# Cal Quarters Neg vs Southlake PK

# 1NC

### 1

#### Interp: Appropriation is defined as exclusive and permanent.

Taylor 19 (Kurt Taylor, [Writer for the Emory international law review] 2019, “Fictions of the Final Frontier: Why the United States SPACE Act of 2015 Is Illegal“, Emory Law, accessed: 1-23-2022, https://ir.lawnet.fordham.edu/cgi/viewcontent.cgi?article=1966&context=flr) ajs

The broad text in Article II of the Outer Space Treaty provides an ordinary and unambiguous meaning free from absurdity.90 The language of Article II is short: “[o]uter space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”91 At first glance, the language clearly intends to bar ownership over all aspects of outer space, with the only wrinkle of confusion being the meaning of “national appropriation.” Stephen Gorove, a space law expert, has suggested it is better to first define appropriation before determining how “national” modifies the term.92 Broadly, appropriation is “the taking of property for one’s own or exclusive use with a sense of permanence.”93 In this regard, appropriation is of a “national” character when it is by an entity under the sovereignty of the state from which they come or represent.94 Even though Article II uses the “national” language, its ordinary meaning is most closely linked to all sovereignties and the individuals and entities that attain property rights under the authority of a sovereign.

#### Violation: They don’t meet the “exclusive” portion – orbital slots aren’t because the ITU grants temporary, forfeitable licenses

Blodger 16 {JD Candidate, 2016, University of Minnesota Law School; BA Hillsdale College, 2013. I would like to thank Professor Carbone and the MJLST editors and staff for their feedback, edits, and guidance throughout this process. "Reclassifying Geostationary Earth Orbit as Private Property: Why Natural Law and Utilitarian Theories of Property Demand Privatization." <https://scholarship.law.umn.edu/cgi/viewcontent.cgi?article=1006&context=mjlst>]

This does not preclude the extension of a countrys legal jurisdiction into the sea, but only precludes the state and private individuals from exercising an ownership interest in the sea.80 This limitation is expressed in the Outer Space Treaty.81 The non-appropriation principles of the treaty are based on the theory that space, like the sea, is a potential medium of transport, and that the occupation of one small part of the area will not foreclose anothers use of the remaining portions of space.82 The current GEO regulation regime also follows the exception proposed by Grotius, that a person may use a common area he occupies for as long as the occupation lasts, as shown by the fact that the ITU only grants temporary, forfeitable licenses to use areas of GEO.83 While these licenses do not confer a property right, they do purport to confer a right to use an area of space; and, even though the ITU likely has no authority to exclude others from operating in the same space, the mere presence of the satellite would deter and likely prevent others from attempting to occupy the same location.84 Thus, the Outer Space Treaty not only relies on Grotius theory as an initial basis for preventing private ownership, but also employs the exceptions Grotius identifies.

#### Negate on presumption if they go for plantext in a vacuum – means that it isn’t an exclusive use no matter what

#### Constellations can be hundreds of satellites which proves other objects can be in the same orbit

Hidalgo (Sebastian Hidalgo, [Research Coordinator for Cloudflight], ND, “Why satellite mega-constellations could be a problem – Cloudflight“, Cloudflight, accessed: 1-29-2022, https://www.cloudflight.io/expert-views/why-satellite-mega-constellations-could-be-a-problem-47440/) ajs

The term mega-constellation describes a constellation consisting of several hundreds or thousands of satellites orbiting Earth

No new 1ar articulation of a defintion – that’s cheating bc they don’t have a def in the 1ac

#### Limits – they expand the topic to anything that can take up a specially temporal spot – any form of rocket, launches, and individual weapons, asats, shuttles, all become topical and topic DAs like innovation, mining good, deterrence assumes permanence

#### No RVIs – a) illogical – you shouldn’t win for being fair – it’s a litmus test for engaging in substance, b) norming – I can’t concede the counterinterp if I realize I’m wrong which forces me to argue for bad norms,

#### 1AR theory is skewed towards the aff –

#### a) the 2NR must cover substance and over-cover theory, since they get the collapse and persuasive spin advantage of the 3min 2AR,

#### b) their responses to my counter interp will be new, which means 1AR theory necessitates intervention. Implications –reject 1AR theory since it can’t be a legitimate check for abuse

### 3

#### Starlink is key to Precision Ag – key to food sustainability and increasing food supply to account for exponential population growth.

Greensight 21 3-15-2021 "Can Starlink Save the World by Connecting Farms?" <https://www.greensightag.com/logbook/can-starlink-save-the-world-by-connecting-farms/> (Data Management Consulting Firm)//Elmer

GreenSight innovates in a number of different areas, but one of the areas we are most passionate about is in agriculture. We’ve deployed our drone intelligence systems all over the world at all sorts of different facilities. One of the most challenging has been deployments at farms, and one of the biggest challenges has been connectivity. Connected farms are a requirement to feed the world, and Starlink will make that happen. Most urban and suburban households in the United States have had easy and reasonably inexpensive access to high speed internet access for 20 years. It is easy to forget that the situation is not the same for rural areas of the country. Many areas have no access to high speed, “broadband”, internet access, with some having only dialup internet access in their homes. According to the 2015 FCC broadband report, only 53% of rural households have access to high speed internet, even using low standards for “high” speed. On average farms have even less access, and that doesn’t even include high speed connectivity out in their fields. Cellular service is spotty especially on large farms in primarily agricultural areas, and legacy satellite systems provide slow upload speeds at expensive prices. Utilizing modern internet connected technologies and cloud based systems that require constant, high speed access can be a challenge at best and potentially impossible. A 2016 research study by Goldman and Sachs projected that by 2050, the world’s food production efficiency needs to increase by 50% to support our growing population. This paper backs up this conclusion with a lot of research, but the fundamental conclusion is that farming land area is unlikely to increase nor will the number of farmers. Increased global food production increases must come from productivity boosts. Researchers feel that productivity improvements from chemistry and genomics are unlikely to yield significant increases as they have in the past. They predict that the most likely area for these improvements are with precision farming techniques, notably precision planting and precision application of chemicals and water. The term “Precision Agriculture” was coined in the late 1960s and 1970s in seminal research that projected that in the future farming would be driven by data with inputs and practices varied and optimized based on weather, measurements from the field, and accurate year over year yield measurements. Since then, many tools and technologies have been developed that have made true precision agriculture more and more practical. Precision RTK GPS can guide equipment with precision better than an inch. Drones and satellite mapping of fields using remote sensing can map out health and detect problems with the crops. In field IoT sensors will stream live data (such as our partners Soil Scout). Soil genomics and analysis can analyze macro and micro nutrient content of the soil and track the genetics of the soil microbiome (like our friends at Trace Genomics). Robotic and automated farming equipment (like our partners at Monarch Tractor and Husqvarna are building) can vary applications and planting according to precomputed variable rate application maps. Despite all these breakthroughs, precision farming techniques still have a low penetration. There are many reasons for this (more than could be discussed in this article!) but one of them is inadequate connectivity. Most of these modern technologies rely on access to the internet and in many cases it just isn’t possible. For decades subsidies and programs have been rolled out to improve rural connectivity but the reality is that connecting up far flung areas is expensive, often labor intensive, and consequently from a pure business standpoint does not make sense for the connectivity providers. Even as infrastructure expands to more remote areas, there will always remain large swaths of rural america where conventional connectivity infrastructure is highly impractical. Most of GreenSight’s data processing is done in the cloud. Several gigabytes of imagery data are uploaded from our aircraft after every flight to be processed and delivered to our customers. Our custom artificial intelligence analyses the data and informs farmers to problem areas. From many remote farm fields, uploading can be a slow process. We’ve invested heavily in the portability of our systems and our upcoming next generation aircraft will be capable of onboard processing, but despite this connectivity will still be needed to make data available for farmers and other automated agriculture systems. Advanced sensing systems like ours have to be able to integrate with connected robotic sprayers, harvesters and tractors, unlocking the productivity potential of precision agriculture. Humanity needs precision agriculture, and connected data-driven systems will be a big part of that revolution. Beyond the global necessity, the economics for farmers work too! A 2018 USDA studies indicate that connecting US farmland will unlock $50B in industry revenue. We are extremely excited about Starlink and its potential to bring cost effective internet connectivity to farms and rural areas. Starlink levels the playing field for rural areas, enabling high speed connectivity everywhere. No longer will farmers have to wait for high speed wired connectivity to come to their area or install a complex mesh network on their property. IoT data can be streamed from fields as easily as it now streams from urban homes. Starlink will be a catalyzing force for chance, advancing access to precision agriculture globally and contributing to solving global food challenges.

#### Food Insecurity goes nuclear – escalates multiple hotspots.

Cribb 19 Julian Cribb 8-23-2019 “Food or War” <https://www.cambridge.org/core/books/abs/food-or-war/hotspots-for-food-conflict-in-the-twentyfirst-century/1CD674412E09B8E6F325C9C0A0A6778A> (principal of Julian Cribb & Associates who provide specialist consultancy in the communication of science, agriculture, food, mining, energy and the environment. , His published work includes over 8000 articles, 3000 media releases and eight books. He has received 32 awards for journalism.)//Elmer

