populations worldwide have risen to 250 million, with those residing in high-income countries constituting more than 14 percent of the populations of those countries, up from less than 10 percent in 2000. Meanwhile, ruling circles and wealthy countries seek to wall off islands of power and privilege from the mass of humanity, who are to be left to their fate.30 More than three-quarters of a billion people, over 10 percent of the world population, are chronically malnourished.31 Food stress in the United States keeps climbing, leading to the rapid growth of cheap dollar stores selling poor quality and toxic food. Around forty million Americans, representing one out of eight households, including nearly thirteen million children, are food insecure.32 Subsistence farmers are being pushed off their lands by agribusiness, private capital, and sovereign wealth funds in a global depeasantization process that constitutes the greatest movement of people in history.33 Urban overcrowding and poverty across much of the globe is so severe that one can now reasonably refer to a “planet of slums.”34 Meanwhile, the world housing market is estimated to be worth up to $163 trillion (as compared to the value of gold mined over all recorded history, estimated at $7.5 trillion).35 The Anthropocene epoch, first ushered in by the Great Acceleration of the world economy immediately after the Second World War, has generated enormous rifts in planetary boundaries, extending from **climate change** to **ocean acidification**, to the sixth extinction, to disruption of the global nitrogen and phosphorus cycles, to the loss of freshwater, to the disappearance of forests, to widespread toxic-chemical and radioactive pollution.36 It is now estimated that **60 percent of** the world’s **wildlife** vertebrate population (including mammals, reptiles, amphibians, birds, and fish) **have been wiped out** since 1970, while the worldwide abundance of invertebrates has declined by 45 percent in recent decades.37 What climatologist James Hansen calls the “species exterminations” resulting from accelerating climate change and rapidly shifting climate zones are only compounding this general process of biodiversity loss. Biologists expect that half of all species will be facing extinction by the end of the century.38 If present climate-change trends continue, the “global carbon budget” associated with a 2°C increase in average global temperature will be broken in sixteen years (while a 1.5°C increase in global average temperature—staying beneath which is the key to long-term stabilization of the climate—will be reached in a decade). Earth System scientists warn that the world is now perilously close to a **Hothouse Earth**, in which **catastrophic climate change will be locked in and irreversible**.39 The ecological, social, and economic costs to humanity of continuing to increase carbon emissions by 2.0 percent a year as in recent decades (rising in 2018 by 2.7 percent—3.4 percent in the United States), and failing to meet the minimal 3.0 percent annual reductions in emissions currently needed to avoid a catastrophic destabilization of the earth’s energy balance, are simply incalculable.40 Nevertheless, major energy corporations continue to lie about climate change, promoting and **bankrolling climate denialism**—while admitting the truth in their internal documents. These corporations are working to accelerate the extraction and production of fossil fuels, including the dirtiest, most greenhouse gas-generating varieties, reaping enormous profits in the process. The melting of the Arctic ice from global warming is seen by capital as a new El Dorado, opening up massive additional oil and gas reserves to be exploited without regard to the consequences for the earth’s climate. In response to scientific reports on climate change, Exxon Mobil declared that it intends to extract and sell all of the fossil-fuel reserves at its disposal.41 Energy corporations continue to intervene in climate negotiations to ensure that any agreements to limit carbon emissions are defanged. Capitalist countries across the board are putting the accumulation of wealth for a few above combatting climate destabilization, threatening the very future of humanity. Capitalism is best understood as a competitive class-based mode of production and exchange geared to the accumulation of capital through the exploitation of workers’ labor power and the private appropriation of surplus value (value generated beyond the costs of the workers’ own reproduction). The mode of economic accounting intrinsic to capitalism designates as a value-generating good or service anything that passes through the market and therefore produces income. It follows that the greater part of the social and environmental costs of production outside the market are excluded in this form of valuation and are treated as mere negative “externalities,” unrelated to the capitalist economy itself—whether in terms of the shortening and degradation of human life or the destruction of the natural environment. As environmental economist K. William Kapp stated, “capitalism must be regarded as an economy of unpaid costs.”42 We have now reached a point in the twenty-first century in which the externalities of this irrational system, such as the costs of war, the depletion of natural resources, the waste of human lives, and the disruption of the planetary environment, now far exceed any future economic benefits that capitalism offers to society as a whole. The accumulation of capital and the amassing of wealth are increasingly occurring at the expense of an irrevocable rift in the social and environmental conditions governing human life on earth.43

