# 1NC vs Marlborough WR

### 1NC - AT: Debris

#### No debris cascades, but even a worst case is confined to low LEO with no impact

Daniel Von Fange 17. Web Application Engineer, Founder and Owner of LeanCoder, Full Stack, Polyglot Web Developer, “Kessler Syndrome is Over Hyped”, 5/21/2017, http://braino.org/essays/kessler\_syndrome\_is\_over\_hyped/

Kessler Syndrome is overhyped. A chorus of online commenters great any news of upcoming low earth orbit satellites with worry that humanity will to lose access to space. I now think they are wrong. What is Kessler Syndrome? Here’s the popular view on Kessler Syndrome. Every once in a while, a piece of junk in space hits a satellite. This single impact destroys the satellite, and breaks off several thousand additional pieces. These new pieces now fly around space looking for other satellites to hit, and so exponentially multiply themselves over time, like a nuclear reaction, until a sphere of man-made debris surrounds the earth, and humanity no longer has access to space nor the benefits of satellites. It is a dark picture. Is Kessler Syndrome likely to happen? I had to stop everything and spend an afternoon doing back-of-the-napkin math to know how big the threat is. To estimate, we need to know where the stuff in space is, how much mass is there, and how long it would take to deorbit. The orbital area around earth can be broken down into four regions. Low LEO - Up to about 400km. Things that orbit here burn up in the earth’s atmosphere quickly - between a few months to two years. The space station operates at the high end of this range. It loses about a kilometer of altitude a month and if not pushed higher every few months, would soon burn up. For all practical purposes, Low LEO doesn’t matter for Kessler Syndrome. If Low LEO was ever full of space junk, we’d just wait a year and a half, and the problem would be over. High LEO - 400km to 2000km. This where most heavy satellites and most space junk orbits. The air is thin enough here that satellites only go down slowly, and they have a much farther distance to fall. It can take 50 years for stuff here to get down. This is where Kessler Syndrome could be an issue. Mid Orbit - GPS satellites and other navigation satellites travel here in lonely, long lives. The volume of space is so huge, and the number of satellites so few, that we don’t need to worry about Kessler here. GEO - If you put a satellite far enough out from earth, the speed that the satellite travels around the earth will match the speed of the surface of the earth rotating under it. From the ground, the satellite will appear to hang motionless. Usually the geostationary orbit is used by big weather satellites and big TV broadcasting satellites. (This apparent motionlessness is why satellite TV dishes can be mounted pointing in a fixed direction. You can find approximate south just by looking around at the dishes in your northern hemisphere neighborhood.) For Kessler purposes, GEO orbit is roughly a ring 384,400 km around. However, all the satellites here are moving the same direction at the same speed - debris doesn’t get free velocity from the speed of the satellites. Also, it’s quite expensive to get a satellite here, and so there aren’t many, only about one satellite per 1000km of the ring. Kessler is not a problem here. How bad could Kessler Syndrome in High LEO be? Let’s imagine a worst case scenario. An evil alien intelligence chops up everything in High LEO, turning it into 1cm cubes of death orbiting at 1000km, spread as evenly across the surface of this sphere as orbital mechanics would allow. Is humanity cut off from space? I’m guessing the world has launched about 10,000 tons of satellites total. For guessing purposes, I’ll assume 2,500 tons of satellites and junk currently in High LEO. If satellites are made of aluminum, with a density of 2.70 g/cm3, then that’s 839,985,870 1cm cubes. A sphere for an orbit of 1,000km has a surface area of 682,752,000 square KM. So there would be one cube of junk per .81 square KM. If a rocket traveled through that, its odds of hitting that cube are tiny - less than 1 in 10,000. So even in the worst case, we don’t lose access to space. Now though you can travel through the debris, you couldn’t keep a satellite alive for long in this orbit of death. Kessler Syndrome at its worst just prevents us from putting satellites in certain orbits. In real life, there’s a lot of factors that make Kessler syndrome even less of a problem than our worst case though experiment. Debris would be spread over a volume of space, not a single orbital surface, making collisions orders of magnitudes less likely. Most impact debris will have a slower orbital velocity than either of its original pieces - this makes it deorbit much sooner. Any collision will create large and small objects. Small objects are much more affected by atmospheric drag and deorbit faster, even in a few months from high LEO. Larger objects can be tracked by earth based radar and avoided. The planned big new constellations are not in High LEO, but in Low LEO for faster communications with the earth. They aren’t an issue for Kessler. Most importantly, all new satellite launches since the 1990’s are required to include a plan to get rid of the satellite at the end of its useful life (usually by deorbiting) So the realistic worst case is that insurance premiums on satellites go up a bit. Given the current trend toward much smaller, cheaper micro satellites, this wouldn’t even have a huge effect. I’m removing Kessler Syndrome from my list of things to worry about.

#### No collisions---takes centuries and mitigation checks.

Hugh Lewis 15. Senior Lecturer in Aerospace Engineering at the University of Southampton, “Space debris, Kessler Syndrome, and the unreasonable expectation of certainty.” Room, <https://room.eu.com/article/Space_debris_Kessler_Syndrome_and_the_unreasonable_expectation_of_certainty>

There is now widespread awareness of the space debris problem amongst policymakers, scientists, engineers and the public. Thanks to pivotal work by J.C. Liou and Nicholas Johnson in 2006 we now understand that the continued growth of the debris population is likely in the future even if all launch activity is halted. The reason for this sustained growth, and for the concern of many satellite operators who are forced to act to protect their assets, are collisions that are expected to occur between objects – satellites and rocket stages – already in orbit. In spite of several commentators warning that these collisions are just the start of a collision cascade that will render access to low Earth orbit all but impossible – a process commonly referred to as the ‘Kessler Syndrome’ after the debris scientist Donald Kessler – the reality is not likely to be on the scale of these predictions or the events depicted in the film Gravity. Indeed, results presented by the Inter-Agency Space Debris Coordination Committee (IADC) at the Sixth European Conference on Space Debris show an expected increase in the debris population of only 30% after 200 years with continued launch activity. Collisions are still predicted to occur, but this is far from the catastrophic scenario feared by some. Constraining the population increase to a modest level can be achieved, the IADC suggested, through widespread and good compliance with existing space debris mitigation guidelines, especially those relating to passivation (whereby all sources of stored energy on a satellite are depleted at the end of its mission) and post-mission disposal, such as de-orbiting the satellite or re-orbiting it to a graveyard orbit. Nevertheless, the anticipated growth of the debris population in spite of these robust efforts merits the investigation of additional measures to address the debris threat, according to the IADC.

### --- AT: Wood 20

#### Wood’s claim is not reverse causal and the satellites causing the problem are already in-orbit and non-operational --- Haven reads green.

Therese **Wood, 20** - ("Who owns our orbit: Just how many satellites are there in space?," World Economic Forum, 10-23-2020, 12-8-2021, https://www.weforum.org/agenda/2020/10/visualizing-easrth-satellites-sapce-spacex)//AW

There are nearly 6,000 satellites circling the Earth, but only 40% are operational. Satellites are a vital part of our infrastructure, helping us to use GPS, access the internet and support studies of the Earth. Out of the 2,666 operational satellites circling the globe in April 2020, 1,007 were for communication services. 446 are used for observing the Earth and 97 for navigation/ GPS purposes. Over half of satellites in space are non-operational. For centuries, humans have looked to space and the stars for answers. The fascination is more than philosophical—it’s coupled with the need to solve problems here on Earth. Today, there are seemingly countless benefits and applications of space technology. Satellites, for instance, are becoming critical for everything from internet connectivity and precision agriculture, to border security and archaeological study. Right now, there are nearly 6,000 satellites circling our tiny planet. About 60% of those are defunct satellites—space junk—and roughly 40% are operational. As highlighted in the chart above, The Union of Concerned Scientists (UCS), determined that 2,666 operational satellites circled the globe in April of 2020. Over the coming decade, it’s estimated by Euroconsult that 990 satellites will be launched every year. This means that by 2028, there could be 15,000 satellites in orbit. Nearly 10,000 satellites will be launched form 2019-2028. Image: Visual Capitalist With SpaceX’s planned Starlink constellation of 12,000 satellites and Amazon’s proposed constellation in the works, the new space race continues its acceleration. Let’s take a closer look at who operates those satellites and how they apply their technology. Technology with a purpose Humans have long used space for navigation. While sailors once relied on the stars, today we use satellites for GPS, navigation, and various other applications. More than half of Earth’s operational satellites are launched for commercial purposes. About 61% of those provide communications, including everything from satellite TV and Internet of Things (IoT) connectivity to global internet. Over 1,000 satellites are for communication purposes. Image: Visual Capitalist Second to communications, 27% of commercial satellites have been launched for Earth Observation (EO) purposes, including environmental monitoring and border security. Commercial satellites, however, can serve multiple purposes. One week, a satellite may be ‘tasked’ to image a contested border. It could later be tasked to monitor the reclamation of a mining site or even the aftermath of a natural disaster. 54% of operational satellites are for commercial use. Image: Visual Capitalist Government and civil purposes make up 21% of all of Earth’s operational satellites, and military purposes come in at 13%. Who owns Earth’s orbit? Space operators SpaceX—founded by Elon Musk—is not only a disruptive launch provider for missions to the International Space Station (saving NASA millions). It’s also the largest commercial operator of satellites on the planet. With 358 satellites launched as of April, part of SpaceX’s mission is to boost navigation capabilities and supply the world with space-based internet. While the company operated 22% of the world’s operational satellites as of April, it went on to launch an additional 175 satellites in the span of one month, from August to September 2020.

#### And says the vast-majority are state owned even if they’re for commercial purposes --- Haven finishes the article.

Therese **Wood, 20** - ("Who owns our orbit: Just how many satellites are there in space?," World Economic Forum, 10-23-2020, 12-8-2021, https://www.weforum.org/agenda/2020/10/visualizing-easrth-satellites-sapce-spacex)//AW

Nations that dominate Earth’s orbit It may be no surprise that the United States, China, and Russia top the list of countries with operational satellites. The U.S. and Russia (then the USSR) piloted the space race throughout the 1950s and 1960s. Both nations are found in the top three of current satellite operators, with the U.S. operating nearly half of all satellites—1,308 as of April 2020. China trails the U.S. with approximately 356 satellites. Taking third spot, Russia has 167 satellites in operation, and the UK comes in at a close fourth with 130 satellites. Space satellites orbit Earth U.S. UK Russia China China owns 356 operational satellites. Image: Visual Capitalist Collectively, the above five countries operate roughly 76% of the world’s satellites. The new space race Where the original space race was a nationalistic competition between Cold War rivals, the new space race is collaborative and commercialized. Today, international cooperation allows for the deployment of satellites, as well as space-based science. Before SpaceX, NASA and the other space agencies that operate the International Space Station had been reliant on Russian Soyuz rockets for hundreds of missions. With the success of its famed reusable rockets, SpaceX is on track to reduce launch costs by as much as US$6 million per flight—which is likely to support the proliferation of satellites in the coming years. With improved technology and commercial partnerships, all signs point to a crowded orbit.

### --- AT: Munoz-Patchen 19

#### Tipping points are thumped, no one follows the guidelines, and new space-faring nations are an alt cause --- Haven reads green.

Chelsea **MuñOz-Patchen, 19** - ("Regulating the Space Commons: Treating Space Debris as Abandoned Property in Violation of the Outer Space Treaty," University of Chicago, 2019, 12-6-2021, https://cjil.uchicago.edu/publication/regulating-space-commons-treating-space-debris-abandoned-property-violation-outer-space)//AW

Debris poses a threat to functioning space objects and astronauts in space, and may cause damage to the earth’s surface upon re-entry.29 Much of the small debris cannot be tracked due to its size and the velocity at which it travels, making it impossible to anticipate and maneuver to avoid collisions.30 To remain in orbit, debris must travel at speeds of up to 17,500 miles per hour.31 At this speed even very small pieces of debris can cause serious damage, threatening a spacecraft and causing expensive damage.32 There are millions of these very small pieces, and thousands of larger ones.33 The small-to-medium pieces of debris “continuously shed fragments like lens caps, booster upper stages, nuts, bolts, paint chips, motor sprays of aluminum particles, glass splinters, waste water, and bits of foil,” and may stay in orbit for decades or even centuries, posing an ongoing risk.34 Debris ten centimeters or larger in diameter creates the likelihood of complete destruction for any functioning satellite with which it collides.35 Large nonfunctional objects remaining in orbit are a collision threat, capable of creating huge amounts of space debris and taking up otherwise useful orbit space.36 This issue is of growing importance as more nations and companies gain the ability to launch satellites and other objects into space.37 From February 2009 through the end of 2010, more than thirty-two collision-avoidance maneuvers were reportedly used to avoid debris by various space agencies and satellite companies, and as of March 2012, the crew of the International Space Station (ISS) had to take shelter three times due to close calls with passing debris.38 These maneuvers require costly fuel usage and place a strain on astronauts.39 Furthermore, the launches of some spacecraft have “been delayed because of the presence of space debris in the planned flight paths.”40 In 2011, Euroconsult, a satellite consultant, projected that there would be “a 51% increase in satellites launched in the next decade over the number launched in the past decade.”41 In addition to satellites, the rise of commercial space tourism will also increase the number of objects launched into space and thus the amount of debris.42 The more objects are sent into space, and the more collisions create cascades of debris, the greater the risk of damage to vital satellites and other devices relied on for “weather forecasting, telecommunications, commerce, and national security.”43 The Space Debris Mitigation Guidelines44 were created by UNCOPUOS with input from the IADC and adopted in 2007.45 The guidelines were developed to address the problem of space debris and were intended to “increase mutual understanding on acceptable activities in space.”46 These guidelines are nonbinding but suggest best practices to implement at the national level when planning for a launch. Many nations have adopted the guidelines to some degree, and some have gone beyond what the guidelines suggest.47 While the guidelines do not address existing debris, they do much to prevent the creation of new debris. The Kessler Syndrome is the biggest concern with space debris. The Kessler Syndrome is a cascade created when debris hits a space object, creating new debris and setting off a chain reaction of collisions that eventually closes off entire orbits.48 The concern is that this cascade will occur when a tipping point is reached at which the natural removal rate cannot keep up with the amount of new debris added.49 At this point a collision could set off a cascade destroying all space objects within the orbit.50 In 2011, The National Research Council predicted that the Kessler Syndrome could happen within ten to twenty years.51 Donald J. Kessler, the astrophysicist and NASA scientist who theorized the Kessler Syndrome in 1978, believes this cascade may be a century away, meaning that there is still time to develop a solution.52

### --- AT: Johnson 13

#### Oops, Marlborough shouldn’t powertag --- no nuke war, alt causes, and thumped. Haven reads green.

Les Johnson 13, Deputy Manager for NASA's Advanced Concepts Office at the Marshall Space Flight Center, Co-Investigator for the JAXA T-Rex Space Tether Experiment and PI of NASA's ProSEDS Experiment, Master's Degree in Physics from Vanderbilt University, Popular Science Writer, and NASA Technologist, Frequent Contributor to the Journal of the British Interplanetary Sodety and Member of the American Institute of Aeronautics and Astronautics, National Space Society, the World Future Society, and MENSA, Sky Alert!: When Satellites Fail, p. 9-12 [language modified]