Future Food Wars The mounting threat to world peace posed by a food, climate and ecosystem increasingly compromised and unstable was emphasised by the US Director of National Intelligence, Dan Coats, in a briefing to the US Senate in early 2019. 'Global environmental and ecological degradation, as well as climate change, are likely to fuel competition for resources, economic distress, and social discontent through 2019 and beyond', he said. 'Climate hazards such as extreme weather, higher temperatures, droughts, floods, wildfires, storms, sea level rise, soil degradation, and acidifying oceans are intensifying, threatening infrastructure, health, and water and food security. Irreversible damage to ecosystems and habitats will undermine the economic benefits they provide, worsened by air, soil, water, and marine pollution.' Boldly, Coats delivered his warning at a time when the US President, Trump, was attempting to expunge all reference to climate from government documents. 23 Based upon these recent cases of food conflicts, and upon the lessons gleaned from the longer history of the interaction between food and war, several regions of the planet face a greatly heightened risk of conflict towards the mid twentyfirst century. Food wars often start out small, as mere quarrels over grazing rights, access to wells or as one faction trying to control food supplies and markets. However, if not resolved quickly these disputes can quickly escalate into violence, then into civil conflagrations which, if not quelled, can in turn explode into crises that reverberate around the planet in the form of soaring prices, floods of refugees and the involvement of major powers — which in turn carries the risk of transnational war. The danger is magnified by swollen populations, the effects of climate change, depletion of key resources such as water, topsoil and nutrients, the collapse of ecosystem services that support agriculture and fisheries, universal pollution, a widening gap between rich and poor, and the rise of vast megacities unable to feed themselves (Figure 5.3). Each of the world's food 'powderkeg regions' is described below, in ascending order of risk. United States In one sense, food wars have already broken out in the United States, the most overfed country on Earth. Here the issue is chiefly the growing depletion of the nation's mighty ground- water resources, especially in states using it for food production, and the contest over what remains between competing users — farmers, ranchers and Native Americans on the one hand and the oil, gas and mining industry on the other. Concern about the future of US water supplies was aggravated by a series of savage droughts in the early twentyfirst century in the west, south and midwest linked to global climate change and declining snow- pack in the Rocky Mountains, both of which affect not only agriculture but also the rate at which the nation's groundwater reserves recharge. 'Groundwater depletion has been a concern in the Southwest and High Plains for many years, but increased demands on our groundwater resources have overstressed aquifers in many areas of the Nation, not just in arid regions', notes the US Geological Survey.24 Nine US states depend on groundwater for between 50 per cent and 80 per cent of their total freshwater supplies, and five states account for nearly half of the nation's groundwater use. Major US water resources, such as the High Plains aquifers and the Pacific Northwest aquifers have sunk by 30—50 metres (100—150 feet) since exploitation began, imperilling the agricultural industries that rely on them. In the arid south- west, aquifer declines of 100—150 metres have been recorded (Figure 5.4). To take but one case, the famed Ogallala Aquifer in the High Plains region supports cropping industries worth more than US $20 billion a year and was in such a depleted state it would take more than 6000 years to replace by natural infiltration the water drawn from it by farmers in the past 150 years. As it dwindles, some farmers have tried to kick their dependence on ground- water other users, including the growing cities and towns of the region, proceeded to mine it as if there was no tomorrow.25 A study by Kansas State University concluded that so far, 30 per cent of the local groundwater had been extracted and another 39 per cent would be depleted by the mid century on existing trends in withdrawal and recharge.26 Over half the US population relies on groundwater for drinking; both rural and urban America are at risk. Cities such as New Orleans, Houston and Miami face not only rising sea levels — but also sinking land, due to the extraction of underlying ground- water. In Memphis, Tennessee, the aquifer that supplies the city's drinking water has dropped by 20 metres. Growing awareness of the risk of a nation, even one as large and technologically adept as the USA, having insufficient water to grow its food, generate its exports and supply its urban homes has fuelled tensions leading to the eruption of nationwide protests over 'fracking' for oil and gas — a process that can deplete or poison groundwater — and the building -of oil pipe- lines, which have a habit of rupturing and also polluting water resources. The boom in fracking and piping is part of a deliberate US policy to become more self-reliant in fossil fuels.27 Thus, in its anxiety to be independent of overseas energy suppliers, the USA in effect decided to barter away its future food security for current oil security — and the price of this has been a lot of angry farmers, Native Americans and concerned citizens. The depletion of US groundwater coincides with accelerating climate risk, which may raise US temperatures by as much as 4—5 oc by 2100, leading to major losses in soil moisture throughout the US grain belt, and the spread of deserts in the south and west. Food production will also be affected by fiercer storms, bigger floods, more heatwaves, an increase in drought frequency and greater impacts from crop and livestock diseases. In such a context, it is no time to be wasting stored water. The case of the USA is included in the list of world 'hot spots' for future food conflict, not because there is danger of a serious shooting war erupting over water in America in the foreseeable future, but to illustrate that even in technologically advanced countries unforeseen social tensions and crises are on the rise over basic resources like food, land and water and their depletion. This doesn't just happen in Africa or the Middle East. It's a global phenomenon. Furthermore, the USA is the world's largest food exporter and any retreat on its part will have a disproportionate effect on world food price and supply. There is still plenty of time to replan America's food systems and water usage — but, as in the case of fossil fuels and climate, rear-guard action mounted by corporate vested interests and their hired politicians may well paralyse the national will to do it. That is when the US food system could find itself at serious risk, losing access to water in a time of growing climatic disruption, caused by exactly the same forces as those depleting the groundwater: the fossil fuels sector and its political stooges. The probable effect of this will, in the first instance, be a decline in US meat and dairy production accompanied by rising prices and a fall in its feedgrain exports, with domino effects on livestock industries worldwide. The flip-side to this issue is that America's old rival, Russia, is likely to gain in both farmland and water availability as the planet warms through the twentyfirst century — and likewise Canada. Both these countries stand to prosper from a US withdrawal from world food markets, and together they may negate the effects of any US food export shortfalls. Central and South America South America is one of the world's most bountiful continents in terms of food production — but, after decades of improvement, malnutrition is once more on the rise, reaching a new peak of 42.5 million people affected in 2016. 28 'Latin America and the Caribbean used to be a worldwide example in the fight against hunger. We are now following the worrisome global trend', said regional FAO representative Julio Berdegué. 29 Paradoxically, obesity is increasing among Latin American adults, while malnutrition is rising among children. 'Although Latin America and the Caribbean produce enough food to meet the needs of their population, this does not ensure healthy and nutritious diets', the FAO explains. Worsening income inequality, poor access to food and persistent poverty are contributing to the rise in hunger and bad diets, it adds.30 'The impact of climate change in Latin America and the Caribbean will be considerable because of its economic dependence on agriculture, the low adaptive capacity of its population and the geographical location of some of its countries', an FAO report warned.31 Emerging food insecurity in Central and Latin America is being driven by a toxic mixture of failing water supplies, drying farmlands, poverty, maladministration, incompetence and corruption. These issues are exacerbated by climate change, which is making the water supply issue worse for farmers and city people alike in several countries and delivering more weather disasters to agriculture. Mexico has for centuries faced periodic food scarcity, with a tenth of its people today suffering under-nutrition. In 2008 this rose to 18 per cent, leading to outbreaks of political violence. 2 In 2013, 52 million Mexicans were suffering poverty and seven million more faced extreme hunger, despite the attempts of successive governments to remedy the situation. By 2100 northern Mexico is expected to warm by 4—5 oc and southern Mexico by 1.5—2.5 oc. Large parts of the country, including Mexico City, face critical water scarcity. Mexico's cropped area could fall by 40—70 per cent by the 2030s and disappear completely by the end of the century, making it one of the world's countries most at risk from catastrophic climate change and a major potential source of climate refugees.33 The vanishing lakes and glaciers of the high Andes confront montane nations — Bolivia, Peru and Chile especially — with the spectre of growing water scarcity and declining food security. The volume of many glaciers, which provide meltwater to the region's rivers, which in turn irrigate farmland, has halved since 1975.34 Bolivia's second largest water body, the 2000 square kilometres Lake Poopo, dried out completely.35 The loss of water is attributed partly to El Niho droughts, partly to global warming and partly to over-extraction by the mining industries of the region. Chile, with 24,000 glaciers (80 per cent of all those in Latin America) is feeling the effects of their retreat and shrinkage especially, both in large cities such as the capital Santiago, and in irrigation agriculture and energy supply. Chile is rated by the World Resources Institute among the countries most likely to experience extreme water stress by 2040.36 Climate change is producing growing water and food insecurity in the 'dry corridor' of Central America, in countries such as El Salvador, Guatemala and Honduras. Here a combination of drought, major floods and soil erosion is undermining efforts to raise food production and stabilise nutrition. Food production in Venezuela began falling in the 1990s, and by the late 2010s two thirds of the population were malnourished; there was a growing flood of refugees into Colombia and other neighbouring countries. The food crisis has been variously blamed on the Venezuelan government's 'Great Leap Forward' (modelled on that of China — which also caused widespread starvation), a halving in Venezuela's oil export earnings, economic sanctions by the USA, and corruption. However, local scientists such as Nobel Laureate Professor Juan Carlos Sanchez warn that climate impacts are already striking the densely populated coastal regions with increased torrential rains, flooding and mudslides, droughts and hurricanes, while inland areas are drying out and desertifying, leading to crop failures, water scarcity and a tide of climate refugees.37 These factors will tend to deepen food insecurity towards the mid century. Venezuela's climate refugees are already making life more difficult for neighbouring countries such as Colombia. Deforestation in the Brazilian Amazon has, in recent decades, removed around 20 per cent of its total tree cover, replacing it with dry savannah and farmland. At 40 per cent clearance and with continued global warming, scientists anticipate profound changes in the local climate, towards a drying trend, which will hammer the agriculture that has replaced the forest.38 Brazil has already wiped out the once- vast Mata Atlantica forest along its eastern coastline, and this region is now drying, with resultant water stress for both farming and major cities like Säo Paulo. Brazil's outlook for 2100 is for further drying — tied to forest loss as well as global climate change — increased frequency of drought and heatwaves, major fires and acute water scarcity in some regions. Moreover, as the Amazon basin dries out, if will release vast quantities of C02 from its peat swamps and rainforest soils. These are thought to contain in excess of three billion tonnes of carbon and could cause a significant acceleration in global warming, affecting everyone on Earth. 