#### Growth is unsustainable AND causes extinction.

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As the previous chapters have shown, economic growth is regarded as a prime policy aim by policy makers and economists because it is thought to be essential for reducing poverty and generating rising living standards and stable levels of employment (Ben-Ami 2010: 19–20). More generally, support for economic growth is usually intertwined with advocating social progress based on scientific rationality and reason and hence with an optimistic view of humans’ ingenuity to solve problems (ibid.: 17, 20, Chap. 5). Growth criticism thus tends to be portrayed as anti-progress and inherently conservative (ibid.: Chap. 8). While it is important to acknowledge and discuss this view, it needs to be emphasised that growth criticism is formulated with long-term human welfare in mind which advocates alternative types of social progress (Barry 1998). This chapter first outlines ecological and social strands of growth critiques and then introduces relevant concepts of and positions within the postgrowth debate. Ecological Critiques of G rowth Generally speaking, two types of growth criticism can be distinguished: the first focuses on limitations of GDP as a measure of economic performance; the second goes beyond this by highlighting the inappropriateness of growth as the ultimate goal of economic activity and its negative implications for environment and society. Since GDP measures the monetary value of all final goods and services in an economy, it excludes the environmental costs generated by production. For instance, as long as there is no cost associated with emitting greenhouse gases , the cost for the environmental and social damage following from this is not reflected in GDP figures. Worse even, GDP increases as a consequence of some types of environmental damage: if deforestation and timber trade increase or if natural disasters or industrial accidents require expenditures for clean-up and reconstruction, GDP figures will rise (Douthwaite 1999: 18; Leipert 1986). Several critics of GDP as a measure of progress have proposed alternative indicators of welfare such as the Genuine Progress Indicator, Green GDPs or other approaches which factor in environmental costs (see Chap. 5 for more details), but they do not necessarily object to economic growth being the primary goal of economic activity (van den Bergh 2011). In contrast, the idea of ecological limits to growth goes beyond the critique of GDP as a measure of economic performance. Instead, it maintains that economic growth should not, and probably cannot, be the main goal of economic activity because it requires increasing resource inputs, some of which are non-renewable, and generates wastes, including greenhouse gases, that disturb various ecosystems, severely threatening human and planetary functioning in the short and long term. 4 CRITIQUES OF GROWTH 41 Resources are regarded as non-renewable if they cannot be naturally replaced at the rate of consumption (Daly and Farley 2011: 75–76). Examples include fossil fuels, earth minerals and metals, and some nuclear materials like uranium (Daly and Farley 2011: 77; Meadows et al. 2004: 87–107). Based on work by Georgescu-Roegen (1971), many ecological economists also assume that non-renewable resources cannot be fully recycled because they become degraded in the process of economic activity. Historically speaking, economic growth is a fairly recent phenomenon (Fig. 2.1). Since its onset in the late seventeenth century in Europe and mid-eighteenth century in the US (Gordon 2012), it has gone hand in hand with an exponentially increasing use of non-renewable resources such as fossil fuels (Fig. 4.1). While we are not yet close to running out of non-renewable resources, over time they will become more difficult and hence more expensive to recover. This idea is captured by the concept of “energy returned on energy invested” (EROEI). In relation to oil for instance, it has been shown that the easily recoverable fields have been targeted first and that therefore greater energy (and hence financial) inputs will be required to produce more oil. Over time, the ratio of energy returned on energy invested will decrease, reducing the financial incentive to invest further in the recovery of these non-renewable resources (Dale et al. 2011; Brandt et al. 2015: 2). Relevant to this is also the debate about peak oil—a concept coined by Shell Oil geologist Marion King Hubbert in the 1950s—the point at which the rate of global conventional oil production reaches its maximum which is expected to take place roughly once half of global oil reserves have been produced. There is still controversy about whether global peak oil will occur, and if so when, as it is difficult to predict, or get reliable data on, the rate at which alternative types of energy will replace oil (if this was to happen fast enough, peak oil might not be reached, if it has not yet occurred), the size of remaining oil reserves and the future efficiency of oil extraction technologies (Chapman 2014). However, it is plausible to assume that oil prices will rise in the long term if conventional oil availability diminishes, while global demand for oil increases with continuing economic and population growth. Since economic growth in the second half of the twentieth century required increasing inputs of conventional oil, higher oil prices would have a negative impact on growth unless alternative technologies are developed that can generate equivalent liquid fuels at lower prices (Murphy and Hall 2011). Some scholars have criticised the focus on physical/energy resource limitations as initially highlighted in the “limits to growth” debate (Meadows et al. 1972) and state that instead catastrophic climate change is likely to be a more serious and immanent threat to humanity (Schwartzman 2012). The main arguments here are first that much uncertainty remains about the potential and timing of peak oil, future availability of other fossil fuels and development of alternative low energy resources, while the impacts of climate change are already immanent and may accelerate within the very near future. Second, even if peaks in fossil fuel production occurred in the near future, remaining resources could still be exploited to their maximum. However, this would be devastating from a climate change perspective as, according to the latest IPCC scenarios, greenhouse gas emissions need to turn net-zero by the second half of this century for there to be a good chance to limit global warming to 2° Celsius (and ideally, below that) (Anderson and Peters 2016). It is telling that some of the more recent debates about ecological limits to growth put much more emphasis on environmental impacts of growth, rather than on peak oil or other resource limitations (Dietz and O’Neill 2013). Differently put, limits of sinks, especially to absorb greenhouse gases, and to the regeneration of vital ecosystems are now attracting greater concern, compared to limits of resources. Growing economic production generates increasing pressures on the environment due to pollution of air, water and soil, the destruction of natural habitats and landscapes, for instance, through deforestation and the extraction of natural resources. Therefore, growth often also threatens the regeneration of renewable resources such as healthy soil, freshwater and forests, as well as the functioning of vital ecosystems and ecosystems services such as the purification of air and water, water absorption and storage and the related mitigation of droughts and floods, decomposition and detoxification and absorption of wastes, pollination and pest control (Meadows et al. 2004: 83–84). Recent research on planetary boundaries has started to identify thresholds of environmental pollution or disturbance of a range of ecosystems services beyond which the functioning of human life on earth will be put at risk. Rockström and colleagues have identified nine such “planetary boundaries”—“climate change; rate of biodiversity loss (terrestrial and marine); interference with the nitrogen and phosphorus cycles; stratospheric ozone depletion; ocean acidification; global freshwater use; change in land use; chemical pollution; and atmospheric aerosol loading” (Rockström et al. 2009: 472). They also present evidence according to which three of these boundaries—climate change, rate of biodiversity loss and the nitrogen cycle—have already reached their limits (Rockström et al. 2009). Of those three thresholds, climate change has received most attention. The 5th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC 2014) concluded that global temperatures have risen by an average of 0.85° since the 1880s (while local temperature increases can be much higher than that) and that the concentration of greenhouse gases in the atmosphere has reached unprecedented levels over the last 800,000 years—that of CO2 has now reached 405.6 parts per million (NASA, January 2017, Fig. 4.2), far surpassing the level of 350 ppm which is considered safe by many scientists (Rockström et al. 2009). The IPCC report also maintained that humans very likely contributed to at least 50% of global warming that occurred since the 1950s (IPCC 2014: 5). A range of climate change impacts can already be observed, including a 26% increase of ocean acidification since industrialisation; shrinking of glaciers, Greenland and Antarctic ice sheets, as well as arctic sea ice; and the rise of sea levels of 19 cm since 1901. This is projected to increase by an additional 82 cm by the end of this century at current levels of greenhouse gas emissions (ibid.: 13). Climate change impacts are already felt with increased occurrences of heat waves, heavy rain fall, increased risk of flooding and impacts on food and water security in a number of regions around the world. It is projected that with a rise of 2° of global temperatures, 280 million people worldwide (with greatest numbers in China, India and Bangladesh) would be affected by sea level rise, escalating to a projected 627 million people under a 4° scenario (Strauss et al. 2015: 10). At the 21st Conference of Parties of the United Nations Framework Convention on Climate Change in Paris in 2015, representatives agreed that action should be taken to limit rise of global temperatures to 2° and Fig. 4.2 Concentration of CO2 in the atmosphere. Source NASA, available from https://climate.nasa.gov/vital-signs/carbon-dioxide/. The CO2 levels have been reconstructed from measures of trapped air in polar cap ice cores 4 CRITIQUES OF GROWTH 45 to “pursue efforts” to limit it to 1.5°. This has been adopted by 196 countries, but immense efforts