Whatever the initial cause, the result may be the same. A satellite destroyed in orbit will break apart into thousands of pieces, each traveling at over 8 km/sec. This virtual shotgun blast, with pellets traveling 20 times faster than a bullet, will quickly spread out, with each pellet now following its own orbit around the Earth. With over 300,000 other pieces of junk already there, the tipping point is crossed and a runaway series of collisions begins. A few orbits later, two of the new debris pieces strike other satellites, causing them to explode into thousands more pieces of debris. The rate of collisions increases, now with more spacecraft being destroyed. Called the "Kessler Effect", after the NASA scientist who first warned of its dangers, these debris objects, now numbering in the millions, cascade around the Earth, destroying every satellite in low Earth orbit. Without an atmosphere to slow them down, thus allowing debris pieces to bum up, most debris (perhaps numbering in the millions) will remain in space for hundreds or thousands of years. Any new satellite will be threatened by destruction as soon as it enters space, effectively rendering many Earth orbits unusable. But what about us on the ground? How will this affect us? Imagine a world that suddenly loses all of its space technology. If you are like most people, then you would probably have a few fleeting thoughts about the Apollo-era missions to the Moon, perhaps a vision of the Space Shuttle launching astronauts into space for a visit to the International Space Station (ISS), or you might fondly recall the "wow" images taken by the orbiting Hubble Space Telescope. In short, you would know that things important to science would be lost, but you would likely not assume that their loss would have any impact on your daily life. Now imagine a world that suddenly loses network and cable television, accurate weather forecasts, Global Positioning System (GPS) navigation, some cellular phone networks, on-time delivery of food and medical supplies via truck and train to stores and hospitals in virtually every community in America, as well as science useful in monitoring such things as climate change and agricultural sustainability. Add to this the [disabling] ~~crippling~~ of the US military who now depend upon spy satellites, space-based communications systems, and GPS to know where their troops and supplies are located at all times and anywhere in the world. The result is a nightmarish world, one step away from nuclear war, economic disaster, and potential mass starvation. This is the world in which we are now perilously close to living. Space satellites now touch our lives in many ways. And, unfortunately, these satellites are extremely vulnerable to risks arising from a half-century of carelessness regarding protecting the space environment around the Earth as well as from potential adversaries such as China, North Korea, and Iran. No government policy has put us at risk. It has not been the result of a conspiracy. No, we are dependent upon them simply because they offer capabilities that are simply unavailable any other way. Individuals, corporations, and governments found ways to use the unique environment of space to provide services, make money, and better defend the country. In fact, only a few space visionaries and futurists could have foreseen where the advent of rocketry and space technology would take us a mere 50 years since those first satellites orbited the Earth. It was the slow progression of capability followed by dependence that puts us at risk. The exploration and use of space began in 1957 with the launch of Sputnik 1 by the Soviet Union. The United States soon followed with Explorer 1. Since then, the nations of the world have launched over 8,000 spacecraft. Of these, several hundred are still providing information and services to the global economy and the world's governments. Over time, nations, corporations, and individuals have grown accustomed to the services these spacecraft provide and many are dependent upon them. Commercial aviation, shipping, emergency services, vehicle fleet tracking, financial transactions, and agriculture are areas of the economy that are increasingly reliant on space. Telestar 1, launched into space in the year of my birth, 1962, relayed the world's first live transatlantic news feed and showed that space satellites can be used to relay television signals, telephone calls, and data. The modern telecommunications age was born. We've come a long way since Telstar; most television networks now distribute most, if not ali, of their programming via satellite. Cable television signals are received by local providers from satellite relays before being sent to our homes and businesses using cables. With 65% of US households relying on cable television and a growing percentage using satellite dishes to receive signals from direct-to-home satellite television providers, a large number of people would be cut off from vital information in an emergency should these satellites be destroyed. And communications satellites relay more than television signals. They serve as hosts to corporate video conferences and convey business, banking, and other commercial information to and from all areas of the planet. The first successful weather satellite was TIROS. Launched in 1960, TIROS operated for only 78 days but it served as the precursor for today's much more long-lived weather satellites, which provide continuous monitoring of weather conditions around the world. Without them, providing accurate weather forecasts for virtually any place on the globe more than a day in advance would be nearly impossible. Figure !.1 shows a satellite image of Hurricane Ivan approaching the Alabama Gulf coast in 2004. Without this type of information, evacuation warnings would have to be given more generally, resulting in needless evacuations and lost economic activity (from areas that avoid landfall) and potentially increasing loss of life in areas that may be unexpectedly hit. The formerly top-secret Corona spy satellites began operation in 1959 and provided critical information about the Soviet Union's military and industrial capabilities to a nervous West in a time of unprecedented paranoia and nuclear risk. With these satellites, US military planners were able to understand and assess the real military threat posed by the Soviet Union. They used information provided by spy satellites to help avert potential military confrontations on numerous occasions. Conversely, the Soviet Union's spy satellites were able to observe the United States and its allies, with similar results. It is nearly impossible to move an army and hide it from multiple eyes in the sky. Satellite information is critical to all aspects of US intelligence and military planning. Spy satellites are used to monitor compliance with international arms treaties and to assess the military activities of countries such as China, Russia, Iran, and North Korea. Figure 1.2 shows the capability of modem unclassified space-based imaging. The capability of the classified systems is presumed to be significantly better, providing much more detail. Losing these satellites would place global militaries on high alert and have them operating, literally, in the blind. Our military would suddenly become vulnerable in other areas as well. GPS, a network of 24-32 satellites in medium-Earth orbit, was developed to provide precise position information to the military, and it is now in common use by individuals and industry. The network, which became fully operational in 1993, allows our armed forces to know their exact locations anywhere in the world. It is used to guide bombs to their targets with unprecedented accuracy, requiring that only one bomb be used to destroy a target that would have previously required perhaps hundreds of bombs to destroy in the pre-GPS world (which, incidentally, has resulted in us reducing our stockpile of non-GPS-guided munitions dramatically). It allows soldiers to navigate in the dark or in adverse weather or sandstorms. Without GPS, our military advantage over potential adversaries would be dramatically reduced or eliminated.

### 1NC - Drones

#### Loss of satellites shuts down drones

Daniel Ventre 11, Engineer for CNRS and Researcher for CESDIP, Cyberwar and Information Warfare, p. 198-199

The introduction of cyberspace operations is part of a specific context; a major evolution in the operation environment and the nature of the conflicts, which make irregular wars the rule, and make regular actors the exception to the rule. But the battle against unconventional, non-state governed, irregular actors raises specific problems: there are multiple actors, unpredictable at that, who do not abide by the same rules. New orders in conflicts are imposing the implementation of an ever more important need for information, and information collection and processing. Networks now have an incredible importance. The document refers to the growing threats against American heritage: the USA is a target and the increasing amount of attacks against their networks is indeed the proof of this. There are many obstacles which need to be removed before they can achieve real superiority and freedom to act, especially as vulnerable points may originate within the very operations of the armed forces. An example of this is the vulnerability of using products (software and hardware), commercial products (off-the-shelf), and sometimes even foreign products123. This brings to mind the fact that the US Air Force uses commercial, even foreign, applications for its cyberspace operations.

Information space extends to space124, particularly via communication and observation satellites125. Satellites are the keystone to the cyberspace and communication systems, but also the security system: monitoring (Echelon network is the symbol), observation, communication. These are at the heart of the C4ISR systems, without which a concept such as network-centric warfare could not exist. There would be no drones without satellites. It is even a question of extending the Internet to extra-atmospheric space. Projects in this vein (Interplanetary Networks) were being formed in the 1990s, but ran into several technical difficulties (delays in important transmissions due to high distances and costs) [GEL 06]. NASA dedicates a few pages on its website to this project126. The development of communication systems based on the infrastructures in extra-atmospheric space will also raise questions for legal, geopolitical and geostrategic domains: questions of seizing this space, questions of regulation of human activity in this space, of sovereignty, new territoriality and independence.

#### Drones escalate every hotspot.

Zenko and Kreps 14 Micah - Douglas Dillon fellow in the Center for Preventive Action at the Council on Foreign Relations, PhD in political science from Brandeis University; \*Sarah - Stanton nuclear security fellow at the Council on Foreign Relations, assistant professor in the department of government and an adjunct professor at Cornell Law School, BA from Harvard University, MSc from Oxford University, and PhD from Georgetown University; “Limiting Armed Drone Proliferation," Council on Foreign Relations, June 2014, http://aspheramedia.com/wp-content/uploads/2014/12/Limiting\_Armed\_Drone\_Proliferation\_CSR69.pdf

The inherent advantages of drones will not alone make traditional interstate warfare more likely—such conflicts are relatively rare anyway, with only one active interstate conflict in both 2012 and 2013.20 Nor will the probable type, quantity, range, and lethality of armed drones that states possess in coming decades make a government more likely to attempt to defeat an opposing army, capture or control foreign territory, or remove a foreign leader from power. However, misperceptions over the use of armed drones increase the likelihood of militarized disputes with U.S. allies, as well as U.S. military forces, which could lead to an escalating crisis and deeper U.S. involvement. Though surveillance drones can be used to provide greater stability between countries by monitoring ceasefires or disputed borders, armed drones will have destabilizing consequences. Arming a drone, whether by design or by simply putting a crude payload on an unarmed drone, makes it a weapon, and thereby a direct national security threat for any state whose border it breaches. Increased Frequency of Interstate and Intrastate Force For the United States, drones have significantly reduced the political, diplomatic, and military risks and costs associated with the use of military force, which has led to a vast expansion of lethal operations that would not have been attempted with other weapons platforms. Aside from airstrikes in traditional conflicts such as Libya, Iraq, and Afghanistan—where one-quarter of all International Security Assistance Force (ISAF) airstrikes in 2012 were conducted by drones—the United States has conducted hundreds in non-battlefield settings: Pakistan (approximately 369), Yemen (approximately 87), Somalia (an estimated 16), and the Philippines (at least 1, in 2006).21 Of the estimated 473 non-battlefield targeted killings undertaken by the United States since November 2002, approximately 98 percent were carried out by drones. Moreover, despite maintaining a “strong preference” for capturing over killing suspected terrorists since September 2011, there have been only 3 known capture attempts, compared with 194 drone strikes that have killed an estimated 1,014 people, 86 of whom were civilians.22 Senior U.S. civilian and military officials, whose careers span the pre– and post–armed drone era, overwhelmingly agree that the threshold for the authorization of force by civilian officials has been significantly reduced. Former secretary of defense Robert Gates asserted in October 2013, for example, that armed drones allow decision-makers to see war as a “bloodless, painless, and odorless” affair, with technology detaching leaders from the “inevitably tragic, inefficient, and uncertain” consequences of war.23 President Barack Obama admitted in May 2013 that the United States has come to see armed drones “as a cure-all for terrorism,” because they are low risk and instrumental in “shielding the government” from criticisms “that a troop deployment invites.”24 Such admissions from leaders of a democratic country with a system of checks and balances point to the temptations that leaders with fewer institutional checks will face. President Obama and his senior aides have stated that the United States is setting precedents with drones that other states may emulate.25 If U.S. experience and Obama’s cautionary words are any guide, states that acquire armed drones will be more willing to threaten or use force in ways they might not otherwise, within both interstate and intrastate contexts. States might undertake cross-border, interstate actions less discriminately, especially in areas prone to tension. As is apparent in the East and South China Seas, nationalist sentiments and the discovery of untapped, valuable national resources can make disputes between countries more likely. In such contested areas, drones will enable governments to undertake strike missions or probe the responses of an adversary—actions they would be less inclined to take with manned platforms. According to the Central Intelligence Agency (CIA), there are approximately 430 bilateral maritime boundaries, most of which are not defined by formal agreements between the affected states.26 Beyond the cases of East Asia, other cross-border flashpoints for conflict where the low-risk proposition of drone strikes would be tempting include Russia in Georgia or Ukraine, Turkey in Syria, Sudan within its borders, and China on its western periphery. In 2013, a Chinese counternarcotics official revealed that his bureau had considered attempting to kill a drug kingpin named Naw Kham, who was hiding in a remote region in northeastern Myanmar, by using a drone carrying twenty kilograms of dynamite. “The plan was rejected, because the order was to catch him alive,” the official recalled.27 With armed drones, China might make the same calculation that the United States has made—that killing is more straightforward than capturing—in choosing to target ostensibly high-threat individuals with drone strikes. China’s demonstrated willingness to employ armed drones against terrorists or criminals outside its borders could directly threaten U.S. allies in the region, particularly if the criterion China uses to define a terrorist does not align with that of the United States or its allies. Domestically, governments may use armed drones to target their perceived internal enemies. Most emerging drone powers have experienced recent domestic unrest. Turkey, Russia, Pakistan, and China all have separatist or significant opposition movements (e.g., Kurds, Chechens, the Taliban, Tibetans, and Uighurs) that presented political and military challenges to their rule in recent history. These states already designate individuals from these groups as “terrorists,” and reserve the right to use force against them. States possessing the lower risk—compared with other weapons platforms—capability of armed drones could use them more frequently in the service of domestic pacification, especially against time-sensitive targets that reside in mountainous, jungle, or other inhospitable terrain. Compared with typical methods used by military and police forces to counter insurgencies, criminals, or terrorists—such as ground troops and manned aircraft— unmanned drones provide significantly greater real-time intelligence through their persistent loiter time and responsiveness to striking an identified target. Increased Risk of Misperception and Escalation Pushing limits in already unstable regions is complicated by questions raised regarding rules of engagement: how would states respond to an armed drone in what they contend is their sovereign airspace, and how would opposing sides respond to counter-drone tactics? Japanese defense officials claim that shooting down Chinese drones in what Japan contends is its airspace is more likely to occur than downing manned aircraft because drones are not as responsive to radio or pilot warnings, thereby raising the possibility of an escalatory response.28 Alternatively, Japan might misidentify a Chinese manned fighter as an advanced drone and fire on it, especially if the aircraft’s radar signature is not sufficiently distinctive or if combat drones routinely fly over the disputed area. Thus, the additional risks associated with drone strikes, combined with the lack of clarity on how two countries would react to an attempted downing of a drone, create the potential for miscalculation and subsequent escalation. As U.S. Air Force commanders in South Korea noted, a North Korean drone equipped with chemical agents would not have to kill many or even any people on the peninsula to terrorize the population and escalate tensions.29 This scenario points to the spiraling escalatory dynamic that could be repeated—likely intensified in the context of armed drones—in other tension-prone areas, such as the Middle East, South Asia, and Central and East Africa, where the mix of low-risk and ambiguous rules of engagement is a recipe for escalation. Not all of these contingencies directly affect U.S. interests, but they would affect treaty allies whose security the United States has an interest in maintaining. Compared with other weapons platforms, current practice repeatedly demonstrates that drones make militarized disputes more likely due to a decreased threshold for the use of force and an increased risk of miscalculation. Increased Risk of Lethality The proliferation of armed drones will increase the likelihood of destabilizing or devastating one-off, high-consequence attacks. In March 2013, Senator Dianne Feinstein (D-CA) observed of drones: “In some respects it’s a perfect assassination weapon. . . . Now we have a problem. There are all these nations that want to buy these armed drones. I’m strongly opposed to that.”30 The worst-case contingency for the use of armed drones, albeit an unlikely circumstance, would be to deliver weapons of mass destruction. Drones are, in many ways, the perfect vehicle for delivering biological and chemical agents.31 A WMD attack, or even the assassination of a political leader, another troubling though unlikely circumstance, would have tremendous consequences for regional and international stability. Deterring such drone-based attacks will depend on the ability of the United States and other governments to accurately detect and attribute them. Technical experts and intelligence analysts disagree about the extent to which this will be possible, but the difficulties lie in the challenges of detecting drones (they emit small radar, thermal, and electron signatures, and can fly low), determining who controlled it (they can be programmed to fly to a preset GPS coordinate), or assigning ownership to a downed system (they can be composed of commercial, off-the-shelf components).32 It is equally noteworthy that civilian officials or military commanders have almost always used armed drones in ways beyond their initially intended applications. Drones do not simply fulfill existing mission requirements; they create new and unforeseen ones, and will continue to do so in the future. Furthermore, U.S. officials would be misguided to view future uses of armed drones solely through the prism of how the United States has used them—for discrete military operations in relatively benign air-defense environments. The potential for misperception is compounded by the fact that few governments seeking or acquiring armed drones have publicly articulated any strategy for how they will likely use them. Conversely, the uncertainty about how other countries will use drones provides the United States with an opportunity to shape drone doctrines, especially for U.S. allies interested in procuring drones from U.S. manufacturers.

### 1NC - Fracking

#### Satellite loss shuts down global fracking

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Energy, environment, farming, mining, land use. All of these areas and more are now inextricably linked to satellite data and would be devastated should that flow of data stop. Environmental Monitoring Oh how complacent we've become. We take for granted that we will have instant images from space showing a volcanic eruption somewhere in the South Pacific within hours of learning that it happened. When the BP oll spill happened in the Gulf of Mexico in 2010, satellite images were used in conjunction with aircraft and ships to monitor the extent and evolving nature of the spill (Figures 10.1 and 10.2). The data were also used to direct the ships that were attempting to clean up the spill, to warn fishermen of areas in which it would be dangerous to fish, and to generally monitor the extent of the disaster. This is the type of data we get from space in a field known as remote sensing. Remote sensing is, well, exactly what its name implies. With it, you gather data, or sense, usually in the form of electromagnetic radiation (light), remotely - that is, you are not physically touching what you are looking at. Satellite remote sensing began shortly after we began launching satellites and many industries are now totally dependent upon having the capability. We use satellites, like the venerable Landsat series, to study the Earth m unprecedented detail. Since 1972, Landsat satellites have taken millions of high resolution images of the Earth's surface, allowing comprehensive studies of how the land has changed due to human intervention (deforestation, agriculture, settlement, etc.) and natural processes (desertification, floods, etc.). The best way to understand how useful Landsat and similar data can be to governments at all levels is best illustrated by looking at 14then and now" photographs. For example, Africa's Lake Chad has been shrinking for 40 years, as the desert has encroached on this once plentiful inland freshwater lake. Forty years ago, there were about 15,000 square miles of water within the lake. Now, it is less than 500 square miles (Figure 10.3) [1]. And what is the practical side of this particular bit of information? Governments use this type of satellite imagery to avoid human tragedy. Hundreds of thousands of people, if not millions, depend upon the waters of Lake Chad for agriculture, industry, and personal hygiene. With the lake going dry, how has this impacted on their livelihoods, their families, and their very lives? The European Space Agency (ESA) is freely providing satellite data to developing countries as they search for new sources of drinking water. For example, ESA assessed data obtained from space over Nigeria to find over 90 new freshwater sources within that country. After ground teams visited the new sites, all were confirmed to contain fresh water. This was no accident. These were satellites with sensors developed for just such purposes in mind [2]. Desertification is but one example of changing climates affecting people's everyday lives. What about more direct observations of our impact on the planet? Figures 10.4 and 10.5 show the scarring of the Earth's surface as a result of surface mining in West Virginia. This is not a polemic against mining; rather, it is an observation that we can use satellite imagery to monitor such mining and be mindful of its impact on the environment. Other than taking pictures of surface features, like lakes and open pit mines, how are satellites monitoring the Earth's changing climate? In just about every way, by: monitoring global land, sea, and atmospheric temperatures; measuring yearly average rainfall amounts just about everywhere on the globe; measuring glaciation rates; measuring sea surface heights; and more. Remote sensing is more than taking pictures of the Earth in the visible part of the spectrum. We can learn a great deal from looking at part of the spectrum that our eyes cannot see - but our instruments can. Shown in Figure 10.6 is a composite image of the Earth's surface showing the average land-surface temperature at night. The data came from two NASA satellites, Terra and Aqua, as they orbit the Earth in a polar orbit. (This means that they circle the Earth from top to bottom, passing over both the North and South Poles with each complete orbit.) Terra's orbit is such that it passes from the north to the south across the equator in the morning; Aqua passes south to north over the equator in the afternoon. Taken together, they observe the Earth's surface in its entirety every two days. Data sets such as this exist for just about any day of the year and can show either night-time lows or daytime highs. By looking in different parts of the spectrum, like the infrared light discussed above, we can make observations as described in Table 10.1. Pollution Monitoring As emerging countries industrialize, they also become polluters. Many of these countries are not exactly forthright about releasing air-pollution details to the media, so much of our awareness of the rising pollution there is anecdotal - typically m the form of stories told by people who have visited these countries and seen the extreme pollution at first hand. This, by the way, is not exactly scientific. Using satellites, and not relying on either the governments in question or second-hand stories, we can accurately assess the pollution levels there and elsewhere. Using satellite images to measure the amount of light absorbed or blocked by fine particulates in the atmosphere, otherwise known as air pollution, you can determine not only what the airborne pollutant might be, but also its size. And, by looking at the overall light blockage, an accurate estimate of the amount of pollution in the air can also be made. Recent studies show that many of these countries are covered in a pollution cloud that countries in the developed world would deem extremely harmful. And how do we know this with scientific certainty? From satellite measurements. Energy Production The recent boom in the production of shale oil in the United States and elsewhere is due in large part to the identification and geolocation of promising geologic formations for test drilling and fracking. "Fracking" is a somewhat new term that comes from the phrase "hydraulic fracturing". In fracking, massive amounts of previously unusable reservoirs of oil and natural gas are released for capture, sale, and transport from deposits deep within the Earth - many located at least a mile below the surface. In the United States alone, there may be as much as 750 trillion cubic feet of natural gas within shale deposits releasable by fracking [3]. How do energy companies know where to look for these deposits? In large part, by analyzing satellite imagery. According to Science Daily (26 February 2009), a new map of the Earth's gravitational field based on satellite measurements makes it much less resource intensive to find new oil deposits. The map will be particularly useful as the ice melts in the oil-rich Arctic regions. The easy-to-find oilfields have already been found. To fuel the growing world economy, those harder-to-find deposits must be located and tapped - which is why satellite imagery is so important. Take away this and other satellite-dependent techniques of oil and gas exploration and the world economy will feel the impact through higher oil and natural gas prices.