39 Latin America is the world capital of private armies, with as many as 50 major guerrilla groups, paramilitaries, terrorist, indigenous and criminal insurgencies over the past half century exemplified in familiar names like the Sandanistas (Nicaragua), FARC (Colombia) and Shining Path (Peru). 40 Many of these drew their initial inspiration from the international communist movement of the mid twentieth century, while others are right-wing groups set up in opposition to them or else represent land rights movements of disadvantaged groups. However, all these movements rely for oxygen on simmering public discontent with ineffectual or corrupt governments and lack of fair access to food, land and water generally. In other words, the tendency of South and Central America towards internal armed conflict is supercharged significantly by failings in the food system which generate public anger, leading to sympathy and support for anyone seen to be challenging the incumbent regimes. This is not to suggest that feeding every person well would end all insurgencies — but it would certainly take the wind of popular support out of a lot of their sails. In that sense the revolutionary tendency of South America echoes the preconditions for revolution in France and Russia in the eighteenth and twentieth centuries. Central Asia The risk of wars breaking out over water, energy and food insecurity in Central Asia is high.41 Here, the five main players — Kazakhstan, Uzbekistan, Turkmenistan, Tajikistan and Kyrgyzstan — face swelling populations, crumbling Soviet-era infrastructure, flagging resource cooperation, a degrading land- scape, deteriorating food availability and a changing climate. At the heart of the issue and the region's increasingly volatile politics is water: 'Without water in the region's two great rivers — the Syr Darya and the Amu Darya — vital crops in the down- stream agricultural powerhouses would die. Without power, life in the upstream countries would be unbearable in the freezing winters' , wrote Rustam Qobil. Central Asia's water crisis first exploded onto the global consciousness with the drying of the Aral Sea — the world's fourth largest lake — from the mid 1960s43, following the damming and draining of major rivers such as the Amu Darya, Syr Darya and Naryn. It was hastened by a major drought in 200844 exacerbated by climate change, which is melting the 'water tower' of glacial ice stored in the Tien Shan, Pamir and Hindu Kush mountain ranges that feed the region's rivers. The Tien Shan alone holds 10,000 glaciers, all of them in retreat, losing an estimated 223 million cubic metres a year. At such a rate of loss the region's rivers will run dry within a generation.45 Lack of water has already delivered a body blow to Central Asia's efforts to modernise its agriculture, adding further tension to regional disputes over food, land and water. 'Water has always been a major cause of wars and border conflicts in the Central Asian region', policy analyst Fuad Shahbazov warned. This potential for conflict over water has been exacerbated by disputes over the Fergana valley, the region's greatest foodbowl, which underwent a 32 per cent surge in population in barely ten years — while more and more of it turned to desert.46 The Central Asian region is ranked by the World Resources Institute as one of the world's most perilously water-stressed regions to 2040 (Figure 5.6). With their economies hitting rock bottom, corrupt and autocratic governments that prefer to blame others for their problems and growing quarrels over food, land, energy and water, the 'Stans' face 'a perfect storm', Nate Shenkkan wrote in the journal Foreign Policy 47 Increased meddling by Russia and China is augmenting the explosive mix: China regards Central Asia as a key component of its 'Belt and Road' initiative intended to expand its global influence, whereas Russia hopes to lure the region back into its own economic sphere. Their rival investments may help limit some of the problems faced by Central Asia — or they may unlock a fresh cycle of political feuding, turmoil and regime change.48 A 2017 FAO report found 14.3 million people — one in every five — in Central Asia did not have enough to eat and a million faced actual starvation, children especially. It noted that after years of steady improvement, the situation was deteriorating. This combination of intractable and deteriorating factors makes Central Asia a serious internal war risk towards the mid twentyfirst century, with involvement by superpowers raising the danger of international conflict and mass refugee flight. The Middle East The Middle East is the most water-stressed region on Earth (see Figure 5.5 above). It is 'particularly vulnerable to climate change. It is one of the world's most water-scarce and dry regions, with a high dependency on climate-sensitive agriculture and a large share of its population and economic activity in flood-prone urban coastal zones', according to the World Bank. 49 The Middle East — consisting of the 22 countries of the Arab League, Turkey and Iran — has very low levels of natural rainfall to begin with. Most of it has 600 millimetres or less per year and is classed as arid. 'The Middle East and North Africa [MENA] is a global hotspot of unsustainable water use, especially of ground- water. In some countries, more than half of current water withdrawals exceed what is naturally available', the Bank said in a separate report on water scarcity. 50 'The climate is predicted to become even hotter and drier in most of the MENA region. Higher temperatures and reduced precipitation will increase the occurrence of droughts. It is further estimated that an additional 80—100 million people will be exposed by 2025 to water stress', the Bank added. The region's population of 300 million in the late 2010s is forecast to double to 600 million by 2050. Average temperatures are expected to rise by 3—5 oc and rainfall will decrease by around 20 per cent. The result will be vastly increased water stress, accelerated desertification, growing food insecurity and a rise in sea levels displacing tens of millions from densely popu- lated, low-lying areas like the Nile delta.51 The region is deemed highly vulnerable to climate impacts, warns a report by the UN Development Programme. 'Current climate change projections show that by the year 2025, the water supply in the Arab region will be only 15 per cent of levels in 1960. With population growth around 3 per cent annually and deforestation spiking to 4 per cent annually... the region now includes 14 of the world s 20 most water-stressed countries.'52 The Middle Fast/North Africa (MENA) region has 6 per cent of the world's population with only 1.5 per cent of the world's fresh water reserves to share among them. This means that the average citizen already has about a third less water than the minimum necessary for a reasonable existence — many have less than half, and populations are growing rapidly. Coupled with political chaos and ill governance in many countries, growing religious and ethnic tensions between different groups — often based on centuries-old disputes — a widening gap between rich and poor and foreign meddling by the USA, Russia and China, shortages of food, land and water make the Middle East an evident cauldron for conflict in the twentyfirst century. Growing awareness of their food risk has impelled some oil-rich Arab states into an international farm buying spree, purchasing farming, fishing and food processing companies in countries as assorted as South Sudan, Ethiopia, the Philippines, Ukraine, the USA, Poland, Argentina, Australia, Brazil and Morocco. In some food-stressed countries these acquisitions have already led to riots and killings.53 The risk is high that, by exporting its own food—land—water problems worldwide, especially to regions already facing scarcity, the Middle East could propagate conflicts and government collapses around the globe. This is despite the fact that high-tech solar desalination, green energy, hydroponics, aquaponics and other intensive urban food production technologies make it possible for the region to produce far more of its own food locally, if not to be entirely self-sufficient. Dimensions of the growing crisis in the Middle East include the following. Wars have already broken out in Syria and Yemen in which scarcity of food, land and water were prominent among the tensions that led to conflict between competing groups. Food, land and water issues feed into and exacerbate already volatile sentiment over religion, politics, corruption, mismanagement and foreign interference by the USA, China and Russia. The introduction of cheap solar-powered and diesel pumps has accelerated the unsustainable extraction of groundwater throughout the region, notably in countries like Libya, Egypt, Saudi Arabia and Morocco. 54 Turkish building of new dams to monopolise waters flowing across its borders is igniting scarcity and potential for conflict with downstream nations, including Iraq, Iran and Syria. 55 Egypt's lifeline, the Nile, is threatened by Ethiopian plans to dam the Blue Nile, with tensions that some observers consider could lead to a shooting war. 56 There are very low levels of water recycling throughout the region, while water use productivity is about half that of the world as a whole. There is a lack of a sense of citizen responsibility for water and food scarcity throughout the region. Land grabs around the world by oil-rich states are threatening to destabilise food, land and water in other countries and regions, causing conflict. A decline in oil prices and the displacement of oil by the global renewables revolution may leave the region with fewer economic options for solving its problems. There is a risk that acquisition of a nuclear weapon by Iran may set off a nuclear arms race in the region with countries such as Saudi Arabia, Syria and possibly Turkey following suit and Israel rearming to stay in the lead. This would translate potential food, land and water conflicts into the atomic realm. Together these issues, and failure to address their root causes, make the Middle East a fizzing powder keg in the twentyfirst century. The question is when and where, not whether, it explodes — and whether the resulting conflict will involve the use of weapons of mass destruction, including nuclear, thus affecting the entire world. China China is the world's biggest producer, importer and consumer of food. Much of the landmass of the People's Republic of China (PRC) is too mountainous or too arid for farming, but the rich soils of its eastern and southern regions are highly productive provided sufficient water is available and climate impacts are mild. Those, however, are very big 'ifs'. In 1995, American environmentalist Lester R. Brown both Eked and aroused the PRC Communist Party bosses with a small, hard-hitting book entitled Who Will Feed China? Wake-Up Call for a Small Planet.57 In it he posited that Chinese population growth was so far out of control that the then-agricultural system could not keep up, and China would be forced to import vast amounts of grain, to the detriment of food prices and availability worldwide. His fears, so far, have not been realised — not because they were unsoundly based, but because China managed — just — to stay abreast of rising food demand by stabilising and subsidising grain prices, restoring degraded lands, boosting agricultural science and technology, piping water from south to north, developing high-intensity urban farms, buying up foreign farmland worldwide and encouraging young Chinese to leave the country. What Brown didn't anticipate was the economic miracle that made China rich enough to afford all this. However, his essential thesis remains valid: China's food supply will remain on a knife-edge for the entire twentyfirst century, vulnerable especially to water scarcity and climate impacts. If the nation outruns its domestic resources yet still has to eat, it may well be at the expense of others globally. Some western commentators were puzzled when China scrapped its 35-year 'One Child Policy' in 2015, but in fact the policy had done its job, shaving around 300 million people off the projected peak of Chinese population. It was also causing serious imbalances, such as China's huge unmarried male sur- plus. Furthermore, rising urbanisation and household incomes meant Chinese parents no longer wanted large families, as in the past. Policy or no policy, China's birthrate has continued to fall and by 2018 was 1.6 babies per woman — well below replacement, lower than the USA and nearly as low as Germany. Its population was 1.4 billion, but this was growing at barely 0.4 per cent a year, with the growth due at least in part to lengthening life expectancy. 58 For China, female fertility is no longer the key issue. The critical issue is water. And the critical region is the north, where 41 per cent of the population reside. Here surface and ground- waters — which support not only the vast grain and vegetable farming industries of the North China Plain but also burgeoning megacities like Beijing, Tianjin and Shenyang — have been vanishing at an alarming rate. 