and very radical reductions of greenhouse gas emissions will be required to comply with the agreement. Even if net greenhouse gas emissions were reduced to zero, surface temperatures would remain constant at their increased levels for hundreds of years to come and climate change impacts such as ocean acidification and rising sea levels would continue for hundreds or even thousands of years once global temperatures are stabilised; moreover, a range of climate change impacts are deemed irreversible (IPCC 2014: 16). One controversial question in the debate about economic growth and environmental impacts has been whether growth can be decoupled from the damage it causes. Important to this debate is the theory of the Environmental Kuznets Curve which applies Simon Kuznets’ hypothesised inverted u-shaped relationship between economic development and income inequality to the relationship between economic development and environmental degradation. According to this theory, environmental degradation is low in the early phases of economic development, then rises with increasing development up to a certain point, beyond which it falls again with advancing development because more resources can be invested to render production and consumption more efficient and less polluting. Therefore, this theory suggests that it is possible to decouple economic growth (measured in GDP) from its environmental implications. The counter-argument to this theory is that it does not take into account the difference between relative and absolute decoupling. Relative decoupling refers to the environmental impacts generated over time per unit of economic output, for instance CO2 emissions per million of US$. In contrast, absolute decoupling would examine aggregate environmental impact, compared to total economic output over time. Here it has been argued that while relative decoupling may be possible as the environmental impact per unit of economic output decreases over time due to efficiency gains, absolute decoupling is much harder to achieve while growth continues. Indeed, there is no evidence for absolute decoupling as total environmental impacts, for instance total global CO2 emissions, are still rising with rising global GDP (Jackson 2011: 67–86). This is partly due to rebound effects which we discussed in Chap. 2: rising consumption because the increase in efficiency has made it cheaper to produce/consume (Jackson 2011: 67–86; see also Czech 2013: Chap. 8 criticising “green growth”). Furthermore, if decoupling is examined at the country level, one would need to take consumptionbased resource use/emissions into account rather than productionbased impacts. Substantial environmental impacts related to everything that is consumed in rich countries occur in developing countries from which goods are imported. A focus on production-based environmental impacts would hence be misleading as it ignores the [and] environmental impacts that relate to a country’s living standards and that occur outside of that country. Social Critiques of Growth Economic growth has not only been criticised from an ecological perspective, but also from an individual and social wellbeing point of view. Here, we can again distinguish a critique of GDP as a measure of wellbeing and a wider critique which highlights potential negative consequences of economic growth for human wellbeing. Several scholars have argued that GDP is an inadequate measure of prosperity or wellbeing because it only includes market transactions and ignores activities of the informal economy in households and the volunteering sector which make an important contribution to individual and social wellbeing (Stiglitz et al. 2011; van den Bergh 2009; Jackson 2011). It also excludes the contribution of certain government services that are provided for free (Douthwaite 1999: 14; Stiglitz et al. 2011: 23), and the roles of capital stocks and of leisure in generating welfare (Costanza et al. 2015: 137). Furthermore, all market transactions make a positive contribution to GDP, regardless of whether expenditures increase or decrease welfare. Similar to the way in which environmental costs of growth are either excluded from GDP or even increase it, expenditures that arise from road accidents, divorces, crime, etc., contribute positively to GDP (ibid.: 133). The focus on market transactions also means that an increasing marketisation (or “commodification”) of an economy will be reflected in a rise of GDP, which may or may not be related to actual “welfare” outcomes (Stiglitz et al. 2011: 49). It also implies that GDP is an insufficient cross-national comparator for the quality of life, as it does not take into account the different sizes of the informal economy across countries (ibid.: 15). Furthermore, GDP does not indicate how income and consumption are distributed in society (Stiglitz et al. 2011: 44). This implies that a rise of GDP can be consistent with a rise of inequality of income and wealth. 4 CRITIQUES OF GROWTH 47 However, if greater inequality has negative impacts on social wellbeing (Wilkinson and Pickett 2009), this would be masked by rising GDP figures (Douthwaite 1999: 17). An even more fundamental criticism of GDP as a measure of wellbeing is that it focuses on the accumulation of money or wealth and thus on the material aspects of wellbeing. Such a narrow conception of the goals of economic activity and wellbeing has been criticised early on in the history of economic thought, e.g. by Aristotle’s distinction between oikonomia and chrematistics. The latter refers to the accumulation of wealth and was regarded by him as an “unnatural” activity which did not contribute to the generation of use value and wellbeing (Cruz et al. 2009: 2021). The argument that wider conceptions of wellbeing and prosperity are required has also become relevant for contemporary critiques of economic growth (Jackson 2011; Paech 2013; Schneider et al. 2010) as we will discuss this in more detail in Chap. 5. Arguments About the Psychological and S ocial Costs of G rowth The broader social critique of economic growth highlights potential “social limits” to or even negative consequences of economic growth for individual and collective wellbeing. The term “social limits to growth” was coined by Fred Hirsch (1976). He argued that the benefits of growth are initially exclusive to small elites and that these benefits disappear as soon as they spread more widely through mass consumption. For instance, only few people can own a Rembrandt painting; holiday destinations are more enjoyable when they are not overrun by hordes of other tourists; there are only few leadership positions, etc. From this perspective, there are “social limits” to the extent to which the benefits of growth can be socially expanded and equally shared. Other scholars have expressed concern about individual and collective social costs of economic growth. First, there is the argument that the need to keep up with ever-rising living standards and new consumer habits, “keeping up with the Joneses”—a lot of which is seen to be driven by advertisement and social pressure rather than real needs, for instance fashionable clothing or gadgets—can generate stress and increase the occurrence of mental disorders (James 2007; Offer 2006; Kasser 2002). 48 M. BÜCHS AND M. KOCH Second, it has been argued that economic growth can imply wider social costs. For instance, with its emphasis on individual gain, market relations and competition, and the need that it generates for spatial mobility (e.g. for successful participation in education and labour markets), it is feared to undermine moral and social capital and put a strain on family and community relations, potentially even leading to increasing divorce and crime rates (Douthwaite 1999; Daly and Cobb 1989: 50–51; Hirsch 1976). Social costs of technological development and industrialisation also include industrial workplace and traffic accidents and time lost in traffic jams and for commuting (Czech 2013: Chap. 2; Stiglitz et al. 2011: 24). Technological innovation which arises from growth can also act as a factor for job losses and increasing job insecurity (Douthwaite 1999), especially if growth rates are not sufficiently high to compensate gains in productivity. It is often assumed that growth will benefit the many because of assumed “trickle-down” effects which promise to improve the lot of the poor simply because the “cake” of available wealth is growing. While progress has been made in reducing extreme global poverty and inequality (Sala-i-Martin 2006; Rougoor and van Marrewijk 2015), the number of people living in poverty across the globe remains high.1 At the same time, income inequality in a range of countries has been rising and the situation of many of the people living in extreme poverty is not improving which means the fruits of economic growth remain to be unequally distributed (Collier 2007; Piketty and Saez 2014). The post-development debate goes even further than that in arguing that not only may growth not have reached the global poor to the extent that had been predicted by neoclassical economists, but that it can also have negative impacts on indigenous communities in developing countries, especially those who rely on local natural resources for their livelihoods which often suffer exploitation, pollution or even destruction through the inclusion of local economies into global value chains (Rahnema and Bawtree 1997). While the distinction between critiques of growth that focus on its problematic ecological and social consequences is useful for analytic purposes, the two dimensions are of course closely linked. Ecological consequences of growth have the potential to severely impact or even undermine human wellbeing. Local livelihoods are already affected by current climate change impacts such as ocean acidification and its impact on marine organisms, draughts, floods and severe weather events, the 4 CRITIQUES OF GROWTH 49 frequency of which has been rising. Accordingly, it is estimated that crop and fish yields are already diminishing in several regions (Stern 2015; IPCC 2014) and that millions of people are already being displaced and forced to migrate due to climate change and other environmental impacts (Black et al. 2011). While the overall long-term impacts of climate change and the surpassing of other planetary boundaries are difficult to predict, they clearly have the potential to substantially undermine human wellbeing. Since greenhouse gas emissions are driven by economic growth, the development of alternative economic models that do not depend on growth is urgent since continued growth “threatens to alter the ability of the Earth to support life” (Daly and Farley 2011: 12