#### Fracking makes extinction inevitable.

Rev. Mac Legerton 18, Co-Founder and Executive Director of the Center for Community Action, Member of the Board of Directors of the NC Climate Solutions Coalition, Member of the Board of Directors of the Windcall Institute, “Will The U.S. Blaze A Trail To Mass Extinction?”, APPPL News, 1/15/2018, https://www.apppl.org/news/will-the-u-s-blaze-a-trail-to-mass-extinction/

As an elder, I now realize that there is even a greater threat to humanity and life on Earth than nuclear war—though, unlike a nuclear exchange, this threat is a slow-motion catastrophe. Can you guess what it is? Here’s a clue: it is something with which most people don’t have a personal relationship. Tragically, some persons remain in total denial of its validity, much less its present danger. And that’s the problem – that’s why this threat needs to be more seriously addressed on the local, state, national, and international level. What is it? It’s the slow-motion but rapidly growing catastrophe of climate change. There’s now good news amidst this seemingly overwhelming challenge. But the answer may surprise you. Today we know what is the #1 preventable cause of climate change. It’s not coal, it’s not nuclear, and it’s not oil and gasoline. It’s actually the use of the very fuel that is touted as being cleaner, greener, and cheaper than all the rest. This fuel is called “Natural Gas”. Let’s start with its name – “Natural Gas”. What is “natural gas”? There’s actually nothing “natural” about it when it is forcibly extracted from the ground through hydraulic fracturing, commonly known as “fracking”. When something is forcibly ruptured from deep within the earth with the use of toxic chemicals, the last name you would use for it is “natural”. Fracking disrupts the geologic fault lines causing earthquakes, uses millions of gallons of fresh water that becomes permanently poisoned by unknown, cancer-producing chemicals added to it, creates air pollution during the drilling process, increases the risk of injury and explosions, raises major health risks to both people and place in close proximity to it, and changes the nature of both neighborhoods and landscapes. Fracking also leaves a massive carbon footprint of drilling wells as deep as 8,000 feet and then drilling horizontally over 10,000 feet; On top of all this, it leaks major amounts of gas into the environment. So, what is this gas? It is 90-95% methane gas which is a hydrocarbon compound made up of one carbon atom and four hydrogen atoms (CH4). It releases carbon into the atmosphere and produces carbon dioxide (C02) just like coal does when it is burned. Methane is not its trace element–it is its undisputed compound of this fossil fuel product. If a compound is 90-95% of a product, it makes sense to call it by that name. Doesn’t it? Well, actually not if you want people to believe and think that it is something that it is not. It is un-natural methane gas produced under massive and highly toxic pressure and hazardous conditions. Now that we know what this gas is, what does it do to the atmosphere and climate that is so dangerous? This hydrocarbon has properties that block the radiation of heat from Earth’s surface 100 times more effectively than CO2 (released from burning coal) during its first 10 years of release and 86 times more effectively in its first 20 years. Because of the climate emergency underway, the first 10 or 20 years matter most. When utility companies and the larger fossil fuel companies state that they are committed to lowering carbon emissions, this just isn’t true. They are radically escalating the most dangerous and worst of all fossil fuels in relation to its impact on the climate. Now the industry wants to expand production of methane gas all over the world by calling it “the most environmentally friendly fossil fuel”and a “bridge fuel” that we can safely use until we transition to 100% renewable energy sources. Why would a major business industry want to call its product by another name? Perhaps for the same reason that the tobacco industry did not like the term “coffin nails” or “cancer sticks” for cigarettes. Honestly, there’s a striking similarity between what are called cigarettes and natural gas. When both were produced and named, their harm was not fully known. Once the industries promoting them learned of their significant harm, they did everything they could to hide this knowledge from the public. They even hired scientists to deny their dangers. The tobacco industry was eventually sued, the truth was acknowledged, and billions of dollars were paid out in the tobacco settlement. This same scenario that occurred with the tobacco industry needs to occur with methane gas and the fossil fuel industry. The major difference in these two scenarios is that that this fossil fuel product doesn’t just threaten the lives of individuals who voluntarily breathe it in – it threatens the lives of not only every human being, but also all life on the planet. The outcome of this scenario needs to be a moratorium and eventual end to all use of methane gas as an energy source. For the sake of all of us, our communities, and world, the sooner the better. This abomination is different. There is no time to waste.

### 1NC - Cap Good

#### Private development and expansion makes the system sustainable

Collins 10

Patrick Collins, professor of economics at Azabu University in Japan, and a Collaborating Researcher with the Institute for Space & Astronautical Science, as well as adviser to a number of companies, Adriano V. Autino is President of the Space Renaissance International; Manager, CEO/CTO, Systems Engineering Consultant / Trainer at Andromeda Systems Engineering LLC; and Supplier of methodological tools and consultancy at Intermarine S.p.A, Acta Astronautica, Volume 66, Issues 11–12, June–July 2010, “What the growth of a space tourism industry could contribute to employment, economic growth, environmental protection, education, culture and world peace”, Pages 1553–1562

4. Environmental protection

Economic development in space based on low launch costs could contribute greatly, even definitively, to solving world environmental problems. As a first step, substantially reducing the cost of space travel will reduce the cost of environment-monitoring satellites, thereby improving climate research and environmental policy-making.

4.1. Space-based solar power supply

A second possibility, which has been researched for several decades but has not yet received funding to enable testing in orbit, is the delivery of continuous solar-generated power from space to Earth. Researchers believe that such space-based solar power (SSP) could supply clean, low-cost energy on a large scale, which is a prerequisite for economic development of poorer countries, while avoiding damaging pollution. However, realisation of SSP requires much lower launch costs, which apparently only the development of a passenger space travel industry could achieve. Hence the development of orbital tourism could provide the key to realising SSP economically [14].

4.2. Carbon-neutral space travel

Clean energy produced by SSP could eliminate the environmental impact of space travel, and even make it “carbon neutral” if this is considered desirable [25]. Moreover, SSP has a much shorter energy pay-back time than terrestrial solar energy, due to the almost continuous supply of power which it can generate, rather than only in day-time during clear weather. Some critics claim that space travel will become a significant environmental burden [26]. However, while superficially correct in the short term, this is the opposite of the truth over the longer term. It would be a dangerous error to prevent the growth of space tourism in order to avoid its initial, minor environmental impact, since this would prevent a range of major benefits in the future, including the supply of low-cost, carbon-neutral SSP, and other space-based industry.

4.3. Space-based industry

If orbital travel grows to a scale of millions of passengers/year—as it could by the 2030s, with vigorous investment—it will stimulate the spontaneous growth of numerous businesses in space. These will grow progressively from simple activities such as maintenance of orbiting hotels, to in-space manufacturing using asteroidal minerals. For example, the development of SSP would enable a range of industrial processes using the advantages of space, including high vacuum, weightlessness, low-cost electricity and sources of both minerals and volatile chemicals in shallow gravitational wells.

If SSP grows to supply a significant share of the terrestrial energy market, more and more industry would operate outside the Earth's ecological system. While most industries cause growing damage to the Earth's environment as they grow in scale, industrial activities which are outside the Earth's ecosystem need not cause any such damage. Hence the growth of space-based industry to large scale offers the longer-term possibility of decoupling economic growth from the limits of the terrestrial environment. Indeed, it has been convincingly argued that only the use of space resources, including especially SSP, offers the possibility of protecting the Earth's environment while enabling sufficient economic growth to preserve civilised society [22] and [27].

4.4. Severe weather amelioration and climate stabilisation

The use of solar power satellites for reducing the severity of hurricanes and typhoons, and/or ameliorating severe snow conditions has been discussed for some years. In the extreme case this application of SSP might even include a role in the stabilisation of climate. Earth's climate system is extremely complex, and is the subject of a great deal of ongoing scientific research, including collection of an ever-wider range of data, and ever-more detailed analysis of climate change in the past.

A positive-feedback cycle causing sudden onset of the cooling phase of the long-term cycle of “ice ages” has been hypothesized, whereby a winter with unusually low temperatures and/or unusually widespread and/or long-lasting snow cover would increase the probability of the following winter being even more severe [28] and [29]. The beginning of such a trend would be similar to the sharply more severe winters seen over the two last years in North America (as well as the unusually cool 2009 summer).

Consequently, although such a possibility may seem remote, and although there are thorny legal problems concerning deliberate weather modification, it is nevertheless noteworthy that satellite power stations may be the only practical means of selectively melting snow over areas of thousands of square kilometres, possibly sufficient to prevent such a vicious circle, even in the event of terrestrial energy shortages.

4.5. Ethical consumption

Passenger space travel and its numerous spinoff activities have the important potential to escape the limitations of the “consumerism” which governments in the rich countries have encouraged in recent decades in order to stimulate economic growth, defined as GDP. Researchers now understand that this is resulting in “excess consumption” which causes unnecessary environmental damage [30], while reducing rather than increasing popular satisfaction [31]. That is, “first world” citizens are increasingly trapped in a culturally impoverished “consumer” lifestyle which reduces social capital, social cohesion and happiness, while damaging the environment. By contrast, expenditure on the unique experience of space travel promises to play a more positive role in the economy and society, enriching customers culturally without requiring mass production of consumer goods and corresponding pollution. As such it could be a harbinger of a future “open world” economy [27].

#### Capitalism is sweet --- the *proliferation of markets* and economic growth supplanted by liberalism has created a *massive reduction* in global violence, war, AND oppression by every metric

Cohen & Zenko 19 (Michael A. Cohen, former lecturer at Columbia University’s School of International and Public Affairs, regular contributor for The Boston Globe on national politics and foreign affairs, has written for dozens of news outlets, including as a columnist for the Guardian and Foreign Policy, US Political Correspondent for the London Observer, former speechwriter at the US State Department; and Micah Zenko, Whitehead Senior Fellow on the US and Americas Programme at Chatham House, former Senior Fellow at the Council on Foreign Relations, former research associate on the Project on Managing The Atom, Harvard University's Belfer Center for Science and International Affairs, PhD Politics, Brandeis University; Clear and Present Safety: The World Has Never Been Better And Why That Matters To Americans, Yale University Press, Kindle Edition, 2019, locations 57-712)