'In the past 25 years, 28,000 rivers have disappeared. Groundwater has fallen by up to 1—3 metres a year. One consequence: parts of Beijing are subsiding by 11 cm a year. The flow of the Yellow River, water supply to millions, is a tenth of what it was in the 1940s; it often fails to reach the sea. Pollution further curtails supply: in 2017 8.8 per cent of water was unfit even for agricultural or industrial use', the Financial Times reported.59 On the North China Plain, annual consump- tion of water for all uses, including food production, is about 27 billion cubic metres a year — compared with an annual water availability of 22 billion cubic metres, a deficit that is made up by the short-term expedient of mining the region's groundwater. 60 To stave off disaster, the PRC has built a prodigious network of canals and pipelines from the Yangtse River in the water-rich south, to Beijing in the water-starved north. Hailed as a 'lifeline', the South—North Water Transfer Project had two drawbacks: first, the fossil energy required to pump millions of tonnes of water over a thousand kilometres and, second, the fact that while the volume was sufficient to satisfy the burgeoning cities for a time, it could not supply and distribute enough clean water to meet the needs of irrigated farming over so vast a region in the long run, nor meet those of its planned industrial growth.61 Oft-mouthed 'solutions' like desalination or the piping of water from Tibet or Russia face similar drawbacks: demand is too great for the potential supply and the costs, both financial and environmental, prohibitive. China is already among the world's most water-stressed nations. The typical Chinese citizen has a 'water footprint' of 1071 cubic metres a year — three quarters of the world average (1385 cubic metres), and scarcely a third that of the average American (2842 cubic metres).62 Of this water, 62 per cent is used to grow food to feed the Chinese population — and 90 per cent is so polluted it is unfit to drink or use in food processing. Despite massive investment in water infrastructure and new technology, many experts doubt that China can keep pace with the growth in its demand for food, at least within its own borders, chiefly because of water scarcity.63 Adding to the pressure is that China's national five-year plans for industrialisation demand massive amounts more water — demands that may confront China with a stark choice between food and economic growth. 'The Chinese government is moving too slowly towards the Camel Economy. It has plans, incentives for officials; it invests in recycling, irrigation, pollution, drought resistant crops; it leads the world in high voltage transmission (to get hydro, wind and solar energy from the west of China). None of this is sufficient or likely to be in time', the Financial Times opined. As the world's leading carbon emitter, China is more responsible for climate change than any other country. It is also, potentially, more at risk. The main reason, quite simply, is the impact of a warming world on China's water supply — in the form of disappearing rivers, lakes, groundwater and mountain glaciers along with rising sea levels. To this is coupled the threat to agriculture from increasing weather disasters and the loss of ecosystem services from a damaged landscape. 65 China is thus impaled on the horns of a classic dilemma. Without more water it cannot grow its economy sufficiently to pay for the water-conserving and food-producing technologies and infrastructure it needs to feed its people. Having inadvertently unleashed a population explosion with its highly successful conversion to modern farming systems, the challenge for China now is to somehow sustain its food supply through the population peak of the mid twentyfirst century, followed by a managed decline to maybe half of today's numbers by the early twentysecond century. It is far from clear whether the present approach — improving market efficiency, continuing to modernise agricultural production systems, pumping water, trying to control soil and water losses and importing more food from overseas will work. 66 China has pinned its main hopes on technology to boost farm yields and improve water distribution and management. Unfortunately, it has selected the unsustainable American industrial farming model to do this — which involves the massive use of water, toxic chemicals, fertilisers, fossil fuels and machines. This in turn is having dreadful consequences for China's soils, waters, landscapes, food supply, air, climate and consumer health. Serious questions are now being asked whether such an approach is not digging the hole China is in, even deeper. Furthermore, some western analysts are sceptical whether the heavy hand of state control is up to the task of generating the levels of innovation required to feed China sustainably.67 Plan B, which is to purchase food from other countries, or import it from Chinese-owned farming and food ventures around the world, faces similar difficulties. Many of the countries where China is investing in food production themselves face a slow-burning crisis of land degradation, water scarcity, surging populations and swelling local food demand. By exporting its own problems, China is adding to their difficulties. While there may be some truth to the claim that China is helping to modernise food systems in Africa, for example, it is equally clear that the export of food at a time of local shortages could have dire consequences for Africans, leading to wars in Africa and elsewhere. How countries will react to Chinese pressure to export food in the face of their own domestic shortages is, as yet, unclear. If they permit exports, it could prove cata- strophic for their own people and governments — but if they cut them off, it could be equally catastrophic for China. Such a situation cannot be regarded as anything other than a menace to world peace. Around 1640, a series of intense droughts caused widespread crop failures in China, leading to unrest and uprisings which, in 1644, brought down the Ming Dynasty. A serious domestic Chinese food and water crisis today — driven by drought, degradation of land and water and climate change in northern China coupled with failure in food imports — could cause a re-run of history: 'The forthcoming water crisis may impact China's social, economic, and political stability to a great extent', a US Intelligence Assessment found. The adverse impacts of climate change will add extra pressure to existing social and resource stresses.' 68 Such events have the potential to precipitate tens, even hundreds, of millions of emigrants and refugees into countries all over the world, with domino consequences for those countries that receive them. Strategic analysts have speculated that tens of millions of desperate Chinese flooding into eastern Russia, or even India, could lead to war, including the risk of international nuclear exchange. 69 Against such a scenario are the plain facts that China is a technologically advanced society, with the foresight, wealth and capacity to plan and implement nationwide changes and the will, if necessary, to enforce them. Its leaders are clearly alert to the food and water challenge — and its resolution may well depend on the extent of water recycling they are able to achieve. As to whether the PRC can afford the cost of transitioning from an unsustainable to a sustainable food system, all countries have a choice between unproductive military spending and feeding their populace. A choice between food or war. It remains to be seen which investment China favours. However, it is vital to understand that the problem of whether China can feed itself through the twentyfirst century is not purely a Chinese problem. It's a problem, both economic and physical, for the entire planet — and it is thus in everyone's best interest to help solve it. For this reason, China is rated number 3 on this list of potential food war hotspots. Africa Food wars — that is, wars in which food, land and water play a significant contributing role — have been a constant in the story of Africa since the mid twentieth century, indeed, far longer. In a sense, the continent is already a microcosm of the world of the twentyfirst century as climate change and resource scarcity com- bine with rapid population growth to ratchet up the tensions that lead competing groups to fight, whether the superficial distinc- Mons between them are ethnic, religious, social or political. We have examined the particular cases of Rwanda, South Sudan and the Horn of Africa — but there are numerous other African conflicts, insurgencies and ongoing disturbances in which food, land and water are primary or secondary triggers and where famine is often the outcome: Nigeria, Congo, Egypt, Tunisia, Libya, Mali, Chad, the Central African Republic, the Maghreb region of the Sahara, Mozambique, Cote d'Ivoire and Zimbabwe have all experienced conflicts in which issues of access to food, land and water were important drivers and consequences. The trajectory of Africa's population in the first two decades of the twentyfirst century implies that the number of its people could quadruple from 1.2 billion in 2017 to 4.5 billion by 2100 (Figure 5.6). If fulfilled, this would make Africans 41 per cent of the world population by the end of the century. The UN Popula- tion Division's nearer projections are for Africans to outnumber Chinese or Indians at 1.7 billion by 2030, and reach 2.5 billion in 2050, which represents a doubling in the continent's inhabitants in barely 30 years. 70 While African fertility rates (babies per woman) remain high by world standards — 4.5 compared with a global average of 2.4 — they have also fallen steeply, from a peak of 8.5 babies in the 1970s. Furthermore, the picture is uneven with birthrates in most Sub-Saharan countries remaining high (around five to six babies/woman), while those of eight, mainly southern, countries have dropped to replace- ment or below (i.e. under 2.1). As has been the case around the world, birth rates tend to drop rapidly with the spread of urban isation, education and economic growth — whereas countries which slide back into poverty tend to experience rising birth- rates. Food access is a vital ingredient in this dynamic: it has been widely observed that better-fed countries tend to have much lower rates of birth and population growth, possibly because people who are food secure lose fewer infants and children in early life and thus are more open to family planning. So, in a real sense, food sufficiency holds one of the keys to limiting the human population to a level sustainable both for Africa and the planet in general. Forecasting the future of Africa is not easy, given the complexity of the interwoven climatic, social, technological and political issues — and many do not attempt it. However, the relentless optimism of the UN and its food agency, the FAO, is probably not justified by the facts as they are known to science — and may have more to do with not wishing to give offence to African governments or discourage donors than with attempting to accurately analyse what may occur. Even the FAO acknowledges however that food insecurity is rising across Sub-Saharan Africa as well as other parts. In 2017, conflict and insecurity were the major drivers of acute food insecurity in 18 countries and territories where almost 74 million food-insecure people were in need of urgent assistance. Eleven of these countries were in Africa and accounted for 37 million acutely food insecure people; the largest numbers were in northern Nigeria, Demo- cratic Republic of Congo, Somalia and South Sudan the agency said in its Global Report on Food Crises 2018.71 The FAO also noted that almost one in four Africans was undernourished in 2016 — a total of nearly a quarter of a billion people. The rise in undernourishment and food insecurity was linked to the effects of climate change, natural disasters and conflict according to Bukar Tijani, the FAO's assistant director general for Africa. 72 Even the comparatively prosperous nation of South Africa sits on a conflict knife-edge, according to a scientific study: 'Results indicate that the country exceeds its environmental boundaries for biodiversity loss, marine harvesting, freshwater use, and climate change, and that social deprivation was most severe in the areas of safety, income, and employment, which are significant factors in conflict risk', Megan Cole and colleagues found. 73 In the Congo, home to the world's second largest tropical forest, 20 years of civil war had not only slain five million civilians but also decimated the forests and their ecological services on which the nation depended. Researchers found evidence that reducing conflict can also help to reduce environ- mental destruction: 'Peace-building can potentially be a win for nature as well, and.. conservation organizations and govern- ments should be ready to seize conservation opportunities'. 74 As the African population doubles toward the mid century, as its water, soils, forests and economic wealth per capita dwindle, as foreign corporations plunder its riches, as a turbulent climate hammers its herders and farmers — both industrial and traditional — the prospect of Africa resolving existing conflicts and avoiding new ones is receding. The mistake most of the world is making is to imagine this only affects the Africans. The consequences will impact everyone on the planet.