#### Economic crisis sparks widespread movements towards localized sustainability.

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In time, this pressure is likely to shift from submitting requests to the state to making demands on it, and then to taking increasing control of it. There will be increasing insistence that frivolous industries must be phased out so that scarce resources can be devoted to meeting fundamental town and regional needs. Meanwhile towns will be driven by necessity to bypass the center and take initiatives such as setting up their own farms, energy supplies and factories, thus transferring various functions out of the control of the centre. There will be increasing recognition that the local is the only level where the right decisions for self-sufficient communities can be made. In time, these shifts will lead to the transfer of functions and power from state-level agencies to the local level, leaving the center with relatively few tasks, and mainly with the role of facilitating local activities. This radical restructuring could conceivably be a smooth and peaceful process, driven by a general recognition that scarcity is making local self-governing communities the only viable option. If this happens then in effect, Stage 1 will be recognized as having constituted the revolution, essentially a cultural phenomenon, and the macroscopic structural changes in Stage 2 will be seen as a consequence of the revolution. Thus a case for Anarchist theory and practice It will be evident that the alternative social organization sketched above is a fairly common Anarchist vision (although there are also varieties that are not being advocated). The argument is that settlements enabling a high quality of life for all, despite very low resource use rates, must involve all members in thoroughly participatory deliberations regarding the design, development and running of their local productive, political and social systems. Their ethos must be non-hierarchical, cooperative and collectivist, seeking to avoid all forms of domination and to prioritize the public good. They must draw on the voluntary good will and energy of conscientious citizens who are ready to contribute generously and to identify and deal with problems informally and spontaneously, and to focus on seeking mutually beneficial arrangements with little if any need for industrial infrastructures and transport networks, bureaucracy, paid officials or politicians. Regional and wider issues will be tackled by the characteristic Anarchist mechanisms of federations and (powerless) delegates bringing recommendations back down to town meetings. The principle of 'subsidiarity' is evident in the practice of grass-roots politics, the avoidance of hierarchies, and the central role of town assemblies. The very low resource costs sustainability requires are achievable because of the proximity, diversity of functions and integration, the familiarity enabling informal communication and spontaneous action, and the elimination of many processes (e.g., transport, waste dumping, fertilizer production, packaging). In the 1930s the Spanish Anarchists in the Barcelona region showed what could be done by ordinary workers and citizens. An impressive current example is the Catalan Integral Cooperative movement (Dafermos 2017; TSW 2015a). Thousands work in hundreds of different cooperatives providing hundreds of thousands of dollars worth of food, goods and services, including unemployment and other welfare services. They operate more than twenty food 'pantries' largely via voluntary labor, handling more than a thousand products. Their goal is to build an alternative society focused on meeting needs, with no involvement of the state or market principles. Many eco-villages operate according to Anarchist principles, achieving high levels of sustainability (again see Lockyer 2017 and Grinde et al. 2018). In addition it will be evident that the discussion of transition strategy also follows Anarchist principles, especially in the notion of 'prefiguring' the new here and now within the old, not depending on the centre let alone a vanguard party, and recognizing the importance of ideas and values. The advent of GFC 2 Unfortunately the foregoing transition sequence is likely to be greatly disrupted and possibly thwarted a global financial crisis of much greater magnitude than the 2008 event. It is widely recognized that the much higher levels of debt are likely to bring on at least a serious recession, and probably worse in the next few years. The global economy is heavily dependent on petroleum supply, which is been kept up by 'fracking', but this has only been made possible by enormous debt; none of the major companies in the arena has ever made a profit. Several analysts have pointed out that the price levels necessary to make the new sources of petroleum profitable now seem to be above those necessary to enable economies to function normally. In addition, Ahmed (2017) has argued persuasively that the rapidly worsening population, food, water and ecological conditions affecting Middle Eastern petroleum suppliers are increasing their chances of becoming failed states. Meanwhile the proportion of their petroleum production they must use internally is increasing, adding to the possibility that their capacity to export will dry up within a decade. These and other deteriorating resource and ecological conditions (especially falling Energy Return on Energy Invested rates) are likely to trigger serious global economic disruption long before localist initiatives have been well enough established. Yet it is very unlikely that the kind of transition envisaged could begin unless there is major breakdown in the existing consumer-capitalist system. As long as it keeps the supermarket shelves stocked, discontent is likely to be muted, and focused on demands for more jobs and higher incomes rather than system replacement. The Goldilocks outcome would seem to be an economic depression that falls short of catastrophic breakdown, but is serious enough to convince large numbers that the system is not going to provide for them. The challenge to the Left This analysis has especially important implications for those who are radically critical of consumercapitalist society. Firstly it is evident that the revolution required to solve the problem is far bigger than that which Marx envisaged. Merely getting rid of capitalism will not suffice. Secondly, the most promising frontier now for such critics is the challenge to current society being set by unsustainable resource and ecological impacts. Latouche said the limits to growth are giving critical theory its last chance (2012: 75). Yet the foregoing argument has been that this opportunity has hardly been recognized, let alone taken up. Bookchin saw this some time ago. "The New Left, like the old left, has never grasped the revolutionary potential of the ecological issues, nor has it used ecology as a basis for understanding the problems of communist reconstruction and utopia" (1973: 242). Significant and increasing numbers of ordinary people are seriously concerned about these issues and are thinking more or less in the general direction of replacing consumer-capitalism with localism and simpler ways. These themes are likely to be the most effective foundations for critical social theory and practice now. But unfortunately the Left has a deeply entrenched reluctance to embrace these ideas. The traditional assumption has been that when power has been taken from the capitalist class, the contradictions preventing full application of the productive forces will be removed and technical advance will lift all to material wealth. Socialism is distinctly not conceived today in terms of frugality or localism. Indeed some socialists embrace 'ecomodernist' ideas, notably Phillips (2014) and Sharzer (2012), who explicitly spurn the suggestion that local or simpler ways are necessary or desirable. David Harvey represents the many Marxists who reject localism both as a goal and as a revolutionary strategy in favor of the typical socialist focus on action at the state level (Harvey 2017). For a critique, see Springer (2017). The Marxist position fails to address current circumstances, where the goal must be to contradict individualistic competitive affluence and must focus on citizen involvement in local economies. Major change at the central or state level cannot be achieved before a profound cultural revolution has been achieved, and this is most likely to occur via developments at the local level. Delusion and denial: the inability to respond There are difficult and puzzling issues for social theorists that will not be taken up in this article. They are the psychological and institutional reasons for the failure to deal adequately with the limits to growth predicament, or with its major sub-problems such as the looming petroleum supply, debt, and climate change crises. The core phenomenon to be explained here would seem to be failure to even recognize the existence and/or seriousness of the problems, rather than lack of appropriate remedial action. The essential causal factor is surely that if the limits to growth analysis is accepted then perhaps the most deeply entrenched post-Enlightenment assumption has to be jettisoned, i.e., the taken-for-granted conviction that progress and the good life are defined by capacity to produce and consume more and more material wealth. The suggestion that the supreme social goal should be materially simple lifestyles and systems, with no prospect of rising to greater affluence over time, would seem to be about as distasteful and unthinkable to workers and the lumpenproletariat as to the super-affluent 1%. 6. Conclusions: a reorientation of social theory The argument is that the advent of the limits to growth issue should be seen as requiring a major shift in the focal concerns of social theorists, especially those interested in critical perspectives on contemporary society and in sustainability and utopian themes. To begin with, a limits perspective involves a commitment to an inescapable logic that leads to quite specific conclusions regarding desirable social forms and how they might be achieved. If the limits are as severe as has been argued, then the goal must be transition from consumer-capitalist society to a general form that involves far lower resource use, and this has to mean mostly small-scale local economies that are self-governing, basically cooperative and committed to materially frugal lifestyles. If this is so, then the transition is essentially a cultural problem, and it is difficult to imagine how these ways could be established other than through a slow grass-roots process whereby ordinary people increasingly coerced by scarcity and economic deterioration take on the restructuring of their own suburbs, towns and regions (Alexander and Gleeson 2019). A major implication drawn above is that centralized agencies, especially the state, cannot drive these changes through.

### 1NC – Turn - Debris

#### Debris creates existential deterrence by raising the bar for conflict – international norms fail

Miller 7/31 [(Gregory, Chair of the Department of Space Power at the Air Command and Staff College, Ph.D. in Political Science from The Ohio State University) “Deterrence by Debris: The Downside to Cleaning up Space,” Space Policy, 7/31/2021] JL

The danger of kinetic strikes increasing orbital debris is a common theme in the literature, but the positive deterrent effects of some debris are often overlooked. The debris resulting from destroyed satellites, or other space objects, creates a deterrent effect on actors who might otherwise violate international norms and strike at objects in space, either to test their capabilities or as an act of hostilities. This is not deterrence in the traditional sense, of one actor publicly threatening punishment in response to another actor’s unwanted actions. It is not deterrence by denial since the attacker is not damaged and may even achieve its objective. Nor is it deterrence by punishment because the debris itself does not threaten to punish the attacker’s country. But debris can increase the future costs to the aggressor, even if their initial attack succeeds, and thus it has a similar restraining effect on certain behavior. Like the automated response of the U.S. tripwire in West Germany, the threat that debris can pose to state interests acts as a form of deterrence, at least to prevent some actors from taking certain types of actions. Removing the danger of debris will weaken that restraint and thus weaken deterrence, making ASAT tests and hostile actions in space more likely.

Several factors may deter a state from launching kinetic tests or striking against an adversary’s interests in space. For one thing, if a state’s adversary has similar capabilities to destroy objects in space, deterrence would be a function of not wanting to escalate tensions. Although international law only explicitly prohibits states from placing weapons of mass destruction in orbit, international space law, like the Outer Space Treaty [30], does provide a framework for addressing the activities of one state that lead to the damage of another state’s property. Likewise, there are international norms (informal but expected rules of behavior) against the weaponization of space. But these norms seem to be in decline [31], and such norms only deter a state from engaging in certain types of behavior if the state cares about following norms, if it cares about how states perceive its behavior, or if it believes other states are willing to enforce the norms. The beauty of debris as a deterrent is that it does not rely on the enforcement of norms or the credibility of states to succeed.

#### Space debris creates existential deterrence and a taboo

Bowen 18 [(Bleddyn, lecturer in International Relations at the University of Leicester) “The Art of Space Deterrence,” European Leadership Network, February 20, 2018, https://www.europeanleadershipnetwork.org/commentary/the-art-of-space-deterrence/] TDI

Fourth, the ubiquity of space infrastructure and the fragility of the space environment may create a degree of existential deterrence. As space is so useful to modern economies and military forces, a large-scale disruption of space infrastructure may be so intuitively escalatory to decision-makers that there may be a natural caution against a wholesale assault on a state’s entire space capabilities because the consequences of doing so approach the mentalities of total war, or nuclear responses if a society begins tearing itself apart because of the collapse of optimised energy grids and just-in-time supply chains. In addition, the problem of space debris and the political-legal hurdles to conducting debris clean-up operations mean that even a handful of explosive events in space can render a region of Earth orbit unusable for everyone. This could caution a country like China from excessive kinetic intercept missions because its own military and economy is increasingly reliant on outer space, but perhaps not a country like North Korea which does not rely on space. The usefulness, sensitivity, and fragility of space may have some existential deterrent effect. China’s catastrophic anti-satellite weapons test in 2007 is a valuable lesson for all on the potentially devastating effect of kinetic warfare in orbit.