Introduction Neither a man nor a crowd nor a nation can be trusted to act humanely or to think sanely under the influence of a great fear. —Bertrand Russell On a crisp January day in 2016, in the small hamlet of Pittsfield, New Hampshire, several hundred voters were gathered for what is a quadrennial rite of passage in the Granite State: listening to a politician make his or her pitch to be the next president of the United States. The speaker this day was Chris Christie, who was then the Republican governor of New Jersey and one of more than a dozen presidential candidates campaigning across the state. Christie discussed everything from illicit drugs and immigration to the federal budget and the U.S. war against the self-proclaimed Islamic State. “He was pretty good,” one woman unenthusiastically shrugged after he finished. But as she struggled to say anything of substance, it seemed clear that Christie had not made much of an impression. When asked, though, if any specific policy issue took on particular importance, her face lit up: “ISIS. I’m really worried about ISIS.” The thought of her kids and grandkids growing up in a world where groups like the Islamic State would be threatening their future seemed to cause her genuine and palpable concern.1 The woman’s anxieties were sincere, but her fear could not have been more misplaced. The Islamic State had yet to launch even one direct terrorist attack within the United States, and if the group had drawn up a list of potential targets, the chances that Pittsfield, New Hampshire—an hour’s drive north of Manchester—would be high on that list were decidedly slim. At a time of ever-widening income inequality, stagnant wage growth, gun violence, and a raging opioid epidemic that in the previous year had claimed 422 lives in New Hampshire alone, this woman considered a shadowy terrorist group that had not killed a single American on U.S. soil one of the biggest challenges facing the country.2 She was far from alone. Public opinion polling consistently shows that Americans have long exaggerated the danger that terrorism represents to the United States. Since 9/11 the average number of Americans killed yearly in a terrorist attack is twenty-seven—and 90 percent of them were in Afghanistan or Iraq. Yet, in 2018, 81 percent of Americans ranked “cyberterrorism” as the most critical threat facing the United States, followed by international terrorism at 75 percent.3 Eighty-three percent of voters expect that a major terrorist incident with large numbers of casualties is likely to occur in the near future. Remarkably, in November 2017, more than half (52 percent) of Americans thought the United States was less safe then than it was before 9/11—as if the trillions spent on homeland security and fighting terrorists in Iraq and Afghanistan had done nothing to make America less vulnerable to international terrorism. Seventeen years after September 11, the outsized fears of another 9/11-style terrorist attack provided compelling—and depressing—evidence that terrorist groups had succeeded, beyond their wildest imaginations, in transforming American society.4 It is not just armed jihadists that scare Americans. A 2012 poll showed that six out of seven Americans agree that “the United States faces greater threats to its security today than it did during the Cold War”—a time when the United States found itself in the crosshairs of approximately ten thousand nuclear weapons, each with a destructive power up to fifty times that of the nuclear bomb that was dropped on Hiroshima.5 How Americans, such as this woman from a small town in the “Live Free or Die” state, became convinced that the United States faces such acute and harmful foreign threats is, at its core, the story of this book. The American public is being fed, by politicians and pundits alike, a steady diet of threat inflation that has made them deeply fearful of the world outside their borders. They have become convinced that overseas menaces are perpetually becoming more likely, lethal, and complex. The world is forever on fire; America is always getting weaker; and its citizens are facing a constant drumbeat of tremendous and unceasing risks. The pervasiveness of threat inflation is such conventional wisdom that alternative—or even less threatening—descriptions of the world are largely nonexistent in foreign policy debates. As a result, most Americans are simply unaware of the extraordinary and unprecedented political, economic, and social progress that has taken place in virtually every corner of the globe over the past three decades. On that January day in New Hampshire, while alluding to the national debate on the balance between security and privacy, Christie declared ominously, “You can’t protect civil liberties from a coffin.” Pittsfield voters who had watched the most recently aired Republican presidential debate would have heard former Florida governor Jeb Bush tell them that the Islamic State had formed “a caliphate the size of Indiana with . . . 30,000 to 40,000 battle-tested soldiers that are organized to destroy our way of life.”6 They would have heard candidate and former pediatric neurosurgeon Ben Carson claim that dirty bombs and cyberattacks are, “in fact, an existential threat to us.”7 Those following the Republican primaries would have heard Donald Trump, the eventual Republican nominee and president of the United States, tell them that the only way to keep America safe was to ban all Muslims from entering the country, torture suspected terrorists, and “take out” (murder) their families.8 As regular consumers of news, Republican voters might have heard South Carolina senator Lindsey Graham tell Americans, “The world is literally about to blow up,” in January 2014 (spoiler: it did not).9 They might have caught Sen. John McCain, who, having been born in 1936, had lived through conflicts that killed an estimated sixty million people and had fought in one of those wars, say in 2015, “We are probably in the most serious period of turmoil in our lifetime.”10 Perhaps in the spring of 2017, they caught secretary for homeland security John Kelly claiming, “Make no mistake—we are a nation under attack” and “We are under attack every single day. The threats are relentless.”11 Or, in the summer of 2018, they might have heard his boss, President Trump, warn that “people coming in from the Middle East” would come across the border by using “children to get through the lines.”12 This incessant, default threat-mongering is neither a partisan issue nor a habit reserved for elected officials. Those Americans tuning in to CNN in October 2014 might have the chyron asking the hypothetical question “Ebola: ‘The ISIS of Biological Agents?’ ”13 Maybe they saw local reporting on defense secretary Chuck Hagel saying, “Cyber threats . . . are just as real and deadly and lethal as anything we’ve ever dealt with,” or New York senator Kirsten Gillibrand calling Iran an “existential threat” to America, or perhaps Arkansas senator Tom Cotton warning that the Islamic State, in coordination with Mexican drug cartels, could infiltrate the border and “attack us right here.”14 Even if viewers missed all that, they would have found it far more difficult to avoid the nonstop news coverage of the latest terrorist attack in Paris, Barcelona, or London. Even more important than what Americans hear from the nation’s leaders is what they do not hear. They do not hear that terrorism harms fewer Americans each year than falling televisions and furniture, bathtub drownings, and lightning strikes do. Annually, more Americans lose their lives from these three rare killers—roughly thirty-three, eighty-five, and forty fatalities, respectively—than at the hands of wild-eyed Islamic jihadists.15 These numbers pale next to the number of Americans killed each year prematurely by preventable, noncommunicable diseases (more than 2.5 million), suicide (44,100), and gun homicides (14,400). In short, Americans do not hear that America is unusually safe and secure from foreign threats. Part of this is a function of geography, but it is also true that the United States faces no serious great-power rival and no near-term political or economic competitor. So it should not be surprising that 86 percent of Americans view Russia’s military power as either an important or a critical threat to America, even though Russia is hemmed in by NATO, has a moribund economy, and has no enduring military partnerships in South Asia, the Middle East (outside of Syria), or the Western Hemisphere. Nor should it be surprising that 87 percent of Americans are concerned about China’s military power even though China faces its own pressing social, economic, and environmental challenges—and its primary near-term interest is maintaining Communist Party rule, not directly challenging the United States. Nor should it be surprising that 75 percent of Americans called the development of nuclear weapons by Iran a “critical threat”—even though Iran has surrendered its nuclear fuel and has allowed invasive inspections of its nuclear facilities through at least 2030.16 Finally, we should not be surprised that half the American people believe that U.S. armed forces are not the number-one military in the world, even though the United States spends more on national defense than the next nine nations combined, is allied or has mutual defense treaties with five of those countries, enjoys long-term security partnerships in every region of the world (outside Antarctica), and is, quite simply, the world’s most dominant nation and more secure than any other great power in history.17 In addition, the Republican primary voters in Pittsfield—or those who voted for a president who regularly told them “the world is a mess”—almost certainly did not hear that the world today is cumulatively more peaceful, freer, healthier, better educated, and wealthier than at any point in human history.18 Like most Americans, they would not have heard that in the year 2015 the proportion of people living in extreme poverty (on less than two dollars a day) dropped to below 10 percent of the global population, the lowest level ever and down from close to 50 percent in 1981.19 They are likely unaware that AIDS deaths have declined for more than fifteen years in a row, global life expectancy has increased by seven years since 1990 alone, and child mortality rates (for children under five years old) has been halved over that same period. Unbeknownst to them and the overwhelming majority of Americans, improvements in polio vaccines and delivery methods have practically eradicated the disease (just eleven active global cases by July 2018), saving more than 650,000 lives since 1988.20 What is most remarkable about all these positive developments is that they are uncontestable—the data are simply that strong. This fundamental disconnect between what Americans have been encouraged to believe about the world and the reality of global affairs is the most critical foreign policy issue facing the United States today. The American people are being sold a dangerous bill of goods that is distorting our foreign policy choices and leading politicians and policy makers to focus more on the threats that Americans perceive, rather than the ones that actually exist. This strategic misdiagnosis has led to consistently mistaken foreign (and domestic) policy choices that are diverting resources and attention away from the actual dangers that Americans face in their homes, neighborhoods, and workplaces. Every dollar spent bombing and then rebuilding Middle Eastern countries, modernizing a duplicative nuclear weapons arsenal, or building the next generation of combat aircraft that are intended to fight yesterday’s enemies means less money for America’s greatest domestic challenges. This includes America’s underperforming schools; a health care system that performs far worse than those of other affluent countries; crumbling roads, bridges, and water systems in places like Flint, Michigan; inadequate preparation for the inevitable and irreversible effects of climate change; and a tattered social safety net that is a far cry from those enjoyed by other developed countries. Pointing out that foreign threats pose a relatively insignificant risk to Americans compared to vastly greater domestic dangers and systemic harms is not to suggest that the United States should pull up the drawbridge and abandon its global role. If anything, at a time of relative peace and stability in the world, smart American leadership and active involvement in global affairs are more important than ever. In the seventy-plus years since the end of World War II, the United States, along with its allies and partners, has helped construct an international system that limits large-scale interstate conflict; encourages democratization, adherence to the rule of law, and respect for human rights; and advances human development. The challenge for the next generation of U.S. policy makers is to solidify the gains that have been made and to ensure that this extraordinary progress is not reversed. For that to happen, Americans must change the ways they think and talk about foreign policy and national security—and the first step is to acknowledge that foreign-threat inflation and the corresponding policy choices that it encourages are a problem. Americans need to think about the world in a whole new way, one that is more accurate and more uplifting than the dystopian view promoted by politicians and pundits. In the following six chapters, we will spell out how this paradigm shift might occur. First, there must be greater recognition that potential rivals and complex issues—frequently portrayed as dangers to Americans—are, in reality, relatively minor threats to Americans. Great-power wars have disappeared, interstate wars have become vanishingly rare, and the world is a safer and freer place than it has ever been in human history. Second, there needs to be better appreciation of the extraordinary global progress that has been made over the past several decades—and why it benefits the American people. The world today is healthier than would have been scarcely imaginable decades ago and is far richer and better educated than ever before. It is also more united and interconnected through travel, communications, economic links, and diplomatic relations. These trends make this current era of relative peace, safety, and prosperity not a momentary blip but, more likely than not, the future reality of global affairs. Third, it is imperative that Americans rethink what “national security” means and focus on the systemic dangers that diminish economic opportunities and the American people’s basic quality of life. From noncommunicable diseases to gun violence to crippling political dysfunction, the things that actually injure and kill us receive rare moments of national attention, while foreign terrorists and other outside threats perpetually occupy our minds. Political attention, policy changes, and expanded government resources can significantly—and cost-effectively—reduce these risks, but that will happen only if Americans recognize the need to address them. Fourth, the loose collection of politicians, government officials, pundits, private security firms, think tankers, academics, cable news hosts, and news editors that we call the Threat-Industrial Complex demands far greater scrutiny. These are the individuals—and institutions—who shape public perceptions about international relations and promulgate a false narrative of danger and insecurity. Fifth, our modern era of threat inflation must be placed in a larger political and historical context: namely, as an enduring feature of American politics and foreign policy debates since World War II. From “missile gaps” and the “domino theory” to the “evil empire” and “evildoers,” foreign threats have been consistently manipulated both in times of actual danger and in times of genuine peace and security. Sixth, to dramatize our argument, we offer a case study and cautionary tale of how threat inflation occurs and its larger political consequences: namely, the response to the tragedy of September 11. Public statements and policy decisions made by President George W. Bush and his administration set the tone, agenda, and political incentives of our contemporary fear-mongering but also wasted opportunities in a disproportionate response to a relatively minor and manageable threat. Finally, we lay out recommendations for reversing this unbalanced perspective and approach to foreign policy that will answer the question of what a U.S. domestic and global policy—properly informed by a more accurate understanding of the world—should look like. This book is not meant to be a comprehensive treatment of threat inflation or the final word about the nature and degree of foreign threats facing the United States and its citizens. As has been true for the past 240 years, the degree to which foreign dangers threaten America and its citizens has changed dramatically over time and will continue to evolve in ways that nobody can predict today. Nonetheless, it is quantitatively true that the current global environment is one of relatively few foreign threats, particularly in comparison to other great powers and to America’s historical experience. The fixation of American foreign policy and national security should not be what former president John Quincy Adams spoke of nearly two hundred years ago: namely, the impulse to look “abroad in search of monsters to destroy.” Rather, it must be to remain focused on ensuring that today’s hopeful present is America’s brighter future. A Safer and Freer World I think, what we need to do is to remind people that the earth is a very dangerous place these days. —White House press secretary Sean Spicer, February 7, 2017 February 16, 2012, was, from all appearances, an unremarkable day. The political world was focused on the upcoming Republican presidential primary in Michigan, in which the frontrunner, Mitt Romney, was facing a spirited challenge from former Pennsylvania senator Rick Santorum. Journalists were mourning the loss of the New York Times reporter Anthony Shadid, who had died on a reporting trip to Syria. New Yorkers obsessed over the Knicks’ budding superstar point guard, Jeremy Lin; the Simpsons marked its five hundredth episode; and Chinese President Xi Jinping was in Iowa hoping, as the Washington Post put it, “to emphasize the idea of an enduring U.S.-Chinese friendship.”1 Yet, on Capitol Hill, the most senior officer in the world’s most powerful military, chairman of the Joint Chiefs of Staff Gen. Martin Dempsey, saw something else altogether: danger. Testifying before the House Appropriations Defense Subcommittee on budget sequestration—the congressional mandate passed in 2011 that required all federal agencies, including the Pentagon, to automatically cut their budgets by 5 to 10 percent in the following decade—Dempsey warned, “in my personal military judgment, formed over thirty-eight years, we are living in the most dangerous time in my lifetime, right now.”2 This is a surprising statement. After all, Martin Dempsey was born in March 1952, during the tail end of the Korean War—which killed more than two million people, including 36,574 Americans. When he attended elementary school, the Cuban Missile Crisis brought the world closer to nuclear holocaust than at any other point during the Cold War. By the time he enlisted in the army in 1974, the Vietnam War had been going on for several years and before it ended would take the lives of more than three million people, including 58,220 Americans. As Dempsey rose through the military ranks, he witnessed the strategic nuclear arms buildup of the 1980s, when the United States and the Soviet Union had tens of thousands of nuclear-armed missiles pointed at each other. Later, on September 11, 2001, the most lethal terrorist attack in American history took the lives of nearly three thousand people. While all of these events directly affected Americans, there were plenty of other dangerous moments in Dempsey’s lifetime, such as the Biafra separatist civil war in Nigeria that killed two hundred thousand, the Angolan civil war in which one million people died, the Khmer Rouge’s genocide in Cambodia that took the lives of approximately a quarter of that nation’s eight million people, the Iran-Iraq War during the 1980s that killed more than one million people, and the internationalized civil war in Congo that has led to three million war-related deaths since the mid-1990s.3 Yet, if Dempsey is to be taken literally, none of those moments compared to the dangers facing the world on the morning of February 16, 2012. What made Dempsey’s statement particularly odd was an observation he made one year later testifying before Congress: “I will personally attest to the fact that [the world is] more dangerous than it’s ever been”—in other words, since the earth was fully formed 4.6 billion years ago.4 Though Dempsey’s comments were clearly hyperbolic—and easily disprovable—they garnered little attention. In a political environment dominated by habitual threat inflation, they barely stand out. Indeed, two years after Dempsey’s testimony, the director of national intelligence, James Clapper, told Congress, “looking back over my more than half a century in intelligence, I have not experienced a time when we have been beset by more crises and threats around the globe.” Remarkably, he had made virtually the same statement—word for word—a year earlier when testifying before Congress.5 In January 2015, army chief of staff Gen. Raymond Odierno told the Senate Armed Services Committee, “today the global environment is the most uncertain I have seen in my thirty-six years of service.”6 This assertion was especially well received by the committee’s chairman, Sen. John McCain, who only days before had proclaimed, “we are probably in the most serious period of turmoil in our lifetime.”7 In November 2017, Air Force Lt. Gen. Steve Kwast went further back in time proclaiming, “There’s no question that this generation . . . is living in the most dangerous time since the Civil War for the Republic.”8 There are specific bureaucratic and political reasons for such apocalyptic descriptions of the global environment (the more vivid the threat, the more likely Congress will be to maintain military and intelligence-community funding). Such views, however, are mimicked across the national security community. Indeed, in the elite world of foreign policy punditry (and national politics), the notion of grave, growing, and irreversible dangers facing the United States is the default (and unchanging) position. So we should not be surprised that most Americans think the world is getting more and more dangerous.9 In the immediate aftermath of the bombing of a subway train and airport terminal in Brussels in March 2016, MSNBC news anchor Brian Williams asked Senator McCain if the world was on the verge of World War III. McCain unsurprisingly said yes.10 Sen. Lindsay Graham, then in the running for the Republican nomination for president, echoed these fears, claiming, “there is a sickness in the world that has to be dealt with, and the civilized world must come together to confront it.”11 Quite simply, this is the lingua franca of the Threat-Industrial Complex. There is one problem: this image of the world is completely wrong. In virtually no element of our national discourse are Americans provided with a more inaccurate depiction of the world than when it comes to matters of war, peace, and freedom. Americans live in a world that is safer and freer than ever before in human history—and it is not even close. To state this is not to be insensitive to those who are suffering real harms or being denied their personal freedoms. It doesn’t mean one is naïve to the potential of current global challenges—some of which are neither illusory nor false—to become serious threats in the future. But facts are facts, and the transformation in the human experience over the past two to three decades is the most consequential global trend in security affairs in any of our lifetimes—and it is largely unknown to the wider public. A Safer World The data supporting the proposition that the world is safer than ever are so overwhelming that they can barely be disputed. For example, interstate war, or war between states, was the defining characteristic of international relations for centuries. Today, such wars have largely disappeared. Since 2012, there have been just two interstate wars: one between Sudan and South Sudan in 2012 and one between India and Pakistan in 2014 and 2015 that led to fewer than one hundred fatalities in total over both years.12 In the seven years before 2010, there was one major interstate conflict—started by the United States in Iraq in March 2003.13 How about great-power conflict? These protracted and bloody wars—such as the Thirty Years’ War, World War I, and World War II—have been historically the most devastating and consequential conflicts. They’ve repeatedly led to massive death tolls of soldiers and civilians, forced transfers of millions of people, and the redrawing of national boundaries to the benefit of the victors. As the historian Timothy Snyder has documented in Bloodlands: Europe between Hitler and Stalin, 10.5 million civilians (Germans, Poles, Belarusians, Ukrainians, and Jews from various countries) were killed by Germany and the Soviet Union between 1939 and 1945.14 Put another way by the eminent British historian Max Hastings, approximately twenty-seven thousand people lost their lives every single day of that conflict.15 That means that during World War II, between a given Monday and Thursday, there would have been as many deaths as there were battle-related deaths in all of 2016.16 Despite the December 2015 claim by Chris Christie that the United States was “already in World War III,” the world has not seen such a total global conflict in more than seven decades.17 All of this might sound like apostasy when you consider the daily fare on cable news segments, in social media feeds, and in the nation’s newspapers and magazines. Foreign reporting in these outlets has been dominated in recent years by North Korea’s nuclear weapons development, stories of terrorist attacks in Iraq and western Europe, a bloody civil war in Syria that has killed an estimated five hundred thousand people, the barbaric cruelty of the Islamic State, Russia’s meddling in its near abroad, and China’s campaign of building military facilities on disputed territories in the South China Sea.18 For those whose lives are directly affected, these crises are serious matters. But alarmist coverage of these global hot spots has deluded Americans into believing that the world is a chronically violent place. It’s not. In fact, modern war is not only a rare occurrence, but when it does happen, it tends to be less violent and of shorter duration. On average, conflicts kill about 80 percent fewer people now than in the 1950s, when wars in Korea, Southeast Asia, and sub-Saharan Africa took millions of lives.19 The vastly greater harm today is the displacement of civilians caught up in the fighting between combatants. By June 2018, sixty-eight million people around the world had been forced from their homes.20 To