### 4

#### Counterplan:

#### Private entities in Asia should significantly invest in the exclusive use of Low Earth Orbit via Large Satellite Constellations for the purposes of emergency communications in the event of disaster relief or external shocks.

#### These constellations should be constrained to a limit of 1000 satellites

#### ll other private entities, except for those in Asia with the above purposes, should not engage in the exclusive use of Low Earth Orbit via Large Satellite Constellations. SpaceX, OneWeb, Google, Amazon, and Telesat should immediately halt their engagement in the exclusive use of Low Earth Orbit via Large Satellite Constellations.

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#### Private LEO constellations are economically viable in the long term, but require upfront investment – those uniquely solve disaster response because of satellite internet’s connectivity options for island countries

Garrity and Husar 21 Garrity, John, and Arndt Husar. John Garrity is an economist, policy advisor, and project manager focusing on digital inclusion, universal internet access policy, and last-mile connectivity. He has coauthored numerous reports on technology and development and has presented around the world on efforts to close the digital divide. Arndt Husar facilitates the effective use of digital technology, advising ADB clients, regional departments, as well as sector and thematic groups on digital transformation. " Digital Connectivity and Low Earth Orbit Satellite Constellations: Opportunities for Asia and the Pacific." (2021).

Satellite communication plays a necessary role in the global connectivity ecosystem, connecting rural and remote populations, providing backhaul connectivity to mobile cellular networks, and rapidly establishing communication in emergency and disaster response scenarios. This Asian Development Bank (ADB) Sustainable Development Working Paper, the first in a series reviewing emerging innovations in connectivity technologies, focuses on low Earth orbit (LEO) satellites, which have been in deployment for decades and are again a subject of intensive investment as new large constellations are in early stages of deployment. These new LEO constellations, such as those being deployed by Starlink by SpaceX, Project Kuiper by Amazon, OneWeb, Lightspeed by Telesat, among others, may prove to be transformational to the connectivity landscape based on their global coverage and their suitability for areas not served by fiber optic cable networks. ADB’s developing member countries are well placed to leverage and benefit from this expansion of internet connectivity, particularly for underserved geographies and countries with limited international internet bandwidth, such as landlocked developing countries and small island developing states. With their global reach and coverage, LEO constellations are expected to dramatically expand the availability of high-speed broadband internet access with levels of service that rival fiber optic cables in terms of speed and latency, and at significantly reduced price levels compared to traditional geostationary satellites. A proactive engagement with LEO solutions is likely to yield benefits as the relevant business models are still evolving. Well-informed early action by regulators and investors can ensure that developing member countries prepare for opportunities presented by the anticipated expansion of connectivity bandwidth. I. IntRoDUCtIon This Emerging Connectivity Innovations Case Study on SpaceX Starlink and low Earth orbit (LEO) satellite constellations is intended to provide readers, particularly in developing countries in Asia and the Pacific, with a background understanding of the role of satellite communications in global internet connectivity and an exploration of the potential impact of the next generation of LEO constellation systems. While the adoption of internet connectivity across the world has generally increased incrementally, some innovations have been transformational, dramatically expanding the geographic reach of connectivity and bandwidth capacity. For example, the introduction of basic mobile phones in the late 1990s and early 2000s led to rapid adoption of mobile telephony across low- and middle-income countries (a phenomenon known as the “mobile miracle”). Similarly, public and private investment in undersea fiber optic cables circling sub-Saharan Africa in the 2000s significantly reduced the cost of bandwidth in many countries in the region. Satellites have used low Earth orbits since the beginning of space exploration; however, private investment in LEO constellations, consisting of hundreds or thousands of satellites, has been limited because significant up-front capital expenditure is required. While it remains to be seen how the next generation of LEO satellite constellations will evolve, LEOs are forecasted to significantly increase the available internet bandwidth in remote and rural geographies not currently served by fiber optic cables. This increased bandwidth could be leveraged to increase economic and social development opportunities for individuals, organizations, businesses, and government facilities (including public schools) located in these areas, provided that the private sector satellite companies investing in LEO constellations see market opportunities to extend service to these areas. This case study is intended to introduce to Asian Development Bank developing member countries how to start preparing for the expansion of LEO satellite communication services. II. BACKGRoUnD: sAteLLIte ConneCtIVItY As A MeAns FoR BRoADBAnD InteRnet Internet connectivity has become a necessary component of every country’s critical infrastructure given the reliance of all aspects of economic activity, governance, and social development on internet communications. The coronavirus disease (COVID-19) pandemic dramatically increased the importance of internet communications infrastructure. Trade, employment, learning, leisure, and communications quickly shifted into the digital sphere and countries with robust internet infrastructure and high adoption rates of internet-enabled devices were better able to adjust and adapt to the shift to digital activity. The United Nations estimates that 1.6 billion learners were affected by school closures in 2020, affecting 94% of the world’s student population and up to 99% in low and lower middle-income countries.1 1 United Nations. 2020. Policy Brief: Education during COVID-10 and beyond. 2 ADB Sustainable Development Working Paper Series No. 76 Access to distance learning opportunities varies greatly by country and income groups, with estimates of less than half of students in low-income countries able to access distance learning.2 Internet access and adoption in the developing member countries (DMCs) of the Asian Development Bank (ADB) continues to grow, particularly as a result of public and private investment in telecommunications infrastructure, increased competition, and allocation of shared resources, such as spectrum auctions and assignment. Despite these efforts, large access gaps remain in Asia, where the most remote, difficult to reach, or sparsely populated districts remain disconnected, leaving more than half of the population without access to the internet. This lack of digital infrastructure represents a missed opportunity to accelerate economic and social development. Despite the rapid expansion of internet connectivity infrastructure across the world, significant gaps in internet adoption and infrastructure access remain. This highlights the importance of satellite communications that can bridge gaps, swiftly expand network coverage, and enhance existing infrastructure. The latest estimates from the International Telecommunication Union (ITU) show that 3.7 billion people are still not participating online (49% of the global population), and 63% of rural households are without internet access (Figure 1).3 Also, 1.5 billion people reside in areas without high-speed mobile data coverage (fourth generation long-term evolution or 4G LTE), while 607 million people reside in areas with no mobile data coverage at all (at least 4G or third generation [3G] coverage). Furthermore, 313 million people reside in areas with only basic voice and short messaging service (SMS) coverage (second generation [2G]), and 220 million people reside in areas with no cellular coverage. The ITU estimates that nearly $428 billion is required to achieve universal access to broadband globally, $251 billion of which is required for Asia, with approximately 75% coming from the private sector and the remainder with support from the public sector.4 The majority of the world’s population, over 5 billion people, live more than 10 kilometers (km) away from any fiber optic cable infrastructure (3.6 billion reside more than 25 km away).5 Other issues, such as affordability, digital literacy, and the lack of relevant or local language content, have resulted in 2.4 billion people who live within 4G coverage not subscribing to 4G data services. [FIGURE 1 OMITTED] Satellite connectivity is predominantly used for backhaul connectivity for remote cellular base stations and as a last-mile connection for individual subscribers and enterprises. Figure 2 provides an overview of the internet infrastructure network components, from international connectivity to the last mile. Because of the higher relative cost of bandwidth transmitted via satellite versus terrestrial technologies, satellite is currently primarily used in situations where fiber optic cables and other high-capacity technologies are not financially viable due to low population densities and large distances between high-capacity networks and last-mile networks.6 However, in a few cases, satellite connectivity is relied upon for international internet gateway traffic or as part of a country’s core network. For landlocked developing countries that are dependent on terrestrial fiber connectivity, in some cases, satellite connectivity serves as a substitute to complex bilateral and multilateral negotiations to extend costly fiber connectivity to their country. [FIGURE 2 OMITTED] Satellite connectivity is predominantly used for backhaul connectivity for remote cellular base stations and as a last-mile connection for individual subscribers and enterprises. Figure 2 provides an overview of the internet infrastructure network components, from international connectivity to the last mile. Because of the higher relative cost of bandwidth transmitted via satellite versus terrestrial technologies, satellite is currently primarily used in situations where fiber optic cables and other high-capacity technologies are not financially viable due to low population densities and large distances between high-capacity networks and last-mile networks.6 However, in a few cases, satellite connectivity is relied upon for international internet gateway traffic or as part of a country’s core network. For landlocked developing countries that are dependent on terrestrial fiber connectivity, in some cases, satellite connectivity serves as a substitute to complex bilateral and multilateral negotiations to extend costly fiber connectivity to their country. Particularly in situations where a high degree of data throughput is required per site, such as satellite backhaul for broadband cellular networks, the data volumes as well as the distance to the nearest backbone node play a significant role in cost comparisons between satellite connectivity versus terrestrial network deployments (microwave backhaul, in particular). Figure 4 illustrates how higher data bandwidth requirements are more cost-effectively supplied by terrestrial ground networks; however, a crossover point occurs where satellite capacity may end up being more cost-competitive, depending on different price points of satellite bandwidth and total traffic demand per month.12 Satellite connectivity is also well- suited to deploy in emergency situations, such as in response to natural disasters or other external shocks, that require expeditious deployment of network connectivity where terrestrial infrastructure is either nonexistent or destroyed. For many rural and remote communities, satellites are the only connectivity option. For geographies without direct access to fiber optic cable infrastructure or at great distances from high- capacity bandwidth capacity, satellite connectivity is the only option available. Even where terrestrial network infrastructure that could be used for backhaul connectivity is available, satellite deployments may still be preferred because satellite terminals require only electrical power and a clear line of sight to the sky. However, an expansion of terrestrial infrastructure usually requires extensive civil works (underground fiber ducts, pole attachments, or tower construction for cellular base stations), which comes with challenges such as securing the rights-of-way, permits, and having to pay the related fees. Satellite broadband is poised to become an even more important technology for addressing the growing digital divide. As information and communication technologies play an increasingly important role in commerce, government services, health care, education, and other sectors, satellite connectivity allows communities to get connected swiftly, bypassing the infrastructure deployment challenges that come with terrestrial infrastructure deployments. The role of satellite connectivity in emergency telecommunications has also been vital where the communications satellites are heavily relied upon in disaster recovery efforts.13 Satellite technology may also be complementary with traditional wired and mobile broadband, which are better suited for densely populated areas. Satellite service could become a default solution for remote areas, allowing terrestrial services to focus on improving access in their current coverage areas. Satellite connectivity is already being used for network redundancy at national levels for international internet capacity, as well as for backup in core and backhaul networks.14 The recent $50 million loan to Kacific by ADB for the deployment of a broadband satellite, which covers large parts of Southeast Asia and the Pacific, demonstrates the relevance of satellite connectivity for unserved and underserved regions.15 By deploying new satellite technology (in the Ka-band16), Kacific’s service offering is commercially viable despite the existing presence of other major competitors in Asia and the Pacific, including global entities such as Intelsat, SES, and Eutelsat, as well as more regional players such as AsiaSat, Thaicom, MEASAT, and SKY Perfect JSAT.