#### No miscalc – debris hits stations all the time.

Cain ’15 (Fraser; 12/23/15; writer for Universe Today; “How Do Astronauts Avoid Debris”; http://www.universetoday.com/121067/how-do-astronauts-avoid-debris)

So, just how do we keep our space stations, ships and astronauts from being riddled with holes from all of the space junk in orbit around Earth? We revel in the terror grab bag of all the magical ways to get snuffed in space. Almost as much as we celebrate the giant brass backbones of the people who travel there. We’ve already talked about all the scary ways that astronauts can die in space. My personal recurring “Hail Mary full of grace, please don’t let me die in space” nightmare is orbital debris. We’re talking about a vast collection of spent rockets, dead satellites, flotsam, jetsam, lagan and derelict. It’s not a short list. NASA figures there are **21,000 bits of junk** bigger than 10 cm, **500,000 particles** between 1 and 10 cm, and more than **100 million** smaller than 1 cm. Sound familiar, humans? This is our high tech, sci fi great Pacific garbage patch. Sure, a tiny rivet or piece of scrap foil doesn’t sound very dangerous, but consider the fact that astronauts are orbiting the Earth at a velocity of about 28,000 km/h. And the Tang packets, uneaten dehydrated ice cream, and astronaut poops are also traveling at 28,000 km/h. Then think about what happens when they collide. Yikes… or yuck. Here’s the International Space Station’s solar array. See that tiny hole? Embiggen and clarinosticate! That’s a tiny puncture hole made in the array by a piece of orbital crap. The whole station is **pummeled by tiny pieces of space program junk drawer contents**. Back when the Space Shuttle was flying, NASA had to **constantly replace their windows because of the damage they were experiencing** from the orbital equivalent of Dennis the Menace hurling paint chips, fingernail clippings, and frozen scabs.

### 1NC – Turn – Water

#### SSA causes Water shortages – Westwood is yellow

Loper 19 [Dr. Robert D. Loper, Ph.D. from the Air Force Institute of Technology, Assistant Professor of Space Physics, Spring 2019. “Carrington-class Events as a Great Filter for Electronic Civilizations in the Drake Equation.” Publications of the Astronomical Society of the Pacific. https://iopscience.iop.org/article/10.1088/1538-3873/ab028e/meta]

Eastwood et al. (2017), the National Academy of Sciences (2008), and the Royal Academy of Engineering (2013) outline the potential economic impacts of severe space weather. In particular, major direct impacts from a Carrington-class CME could be outlined as including the following. 1. Power grid failure due to destruction of large transformers by geomagnetically induced currents. The large transformers in question here generally cost about $1 million per unit and require about 18 months to manufacture, ship, and install. The National Academy of Sciences (2008) report estimates such a power grid failure would cost $1–2 trillion per year6 and last four to ten years. 2. Outages or failures of LEO (low Earth orbit) space assets due to enhancement of the inner Van Allen belt. A severe solar storm can also cause ionospheric uplift which can dramatically increase satellite drag (Tsurutani et al. 2012). Additionally, LEO spacecraft operation could be disrupted by solar energetic protons (SEPs) generated in the shock of the CME passage through the solar wind (Royal Academy of Engineering 2013). 3. Outages or failures of GEO (geosynchronous equatorial orbit) space assets due to enhancement of the outer Van Allen belt or due to SEPs generated in the shock of the CME passage (Royal Academy of Engineering 2013). 4. GPS outages due to GEO spacecraft outages or failures, or GPS degradation due to ionospheric uplift and enhancement, potentially lasting several days or longer. 5. Communications outages due to high-frequency and ultrahigh-frequency radio blackouts, as well as cellular communication network and internet collapse due to extended power outages beyond the limits of generators and stored fuel. In particular, although optical ﬁber cables are the foundation of much of the global communication network, electrical power is still needed to power optical repeaters and transmitters (Royal Academy of Engineering 2013). 6. Increased radiation doses to astronauts and airline passengers (Royal Academy of Engineering 2013). This is more of a risk for long-haul airline ﬂights or manned spaceﬂight. Major indirect effects could include, but are by no means limited to, the following: 1. water and waste water shortages due to reduced or eliminated pumping from power grid failure; 2. fuel shortages due to reduced or eliminated pumping from power grid failure, which could result in transportation stoppages; 3. food shortages due to transportation stoppages, which could contribute to increased death rates and incite rioting and/or looting; 4. reduced hospital care due to water shortages and power outages, which could contribute to increased death rates and rates of infection; and 5. a years-long power grid and internet degradation or outage might irrevocably damage the global economy, in turn greatly prolonging the time to restore the power grid beyond the estimate of four to ten years. If one recalls major disasters caused by terrestrial weather events like hurricanes Katrina (New Orleans, 2005) and Maria (Puerto Rico, 2017), one can imagine the sorts of major effects on people and life in those areas. The most striking difference is that, whereas humanitarian aid came to bear on these disasters, a Carrington-class event would be a global catastrophe with little or no aid forthcoming. Much greater loss of life could result, and our civilization could be driven back to a much more fractured and pre-electronic one. For the purposes of another planet’s Drake equation, our civilization would be eliminated from the calculation. Conversely, another planet whose electronic civilization were struck by a Carrington-class CME would be eliminated from our calculation. Riley (2012) estimates the probability of another Carringtonclass event occuring within the following decade at about 12%. This estimate preceded the solar storm of 2012, but a good rule of thumb would be to estimate this to be the probability of having a Carrington event during any given solar cycle. Love (2012) and Kataoka (2013) have calculated probabilities in rough agreement, but there are a wide range of probabilities in the literature, ranging from once per 60 years (Tsubouchi & Omura 2007) to once per 500 years (Yermolaev et al. 2018). This work will retain the result of Riley (2012), which is also used in National Academy of Sciences (2008) and Royal Academy of Engineering (2013). This roughly agrees with the “once in a century” designation usually given to the Carrington event. Royal Academy of Engineering (2013) indicates that this designator is not well understood given the relative lack of data, but also that there are several tens of Carrington-class CMEs every century that either miss Earth or have lesser impact due to a northward orientation of the interplanetary magnetic ﬁeld. As shown in Figure 1, such a CME has a very wide angular extent (in the 2012 July event, the CME extended in about a 135° arc from the Sun), which could strike Earth in three out of eight occurrences. There is also some indication that a solar storm could trigger other Great Filter events. Knipp et al. (2016) outlines a solar storm in 1967 May that nearly triggered a nuclear war, as American radar operators initially mistook a solar storm for Soviet jamming. It might also be possible that a Carrington-class event could unleash or exascerbate an infectious disease due to reduced hospital care at a critical time, resulting in a pandemic.

#### Resource conflict is inevitable from population and economic shifts--- scarcity creates cooperation that defuses conflict broadly

Dr. Thomas Bernauer 20, Professor of Political Science and Director of the Institute of Science, Technology and Policy (ISTP) at ETH Zurich, and Dr. Tobias Böhmelt, Professor of Government at the University of Essex, “International Conflict and Cooperation Over Freshwater Resources”, Nature Sustainability, Volume 3, https://www.nature.com/articles/s41893-020-0479-8

Unsustainable use of freshwater resources worldwide creates enormous challenges for human societies populating these natural systems, and these challenges are likely to grow with climate change. Will societies respond with increased cooperation to manage freshwater resources more sustainably or will there be more conflict over this scarce but vital resource? This review of research on conflict and cooperation over transboundary freshwater resources shows that, thus far, the prevailing response is cooperation, albeit non-violent conflict is quite frequent, too. It also documents substantial progress in understanding the drivers of water-related cooperation and conflict. Key knowledge gaps remain, particularly with respect to transboundary water conflict and cooperation in the past 10 to 15 years and in terms of local water-related events. The key prerequisite for filling these gaps is that the research community engages in a joint effort to address persistent shortcomings in existing event datasets on water cooperation and conflict.