the credit of the United Nations, international organizations, and nongovernmental groups, the breadth and depth of understanding about the underlying dynamics and drivers of conflict have expanded dramatically, and there now exist far more tools for preventing and mitigating such armed violence. Not surprisingly, conflict gets more attention than does the successful use of international and regional conflict-prevention methods to prevent wars from occurring in the first place. The wars that never occurred between Israel and Iran, Peru and Ecuador, Russia and its Baltic neighbors, and Turkey and Russia after the shooting down of a Russian fighter in 2016 receive precious little attention. Despite routine alarms of mounting tensions between China and its neighbors over territorial disputes in the East and South China Seas, conflict there has been avoided. This is true of the overwhelming number of maritime and land disputes, which a majority of countries have with their neighbors. Additionally, of the 430 bilateral maritime boundaries in the world, most are not defined by formal agreements between affected states. Unfortunately, peace, even between bitter adversaries, is not an “event” worth recognizing, much less celebrating; the dominant media narrative is that of an ever-threatening world.21 The current era of relative peace and stability has also contributed to a notable decline in the prevalence of state-directed mass killings of civilians.22 During the Cold War, approximately one in seven countries experienced a state-sponsored mass killing. This number increased to nearly 25 percent immediately after the Berlin Wall came down and declined to between 5 and 10 percent by the 2010s.23 In fact, far fewer people have been killed in war in the past quarter century than in any other quarter century over the past six hundred years. In 1800, one out of every two thousand people on earth—civilians and combatants—died from a combat-related death; in 1900, it was one in every twenty thousand; by 2016, it was one in every one hundred thousand.24 The overall decline in global conflict has had extraordinary ripple effects. William Tecumseh Sherman famously declared in 1879 that “war is hell,” but his words barely capture the full costs of warfare and armed violence. As one would expect, warfare significantly limits life expectancy. The Syrian civil war, for example, reduced life spans there from 79.5 years before 2011 to 55.7 in 2015, an extraordinary twenty-year decline in just a four-year period.25 Children living in conflict-affected poor countries are twice as likely to die before their fifth birthday as are children in other poor countries, and warfare diminishes educational opportunities at all levels as well as overall quality of life. For example, children who grow up in conflict-affected countries are less likely to be literate and far less likely to be enrolled in primary school.26 Beyond the immediate human costs, wars do untold physical and environmental damage. In 2016, a time of relative peace and stability, all of the world’s armed conflicts combined cost the global economy an estimated $14.3 trillion. That is nearly 12.5 percent of global GDP.27 The relationship between conflict and economic distress is self-perpetuating—just as war drains government coffers, economic slowdowns also increase the likelihood of the outbreak and recurrence of conflict. Finally, conflict-prone countries are far less democratic, and, in fact, the presence of an autocratic government increases the risk of a civil war starting within that government’s territory.28 As noted previously, this matters because civil wars—including those like Syria’s that became “internationalized” with external support—are virtually the only type of armed conflicts that still occur in the world today. Ironically, Americans tend to see the world as far more dangerous than it is precisely because the world is safer. Conflicts that were once far more routine have become more unusual and thus receive greater (and more vivid) media attention. This bolsters the impression that we live in a world of constant conflict when compared to recent history. Yet it is often forgotten exactly how bloody the final years of the Cold War were, particularly in comparison to today. The Cold War is mistakenly remembered as an era of relative quiet in which Washington and Moscow co-managed global affairs. For example, in February 2016, Clapper said the reason there were more threats than at any point in his seventy-three-year lifetime was the disappearance of the superpower rivalry between the United States and Soviet Union. “Virtually all other threats were sort of subsumed in that basic bipolar contest that went on for decades and was characterized by stability,” said Clapper.29 Yet, in the decade preceding the end of the Cold War in 1991, there were more than two million battle-related deaths around the world. In the ten years immediately after, there were 651,000, and in the past ten years, there were even fewer: 402,000.30 While the Cold War saw a bipolar (albeit unimaginably costly) peace between two nuclear-armed superpowers, it does not mean the rest of the world enjoyed peace and safety. There were significant internationalized wars, genocides and mass killings, and lengthy and bloody civil wars dotting the globe, from Indonesia and Afghanistan to Vietnam, Nigeria, and throughout Central America. There is also the inconvenient fact that the United States and Soviet Union possessed nearly seventy thousand nuclear weapons, many perched on intercontinental missiles pointed directly at each other. The two adversaries also had tactical nuclear weapons deployed in twelve countries—many poorly secured or with the authority to use them resting with local military commanders.31 In the event of a full-scale superpower conflict, human life as we know it would have likely ceased to exist. Since Americans misremember what happened during the Cold War—and forget how real the threat of nuclear conflict was—they are far more prone to accept claims that the world is less stable and safe today. One more reason Americans perceive the world to be so dangerous is that the overwhelming foreign policy focus of government leaders, Congress, and the media is on the Middle East and North Africa (MENA). Chronic political instability, proxy wars, and occasional interstate wars have long come to dominate the region. Indeed in 2017 alone, eight of nineteen MENA countries experienced intrastate conflicts (noninternational conflicts that resulted in twenty-five or more battlefield deaths).32 That is the exception, not the rule, in comparison to every other part of the world. Though the MENA region gets oversized media attention, it constitutes less than 5 percent of the world’s population and is not representative of the overwhelming majority of the planet’s seven and a half billion residents. Painting a picture of the world solely using the chaotic and violent imagery from the Middle East severely distorts one’s image of global affairs. More Freedom The world is not merely safer than ever before; it has also become demonstrably freer over the past quarter century. Just as the Cold War is misremembered for being an era of relative peace and stability, it is often forgotten that the world then was defined far more by authoritarianism and totalitarianism than by democracy. In most corners of the globe, political freedom represented an aspirational, seemingly unachievable, goal. Today, even in the face of troubling reversals and assaults on democracy, a greater percentage of people are freer than before. They enjoy personal, political, and economic self-determination that would have been unimaginable to most people living outside the United States and western Europe just thirty years ago. In November 1989, as the Berlin Wall was being dismantled, there were just 69 electoral democracies in the world, or 41 percent of 167 countries in total. Today, according to the Freedom House Index, that number is 116 (out of 196 countries), or 59 percent.33 In the 1980s, Latin America was mired in economic stagnation, social injustice, persistent conflict (both civil wars and cross-border conflicts), and above all, an almost complete lack of democratic governance. In Chile in 1973, a democratic election was overturned by a military coup, leading to dictatorship, widespread human rights abuses, and a full-fledged economic crisis. In Argentina, a military junta invaded the Falkland Islands in 1982, sparking a pointless war with the United Kingdom. Throughout the late ’70s and ’80s, Central America became a hotbed of human rights abuses, civilian massacres, and economic deprivation, fueled by superpower competition between Washington and Moscow. Today, while economic and political progress across the region has been uneven and backsliding is evident, all of Latin America—with the exception of Venezuela and Cuba—is today designated as “free” or “partly free” by Freedom House. Thirty years ago in Europe, half the continent was under the thumb of totalitarian leaders, basic freedoms were restricted, and barbed-wire-topped walls prevented citizens from traveling outside their borders. With the exception of Belarus and Russia, every country in western and eastern Europe is today considered a free or partly free democracy. In the Far East, South Korea, Mongolia, and Taiwan—countries once (wrongly) considered by Western academics as culturally inappropriate for political liberalization—have become full-fledged democracies. Even in sub-Saharan Africa, which has experienced a decline or stagnation in democratization since 2005, the majority of people live in free or partly free countries.34 Once again, it is the Middle East that remains outside the global shift toward greater political freedom, with only Tunisia and Israel being considered free countries and a handful ranked as partly free.35 These gains have also led to greater political stability as there has been a marked decline in the number of coup attempts across the globe over the past three decades.36 The Polity IV project, a widely respected data source of global governance trends, assigns “polity scores” to states to quantify their governing authority on a scale of –10 to +10. It does this by coding democratic and autocratic traits, such as political participation, competitiveness of political leadership positions, and constraints on the chief of state. A polity score of +10 would be a full democracy, such as Sweden, while a –10 would be a severe autocracy, such as North Korea.37 In 1989, the average score for all governments was –0.5, the equivalent of an Afghanistan governance score by the latest rankings. By 2016, it had moved all the way to +4.3.38 Meanwhile, today a country with a score of –0.5 would be somewhere between Afghanistan and the Central African Republic. Moreover, when changes in polity scores from 1949 to 2014 are tracked against changes in “human rights scores” over the same period, a hopeful trend is apparent: as countries become more democratic, their respect for human rights also increases.39 Democratic progress, however, remains fragile, and according to Freedom House—which tracks relative democratic rankings—global freedom has declined for the past twelve years. In aspiring great and midlevel powers such as China, Russia, and Turkey, there has been a disturbing uptick in autocratic behaviors. In all three countries, there’s been the silencing and even murder of independent journalists, the overregulation and harassment of civil society organizations, consolidation of political rule by authoritarian leaders, and more centralized control of security forces. Notable and troubling declines are also evident in the Philippines, Poland, Hungary, and Nicaragua. Moreover, confidence in elected officials in strongly democratic countries—including the United States and in western Europe—has notably fallen in recent years as populist, nativist, and xenophobic political movements have made inroads.40 The extraordinary democratic progress made in the years after the fall of the Berlin Wall is now moving in the opposite direction. Struggles for more entrenched democratization and personal freedoms are constantly contested, messy, and even bloody affairs—and many young democracies go through extended periods of political turmoil. Those who hold power generally seek to exercise it with the fewest possible restraints, and those restraints are growing. Indeed, if there is one area where the path of human progress could potentially be slowed or even reversed, it is on the expansion of political freedom. The growing disinterest among U.S. policy makers toward the issue—and the cultivation of authoritarian leaders by President Donald Trump—will undoubtedly make this situation worse. Yet the path of progress over the past thirty years cannot be denied. Quite simply, the world is far more democratic and free today than it was during the height of the Cold War. Why Does This Matter for America? While fewer armed conflicts and increased political freedom is good news for the vast majority of the world’s seven and a half billion people, it is also great news for America. If there is one relatively ironclad rule of international affairs, it is that democracies tend to have happier, healthier, and better-educated citizens. They almost never go to war with other democracies, much less even threaten each other; and they are also far less likely to find themselves in conflict with nondemocratic governments.41 A world that is relatively freer and thus less conflict-prone is one that is indisputably better for the United States. It means the U.S. homeland is less likely to be threatened or attacked by great powers with conventional or nuclear weapons. It means treaty allies are not at war, and as a result, the U.S. military is not required to come to their defense. Indeed, in 2015, only five armed conflicts (all internal) took place in countries that are U.S. treaty allies: Philippines (two of them), Colombia, Thailand, and Turkey.42 It means that fewer countries host or sponsor transnational terrorist groups dedicated to attacking the United States, its citizens, or its overseas diplomatic facilities. It means there are fewer disruptions to global flows of trade, tourism, and energy supplies that benefit the U.S. economy and American jobs. It means fewer people grow up in societies where hopelessness, resentment, and alienation make them susceptible to the appeals of violent extremists. Finally, it means governments are more likely to cooperate on transnational challenges such as fighting climate change, preventing the spread of infectious diseases, lowering the barriers to global trade and furthering human development.43 Since terrorism dominates contemporary foreign policy debates, Americans might immediately ask, “What about 9/11?” Understandably, the September 11, 2001, attacks are deeply imprinted into our national consciousness and will remain an inflection point for the division of historical eras, similar to the “Cold War” and “post-Cold War” eras. Yet it is important to understand just how tragically lucky al-Qaeda was on 9/11 and why the attacks were such an anomaly. U.S. homeland security policies, intelligence cooperation, and commercial aviation security were hugely deficient, and this combined negligence made America needlessly vulnerable. As we will detail later, the United States is vastly safer today from such a mass-casualty terror attack. There are still terrorist groups seeking to kill Americans on American soil, yet they have been overwhelmingly unsuccessful in their efforts to do so. Since 9/11, 103 Americans have been killed within the United States by jihadist terrorists or affiliated terrorist actors, which is almost the same number of Americans killed in hate-crime attacks since 2002.44 Since 9/11, 402 U.S. citizens have died in terrorist incidents while living abroad, but nearly 75 percent of them died working as diplomats, contractors, aid workers, or journalists in Iraq, Syria, Pakistan, and Afghanistan—the very places where the United States started wars and continues to conduct air strikes to destroy terrorist safe havens.45 It is tragic but unsurprising that individuals bravely serving in places where conflict is occurring face severely heightened risks to their personal safety, but that does not mean Americans should feel at increased risk of being killed by terrorists.46 Indeed, at the same time that Americans have become safer from terrorism, such attacks have increased globally. In 2002, there were fewer than 200 terror incidents worldwide, which killed a total of 725 people; in 2017, there were 8,584 incidents, which took the lives of 18,753 people, one-quarter of whom were the perpetrators.47 Yet seventy percent of all these fatalities occurred in just five countries: Afghanistan, Iraq, Nigeria, Somalia, and Syria. The perpetrators are relatively weak, nonstate actors using violence to achieve their political objectives, while the victims are overwhelmingly civilians (who themselves are overwhelmingly Muslims) caught between government security forces that cannot protect them and terrorist armies willing to kill them. Even in these five countries, however, there have been notable improvements, especially within Pakistan, which has experienced a decline in civilian deaths from terrorism every year between 2012 and 2017, with 3,007 deaths in 2012 and 540 in 2017.48 Contrary to General Dempsey’s apocalyptic warnings, the world that existed on February 16, 2012, was far less dangerous than at any point since he had been alive—and it remains so today. In the years after the end of the Cold War, many foreign policy analysts predicted a very different world—a “coming chaos” of continuous ethnic conflicts and genocidal civil wars.49 The political scientist Samuel Huntington warned of a potential “clash of civilizations,” while John Mearsheimer wrote ominously in the pages of the Atlantic that we would soon miss the Cold War.50 The journalist Robert Kaplan predicted that the post-Cold War years would be defined by “anarchy” and regional wars sparked by ancient, tribal hatreds. U.S. senator Daniel Patrick Moynihan warned that renewed ethnic tensions could turn the planet into a “pandaemonium.”51 Contrary to this drumbeat of doomsaying, globalization failed to produce the xenophobia and unchecked ethnic and racial hatreds that were confidently predicted.52 If anything, the end of the Cold War led to a period of expanded global commerce, communications, and travel, as well as vastly higher living standards for the majority of people on earth. Global and regional cooperation, not competition, is the defining characteristic of international politics today. That includes national governments, corporations, industry associations, nongovernmental organizations, and individual citizens. As we demonstrate in the following chapter, the world is not just safer and freer; it is a far better place to live now than at pretty much any point in the history of the human race. Healthier, Wealthier, Better Educated, and More Interconnected When you look at all the measures of well-being in the world, if you had a choice of when to be born and you didn't know ahead of time who you were going to be—what nationality, whether you were male or female. v/hat religion—but you had said. ‘When in human history would be the best time to be born?'” the time would be now. —President Barack Obama, September 7,201 a In 2013, a Swedish research firm wanted to know what the residents of the world's most powerful and influential nation knew about the world outside its borders.: What it found out is not pretty. That its survey showed the American people lacked detailed knowledge about global affairs was unsurprising. More interesting, however, is the way Americans are wrong. Eighty-three percent believed that less than half of the world's children had been vaccinated for measles. In fact. 85 percent of kids have received this life-saving vaccines. Americans underestimated the number of adults with basic literacy skills (a majority guessed 00 percent; it is actually 30 percent). Most telling, however, was the response to a question about the proportion of people in the world living in extreme poverty. Two-thirds said the global poverty rate had "almost doubled.\*’ 29 percent said it has •‘remained more or less the same,\* and a mere 5 percent picked what was then the correct answer—that it has been cut in half. This survey is an incomplete snapshot, but it is backed up by other data. When Americans were polled in the fall of 2017 about their perceptions of the world, just 10 percent agreed that “the world is getting better;" while nearly four times as marry (63 percent) thought it was getting worse.! A 2010 poll found that 92 percent of Americans believed that extreme poverty has either increased or stayed the same over the past two decades.! In short. Americans think the world is a pretty lousy place. That means they are missing the most important international story of any of our lifetimes—namely, that it has never been a better time to be a human being than right now. Today, the seven and a half billion people who reside on our planet live longer lives; are better educated; have greater access to health care, sanitation, and food; and are far less likely to live in extreme poverty. These improvements, most of which have occurred over the previous two to three decades, have reduced the potential for military conflict, created social and economic opportunities for women and girls that previously never existed, and improved the happiness and quality of life for billions of people. Indeed, these are the fastest and most extraordinary advances in human progress in the history of the species. Recognizing and celebrating this unprecedented improvement in the human experience does not mean that global development work has reached its conclusion. Neither does it diminish the obstacles facing those who continue to lack access to health services or live in countries where poverty eradication has stalled, which increasingly includes the United States. There are still hundreds of millions of people around the world who remain in dire need. However, to overlook positive social trendlines ignores the unquestioned successes of global development endeavors and further cements the pessimistic view that little can be done to improve the lives of others. If recent history teaches us anything, it is that the opposite is true—the power to enhance people's lives for the better is overwhelmingly within our grasp. These vast improvements in the health and well-being of people outside the United States—and the increased global interconnectivity among governments, markets, and people—matters a great deal for ordinary Americans. The United States has global interests that range from protecting treaty allies and preventing nuclear proliferation to expanding export markets. Those interests are far better secured when children across the world are in school learning, women are able to work and have greater control of their bodies and their lives, and people's time on earth is longer, happier, and more fulfilling. All of these factors are strongly correlated with greater political stability and lesser chances for conflict. Fewer states at war means reduced regional tensions that may otherwise compel a government to obtain weapons of mass destruction and more stable and prosperous economies to purchase American goods and services. When the world is a better place for more people, it is also a better place for the United States. How the World Became Far Better for Far More People Why has the world become such a wealthier, healthier, freer, and less violent place? It is no coincidence that it began to occur at the same time that the Cold War was winding down. As communism was cast into the ashbin of history, once-closed-off countries adopted policies that made them more economically dynamic and interdependent. At the same time, new information technologies became increasingly ubiquitous—even in some of the world’s poorest countries. Take the experience of China. Beginning in the early 1990s. Chinese leaders opened their country to foreign investment and global trade. Economic growth became a national priority, and while the reigning Communist Party stubbornly clung to one-party rule, it began to loosen the political, economic, and social restrictions that had impeded the country's development. Similar efforts at moving to a more-market-based economy began in India, the world's second-most-populous country. Between 1990 and 2010, GDP per capita increased by $7,300 in China and $1,350 in lndia.1 The success of the world's two most populous nations in raising living standards has been a critical driver of global social and economic change. But the advances in the human condition over the past several decades have hardly been restricted to these two nations. In practically every country on earth, there have been significant and notable improvements in reducing poverty, extending life expectancies, and improving health outcomes. TO chart that growth, a good place to start is the Millennium Development Coals (MDGs). The MDGs are an initiative that will be familiar to few Americans outside the world of global development. Indeed, even for most foreign policy professionals, the MDGs are not well understood or appreciated. But this landmark commitment—agreed to unanimously by all 193 countries in September 2000—has been translated into eight sweeping goals that have transformed the developing world and changed the lives of hundreds of millions of people for the better. Moreover, the MDGs offer a compelling lesson of how the international community can continue to work together for the common global good—which will be essential as world leaders face the growing and potentially calamitous threat of climate change. When the MDGs were initially proposed, development trend lines were already moving in a more positive direction, but their global adoption brought more sustained political focus and consolidated numerous governmental and nongovernmental resources. By definition, the creation of strategic goals only occurs when leaders and states agree that they want to accelerate progress. The MDGs represented concrete and actionable goals that every country in the world supported. Moreover, they created metrics that allow us to assess the trajectory of human development—and the results speak for themselves. The first and most essential MDG was aimed at eradicating extreme poverty and hunger—and for good reason. Reducing poverty, besides making life better, opens up innumerable economic opportunities: more food, more leisure, longer lives, and perhaps, above all else, lowers economic anxiety and stress. It means children in developing countries are more likely to live past their fifth birthday. It means they go to school, rather than toil infields or factories. And it means they will have access to healthcare that will ensure they will not be felled by preventable diseases and illnesses. Mothers who have confidence that their children will not just survive into adolescence and adulthood but have an opportunity for success will get pregnant less often. With fewer kids to care for, women are more likely to enter the workforce, which increases overall household wealth. Higher income means that even the smallest luxuries of life—which people in the devel- oped world take for granted, such as taking a vacation, buying a toy, or getting an ice cream cone as a treat for our children—suddenly become available. Quite simply, a life not lived in poverty means far greater happiness.L Since 1990. the reduction in global poverty rates has been astounding-Over the past twenty-eight years, the number of people in the developing world living on less than $1.25 a day (a traditional definition for extreme poverty) has been reduced by one billion! Back then, approximately half the developing world was mired in such crippling poverty; today, it is fewer than one in ten, and it continues to drop year after year, with further reductions challenging but likely.! China accounts for much of this decline, having seen its extreme poverty rate drop by 60 percent in just eighteen years. This means that by 2017 more than eight hundred million Chinese citizens had been lifted out of economic deprivation.. But China's evolution has been replicated in countries across the globe. Iran's poverty rate has gone from 17.6 percent in 1986 to under 1 percent in 2014!