#### The Asia-Pacific is the most disaster-prone region in the world – the next catastrophe is a question of when, not if

Thomas Bickford et al 15, Ph.D., senior research scientist in CNA Corporation’s China Studies division, “The Role of the U.S. Army in Asia,” May, https://www.cna.org/CNA\_files/PDF/CRM-2015-U-010431-Final.pdf

Natural disasters As Typhoon Haiyan amply demonstrated when it hit the Philippines in November 2013, natural disasters can represent a significant threat to human security. In 2012, the Asia-Pacific region experienced 93 natural disasters, which affected some 75 million people.206 It is one of the most disaster-prone regions in the world:207 it is prone to typhoons and cyclones; it contains some of the world’s most active faults and volcanos; and many areas experience massive flooding. As former USARPAC commander Lieutenant General Wiercinski has noted, the only questions are when and where the next big disaster will occur. Admiral Locklear, Commander, USPACOM has noted that climate change is one of the region’s most pressing security challenges.209 While the ability to respond to natural disasters varies widely among countries in the region, even advanced countries can require international assistance, as Japan did after the March 2011 earthquake and tsunami.

#### Disasters are an existential threat---it’s try or die for response and coordination.

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As the three spheres of our habitat evolve and erupt, human beings frequently get in the way. Natural hazards become humanitarian disasters when they expose and exacerbate human vulnerabilities—those characteristics of societies that limit their ability to avoid major damage and recover quickly.3 Such vulnerabilities range from very concrete weaknesses in infrastructure or the exposed locations of large populated areas to more intangible dimensions of economic fragility, social cohesion, and political capacity, which affect both preparedness and recovery. Although the recent historical pattern of major storms, droughts, and earthquakes can be traced (see map 1 at the end of this report), the extent of human vulnerabilities is a complex and subjective matter, often evident only after the fact. Mortality figures are typically used as indicators of the severity of disasters. By that measure, the three worst disasters in the world since 1950 were the earthquake in Tangshan, China, in 1976 (250,000 dead), the earthquake and tsunami in the Indian Ocean in 2004 (240,000 dead), and the earthquake in Haiti in 2010 (316,000 dead).4 These three earthquakes were by no means the largest in that sixty-year time frame, but they occurred where large numbers of people were exposed and unable to protect themselves. Severity also can be measured by other direct effects: destruction, dislocation, and disease. The 2010 earthquake in Haiti not only killed more than 300,000 people but injured an additional 300,000, affected 3.7 million (30 percent of the total population), caused $8 billion in damage, and was followed by 470,000 cases of cholera with 6,631 attributable deaths. The death rate from an earthquake, hurricane, or epidemic is generally much higher in poorer societies than in richer ones, where economic damage is usually the more numerically impressive consequence. Because their constituents have come to recognize how much the damage from “acts of God” can be affected by the actions, or inactions, of human beings, political leaders are increasingly being held accountable for minimizing the foreseeable risks of extreme events. “Natural Hazards, UnNatural Disasters: The Economics of Effective Prevention” is the indicative title of one important report by the United Nations and the World Bank. Reducing the risks begins with the recognition of how vulnerable many people have become. Throughout the world, in both wealthy and poor countries, ever-larger concentrations of people live in exposed locations under fragile or unprotected conditions. Infrastructure is often inadequate or deteriorating, and there is little or no awareness or preparation even for likely natural events. Those most exposed include millions in low-lying shorelines or coastal wetlands, marginal urban slums, and huge “temporary” settlements of internally displaced persons or refugees. Many of these populations depend on international humanitarian agencies to provide food and medicine and to assist local authorities in assuring adequate water, sanitation, health services, and shelter. As urban populations grow and conditions deteriorate further, reliable access to these necessities is becoming increasingly problematic for more and more people. Demographic trends best convey the scale of the challenges. In less than twenty years, the global population will rise from 7.1 billion to more than 8 billion. Key countries will grow even more rapidly. Between 2010 and 2025, Egypt is projected to grow from 81 million people to 106 million, Pakistan from 174 million to 234 million, and Nigeria from 159 million to 258 million.5 Many more people around the world will attain middle-class incomes, but a large percentage in many countries will be young and unemployed. Half the world’s population is already twenty-five years old or younger. Projections suggest that, by 2030, the world will need to provide fifty percent more food and additional fresh water equivalent to twenty new Nile Rivers.6 In that time frame, the needs of many countries, including India and China, will begin to exceed foreseeable water supplies for consumption and irrigation. The growth of earthquake-prone megacities is perhaps most telling of all. In just over a decade, metropolitan Jakarta will go from 9.6 million to 12.8 million people, Mexico City from 20 million to 24.6 million, Delhi from 22 million to 32.9 million, and Tokyo from 37 million to nearly 40 million—and these are just four of the thirty-seven cities that will then have populations greater than 10 million.7 There were only twenty-three in 2011. One of every seven or eight people in the world will be living in one of these massive metropolises, many in huge urban slums that have few, if any, services or infrastructure. Such concentrated population centers are extremely vulnerable to even normal patterns of earthquakes, storms, drought, and disease (see map 2). Epidemics that spread within such populations are especially difficult to contain. Climate volatility adds a further dimension of growing risk. Current changes in the climate of key regions portend severe near-term effects, whether or not the consequences of global warming match the worst predictions for the longer term. Since the 1980s the number of recorded natural disasters related to weather and climate has roughly doubled. According to the above-mentioned United Nations-World Bank report, “If there is no conscious change in adaptation policies to extreme events, baseline damages [even] without climate change are expected to triple to $185 billion a year from economic and population growth alone”8 (emphasis added). Nor are these risks confined to poor or middle-income countries. The world’s largest reinsurance companies, Munich Re and Swiss Re, warn of major increases in weather-related damage in both North America and Europe over the next decade.9 Contrary to critiques from global warming skeptics, the scientific and intelligence communities actually have been cautious in predicting the human effects of climate change. The April 2012 report of the Intergovernmental Panel on Climate Change (IPCC) is relatively conservative in forecasting future climate-induced disasters.10 Likewise, the National Intelligence Council handles climate change and natural disasters in a largely conventional and understated manner.11 However, an increasing number of authoritative reports have begun to highlight the dire risks of current climate trends and the need to begin assessing the potential for plausible adverse scenarios. Both the World Bank and the UN Environment Programme warned recently that the likely rise in global mean temperatures will exceed key thresholds sooner than previously expected, with implications for both severe weather and ocean surges.12 Security specialists are beginning to take these trends to heart. The Defense Science Board warned in its 2011 report that climate changes in key regions will interact with other vulnerabilities to become serious “threat multipliers.”13 The World Economic Forum highlights the interactive implications of climate changes with governance, fiscal, population, and technology vulnerabilities.14 A recent report of the National Research Council called on foreign policy experts to consider more systematically the political and security implications of foreseeable climate changes, suggesting that “it is prudent for security analysts to expect climate surprises in the coming decade, including unexpected and potentially disruptive single events as well as conjunctions of events occurring simultaneously or in sequence, and for them to become progressively more serious and more frequent thereafter, most likely at an accelerating rate.”15 Despite the pervasive dysfunction of most governments in addressing “climate surprises” and other disaster vulnerabilities, we will no doubt see environmental risks beginning to shape the political expectations of senior officials and thought leaders. As in the Cold War or the current ”war on terror,” responsible policymakers must look not only to the familiar and most imminent threats but also to less likely but higher-impact scenarios that could be truly catastrophic for national security, particularly if sudden and unanticipated.16 Not unlike other threats to peace and security, the inability to predict with certainty the location and timing of future natural disasters should not obscure a nation’s vital interest in assessing their likelihood and potential aftereffects.