Main

Scientific and policy debates over human impacts on global freshwater resources have been intensifying, particularly in the context of growing concerns about the implications of climate change for already stressed freshwater systems1,2,3. Climate change is likely to lead to greater variability and, in some places, an overall decrease of available freshwater, while human water use is likely to increase. The latter is driven primarily by population and economic growth as well as more consumption of goods with a high water footprint4. Projections such as these have led some scholars and policymakers to expect an increasing risk of conflicts, including violent ones, over scarce freshwater resources. Others, objecting to this Neo-Malthusian predicament, are more optimistic in view of humanity’s potential for social and technological innovation. While such expectations about the future are marked by great uncertainty, empirical research can help us understand whether and under what conditions human and climate-induced water scarcity has led to conflict or cooperative problem solving.

Human impacts on freshwater systems are well understood from a geophysical and biological perspective5,6,7,8,9,10. Much less is known about the implications of these impacts for the wellbeing of human societies relying on them. For example, controversy surrounds whether and how higher freshwater-related stress, resulting from overconsumption (water demand) or from climate-related variability and scarcity (water supply), might affect people, and how societies will respond and perform in terms of adaptive capacity and resilience. Potential effects of increased water stress on human security range from higher poverty and social instability to human migration and violent conflict within and between nations11,12,13,14.

Research on freshwater conflict and cooperation to mitigate and adapt to water problems has contributed in important ways to scientific and policy debates over the past two decades. Scholars have developed concepts and approaches to measure conflict and cooperation and to systematically assess their drivers. The most important literature in this field focuses on international freshwater catchments, on global comparisons of such catchments, and conflict and cooperation amongst riparian countries15,16,17,18,19,20. International river basins are defined by either a common water flow destination, or water flowing year-round across boundaries21. There currently are around 310 international river basins that are shared by 150 countries. They cover 47% of the world’s land surface and are home to 52% of the world’s population15. In this Review, we assess what we can learn from research on international freshwater conflict and cooperation, where our understanding remains limited, and how we can overcome existing gaps22.

Most studies on freshwater conflict and cooperation focus on individual international freshwater catchments and on policy options for dealing with the respective local challenges (for example, the Brahmaputra23, Indus24 or La Plata25 river basins). Complementing case-specific studies, we focus this Review on more general, global answers to several key questions: how prevalent are water conflict and cooperation in international freshwater catchments globally? Which catchments are more prone to water conflict or cooperation, and under what circumstances do we observe more conflict or cooperation? What conditions make catchments and their riparian countries more resilient to water-related stress and what role does international cooperation play here? Together with insights on specific freshwater catchments, answers to these questions contribute to a comprehensive assessment of anthropogenic impacts, adaptation and vulnerability with respect to global freshwater resources, and also to more informed policy choices.

Why focus on international water basins?

Freshwater-related conflict and cooperation can, in principle, be studied at any geographic, hydrological or social scale, for example, from small social groups such as a village to the water-catchment level as a hydrological unit. Climate change may be more likely to lead to local or sub-national than to international conflicts and there is an urgent need to concentrate more strongly on those as well. However, most scientific progress so far has been made on international freshwater conflict and cooperation, and we focus on this research for two additional reasons. The first reason is analytical. Generalizable conclusions about conflict and cooperation over freshwater resources should be based on a systematic comparison of a large number of clearly defined and homogeneous units, ideally for a known population. These conditions are met for countries and international freshwater catchments, all of which can be systematically identified and characterized, based on hydrological, political and other data. Such identification is more difficult for other units of analysis, such as social or ethnic groups, villages, cities and subsystems of water catchments. This also explains why the literature on freshwater conflict and cooperation at sub-national scales remains less developed (for exceptions, see refs. 18,26,27).

Second, because international freshwater catchments extend beyond national jurisdictions and their policy-making structures, effective policy responses to water stress require international collective action. In contrast to domestic water problems, which in principle can be addressed through interventions by a single government, problem-solving approaches among countries in international freshwater catchments are more complex and potentially more prone to failure15,19,20,28.

Characterizing freshwater catchments

A large literature focuses on individual cases and provides valuable insights into how water stress may lead to cooperative or conflictive outcomes, for example, via differences in how international negotiations and river management institutions are designed29,30,31,32,33,34,35,36,37. The main limitation of this research is that cooperation and conflict are empirically identified and measured differently, and explanations of particular outcomes are case-specific and based mostly on qualitative interpretation of evidence. This makes it difficult to generate generalizable conclusions about international freshwater cooperation and conflict, such as global development over time, spatial and temporal drivers, and which freshwater systems are at particular risk.

Quantitative research on conflict and cooperation in international river basins has made substantial progress over the past two decades. This applies in particular to generating better empirical data on the characteristics of international freshwater catchments and a widely accepted approach to measuring levels of cooperation and conflict. With regard to the characteristics of international freshwater catchments, based on geographic information systems and geophysical, political and other data, researchers have characterized the global landscape of international freshwater catchments. Generating this information is challenging, particularly because of technical difficulties in delineating, with high spatial resolution, the geophysical boundaries of freshwater catchments and the (sometimes time-varying) political boundaries of countries15,20,38.

One example for why increased spatial resolution is important concerns a popular hypothesis in the international water management literature. It holds that river settings with an upstream–downstream political geography are more prone to conflict. In such settings, the upstream country is likely to have an incentive to exploit its position in ways to impose damages on the downstream state (for example, reduced river flow). However, identifying where any given country in a catchment is located relative to other states is far from trivial, particularly in complex river geographies. Available data and methods now allow us to capture country and catchment boundaries with adequate precision. This also facilitates determining which countries in a catchment are more upstream or downstream, and how two or more states relate to each other in terms of freshwater dependencies15. We can thus use these measures to assess, for instance, whether upstream–downstream asymmetries between countries in freshwater catchments are, all else equal, associated with more water conflict and less cooperation.

To capture hydro-political dependence among riparian states, Beck et al.16, for example, employ a flow accumulation matrix that was created for each international river basin. They calculate the number of cells draining into a given country and determine the dependence of each riparian country on the other countries within a basin16. A flow interdependence matrix then indicates the flow contribution to each of the riparian countries. Based on these new data, they show that, contrary to conventional wisdom, there is no robust evidence for the claim that upstream–downstream catchments suffer from more water conflict than catchments with less pronounced upstream–downstream asymmetries.

Quantifying water conflict and cooperation

Generating accurate data on international freshwater conflict and cooperation is associated with a variety of challenges. In contrast to geophysical phenomena, social or political ones are usually not directly observable, but must be inferred from secondary sources. That said, most scholars now agree on what water-related cooperation and conflict means at the conceptual level, what procedures should be used to assess information from particular sources to generate numerical scores from this information, and how to structure such data for meaningful analysis14,20,39. In line with common practice in conflict research, conflict and cooperation are viewed as a social interaction that involves at least two actors. Hence, freshwater catchments with more than two countries are disaggregated into country pairs (for example, three country pairs, or dyads, in a catchment with three riparians).

Three main approaches capture conflict and/or cooperation over international freshwater catchments. First, conflict can be measured by means of widely available data on armed conflict40 and/or so-called militarized interstate disputes41. These outcomes are then combined with explanatory variables characterizing freshwater systems. Using this approach, various studies have examined whether water scarcity could, all else equal, increase the probability of armed hostilities between countries42. Second, cooperation over international freshwater resources can be operationalized via international water agreements, treaties, or joint river basin management approaches, among other variables along those lines43,44,45,46,47,48. For example, Giordano et al.47 identify 688 agreements signed between 1820 and 2007 that constitute 250 independent treaties and apply to 113 basins. Third, research coding event data for both conflict and cooperation builds on data collection approaches used in the study of international relations and conflict between countries (for example, the WEIS49 coding project or, more recently, the CAMEO50 framework and the Open Event Data Alliance51). Such coding is based on content analysis of global news media reporting, available from digital archives of translated reports, such as BBC Monitoring52 or Factiva53. Research teams have extracted large amounts of text material from these sources, using search algorithms that seek to strike a balance between capturing relevant reports and avoiding too many irrelevant items38. Human coders then identified water-related events and scored these on scales ranging from conflict to cooperation.