£ El Salvador's fell from 36 percent in 1989 to 1.9 percent in 20 IS. and Ethiopia went from 92 percent in 1981 to under 30 percent today.il The underlying cause for these rapid improvements has been the end of conflict: bloody civil wars in El Salvador and Ethiopia and. for Iran, the end to a brutal eight-year struggle with Iraq. It is yet another reminder that fewer wars and greater peace and stability bring enormous residual benefits. In other places, however, the story is simpler: countries liberalized their economies and removed trade barriers that prevented them from selling their products overseas. They attracted new investment and new businesses with the advantage of lower labor costs. They sent workers overseas to send back remittances to family members, and at home, they strengthened the social safety net to help give those who were mired in poverty a helping hand. And perhaps above all, as more countries became democratic, it put pressure on political leaders to keep the good economic times going—or face the potential prospect of losing their own jobs. We can see positive results from Brazil, where the poverty rate dropped from 20 percent in 1990 to just 4.3 percent in 201 5!! In Namibia, it went from 69 percent in 1993 to 27 percent in 201S!land in Bangladesh, it dropped from 44 percent in 1990 to 24.3 percent in 2016.11 While these countries still face serious social and economic challenges, their success in reducing poverty is staggering. As for hunger, the trend lines are similarly positive. In 1990, about one in five people in the developing world suffered from undernourishment. Since then, that number has been cut in half—i At one time, famine was one of the world's worst killers. In the 1960s alone, it took the lives of more than eighteen million people. Biafra. Bangladesh, North Korea, and Ethiopia had all been witness to famines that killed more than a million in each country. China is estimated to have lost thirty million people during the 19SOs and '60s in a famine caused, in part, by horribly misguided government policies. By contrast, from 2010 through 2016. the number of people killed in famine was around a quarter of a million—a tragedy, of course, but also an indication of how far the world has come in preventing such deaths!! The MDGs also established benchmarks for universal primary education and promoted greater gender equality by ensuring that young girls had the same opportunity to go to school as young boys. The benefits of such a strategy are self-evident: abetter-educated populace means that more people can read and write. When more people are literate, that translates into a workforce that is more highly skilled and innovative, less unequal, and more productive. But the benefits of education are particularly important when it comes to young women. Girls who are enrolled in school at a young age are more likely to get married later in life. They have fewer children and thus lower levels of poverty. They are at reduced danger of the most common and acute diseases that have long ravaged the developing world. And girls who are given the chance to attend school along with their male peers are more likely to grow up to be women who arc socially and per- sonally empowered to take control of their own destiny. Ask any development expert about the best way to lift up adeveloping economy, and virtually all of them will give you the same answer: make sure girls are going to school.il Increasingly that is exactly what is happening. Primary-education enrollment rates in the developing world have jumped from 33 percent in 2000 to 91 percent today.!! That might seem like a relatively small rise, but, in fact, it means that more than forty million more children spend their day in a classroom today than did fifteen years ago. In 1990. in sub-Saharan Africa, only 4 5 percent of the population received a basic education; today, 80 percent do.il The jump in South Asia and Southeast Asia has gone from 75 percent to 95 percent; and in the Middle East and North Africa, from 63 percent to 95 percent 11 Today, the global literacy rate stands at 91 percent among young people and 86 percent for adults; in 1990. just 61 percent of the world could read or write!l For young girls, the story is even more positive. In South Asia, in 1990, the girls' literacy rate was 49 percent, and an average of 74 girls compared to lOO boys were in primary school; today, the rate is 85 percent, and the enrollment ratio stands at 103 girls for every lOO boys!\* Across all developing countries, girls are less likely than boys to repeat grades or drop out of school. This has helped to promote steady advances in female labor-force participation (for both formal and informal work)!! Tt>day. a previously unimaginable percentage of young boys and girls around the world are being educated. This both improves lives and. once again, makes the world a safer place, since countries with higher education levels are less likely to find themselves mired in armed conflict.il Two MDGs were aimed at decreasing child mortality and improving maternal health. This has led to notable increases in vaccination rates that have reduced the number of children felled by preventable diseases by more than seven million This decline has helped cut the under-five child mortality rate in half since 1990. That means that every year, 2 72,000 children who two or three decades ago would have died are alive today !! Here, enhanced access to education has had an enormous impact, since increases in education levels for women strongly correlate with reduced levels of childhood mortality!! In the same period, maternal mortality rates have dropped globally by 45 percent, with the sharpest decline occurring from 2000 to 200S.il This means that in 2017, more than 136.000 mothers who would have died a couple of decades ago are alive and able to help raise their children. Finally, the increased availability of family planning op- tions cut the number of unintended pregnancies around the world by 44 percent between 1990 and 2014.21 An MDG focused on combating HIV/AIDS, malaria, and other infectious diseases has been similarly transformative. Since 2000. new HIV infections have dropped 45 percent around the world, and more than thirteen million AIDS-related deaths have been averted!: Additionally, tuberculosis prevention and treatment saved an estimated fifty-three million lives, increased measles immunizations prevented more than twenty million deaths between 2000 and 2016, and polio has largely been eradicated. There were just eleven active cases of the disease as of July 2018.11 An oral polio vaccine—delivered with just two drops—and the necessary funding to make it widely available had. as of 2014, saved the lives of more than 650,000 people over the previous twenty-five years!! In March 2018. South Sudan announced that it had eradicated guinea worm, a parasitic illness that causes agonizing and incapacitating pain. In 1986, the disease afflicted three and a half million people in the developing world. In 2017, the number had fallen to thirty, and by May 2018, there were just three reported casesll According to the Carter Center, which has been at the forefront of the guinea-worm eradication effort, close to eighty million cases of the illness have been averted over the past thirty Improved access to safe drinking water and basic sanitation has been another target of the MDGs. The expanded international commitment to these issues has helped more than a fifth of the current global population (1.3 billion people) gain access to sanitation since 200011 In addition to saving the lives of 340,000 children who used to die from diarrhea because they were exposed to dirty water, improved sanitation also keeps children in school instead of sick at home. Even better, children with access to clean drinking water are in better shape physically, cognitively, and even socially!! Nutritional advances have come so quickly and been so significant that public health officials now express concern over what is known as the 'double burden of malnutrition,'’ in which developing countries are simultaneously experiencing health perils generally associated with being overweight as well as those from undernourishment. Amazingly, obesity now poses greater harm globally than lack of adequate nutrition does, a phenomenon that would have been unimaginable even a quarter century ago.!! What is perhaps most remarkable about all this sweeping progress is that it was achieved at the same time that the planet's population grew by one and a half billion people, and global life expectancy increased by more than five full years since the MDGs were announced in 2000!! Yet for all of the success of the MDGs (and also the full panoply of public health and human development changes), they are rarely mentioned in current foreign policy debates. Long-term positive trends go largely unreported, with the focus instead, almost exclusively, on-hard" security issues, such as coercive “redlines," nuclear weapons, terrorism, and drone strikes. Highlighting polio eradication, for example, does not drive internet clicks, justify’ a larger Pentagon budget, or motivate voters to support a more interventionist foreign policy. In the United States, good news about the world has little political salience, and it is sim- ply not deemed newsworthy. The development scholar Laura Freschi pithily captured why this phenomenon matters. She observed in 2010 that more Americans believed that their president was a Muslim than had heard of the improvements in quality of life on our planet!! Global Interconnectivity While the global development community deserves enormous credit for many of the advances chronicled above, they drafted off of historic geopolitical changes. When the Cold War ended, the most resonant image was the fall of the Berlin Wall on November 9. 1939. The pictures of Germans chipping away at the barrier that hid separated them for thirty-eight years—and the pictures of supposed enemies joyfully embracing—were poignant reminders of the universal desire for freedom. From that moment forward, hundreds of millions of people around the world—from Jakarta to Johannesburg and Managua to Minsk—began choosing their own leaders, holding them accountable, and voicing their opinions without the government interference they endured while living under dictatorship. Yet, in the nearly thirty years since that epoch-making event, it is the economic bonds built between peoples and countries that have played the leading role in changing the human experience for the better. Communism, by its very nature, was an overwhelmingly closed economic system that purposely avoided commercial and business ties with capitalist nations. Even countries outside the Soviet and Chinese orbits often pursued economic policies that protected failing native industries; suppressed talented entrepreneurs, investment, economic innovation, and development: and. more generally, shut the door to the outside world. But with the breakup of the Soviet Union and the gradual shift in China toward an export-driven economic strategy, all of that began to change. China transitioned along with its regional neighbors—Japan and South Korea and then Taiwan. Singapore, and Hong Kong. Even in noncommunist countries like India and Brazil, the end of the Cold War ushered out protectionist policies in favor of those seeking foreign investment, encouraging entrepreneurship, and creating new and vibrant trade links. Tariffs went down, and subsidies were slowly eased out, as countries worked to fashion themselves into more attractive investment destinations for global businesses. The results are overwhelming. Foreign direct investment in the developing world has gone from $20 billion a year in 1990 to Jo 53 billion in 2017, while private capital flaws went from $91 billion to $1.2 trillion during the same time.li Emerging economies are today deeply reliant on international trade not only as a means of development and job creation but also for attracting new capital investments and technical expertise. The result is stronger and more diversified economies, higher productivity, significant improvements in the welfare of women, and of course, reduced poverty.:\*® Recent trends, such as a decline inG-20 imports and new trade restrictions, suggest that this economic openness has slowed—the consequences of which have been hundreds of billions of dollars in lost global GDP.il In addition, while the process of globalization has contributed to higher living standards, it can contribute to greater income inequality and has given impetus to nativist and anti-immigrant movements in Europe and the United States. These are issues of serious concern, and if they go unaddressed in Western democracies, it could undermine the economic progress made over the past quarter century. Nonetheless, it is undoubtedly true that far more people have benefited from globalization than have been harmed.42 From the perspective of global security, the benefits are even more clear-cut because when a country trades with other states, it significantly diminishes the likelihood of conflict. Doubling a country's international commerce can reduce its risk of interstate violence by up to 30 percent, while countries with no regional trade tics are more than twice as likely as their highly integrated neighbors to experience a civil war.43 Similarly, when a country experiences an increase in foreign direct investment, it significantly improves the welfare of women and reduces the likelihood that the country will participate in an armed conflict.44 Being an active participant in today's globalized economy does not eliminate the possibility of a country going to war, as is evinced by America's ongoing military operations in Afghanistan. Iraq, and Syria. However, it is a fact that countries with increased economic interconnectivity are less likely to find themselves mired in conflict. The Smartphone Story The foregoing numbers, while impressive, do not fully do justice to the impact of economic integration over the past few decades. Visualizing the spectrum of changes that global interdependence has wrought is as simple as reaching into your pocket and pulling out your phone. That device that you use to talk to and text with your friends and family, get news, watch soccer or basketball clips, find out what the president of the United States just tweeted, or play Words wick Friends offers one of the best possible explanations for how the world has become more connected, wealthier, and safer—and why it is likely to stay that way. Since there are many smartphones, let's pick the one that is perhaps most ubiquitous: Apple’s iPhone. Since its introduction in 2007, the iPhone has improved productivity, sped up communications, and allowed for more people to live and work remotely from their employers, customers, or clients. The iPhone is sold in more than 130 countries—a symbolic example of how the removal of trade barriers has spurred the rapid adoption of transformative technologies in both rich and poor countries. Some 725 million smartphones were sold in 2012, increasing to more than l.S billion by 2010, of which more than 000 million went to emerging-market customers from China. India, Brazil, and IndonesiaJi. Additionally, while mobile internet usage in Western countries is increasing fourfold annually, it is rising twenty-seven-fold in developing countries. There are 5.2 billion smartphone subscriptions globally, with 3.5 billion projected by 2023—and most of them will be in the developing world.iLIn many countries, there arc actually more cell phones than people. In places like Afghanistan, one of the poorest countries in the world, the landscape is defined by omnipresent cell towers that now provide mobile services to more than 80 percent of the population.47 The iPhone contains components that have been developed and manufactured in multiple countries, which exemplifies how patent protections, increased foreign investment, and globalized supply chains have spread economic development across the globe. Take, for example, the iPhone X, which was released in fall 2017. Its accelerometer comes from the German firm Bosch, the display screen from the South Korea-based giant Samsung, the electronic compass from the Japanese firm Alps Electronic Company, and various radio-frequency components from Sky works Solutions, a compary located in a suburb of Boston. Massachu- setts \_li The iPhone X was assembled at a Taiwanese-owned Foxconn plant in southern China, which is emblematic of the inflow of low-wage manufacturing jobs that have taken the world's most populous nation from impoverishment to becoming among the most dynamic and steadily growing economies in the world. The iPhone and the internet access it provides have further empowered hundreds of millions of people in developing nations. From Tunisia to Egypt's Tahrir Square and in multiple elections in fledgling democracies, ordinary citizens have used their cell phones to safeguard votes against electoral fraud and organize activists and pro-democracy demonstrators. Mobile technology and social media apps have made it possible for citizens to compile damning information about their governments, report abuses to news outlets outside their communities, and more easily publicize those abuses on a variety of social media plat- forms. This has even, ironically, become a problem for Apple itself- In 2012. after workers at the company's Foxconn factories in China documented and publicized poor working conditions there. Apple agreed to independent audits of the facilities by the Fair Labor Association. Here in America, cell-phone cameras have served as an invaluable tool for documenting and holding local police officers accountable for police shootings and gave critical impetus to the Black Lives Matter movement. Governments have also occasionally used mobile technology to expand democratic participation. In 2014, Libya's election commission worked with the firm Reboot to digitize the country's voter registration system, making it possible for voters (including diaspora Libyan citizens) to register for upcoming parliamentary elections on their phones. Considering that mobile penetration in Libya stood at nearly 150 percent, it was amove that made more sense than asking Libyans to register in person. More than l.l million citizens living in Libya and thirteen other countries were successfully signed up. and the system is still being used today to manage voter rolls. Libya remains fractured along ethnic and geographic lines, but the digital voting infrastructure remains in place if political leaders choose to reuse it in future elections. Communication technologies are, of course, a double-edged sword, and governments have leveraged internet and mobile-phone penetration to spy on, influence, track, and harass their citizens. Journalists, activists, opposition-party leaders, and others have found their phones unknowingly implanted with spyware—often with the assistance of Western cyber security firms—that allows security services to monitor political opponents. Governments have also, at times, blacked or limited access to social media networks on the whims of political leaders. Yet technologically savvy and creative citizens are constantly developing workarounds to such spying—with encrypted communications, like Tt leg ram and WhatsApp, as well as virtual private networks and other digital solutions that are not widely publicized. Government authorities have tried to control the flow of information and communications for centuries, and one should be under no il- lusion that this will not continue for the foreseeable future, ftt never before have so many people been more empowered to learn, connect, and collaborate in real time for relatively little cost. Moreover, one does not need a cutting-edge smartphone to take advantage of the mobile revolution. Basic mobile phones are increasingly essential in those places where citizens do not have access to brick-and-mortar banks or any credit history. Mobile banking is benefiting hundreds of millions of new individuals each year by allowing them to document and save money, safely transfer funds, and pay down loans±l In Kenya, 90 percent of households use mobile phones and mobile money, mostly through a text-message-based payment system called M-PESA.li Researchers found that mobile banking makes it easier for breadwinners to provide for their families or for friends and family to send emergency funds immediately to each other when feeing a health crisis. Between 2003 and 2014, more than 194,000 households were lifted out of poverty and 185,000 women were induced to enter the business world as a direct result of the soci- etal shift provided by M-PESA.1L Similarly, smartphones are empowering a wide range of entrepreneurs in all sectors, from small business owners to farmers. For example, a free mobile app called MandiTrades allows farmers in India to receive real-time market information to help manage their crops, upload information about their produce right from the field, and finally connect with markets for salesJ2 In India, where one of the biggest challenges to cell-phone proliferation is getting the devices in the hands of women, wider access to smartphones will make it easier for women to find and apply for jobs outside the home and. as a result, increase their partic- ipation in the workforce. Finally, that iPhone on which you pi a)1 Candy Crush Saga and Fortnitc is also saving lives. In Mozambique, for example, a free app alerts patients with HIV or tuberculosis when to take their medicine and reminds them of upcoming appointments.!! Other programs send text messages and voice mails to new and expectant mothers, with basic advice on nutrition, health, and immunization schedules. In Bangladesh, the Mobile Alliance for Maternal Action has reached more than five hundred thousand pregnant women and new moms” In Pakistan, targeted calls from provincial educational officials and local school council members increased the school enrollment rates for young girls by 12 percent-11 More broadly, in classrooms around the developing world, tablets and cell phones are increasingly replacing books and notepads, as students can now download reading assignments directly, helping to improve literacy and promote reading. There are hundreds, if not thousands, more stories that speak to the direct positive impact that mobile technology has had on global public health, the promotion of democracy, the improvement of educational outcomes, and the expansion of economic growth. But there is one behind-the-scenes component that makes all of this possible. What, for example, protects the patents used to develop the iPhone? The answer: international treaties (starting with the Paris Convention for the Protection of Industrial Property of 18 84) that uphold patent rights and bolster international organizations (namely, the Patent Cooperation Treaty), which ensures that Apple's intellectual property rights are protected. What makes it possible for you to get on a plane, fly to China, anduseaphone as if you were in your home country? Answer: several international agreements (starting with the International Convention for the Protection of Submarine Telegraph Cables, also of 1884) and industry groups (particularly the International Cable Protection Committee), which govern and share best practices for laying and maintaining undersea cables. This might seem minor, but keep in mind that these three hundred transoceanic cables stretching six hundred thousand miles are responsible for 95 percent of the world's internet, phone, and data traffic. This overlapping web of reciprocal agreements and international understandings is unknown to all but a few Americans. But the ability to connect people, ideas, and markets from every corner of the earth is the direct result of an international system that is specifically constructed to further global coopera- tion. That iPhone in your hand tells the story of an interdependent and interconnected world that would have been unimaginable just a generation ago. Why should Americans care that the world has become a far better place for far more people than ever before? Because a world that is more prosperous, healthier, better educated, and closely connected is a less chaotic and violent place—and more likely to stay that way22 Countries that are more democratic are also more politically stable and more open to trade and foreign investment that is likely to benefit American workers and consumers 1\_1 Yet, despite all of these remarkable gains, there is significant work to be done. Eight hundred million people still live in extreme poverty, 100 million children under age five do not get enough to eat, and 01 million are not attending school. Only half of the 30.7 million who are living with HIV in developing regions receive antiviral treatments, and 884 million people still lack adequate drinking water.!! These numbers are sobering, and they demand greater resources and a more concerted effort on the part of the international community.!! But the fact that sizable problems remain cannot take away from the sustained progress that has been made. Domestic politics, in part, explain why Americans remain unaware of these tremendous changes. Stating that the world is actually a pretty safe and much-better place to live is somehow a taboo, a sign of naivete, or deeply insensitive in light of the real harms experienced by Americans. Yet politicians should recognize and celebrate the positive accomplishments that have improved the lives of so man)' people, and U5 citizens should come to expect this from their elected leaders. All too rarely have U.S. '\*national interests" included advancing the health, well-being, and economic opportunities of humanity. But the top foreign pol- icy priority for whoever sits in the Oval Office or controls Congress should be precisely that—not just because it is the right thing do but also because it makes America safer.