Local Catastrophes and Global Repercussions

The challenge is to envision plausible threats and sequential patterns of potential danger—not to scare people but to anticipate potential consequences and devise strategies to prevent or reduce economic, political, and social damage. The National Research Council suggests using analytical “stress” tests of particular countries or regions to envision the effects of major disasters, or clusters of disasters, even if some of them should be considered unlikely. History offers examples of catastrophes that illustrate the possible ripple effects from otherwise local disasters. The Lisbon earthquake, tsunami, and fire of 1755 destroyed that city and decisively degraded Portugal’s role as an imperial power.17 The Spanish flu epidemic of 1918–20 killed an estimated fifty million to one hundred million people worldwide and was particularly lethal among young adults, compounding the immense losses to that generation from World War I. More recently, the destruction from Hurricane Katrina on the U.S. Gulf Coast in 2005; the earthquake, tsunami, and nuclear shutdown in Fukushima, Japan in 2011; and Tropical Storm Sandy on the U.S East Coast in 2012 exposed the interconnected vulnerabilities of coastal settlements, energy infrastructures, health-care facilities, and large-scale relief and recovery operations—a complex combination for which neither the United States nor Japan was adequately prepared. Major localized disasters do not always result in irreversible setbacks. The Chicago Fire of 1871, the Boston Fire of 1872, and the San Francisco Earthquake of 1906 resulted in the major reconstruction of all three cities, making each of them more economically vibrant and resilient.18 New York will undoubtedly be better prepared after Sandy, as New Orleans was after Katrina when it faced Hurricane Isaac in August 2012. Yet both disaster specialists and mainstream media too often treat natural disasters as limited and local matters. Media focus has typically been more on immediate suffering than larger implications, direct effects than long-term consequences, and infrastructure repair than major institutional reforms. Nevertheless, as the number and scale of natural disasters increases, we are likely to witness growing public awareness and anxiety about the vulnerability of certain areas, which will become a strong political factor adding to the wider and longer-term consequences of disasters. Internet technologies will facilitate not only the rapid dissemination of distressing information about natural disasters and severe environmental conditions but also the potential for exaggerated predictions, political incitement, conspiracy theories, or even popular panic. Worst-case scenarios may then become urgent political focal points, especially those that illustrate the fragility of economic necessities, social cohesion, or public safety.19 Economic Cascades The most troubling scenarios of natural disasters involve those with simultaneous effects on major essentials: food, water, land, medicine, energy, or subsistence income. An overlapping series of earthquakes, floods, and food shortages affecting a megacity could overwhelm the capacity of national and international agencies to respond adequately. Other consequences could follow: The Fukushima nuclear meltdown, for example, led both the Japanese and German governments to announce the phasing out of their nuclear power industries—a major blow to any prospect of curbing global carbon emissions.20 Disruptive disasters in major food-producing regions could have dire global consequences. Corn, wheat, and rice crop failures would lead to price hikes and shortages in far-flung locations. The worldwide collapse of one of these major staples—for example, from a new fungal infestation in one region and a drought in another—could lead to famines, export cutoffs, stockpiling and hoarding, or cartelized supply arrangements. Such developments could create new zones of instability, hostility, and populist pretexts for aggressive steps to secure new supplies or assure future access. The drive to guarantee food sources has already prompted the governments of China, Korea, Saudi Arabia, and others to buy land in Africa and Latin America for growing food that could be diverted from global markets during shortages. Water shortages could be another cause of future conflicts. Recent intelligence analyses suggest that countries are unlikely to go to war over water,21 but the larger patterns of depletion and diversion—glacial melts in South Asia and the Andes; upstream dams in the Middle East, East Africa, and Southeast Asia; widening drought in sub-Saharan Africa—suggest that peacefully resolving some disputes over severe water shortages could be very difficult. The genocides in Rwanda and Darfur owed much to the pressures of land, food, and water competition in fomenting ethnic conflicts.22 Medicine can be another life-and-death necessity in times of emergency. It is not difficult to imagine that the government of a state facing the prospect of a deadly epidemic would take steps to seize or intercept supplies of essential medicines. After European and U.S. laboratories cloned the lethal H5N1 virus, Indonesia demanded access to the vaccine formulas to assure adequate supplies for its huge population at reasonable cost. A global pandemic from that virus or a similar microorganism could lead to travel restrictions, news blackouts, and other isolationist reactions, but also to more aggressive measures to obtain lifesaving medicine. Massive casualties could undermine the standard protocols of global cooperation among international and national agencies, reducing global effectiveness in containing disease.23 Natural disasters can also sever transportation and communication links and global supply chains—life lines for necessities—compounding the catastrophe where the disaster occurs and affecting employment even in distant locations. In 2011 both the Thai floods and the Japanese earthquake and tsunami disasters affected hard-disk and auto suppliers, causing factory shutdowns and end-product shortages on other continents. The volcanic dust cloud from Iceland in 2010 halted European air traffic for only a week or so but even then had significant effects on both business and tourism. Compare this with the massive 1883 eruption of Krakatoa and the 1815 eruption of Mount Tambora, both in Indonesia, which created longer-lasting effects around the world. The Tambora event led to what was then called “The Year Without a Summer,” because of the adverse effects on U.S. and European weather patterns.24 Social Collapse Major disasters can have social consequences when the intense stress of damage and recovery causes breaks along ethnic, religious, class, or geographic fault lines. A major earthquake in a megacity could produce violent confrontations among groups competing for scarce relief supplies and recovery assistance. Or the disaster might create reverse-urbanization pressures for millions of homeless and jobless people in suddenly uninhabitable slums. Once again, the purpose of discussing such scenarios is not to suggest that social chaos following a disaster is a given but rather to consider ways to prevent, or at least reduce, that possibility. The major quake that struck Mexico City in 1985 produced not widespread strife but inspiring solidarity in local relief and recovery operations, even among the poorest citizens.25 That city is now a prime candidate for even bigger quakes, affecting an even larger population. Joint planning for such a crisis by the United States and Mexico could reduce the possibility of greater casualties and infrastructure losses that might impel hundreds of thousands to seek entry into the United States. Sudden large-scale migrations are an increasing prospect among the effects of climate change. Low-lying islands, flood-prone coastal areas, large refugee camps, and regions of prolonged drought could provoke major population movements. The possibility of Bangladeshis pouring into India to escape delta flooding has already led the Indian government to construct a 4,000-kilometer fence to forestall such influxes. Mass migration from Africa to Europe could also result from the droughts and floods affecting an increasing number of areas. Within the continent, such forced movement could compound urbanization trends. Such cataclysms are unlikely to occur without violence.

Political Catalysts

Natural disasters can dramatically expose deep social inequities and government indifference or incompetence, fomenting opposition movements. In 1970, the government in western Pakistan responded so poorly to the cyclone that struck eastern Pakistan that it strongly contributed to the secession of what became Bangladesh. The Nicaraguan earthquake in 1972 fatally discredited the Somoza regime. The Myanmar government’s heartless response to Cyclone Nargis in 2008 was likely a further factor in the military regime’s political vulnerability and may have accelerated the recent transition there. An unprecedented drought in Syria from 2006 to 2010 disrupted agriculture in regions that then became strong supporters of the armed resistance.26 The rise in global food prices that began with a severe drought in Russia in the summer of 2010 was a key factor in provoking popular uprisings in various Arab states the following year.27 An earthquake and tsunami near Jakarta—40 percent of which is below sea level and frequently inundated by heavy rains—could render much of that city uninhabitable and set back Indonesia’s economic growth and democratic development for years. It could also reduce the country’s ability to cooperate on global issues, such as deforestation or pandemic prevention, on which its involvement has been crucial.28 An earthquake in Karachi or Delhi or a major flood in Mumbai or Lagos could cripple the economies of their respective countries and further degrade the effectiveness of government authorities to avoid serious ethnic, sectarian, or even international conflicts. Major deterioration of any one of these cities could undermine the stability of their respective regions, with direct economic and possibly military consequences for the United States. Weak governments or failed states lack the capacity to prevent even moderate disasters from becoming severe crises. For any of the above scenarios, it is insufficient for only government agencies to be aware or prepared. As the extent of global fragility in the face of natural disasters becomes more widely felt, the public may sense the start of a regional or even global slide toward scarcities of various kinds, leading to political pressures for more secure sources of necessities. Such pressures increase the risk of international confrontation and present opportunities for exploitation by terrorists, criminals, or fanatics who see increased mayhem as in their interest.29

Defensive Measures and Strategic Adjustments

Efforts to reduce the severity of natural disasters and contain their larger consequences will require three kinds of initiatives: stoic, heroic, and “ecozoic.”

Stoic Resilience

Humans continue to cope with natural disasters largely as they always have, by “weathering” them: riding out storms, putting out fires, waiting out droughts, and helping out their neighbors. The capacity of societies to withstand catastrophes is generally referred to as resilience. Such resilience depends on physical, economic, cultural, and political factors that determine a society’s ability to plan for and recover from disasters without creating major social and economic fallout. These capabilities are almost entirely the “stoic” achievements of local people—namely, doing what is necessary to survive and prosper in the places they inhabit. As with all preventive efforts, the benefits of investing in resilient infrastructure and sensible preparedness far outweigh the costs of coping with the consequences after disasters strike. Strong and enforced building codes; zoning restrictions in coastal areas; prepositioned shelters and supplies; accessible hospitals, clinics, and health workers; wellpublicized evacuation routes; and other aspects of public awareness all make a substantial difference in reducing casualties and damage. Media coverage can sometimes give the impression that those most affected by disasters depend mainly on responses from outsiders, but the reality in most cases is otherwise. People in the path of a natural event are almost always most effective in helping each other, comprising the overwhelming proportion of first and subsequent responders.30 However, the United States is neglecting a range of major domestic vulnerabilities to natural hazards that could have catastrophic consequences.31 Stephen Flynn has most ably summarized these and other ominous features of what he calls our “brittle nation.”32 The vulnerability of coastal developments along the Eastern seaboard, so tragically demonstrated during Tropical Storm Sandy, is one continuing danger. On the opposite side of the country, earthquakes present the more ominous threat. As Flynn recounts, the deteriorating earthen levees that currently protect the massive farmlands of California’s Central Valley are vulnerable to seismic effects. If seawater were to breach the levees after a major earthquake, it would contaminate one of the country’s most important food and employment sources for years to come. Prolonged heat waves and drought in the Midwest, even worse than those in 2012, could permanently devastate croplands and damage the country’s strained and outdated electrical grid. As the U.S. public health infrastructure continues to degrade, deadly epidemics could severely reduce national economic performance and shake citizens’ confidence in the competence and reliability of government at all levels. The current economic stress and political paralysis in the United States complicate the country’s physical vulnerabilities. Debt levels and ongoing deficits substantially reduce the capacity of government agencies at all levels to address infrastructure and preparedness investments that reduce disaster risks. In 2012, even normally routine federal appropriations for disaster relief after Sandy became a political football.33 While most investments in community resilience, as well as in industrial and agricultural facilities, are state and local matters, congressional gridlock on many major issues indicates the difficulty that new assertions of federal authority or leadership would face in directing infrastructure changes or restricting flood zone settlements. The domestic vulnerabilities of the United States are further compounded by the global risks to vital U.S. interests resulting from the vulnerabilities of critical infrastructure and large populations around the world. While national development strategies increasingly emphasize “disaster risk reduction” and “sustainable economies”34 and certain countries, such as Bangladesh, Vietnam, and Mozambique, have successfully lowered their casualty rates from recurrent flooding through better preparedness and infrastructure changes, their examples are not widely imitated. Even their successes may be overwhelmed eventually by the expected scale of storms and ocean surges. Ethiopia and Rwanda have implemented food security policies that have increased their ability to cope with drought and other environmental challenges. But despite initiatives such as the U.S. Agency for International Development’s (USAID) Feed the Future program, the global prospects for substantial increases in food production are uncertain at best. Worldwide expenditures on health care, including infrastructure and training, experienced an exceptional increase over the last decade, especially from the U.S. government. However, both health and agricultural improvements depend on continued donor assistance, which has already fallen significantly since the global recession.35 Most fundamental to stoic readiness is the political capacity of societies to mobilize in the face of crises. Such capacity includes the ability to make decisions quickly and cohesively, to redirect funding rapidly without corruption, and to deliver supplies and support efficiently. Even effective democratic governments, such as those of Turkey or Indonesia, might find regional, ethnic, or religious diversity becoming a source of conflict in the wake of a massive natural disaster. More troubled federal polities, such as Pakistan or Nigeria, could unravel, although Pakistan has handled three successive seasons of massive flooding with remarkable resilience. In failed or failing states, government capabilities are especially lacking, and such political capacity is the most difficult set of skills and institutions to improve, even with major development assistance from outsiders.36 International organizations and financial institutions increasingly promote disaster risk reduction. Both the World Bank and the agencies of the UN system, led by the United Nations Development Programme, advocate investments that increase resilience to environmental challenges. But the resources to back up these recommendations are not commensurate. For example, under the impetus of the 1997 Kyoto Protocol on climate change, an adaptation fund to assist with risk reductions was initiated in 2001. But that fund was not actually launched until 2007, and despite the creation of a similar green climate fund at the Copenhagen climate change summit in 2009, both initiatives remain woefully underfunded—as highlighted in the latest global gathering on climate change in Doha.37 With a huge imbalance between growing global risks to large populations and declining investments in resilience, U.S. leaders will be forced to make difficult choices. U.S. policies on development assistance will likely have to adopt a form of preventive triage, placing scarce assistance dollars where they will have the most enduring effects on resilience and adjustment, rather than where the needs of poverty reduction and other objectives of the UN’s Millennium Development Goals (MDGs) might otherwise seem greatest. Already the efforts to set a new agenda for development after the deadline for the MDGs in 2015 include some recognition of the need for a more pragmatic view of sustainability. But as with the MDGs, the political dimensions of resilience continue to receive little emphasis in current drafts of these global manifestos.