Studies based on the first approach, that is, those explaining armed conflict or militarized disputes in terms of water stress, have produced inconclusive findings15,16,41. Even if there is evidence for some water-related influence, other determinants of armed conflict actually play a much more important role than water stress. For example, Beck et al.16 or Bernauer and Böhmelt17 report a stronger impact of factors like income or population, which are indeed among the most robust predictors in ‘traditional’ armed-conflict models54. This finding mirrors the literature on climate change and political violence. Besides, this literature has three limitations. First, it focuses on identifying a possible correlation (all else equal) between water stress and conflict, but cannot tell us whether conflict, if observed, was directly water-related. This raises questions about the causal influence of water stress. Second, armed conflict is an extreme, and rare, form of social interactions. Concentrating on this disregards other types of conflictive interactions that water stress may induce. In fact, the basins-at-risk (BAR) scale discussed below demonstrates that non-violent conflict events are far more prevalent than violent ones. Third, this literature does not tell us much about the flip-side of conflict, that is, the conditions under which water stress may induce cooperative efforts and motivate societies to unleash their adaptive capacities11,13,27,41. The works on transboundary water cooperation42,43,44,45,46,47 address the latter point to some extent, but many of these studies focus on binary classifications of treaty formation. However, the overall degree of cooperation and eventual success cannot be comprehensively captured by a dichotomous item on whether states concluded a treaty on a transboundary water resource or not.

The main limitations of event-data coding, which we consider the most promising approach, pertain to the quality of the text material and the human-coding process. Media reporting in richer countries with free media is more likely to pick up events of interest and report on them with accuracy. This means, for instance, that conflictive events, relative to cooperative ones, might be underreported in authoritarian political systems. While this problem is not trivial, it is usually mitigated because at least the more important events (because of scale and intensity) tend to be covered by several media sources, including those in neighbouring countries or the international press. One alternative is to scrape the Internet or use social-media data, such as data from Twitter. But such information suffers from biases, too, because governments and other actors can manipulate Internet access and post wrong or misleading information. In addition, there are no information platforms that would offer consistent information for events-data coding in one or a few languages—the latter is needed to make the task manageable for a small- to medium-size research team (there are around 6,500 spoken languages in the world).

Another challenge is that in extracting and characterizing events from media text material, humans can make mistakes (for example, overlook certain information) or subjective assessments. Agreed definitions of key concepts and detailed coding instructions, scales and procedures have helped to reduce subjectivity and error. While the obvious next step would be to use automated (computerized) coding approaches, the material from which to code freshwater conflict and cooperation is more heterogeneous than for other applications, such as central bank statements, consumer sentiment or political party programs. Moreover, machine-learning algorithms may also be biased due to the data they are trained on. In sum, while some challenges remain and the data generated on freshwater conflict and cooperation are not perfect, they are probably as good in quality as the most commonly used social-sciences data, such as economic growth, democracy, poverty and so on.

Event-data coding of transboundary water conflict and cooperation is arguably the most widely used approach and has generated numerical information on freshwater-related events between pairs of countries in a given international catchment over time38. The BAR55,56,57 scale is one of the most prominent measures here: it ranges between –7 (maximum conflict) and +7 (maximum cooperation) and captures the degree of conflict and cooperation over international freshwater catchments between 1948 and 2008. Other datasets include the International River Basin Conflict and Cooperation (IRCC) data38 and the Issue Correlates of War − River Claims dataset56. Evidently, one shortcoming of the BAR data is that the most recent year covered is 2008. While we can still learn a lot from analysing data for 50 years, including information on the more recent past remains highly desirable from a policy perspective and in the scholarly interest.

Figure 1 illustrates the distribution of cooperation and conflict events across all freshwater catchments and countries, using median values of conflict and cooperation per year from 1948–2008. Perhaps surprisingly, states’ interaction over freshwater catchments is generally, that is, on global average of all catchments and countries in a given year, characterized by more cooperation than conflict. For the majority of years from 1948–2008, the median values of the BAR scale are well above 0, indicating that cooperation was more prevalent than conflict. From a policy perspective, it is interesting to pinpoint those catchments that experience most conflict or cooperation: hence, disaggregating the BAR scale by catchment.

Chart

Description automatically generated with medium confidence

The graph depicts three median splines across the BAR scale’s observation period for all possible BAR values, only cooperative (positive) ones, and only conflictive (negative) ones. The graph is based on data from www.transboundarywaters.science.oregonstate.edu.

Understanding the spatial and temporal distribution of international freshwater conflict and cooperation, in a descriptive sense, is important in its own right. However, it is also imperative to understand the drivers of variation in conflict and cooperation. Why do some catchments and/or pairs of countries in those catchments experience more conflict? Why is cooperation more prevalent in other cases?

Predictors of water cooperation and conflict

Accurate characterizations of international freshwater catchments and precise data on water conflict and cooperation are a precondition for meaningful analysis of drivers of water conflict and cooperation. Such analysis views conflict and cooperation as the outcomes to be explained and focuses both on conflict and cooperation at varying levels of intensity (for example, from conflictual verbal exchanges to violent conflict over water). Such research is obviously also of interest to practitioners because they are interested in which particular factors induce conflict or cooperation to identify risks and opportunities for cooperative solutions. Studies of factors associated with, or that cause variation in, the outcome variable (for example, the outbreak of armed conflict, the emergence of a water treaty, or values on the BAR scale) are based on a range of statistics, from correlational analysis to estimating the predictive power of specific determinants. In the following, we discuss the most common and robust predictors of transboundary water conflict and cooperation55,58,59.

#### Shortages force a shift to sustainable agriculture

Ann Hayden 21, Senior Director of Western Water and Resilient Landscapes at the Environmental Defense Fund, Emmy Cattani, Fifth-Generation Member of Cattani Farms, “Silver Lining to Water Woes Could Be Farmers Putting Their Lands To New Uses Besides Crops”, Fresno Bee, 4/21/2021, https://www.fresnobee.com/opinion/readers-opinion/article250540959.html

The Central Valley has reached a critical juncture.

On one path, without proactive, collaborative planning, the Valley could become a haphazard patchwork of dusty fields infested with invasive weeds and pests, further impairing already poor air quality, devastating the agricultural economy and putting many farmworkers out of work.

On another path, the Valley can remain a thriving agricultural region amid a mosaic of new land uses, like vibrant habitat corridors for the endangered San Joaquin kit fox or wildlife-friendly groundwater recharge areas for migratory birds or outdoor recreational green spaces for families.

A bill that on Thursday unanimously passed out of the Assembly Committee on Water, Parks and Wildlife can help move the Valley down this second, more resilient path.

Introduced by Assemblymembers Robert Rivas (D-Hollister) and Rudy Salas (D-Bakersfield), AB 252 will help ease the Valley’s transition to sustainable groundwater use and open the door to exciting new opportunities.

In 2014, the Legislature passed the historic Sustainable Groundwater Management Act, the most sweeping change to California water law in a century. Commonly referred to as SGMA (pronounced “sigma”), this law was passed to address decades of groundwater overpumping, which caused significant impacts. During the last drought, overpumping caused land to sink and damaged roads and canals, dried up community drinking water wells, and de-watered wetlands.

The implementation of SGMA is critically important to build long-term water sustainability for the Central Valley and will require a variety of tools and approaches to succeed.

One unfortunate reality of adjusting to increased water scarcity is that a significant amount of the state’s irrigated agricultural land — potentially the size of Yosemite National Park — will need to shift to less water-intensive agriculture or be taken out of production over the next couple decades. This will undoubtedly be challenging and will be exacerbated by more frequent droughts — like what we’re now experiencing — that will put additional strain on limited water supplies.