#### Cap good and root cause narrative wrong – inefficiencies in the market cause environmental damage net more

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Pierre. “Solving global warming: Don’t “tear down capitalism.” Just be a bit more like Sweden” <https://ora.ox.ac.uk/objects/uuid:274c499d-d4ed-436c-aa90-24634aeecbee/download_file?safe_filename=BASSwedenDecarb.pdf&file_format=application%2Fpdf&type_of_work=Journal+article>

It is surprising and frustrating that, at a time of increasingly overwhelming evidence that human caused global warming poses a serious problem, public support in the United States for actions of the magnitude required has stubbornly remained tepid for decades. Despite wholehearted denial that there is even a problem— a stance which makes them unique even among the world’s conservative political parties—the US’ Republican party is able to garner the support of about half of all voters. While the United States is not alone in failing to meet the challenge of global warming, its status as one of the world’s top emitters of carbon dioxide (the chief cause of global warming) makes its recalcitrance especially problematic.

In my experience, inaction on restraining carbon dioxide emissions does not stem from insufficient understanding of the science or insufficient fear of the consequences of warming. Instead, it is more due to excessive fear of the nature of the solutions. On the political right, this takes the form of a fear that it is all a thinly disguised leftist plot to impose socialism. Naomi Klein’s recent book, This Changes Everything: Capitalism vs the Climate, plays directly into this fear. Klein’s thesis is that capitalism is structurally unable to meet the challenge of getting fossil fuels out of the economy (Klein 2014; see also the November interview with Klein on the Bulletin’s website: http://thebulletin.org/naomi-klein-climate-change-makes-hotter-and-meanerworld8910). But while Klein is right about many things, including the problem’s urgency and the need for most of the world to take a different course from what is happening right now, she is quite wrong about the root cause of the current inadequate response to global warming.

The problem is not too much capitalism, but rather too little of it, and even a lack of faith in the power of the ingenuity unleashed by capitalism to solve big problems. As currently practiced, US capitalism, far from being the archetype of a free-market economy, is riddled with fossil fuel subsidies and hobbled by politically powerful corporate stakeholders who have used their influence to protect the value of their fossil-fuel assets, regardless of how bad this may be for the rest of the economy. And even free markets cannot function properly if burdened by “externalities,” such as polluters not having to pay for the damage they cause. It’s a case of privatizing the profits while shunting the expenses off to the public.

To break the current impasse, we need to look to success stories for reassurance that decarbonization

#### Carbon capture is necessary to reach emissions targets – we’ve gone past core tipping points and can’t decarbonize in time absent CCS

Moniz 19 - 13th Secretary of Energy (2013 to 2017) and is the founder and CEO of the Energy Futures Initiative

Fredd Krupp is president of the Environmental Defense Fund, Ernest Moniz, “Cutting Climate Pollution Isn’t Enough — We Also Need Carbon Removal,” Text, TheHill, September 23, 2019, <https://thehill.com/opinion/energy-environment/462609-cutting-climate-pollution-isnt-enough-we-also-need-carbon-removal>.

It has been almost four years since the Paris climate agreement was signed. But as leaders gather in New York this week for the United Nations Climate Change Summit, the world remains far off track from meeting the Paris objective of limiting global warming to well below 2 degrees Celsius -- and pursuing efforts at 1.5 degrees.

To meet that target, the world must achieve a 100 percent clean economy — one that produces net zero emissions, or no more climate pollution than can be removed from the atmosphere — soon after mid-century, with the United States and other advanced economies reaching that milestone no later than 2050. It’s a daunting but doable task.

The consequences of falling short are enormous. This year, the U.S. government’s fourth National Climate Assessment documented the huge economic and social impacts of unchecked warming. The Pentagon has repeatedly warned of the impacts on national security and our troops.

Achieving a 100 percent clean economy will require a swift transition to renewables and other zero-carbon energy sources. But we also need to face the reality that meeting the Paris target will require taking carbon out of the atmosphere at massive scale. In part, that’s because eliminating emissions will be very challenging for some sectors, especially the transportation industry and agriculture. Removing carbon from the atmosphere would also bring concentrations down, helping to stabilize the climate at safer levels. So, the push for clean energy must be supplemented by a suite of technologies known as carbon dioxide removal (CDR).

It is not a question of what we’d prefer. It’s a question of insurmountable math.

The crucial role carbon removal must play is becoming more widely recognized. The 2018 Intergovernmental Panel on Climate Change report stressed the importance of carbon removal, and the U.S. National Academies of Sciences, Engineering and Medicine late last year estimated that ten billion tons of CO2 will need to be pulled from the atmosphere annually by 2050, and double that by 2100. For context, today’s global emissions are less than 40 billion tons per year. If the 10 billion tons of CO2 from CDR were stored underground, that would be roughly double the world’s annual oil production.

The good news is that there are a surprisingly large number of promising pathways for carbon dioxide removal. Nature-based approaches include reforestation and forest management as well as agricultural practices that increase carbon stored in soils. Some of the attendant challenges include competition for land and permanence of the carbon sequestration.

Technological approaches include direct air capture — machines that actually suck carbon from the air — and technologically-enhanced natural processes, such as plants genetically modified with deep roots to fix carbon in the soil; enhanced mineralization, which uses certain reactive rocks to bind with carbon from the air; and accelerated ocean uptake in phytoplankton. These technologies are immature and require considerable research, development and demonstration to ensure viability and affordability at very large scale.

Despite the urgency, there is no dedicated federal effort to develop these crucial technologies; existing programs are piecemeal and largely focused on sequestering emissions from industrial and electricity generating sources.

The National Academies recommended the rapid establishment of a robust, focused, scalable and accelerated federal research program spanning the Departments of Energy and Agriculture, the National Oceanic and Atmospheric Administration and the National Science Foundation, among others. Such a program would encompass the full range of technological pathways that can remove CO2 from the environment. ‘’Clearing the Air,’’ an analysis of CDR’s value and a proposed plan to deploy it, has been completed by the Energy Futures Initiative. Over the next decade, the program scale would be about a billion dollars a year.

Carbon dioxide removal is not a magic bullet. We must do everything we can to deploy innovative low- and zero-carbon methods to generate electricity, heat homes, fuel vehicles, and power industry, creating new economic opportunities in the process. Tackling the climate crisis also requires placing a declining limit and a price on carbon pollution, as well as a significant increase in energy technology innovation and deployment across the board.

But CDR is also not a “Plan B.” It is a critical part of any “Plan A” for climate, a necessary complement to emission reduction. It can provide more flexibility and optionality in policy planning, which could ease the transition to a carbon-neutral economy while minimizing transition costs and providing greater assurance that science-based climate goals can be met in a timely manner. It would eventually enable a net negative global economy that could bring the atmospheric carbon concentrations down — and global temperatures with it.

We have delayed meaningful action for far too long. As a result, the scale and urgency of the challenge is such that we cannot simply work on doing better in the future. We need to correct what we did in the past. Carbon removal is the enabler.

#### NO shortages --- Tech and inevitable adaptation prevent environment scenarios and resource wars

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Ronald. March 12. “Climate Change Problems Will Be Solved Through Economic Growth” <https://reason.com/blog/2018/03/12/climate-change-problems-will-be-solved-t>

"It is, I promise, worse than you think," David Wallace-Wells wrote in an infamously apocalyptic 2017 New York Magazine article. "Indeed, absent a significant adjustment to how billions of humans conduct their lives, parts of the Earth will likely become close to uninhabitable, and other parts horrifically inhospitable, as soon as the end of this century."

The "it" is man-made climate change. Temperatures will become scalding, crops will wither, and rising seas will inundate coastal cities, Wallace-Wells warns. But toward the end of his screed, he somewhat dismissively observes that "by and large, the scientists have an enormous confidence in the ingenuity of humans....Now we've found a way to engineer our own doomsday, and surely we will find a way to engineer our way out of it, one way or another."

Over at Scientific American, John Horgan considers some eco-modernist views on how humanity will indeed go about engineering our way out of the problems that climate change may pose. In an essay called "Should We Chill Out About Global Warming?," Horgan reports the more dynamic and positive analyses of two eco-modernist thinkers, Harvard psychologist Steven Pinker and science journalist Will Boisvert.

In an essay for The Breakthrough Journal, Pinker notes that such optimism "is commonly dismissed as the 'faith that technology will save us.' In fact, it is a skepticism that the status quo will doom us—that knowledge and behavior will remain frozen in their current state for perpetuity. Indeed, a naive faith in stasis has repeatedly led to prophecies of environmental doomsdays that never happened." In his new book, Enlightenment Now, Pinker points out that "as the world gets richer and more tech-savvy, it dematerializes, decarbonizes, and densifies, sparing land and species." Economic growth and technological progress are the solutions not only to climate change but to most of the problems that bedevil humanity.

Boisvert, meanwhile, tackles and rebuts the apocalyptic prophecies made by eco-pessimists like Wallace-Wells, specifically with regard to food production and availabilty, water supplies, heat waves, and rising seas.

"No, this isn't a denialist screed," Boisvert writes. "Human greenhouse emissions will warm the planet, raise the seas and derange the weather, and the resulting heat, flood and drought will be cataclysmic. Cataclysmic—but not apocalyptic. While the climate upheaval will be large, the consequences for human well-being will be small. Looked at in the broader context of economic development, climate change will barely slow our progress in the effort to raise living standards."

Boisvert proceeds to show how a series of technologies—drought-resistant crops, cheap desalination, widespread adoption of air-conditioning, modern construction techniques—will ameliorate and overcome the problems caused by rising temperatures. He is entirely correct when he notes, "The most inexorable feature of climate-change modeling isn't the advance of the sea but the steady economic growth that will make life better despite global warming."

Horgan, Pinker, and Boisvert are all essentially endorsing what I have called "the progress solution" to climate change. As I wrote in 2009, "It is surely not unreasonable to argue that if one wants to help future generations deal with climate change, the best policies would be those that encourage rapid economic growth. This would endow future generations with the wealth and superior technologies that could be used to handle whatever comes at them including climate change." Six years later I added that that "richer is more climate-friendly, especially for developing countries. Why? Because faster growth means higher incomes, which correlate with lower population growth. Greater wealth also means higher agricultural productivity, freeing up land for forests to grow as well as speedier progress toward developing and deploying cheaper non–fossil fuel energy technologies. These trends can act synergistically to ameliorate man-made climate change."

Horgan concludes, "Greens fear that optimism will foster complacency and hence undermine activism. But I find the essays of Pinker and Boisvert inspiring, not enervating....These days, despair is a bigger problem than optimism." Counseling despair has always been wrong when human ingenuity is left free to solve problems, and that will prove to be the case with climate change as well.

#### Decline guarantees war --- Now uniquely likely

Liu 18 – Dr. Qian Liu, PhD in Economics from Uppsala University, Former Visiting Researcher at the University of California, Berkeley, Managing Director for Greater China at The Economist Group, Guest Lecturer at New York University, Tsinghua University, the Chinese Academy of Social Sciences and Fudan University, “The Next Economic Crisis Could Cause A Global Conflict. Here's Why”, World Economic Forum, 11-13, https://www.weforum.org/agenda/2018/11/the-next-economic-crisis-could-cause-a-global-conflict-heres-why

The next economic crisis is closer than you think. But what you should really worry about is what comes after: in the current social, political, and technological landscape, a prolonged economic crisis, combined with rising income inequality, could well escalate into a major global military conflict.

The 2008-09 global financial crisis almost bankrupted governments and caused systemic collapse. Policymakers managed to pull the global economy back from the brink, using massive monetary stimulus, including quantitative easing and near-zero (or even negative) interest rates.

But monetary stimulus is like an adrenaline shot to jump-start an arrested heart; it can revive the patient, but it does nothing to cure the disease. Treating a sick economy requires structural reforms, which can cover everything from financial and labor markets to tax systems, fertility patterns, and education policies.

Policymakers have utterly failed to pursue such reforms, despite promising to do so. Instead, they have remained preoccupied with politics. From Italy to Germany, forming and sustaining governments now seems to take more time than actual governing. And Greece, for example, has relied on money from international creditors to keep its head (barely) above water, rather than genuinely reforming its pension system or improving its business environment.

The lack of structural reform has meant that the unprecedented excess liquidity that central banks injected into their economies was not allocated to its most efficient uses. Instead, it raised global asset prices to levels even higher than those prevailing before 2008.

In the United States, housing prices are now 8% higher than they were at the peak of the property bubble in 2006, according to the property website Zillow. The price-to-earnings (CAPE) ratio, which measures whether stock-market prices are within a reasonable range, is now higher than it was both in 2008 and at the start of the Great Depression in 1929.

As monetary tightening reveals the vulnerabilities in the real economy, the collapse of asset-price bubbles will trigger another economic crisis – one that could be even more severe than the last, because we have built up a tolerance to our strongest macroeconomic medications. A decade of regular adrenaline shots, in the form of ultra-low interest rates and unconventional monetary policies, has severely depleted their power to stabilize and stimulate the economy.

If history is any guide, the consequences of this mistake could extend far beyond the economy. According to Harvard’s Benjamin Friedman, prolonged periods of economic distress have been characterized also by public antipathy toward minority groups or foreign countries – attitudes that can help to fuel unrest, terrorism, or even war.

For example, during the Great Depression, US President Herbert Hoover signed the 1930 Smoot-Hawley Tariff Act, intended to protect American workers and farmers from foreign competition. In the subsequent five years, global trade shrank by two-thirds. Within a decade, World War II had begun.

To be sure, WWII, like World War I, was caused by a multitude of factors; there is no standard path to war. But there is reason to believe that high levels of inequality can play a significant role in stoking conflict.

According to research by the economist Thomas Piketty, a spike in income inequality is often followed by a great crisis. Income inequality then declines for a while, before rising again, until a new peak – and a new disaster. Though causality has yet to be proven, given the limited number of data points, this correlation should not be taken lightly, especially with wealth and income inequality at historically high levels.

This is all the more worrying in view of the numerous other factors stoking social unrest and diplomatic tension, including technological disruption, a record-breaking migration crisis, anxiety over globalization, political polarization, and rising nationalism. All are symptoms of failed policies that could turn out to be trigger points for a future crisis.

Voters have good reason to be frustrated, but the emotionally appealing populists to whom they are increasingly giving their support are offering ill-advised solutions that will only make matters worse. For example, despite the world’s unprecedented interconnectedness, multilateralism is increasingly being eschewed, as countries – most notably, Donald Trump’s US – pursue unilateral, isolationist policies. Meanwhile, proxy wars are raging in Syria and Yemen.

Against this background, we must take seriously the possibility that the next economic crisis could lead to a large-scale military confrontation. By the logic of the political scientist Samuel Huntington , considering such a scenario could help us avoid it, because it would force us to take action. In this case, the key will be for policymakers to pursue the structural reforms that they have long promised, while replacing finger-pointing and antagonism with a sensible and respectful global dialogue. The alternative may well be global conflagration.

#### Turns democracy

**Halperin 5 –** Morton Haperin, Senior Vice President of the Center for American Progress and Director of the Open Society Policy Center, 2005, The Democracy Advantage, p. 90

This chapter has made the case that **economic stagnation is a threat to de­mocratization**. Over 70 percent of democratic backtrackers experienced economic stagnation in the years preceding their political contraction**.** Moreover, democratizers with more prolonged recessions had a greater tendency to **revert to authoritarianism**.