AB 252 will create the Multi-benefit Land Repurposing Incentive Program to compensate farmers who voluntarily re-purpose some of their previously irrigated land to create new uses that Valley communities need and want. Benefits could include water sustainability, habitat corridors for wildlife, and open space and recreational areas. Importantly, this program can also provide incentives to landowners to make the changes necessary to comply with SGMA sooner and in a way that minimizes economic and social impacts.

#### Industrial ag collapses insect populations---extinction

Dr. Liz Kimbrough 21, Ph.D. in Ecology and Evolutionary Biology from Tulane University, BS in Botany from Humboldt State University, Journalist at Monga Bay, “Are Major Insect Losses Imperiling Life on Earth?”, Monga Bay, 1/28/2021, https://india.mongabay.com/2021/01/are-major-insect-losses-imperiling-life-on-earth/

* New studies assessing insect declines around the planet find that on average, the decline in insect abundance, seen on nearly every continent, is thought to be around 1-2% per year or 10-20% per decade.
* Precipitous insect declines are being escalated by humanity as soaring population and advanced technology push us closer to overshooting several critical planetary boundaries including biodiversity, climate change, nitrification, and pollution.
* Action on a large scale (international, national, and public/private policymaking), and on a small scale (replacing lawns with insect-friendly habitat, for example) are desperately needed to curb and reverse insect decline.

Chances are, the works of the world’s insects touch your lips every day. The coffee or tea you savor, both are pollinated by insects. Apples, oranges, cabbages, cashews, cherries, carrots, broccoli, watermelon, garlic, cinnamon, basil, sunflower seeds, almonds, canola oil — all are insect-pollinated. Honey, dyes, even some vaccines require insects to come to fruition.

Vital to the world’s food web, nested in nutrient cycling, and embedded in industries — the closer we look, the more we see insects as vital to maintaining life’s frameworks. Referring to this fact, famed biologist E.O. Wilson wrote in 1987, “[I]f invertebrates were to disappear, I doubt the human species could last more than a few months.”

Which is why the precipitous decline of insects is raising alarms.

Insect populations are being reduced at varying rates across space and time, but on average, the decline in their abundance is thought to be around 1-2% per year, or 10-20% per decade.

“Think of a landowner with a million-dollar house on a river that’s a little bit wild. And they’re losing 10% to 20% of their land every decade, and it’s horrifying. It means that after even a century, you really don’t have anything left,” David Wagner, an entomologist with the University of Connecticut told Mongabay in an interview. That, he says of this comparison, is the danger we now face.

Wagner has just edited a newly released in-depth feature in the Proceedings of the National Academy of Science, Global Decline of Insects in the Anthropocene, in which 56 researchers present scientific studies, opinions and news on insect declines. The journal offers perspectives on the ecological, taxonomic, geographical and sociological dimensions of insect declines, along with suggestions on how we move forward to study and reverse this drain on global biodiversity.

Insect “death by a thousand cuts”

In a perspective piece that leads off the special issue, Wagner and his co-authors address the likely causes of insect decline. The main stressors to insects, they write, are changes in land use (particularly deforestation), agriculture, climate change, nitrification, pollution and introduced species. However, the importance of each stressor and how they interact still puzzles scientists.

“There are so many good scientists that can’t figure out what the cause is,” Wagner said. He poses the well-known honeybee as an example. “I mean, this thing is worth billions upon billions of dollars and we don’t know why it’s having such a hard time. And I think the reason is, it’s death by a thousand cuts… most of these things are hit by four or five pretty important stressors, and they’re acting synergistically.”

The articles that follow that opening essay zero in on the key causes for some of the biggest known losses:

A study by Wagner and Peter Raven, president emeritus of the Missouri Botanical Garden, concludes that declines in insect biodiversity and biomass are linked to the intensification of agriculture over the past 50 years.

Research by Dan Janzen and Winnie Hallwachs — both biologists from the University of Pennsylvania who describe themselves as “intense observers of caterpillars, their parasites, and their associates” — focuses on climate change as a stressor. Since the late 1970s, they write, they’ve watched as insect declines came to the dry forests, cloud forests, and rainforests of Costa Rica’s Guanacaste Conservation Area, as the region was plagued by rising temperatures, increasingly erratic seasons and inconsistent rainfall.

Another study in the special feature, titled, Insects and recent climate change, argues that climate may be playing even more of a role in declines than land-use change — which is massive around the planet mostly due to agribusiness expansion. The authors base their climate findings on a Northern California butterflies case study, where declines were severe even in areas suffering little habitat loss. Similar losses within well-protected areas have been detected in Germany and Puerto Rico.

Likewise, butterfly populations in Europe face challenges. In the UK, butterfly numbers have declined by around 50% over the past 50 years, with 8% of known resident species considered extinct. In the Netherlands, upwards of 20% of species have been lost and in Belgium 29%. Researchers suggest habitat loss, habitat degradation and chemical pollution as the primary causes. The authors offer conservation solutions and recommend policy changes to conserve butterflies and other insects — but so far political will has been lacking.

Moving from the winged creatures of the day to night fliers, Wagner and colleagues give an overview of the global state of moth declines. Moths are extremely diverse and cosmopolitan. “For every butterfly that Mongabay readers see during the daytime, there are 19 species of moths flying around at night,” Wagner revealed.

Although moth numbers have declined in some areas, such as in parts of Europe and Central America, in other, mostly temperate areas, many moth taxa are increasing in abundance. Another study found that the overall abundance of arthropods in the Arctic has increased in recent years. Researchers attribute these increases in insect abundance to climate change, which scientists say has both its species winners and losers. As warmer temperatures march northward, new suitable habitats open up for insects. The consequences of this range expansion — and the conflicts which may occur with plant and insect species already occupying those ranges — have yet to be analysed.

Insect declines are emblematic of a larger problem: the earth is in the midst of what some call the “sixth mass extinction.” Birds, amphibians, freshwater mussels, large mammals, all have seen dwindling numbers. The question for entomologists, Wagner said, is whether or not the decline of insects is actually occurring faster than for some other groups, especially because insects are often the direct target of destruction by human, due to pesticide and herbicide use.

Sarah Cornell, a scientist at the Stockholm Resilience Centre (SRC), raises an insect-related question relevant to our time: “There might have been many more mass extinctions. It’s just that we only see extinctions with the things that leave a record… things with skeletons… When people [say], ‘we’re entering the sixth mass extinction.’ Okay, well, how do we know that? We might be entering the 17th?… We might make ourselves extinct before we even reach these hallowed glories of the sixth.”

Overshooting planetary boundaries

Clearly, the loss of insect abundance — depending on where and how fast it occurs — could have far more dire, unforeseen impacts than the loss of coffee or cashews. The wholesale transformation of global ecosystems, triggering mass insect declines, could be pushing the Earth past what scientists have dubbed as a “planetary boundary.”

## If time - T

#### Interpretation: “private entities” excludes governments

UpCounsel n.d. [(UpCounsel, interactive online service that makes it faster and easier for businesses to find and hire legal help solely based on their preferences) “Private Entity: Everything You Need to Know”] JL

A private entity can be a partnership, corporation, individual, nonprofit organization, company, or any other organized group that is not government-affiliated. Indian tribes and foreign public entities are not considered private entities.

#### Violations:

#### The aff requires bans governments from alienating resources for non-publicly justified purposes – 1AC Babcock

The PTD offers both an approach for managing an open access commons and a gap-filling tool until a regulatory regime is adopted.507 The doctrine is based on the idea that the “sovereign holds certain common properties in trust in perpetuity for the free and unimpeded use of the general public.”508 The public’s right to access and use trust resources is never lost, and neither the government nor private individuals can alienate or otherwise adversely affect those resources unless for a comparable public purpose.509 The resources the doctrine protects “have long been part of a ‘taxonomy of property’ [that recognizes] the division of natural wealth into private and public property.”510

#### Vote negative for limits – their interpretation justifies affs banning any government from appropriating space – that skirts the core topic controversy of what private entities specifically should do and kills uniqueness because national appropriation is already prohibited – unlimited topics incentivize obscure affs that negs won’t have prep on – limits are key to reciprocal prep burden

#### – extra T creates a slippery slope that incentivizes Frankenstein affs with infinite additional planks to circumvent neg links