### 1NC - Space Col Good

#### Mining---colonizing space resources solves bioD loss and resource shortages

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Ram S. Jahku, “The Importance of Natural Resources from Space and Key Challenges,” *Space Mining and Its Regulation*, Published by Springer International Publishing, pp. 11-21. 2017

Coping with the Scale and Complexity Problem

The land area of the entire world is 148.94 million sq. km (or 57.506 million sq. miles), and its water area is 361.132 million sq. km (or 139.434 million sq. miles). About half of that land area is truly viable for year- round habitation when one eliminates most parts of Antarctica, the Arctic north, Siberia, the most dangerous mountain ranges and the most arid desert regions. Rising sea levels will further decrease available land areas. When one divides about 75 million sq. km by 10 billion people (or about 133 people people/sq. km) it becomes clear that rising global population and shrinking land areas and exhaustion of many types of natural resources—especially potable water— will be a growing problem.7 Figure 2.2 shows the volume of water in the world in comparison to the total volume of Earth. This graphic helps us to realize just how small the amount of potable water that is truly accessible today in comparison to a rising global population actually is.

Figure 2.2 underscores the issue of just how difficult it will be to continue to provide key resources especially to major urban centers as global population continues to grow. And this is not just a question of sustaining human needs for water and natural resources. It is also a matter of sustaining endangered species of flora and fauna. The United Nations had done an analysis that shows the loss of species since 1800 and projections for the future show a very disturbing trend.8

The graphs in Fig. 2.3 that come from the U. S. Geological Survey seem to show a relationship between the rapid growth of the global human population in recent times and the increasing rate of extinction on species. The future availability of petroleum products and water is most often mentioned in studies of future resource scarcity, but broader studies have shown that the world by the mid twenty-first century will have many shortages. The following results from a detailed Global Nonrenewal Natural Resources (NNR) study came up with the following results, as shown in Fig. 2.1. 9 Although these results might vary somewhat from year to year based on economic downturns or upturns, the overall trend toward increasing shortages is clear. The upward mobility of the populations in China, India, Indonesia, and other newly industrialized companies suggest that up to three times more consumer demand for products and energy will be present by the middle of the twenty-first century. Only recycling and new energy sources can meet the great bulk of this burgeoning demand. Meeting the demand for natural resources has been identified as a problem by many that have researched this problem. The projections of shortages in the future are presented in Fig. 2.4 and in even greater detail in Fig. 2.5 are certainly of concern. As Chris Clugston’s detailed analysis of this subject has concluded: “Global Non Renewable Natural Resource (NNR) scarcity will intensify going forward, as global economic activity levels, economic growth rates, and corresponding NNR demand return to their pre-recession levels; and global NNR supply levels continue to approach and reach their geological limits.”

Yet the prospect of space mining can provide new options. A modest nearEarth asteroid rich in platinum, approximately spherical in shape and 30 m in diameter would constitute a volume of 4500 cu. m and represent a mass of perhaps 5000 metric tons. If one assumed that this asteroid was 50% platinum, then its value at current world market prices would be on the order of $90 billion. Even if the asteroid recovery mission and refinement costs ran to $5 billion and even if some of the proceeds were to go into some sort of global commons development or ecological fund, just a single such mission would produce many billions of dollars in profits. This may represent an extreme example, but there are over a million PHAs that are on the order of 30 m. The key in the early days of space mining would be to identify high-value targets.

A 50-m PHA would be over 4.6 times more massive in volume and content and would be incredibly valuable if it contained precious metals or rare earth materials such as iridium, rhodium, ruthenium, palladium, or osmium. In contrast, the economics would be much more difficult in the case of PHAs with less valuable natural resource contents. An asteroid with 70% nickel and molybdenum content and 50 m in diameter would have something like a market value of only about $200 million based on current market prices of $13,000 a metric ton for molybdenum and $10,000 a metric ton for nickel. This much lower valuation would call for space mining transport equipment of the longer term future that could be used over and over again. It would also likely mean systems that ran off of solar and electric propulsion systems.

#### That averts resource wars.

Klare, 13 - Defense Correspondent for *The Nation*, Professor emeritus of peace and world-security studies at Hampshire College, senior visiting fellow at the Arms Control Association in Washington, DC

Michael T. Klare, “How Resource Scarcity and Climate Change Could Produce a Global Explosion,” *The Nation*, April 22, 2013. <https://www.thenation.com/article/how-resource-scarcity-and-climate-change-could-produce-global-explosion/>

Brace yourself. You may not be able to tell yet, but according to global experts and the US intelligence community, the earth is already shifting under you. Whether you know it or not, you’re on a new planet, a resource-shock world of a sort humanity has never before experienced.

Two nightmare scenarios—a global scarcity of vital resources and the onset of extreme climate change—are already beginning to converge and in the coming decades are likely to produce a tidal wave of unrest, rebellion, competition and conflict. Just what this tsunami of disaster will look like may, as yet, be hard to discern, but experts warn of “water wars” over contested river systems, global food riots sparked by soaring prices for life’s basics, mass migrations of climate refugees (with resulting anti-migrant violence) and the breakdown of social order or the collapse of states. At first, such mayhem is likely to arise largely in Africa, Central Asia and other areas of the underdeveloped South, but in time, all regions of the planet will be affected.

#### Space exploration and habituation is good ---

#### 1] Extinction from asteroids and warming

Kovic 18 (Marko Kovic, co-founder and president of the thinktank [ZIPAR](https://kovic.ch/zipar/), the Zurich Institute of Public Affairs Research. He is also co-founder and CEO of the consulting firm [ars cognitionis](https://kovic.ch/consulting-ars-cognitionis/),. He has a PhD in political communication, University of Zurich.)(“Why space colonization is so important”, Nov 10, 2018, https://medium.com/@marko\_kovic/space-colonization-why-nothing-else-matters-a877723f77d4)

Should humankind exist in the future? Should the future existence of humankind be as good as possible in as many ways as possible?

If your answer to these two questions is Yes, then there is a topic that you should care about a lot: Space colonization.

Why, you might wonder, does space colonization matter, possibly more than anything else, as the title of this article claims? Because the future of humankind directly and completely dependent on whether and how we manage to colonize space.

Space colonization is a double-edged sword. On one hand, the creation of permanent and self-sustainable human habitats beyond Earth is unavoidable if humankind is to exist in the long-term future. On the other hand, however, space colonization could bring about a catastrophically bad future if we colonize space in a bad way. That future that might be worse than one in which humankind does not exist.

Space or bust: Why we must reach for the stars

Why should we pursue space colonization in the first place? Don’t we have more pressing problems today, on Earth?

Yes, we do have many problems on Earth today, and we should try to solve them. But space colonization is just that: A strategy for dealing with certain problems. An the problems that space colonization would be dealing with are, arguably, among the greatest problems of them all: Existential risks; risks that might lead to the extinction of humankind [1]. Currently, all of our proverbial existential eggs are in the same basket. If a natural existential risk strikes (for example, a large asteroid colliding with Earth) or if a man-made existential risk results in a catastrophic outcome (for example, runaway global warming [2, 3]), all of humankind is at risk because humankind is currently limited to planet Earth. If, however, there are self-sustainable human habitats beyond Earth, then the probability of an irreversibly catastrophic outcome for all of humankind is drastically reduced.

Investing in space colonization today could therefore have immense future benefits. Using resources today in order to make space colonization possible in the medium-term future is not a waste, but a very profitable investment. If humankind stays limited to Earth and if we go extinct as a consequence of doing so, then we will all the billions of life years and billions of humans who might have come to exist — and who would have experienced happiness and contributed to humankind’s continued epistemic and moral progress.

Taking space colonization more seriously today does not, of course, mean that we should only pursue space colonization and ignore everything else that is bad in the world. We should continue dealing with current global problems and, at the same time, invest greater resources into space colonization. At this point in our history and our technological development, even modest amounts of resources directed at space colonization would go a long way, such as public funding of basic research. Additionally, it is very likely that technological advances in the domain of space colonization would improve our lives in other ways as well thanks to technology transfer [4] — investing in space colonization today would probably be a win-win situation.

So the situation seems clear: We must pursue space colonization and try to spread beyond Earth as fast as possible. Unfortunately, there is a catch: Yes, we must colonize space if humankind is to survive, but space colonization itself is very risky. So much so that bad outcomes of space colonization might be even worse for humankind than “merely” going extinct.

#### 2] Even if we don’t get there, working towards it builds spinoffs that resolves structural violence.

--drinking water

--elecricity

Comstock and Lockney 7

Douglas A. Comstock, Director, Innovative Partnerships Program; Senior Member, AIAA, NASA, and Daniel Lockney, NASA Center for AeroSpace Information (CASI), IAA SPACE 2007 Conference & Exposition, “NASA’s Legacy of Technology Transfer and Prospects for Future Benefits.”

NASA’s technologies have been transferred to many different areas that contribute to quality of life and safety of the public, as well as to economic growth. These areas include: Health and Medicine; Transportation; Public Safety; Consumer Goods; Environmental and Agricultural Resources; Computer Technology; and Industrial Productivity. A sampling of some well known historic examples, all of which can be accessed through the Spinoff database, include: 1978: Teflon-coated fiberglass developed in the 1970s as a new fabric for astronaut spacesuits has been used as a permanent roofing material for buildings and stadiums worldwide. 1982: Astronauts working on the surface of the Moon wore liquid-cooled garments under their space suits to protect them from lunar temperatures that often reached 250°F. Developed by NASA’s Ames Research Center, the technology is one of the most widely used spinoffs in NASA history. The technology has been adapted to portable cooling systems for treatment of medical ailments such as burning limb syndrome, multiple sclerosis, spinal injuries, and sports injuries. 1986: A joint National Bureau of Standards/NASA project directed by Johnson Space Center resulted in a light- weight breathing system including face mask, frame, harness, and air bottle for fire fighters. To this day, every major manufacturer of breathing apparatuses incorporates NASA technology in some form, and inhalation injuries have been significantly reduced. 1991: Employing three separate NASA-developed technologies in the design and testing of its school bus chas- sis, a Chicago-based company was able to mathematically analyze a design and predict how it will hold up under stress, monitor structural changes during fatigue testing, and develop a measurement of ride vibration and sound level. This testing contributed to the company’s creating of a safer, more reliable, advanced chassis and allowed the company to gain nearly half of the school bus chassis market within its first year of production. 1994: Using technologies created for servicing spacecraft, a Santa Barbara-based company developed a mechanical arm that enables surgeons performing laparoscopic surgery to operate three instruments simultaneously. The robot, AESOP (Automated Endoscopic System for Optimal Positioning), holds the laparoscope and moves it in response to a controller operated by the surgeon. In August of 2001, the first complete robotic surgical operation was performed, when a team of doctors in New York removed the gallbladder of a woman in France using the Com- puter Motion equipment. 1995: The Left Ventricular Assist Device (LVAD) is used to supplement the heart’s pumping capacity in the left ventricle. David Saucier of NASA’s Johnson Space Center teamed with Dr. Michael DeBakey of the Baylor College of Medicine to develop the device with tools and techniques used by NASA in spacecraft propulsion system compo- nent design. The device can maintain the heart in a stable condition in patients requiring a transplant until a donor is found, which can range from one month to one year. In some cases, the need for a transplant may be negated by permanent implantation of the LVAD. 2000: Internet-based Global Differential GPS (IGDG) was developed at Jet Propulsion Laboratory and won its inventors the “2000 NASA Software of the Year” award. The C-language package provides an end-to-end system capability for GPS-based real-time positioning and orbit determination. The software is being used to operate and control real-time GPS data streaming from NASA’s Global GPS Network. The Federal Aviation Administration (FAA) adopted its use into the Wide Area Augmentation System program that provides pilots in U.S. airspace with meter-level accurate knowledge of their positions in real-time. 2002: Three SBIR contracts with NASA’s Langley Research Center to research and develop a new, low cost, lightweight recovery system for aircraft in both civilian and military markets resulted in a unique ballistic parachute system that lowers an entire aircraft to the ground in the event of an emergency. These parachutes are designed to provide a safe landing for pilots and passengers while keeping them in their aircraft, and a uniquely effective safety technology in the event of engine failure, mid-air collision, pilot disorientation or incapacitation, unrecovered spin, extreme icing, and fuel exhaustion. To date, over 200 lives have been saved as a result of this parachute system. The uniqueness of living and working in space teaches us to think in new ways. The weightless environment can be very counter-intuitive, as things don’t fall when you drop them, and liquid doesn’t pour. A key example of this is what was learned from a sintering experiment on Shuttle, which led to improved manufacturing here on earth. Liq- uid-phase sintering is an industrial process of heating and compacting materials used to manufacture many products such as cutting tools and automotive turbochargers. Experiments conducted in space showed exactly the opposite behavior relative to what was predicted: the sintered samples distorted more in microgravity. After analyzing the surprising behavior with NASA researchers, Kennametal, Inc., the North American market leader in the metal- cutting tool industry and second worldwide, with annual sales of $1.8 billion, changed their sintering process. Be- fore, grinding was required to bring the part into specification after sintering because the sintering process produced an imperfect shape. The cost of this extra production step was about 40% of the total manufacturing cost. Using the insight obtained from space research, it was possible to nearly eliminate the grinding step, and make parts more simply and at less cost. The importance of this Shuttle-based research was verified by independent experts of the National Research Council8. NASA technologies have been saving lives and improving the quality of life all over the globe. Advances re- cently featured in Spinoff include the use of a portable water filtration device that is a direct descendant of a technol- ogy developed for use on the ISS and space shuttle to provide clean drinking water to people in Pakistan, the Do- minican Republic, and Northern Iraq. Space suit technologies have been adapted to create a type of weather balloon that have been used as an affordable “satellite” for cell phone coverage in remote parts of Africa. A technique for diffusing landmines with surplus NASA rocket fuel is saving lives in Kosovo and Jordan. A device originally developed for monitoring astronaut health is now being used in networks of sensors for monitoring environmental changes, including monitoring water quality in Vietnam and tracking public health information in Ethiopia. The radiant barrier material popularized as the “space blanket” was shipped in mass quantities to Pakistan after the earthquakes in 2005. Techniques developed for groundwater remediation at Kennedy Space Center’s launch sites have been used to reclaim areas heavily contaminated with solvents and industrial byproducts. These are just a few of the many historic examples of how NASA technologies are helping people around the world, and exemplify the type of public benefits NASA seeks to document each year in Spinoff. While historic ex- amples are interesting, what has NASA done lately? To provide a sense of the current benefits NASA technology is providing, a few brief examples – that are fully documented in the soon-to-be-released 2007 edition of Spinoff – are summarized below. They are presented in seven major benefits categories.

#### 3] Food production---just the tech is enough to avert mass starvation

Pandya ‘9 S., University of Alberta, “From Orbit to OR: Space Solutions for Terrestrial Challenges in Medicine” P. Olla (ed.), Space Technologies for the Benefit of Human Society and Earth,

Nutrition in space is highly subject to a host of factors, including many of those dis- cussed above. Obviously, the weightless environment greatly influences one’s diet and eating habits based on mechanics alone, but proper nutrition may also impact cognitive function and cancer susceptibility after radiation exposure. Like the on- board atmosphere, however there is also the added limitation of being isolated from food sources and the need for contamination prevention. The challenge, therefore, lies in creating meals that are nutritionally sound, easily stored and packaged, have a long shelf life, and that are possibly regenerative. These stringent requirements for “astronaut food” therefore have many useful repercussions for the terrestrially- bound. By way of example, research from the Nutrition, Physical Fitness and Rehabil- itation Team at NSBRI suggests that up to one-third of all cancers may be linked to nutrition – and some foods actually help protect against specific cancers. One of the team’s initiatives is therefore concerned with designing a diet to protect against radiation-induced DNA damage and cancer. Other researchers are looking at the use of particular amino acids – alone or in combination with carbohydrates to target insulin secretion, thereby preventing diabetes and muscle-wasting. The po- tential halt in muscle wasting based on dietary measures alone would be extremely valuable, directly impacting the millions of people the world over who suffer from muscle wasting due to disease, injury or aging. (NSBRI 2008) In addition to dietary composition, issues of food storage, synthesis and sustain- ability have also led to relevant medical spinoffs. After all, one of the greatest threats to health on a global scale stems from access to adequate food and water. NASA has long since realized that any long-term Moon and Mars missions will need to be largely self-reliant and sustainable, with minimal reliance on outside supplies for reasons of cost, practicality and survivability. Plants are therefore key because of their ability to provide food, water and oxygen. More importantly, the lack of soil in space and other celestial bodies has spawned a large body of research on the use of hydroponics, or liquid nutrient solutions in lieu of soil to support plant growth (The Space Place 2004). In the face of growing food shortages, increasing population demands, decreasing agricultural land space, and variable soil quality from year to year, hydroponics will have a huge role to play in food supplementation and growth on Earth in the coming decades. NASA research has resulted in similar advances in the nutritional content of food. One research product, a microalgae-based vegetable-like oil dubbed “Formulaid,” has been developed for long-duration space travel, but has since been spun-off to create enriched baby food. Forumulaid contains two essential fatty acids vital for mental and visual development, typically found in breast milk but not in most other formulae. (The Space Place 2004) Global disease is also greatly impacted by contaminated water sources. The occurrence of a contaminated water supply aboard the ISS would be perilous for the crew. As such, NASA has put much time and effort into creating a compact, reliable water filtration system. Known as the Regenerable Biocidal Water Delivery Unit, this water filtration system relies on iodine instead of chlorine to kill bacteria and has also been made available in developing countries to ensure access to clean drinking water (The Space Place 2004). Also on the subject of contamination, the NSBRI Nutrition, Physical Fitness and Rehabilitation Team is currently exploring ways to extend the period for which food can be preserved, which will obviously be of interest to everyone from Emergency Rescue teams in natural disaster situations to grocers (NSBRI 2008). Related to the issue of food storage is that of delivery: research has shown that hospital in-patients’ appetites are related to a meal’s warmth (when it is supposed to be heated). To help address this issue, many hospitals now make use of the Food Service Sys- tem, initially designed for meal service aboard the 1966–7 Apollo missions, helping maintain patient well-being by providing warm meals (JAXA-b 2005).