Heroic Relief

Increased resilience must be matched with enhanced capabilities for effective relief. Improving the scale and effectiveness of assistance to the victims of disasters is an essential priority not only for limiting immediate effects but also for containing political fallout. In the United States, specialized national agencies, such as the Federal Emergency Management Agency (FEMA) and the American Red Cross, are the principal organizers of emergency support, supplemented by state-level agencies, the National Guard, and countless local and national non-governmental organizations (NGOs).38 Since Hurricane Katrina in 2005, all these actors have demonstrated improved capacities to deal with storms, even as available resources for future crises are in decline. Most other developed countries have similar, though mainly national, agencies to lead relief operations. In poorer countries, capacities are more variable, often either completely localized or highly dependent on national military agencies, as evidenced during the 2004 tsunami in the Indian Ocean. The National Disaster Management Authority of Pakistan, in its response to the massive floods of 2010 and 2011, has been one of the notable civilian exceptions. Assistance to the most at-risk countries to increase their own capacity for humanitarian relief should be a donor priority. Resources for humanitarian assistance from national donor agencies have seen major growth in the past twenty years. In the United States, funding for foreign disaster assistance has had strong bipartisan support in Congress for many years, and humanitarian relief resonates strongly with large portions of the U.S. electorate. The Office of Foreign Disaster Assistance (OFDA) within USAID has had a record of operational excellence and effectiveness. Other governments also have made international humanitarian assistance a high priority. Scandinavian ministries, the United Kingdom’s Department for International Development (DFID), and the European Commission’s Solidarity Fund have been especially generous contributors to relief operations in recent times, both directly and through UN agencies. The role of major international NGOs, corporate philanthropy, and foundations has also grown, with resources that sometimes exceed those from official sources. With the expansion of heroic generosity, the delivery of disaster assistance has become a major international industry. Large companies and suppliers sell their goods and services in the wake of each major event. NGOs similarly follow devastation and suffering from place to place. Many take advantage of public attention and sympathy for disaster victims to raise large amounts of money for relief. However, the effectiveness of relief operations, and especially the transition from relief to recovery, often has been less than optimal. Repeated proposals have been made to create a more centrally coordinated system, and UN agency leaders have made major advances over the past two decades in coordinating and funding major international relief operations. In 1991, the General Assembly created an Inter-Agency Standing Committee (IASC) of UN agencies, a Central Emergency Revolving Fund (CERF), and an Emergency Relief Coordinator (ERC) within the UN secretariat. The latter evolved by the end of the 1990s into the Office for the Coordination of Humanitarian Affairs (OCHA), headed by the ERC with the rank of under-secretary-general. In 2005, following the Indian Ocean tsunami, IASC members agreed on an intensified approach to collaboration, dubbed the “cluster system,” which divided relief operations into major functional components and designated lead agencies in each sector to coordinate the work of both international organizations and NGOs. The current ERC, Valerie Amos from the United Kingdom, has undertaken further efforts to improve the performance of the relief community, in the process raising billions of dollars through consolidated appeals, including urgent “flash appeals” to donors. The January 2010 earthquake in Haiti, which received huge publicity and donations, highlighted both the best and worst features of the international cluster system—and of heroic relief efforts in general.39 Assistance followed a familiar pattern of initial energy and compassion that dissipated once the atmosphere of emergency and improvisation shifted to the long-term demands for major reconstruction and local government control. The influx of supplies and aid workers during the first year of relief was overwhelming. One year later, agencies reluctantly faced the need to shift their promises from “building back better” (as former President Clinton likes to put it)40 to the harsher choices involved in satisfying donors that their resources were accomplishing more immediate concrete effects. Addressing short-term basic human needs for water, food, and shelter—often to people living in large tent cities—is a different task from that of rebuilding basic infrastructure, restarting large and small businesses, and forging political institutions that endure after agencies depart. As all too often happens, the initial humanitarian response to Haiti was overly romantic, inconsistent, and insufficiently attuned to the unique features of the local culture, economy, and political system.41 With intense economic pressures on virtually all major donors, disillusionment with relief operations may result in political pressures to reduce assistance. Popular support for even the most sympathetic causes may begin to wither, including among generous Americans, especially if foreign crises multiply, or if the U.S. homeland itself is struck by major natural disasters that divert attention and resources to domestic priorities. The multilateral institutional cushions needed to mitigate the social, economic, and political fallout from extreme events remain ad hoc and undeveloped. G-8 and G-20 summit agendas pay some attention to these issues but with little evident follow-through from national governments.42 The UN Security Council, despite one famous session to address the security implications of HIV/AIDs in early 2000, has been erratic and unfocused in dealing with the broader security challenges of disease and disasters. As the council is the principal global institution responsible for addressing international “threats to the peace,” such neglect will need to be remedied. International financial institutions have standard approaches for assisting with disaster recovery, such as the emergency response programs of regional development banks, as well as the World Bank’s Emergency Recovery Loan program, Hazard Management Unit, and Global Facility for Disaster Reduction and Recovery (GFDRR). The International Monetary Fund has an emergency assistance facility designed to ease the fiscal effects of major disasters.43 But these economic mechanisms are not scaled for the size of the challenges ahead, and the international diplomatic and intelligence channels needed to address urgent political and security risks are relatively undeveloped. Even the example of the successful global efforts led by the World Health Organization in responding to pandemic threats from the SARS and avian flu viruses may not prevent national budget cuts in preventive and public health capacity.44 The same budgetary fate could befall otherwise promising initiatives to reduce food insecurities, such as those which the G-20 governments have endorsed. The international community deserves great credit for its recent heroic efforts to aid societies affected by natural disasters. But it is highly unlikely that multilateral relief operations are prepared to work at the necessary scale when disaster incidents multiply. As with future investments in resilience, some form of priority setting or triage may become the imposed standard for major international relief as well. Ecozoic Relocation Even the most effective combination of stoic and heroic efforts will not sustain vulnerable populations indefinitely. As sea levels and storm surges continue to rise, as key fisheries are contaminated or extinguished, as certain regions become inhospitable to agriculture, or as earthquakes or epidemics degrade the capacity of megacities to provide for their citizens, some currently inhabited parts of the planet will have to be scaled back, or even abandoned, for large-scale settlement. Particularly if global warming trends fulfill some scientific projections, the planet may impose wholesale and dramatic adjustments to the locations, dimensions, and lifestyles of human settlements on a scale akin to the major migrations imposed by ancient ice ages. Anticipating future adaptations of this magnitude, some scientists and philosophers have begun to refer to a coming “ecozoic” age of human adaptation.45 In the United States, such speculation will likely surface initially as more intense versions of familiar controversies over development or rebuilding in coastal areas or floodplains. These issues involve decisions about zoning, taxes, subsidized flood insurance,46 and the various publicly funded programs that promote or sustain coastal growth, such as beach reclamation or the building of wave barriers and dikes.47 Developers and local politicians often downplay disaster risks and the pressures from local citizens are almost always to rebuild rather than to abandon or relocate. Yet even the most stoic impulses must confront difficult choices. New Orleans is a prominent case in point regarding resettlement and reconstruction in areas prone to further flooding, such as the lower Ninth Ward. Hurricane Isaac demonstrated that the huge post-Katrina investments in floodwalls and levies involved decisions to protect certain areas at the expense of others. Such choices now confront officials and citizens on the Jersey Shore, Staten Island, and Long Island in the wake of Tropical Storm Sandy. The same issues will be replicated around the world. Government subsidies for hazard insurance or expensive engineering for stopgap measures, such as dikes, imported water supplies, or beach reclamation, will at some point no longer protect exposed populations enough to justify the resources needed to maintain them. As media coverage and public discussion increasingly focus on the most exposed areas, many people will begin to vote with their feet and look to resettle their families and businesses in areas less exposed to the hazards they witness across the globe. Real estate prices and infrastructure investments will increasingly reflect the realities of that new marketplace. Obvious areas of special exposure already justify “exit strategies” or migratory transitions. The former president of the Maldives, Mohamed Nasheed, has become a prominent spokesman for the fundamental threats of sea level increases to small island states.48 In other exposed areas—such as low-lying estuaries of Bangladesh, Burma, and Vietnam, as well as large areas of Africa—desertification, erosion, or salinization could render agriculture or adequate supplies of potable water infeasible. Water shortages may make areas of Central Asia and the Middle East impractical for continued settlement. On an even larger scale, some experts suggest that the expected growth of certain megacities will reach practical ceilings because of the physical and economic limitations of distributing food and water.49 Major epidemics could accelerate these pressures to limit or reduce some urban populations. The political and social dimensions of massive shifts in environment and population are difficult to predict, but the likelihood is that over time large groups of people will become ecologically displaced persons or “environmental refugees,” forced from their historic homelands and needing relocation to more hospitable places within or beyond national boundaries.50 Such transitions will present large political and economic challenges, both for long-term humanitarian support and for immigration laws and enforcement. If these movements involve millions of desperate people, geographic and political boundaries will become increasingly problematic. Recommendations: National Security and Global Solidarity The incidence of military conflicts between states is at a historic low; even the number of conflicts within states has declined steeply since the twentieth century.51 However, both trends could be slowed or reversed by increased vulnerabilities to natural disasters and the limits of political and economic capacity to deal with them.

How should the challenges ahead be framed in terms of U.S. national security and the larger “threats to the peace”?

Citizen Safety Most governments place their highest priority on national security, which begins with ensuring the physical safety of their citizens, or as John Jay famously put it in The Federalist: “Among the many objects to which a wise and free people find it necessary to direct their attention, that of providing for their safety seems to be the first.”52 While they are used to thinking of such safety in terms of protection from attacks by military or terrorist adversaries, Americans also regard their fundamental security as dependent on access to reliable supplies of air, water, food, medicine, and shelter.53 All would likely place these subsistence needs above any threat currently on the horizon, foreign or domestic. However, it is leaders—thought leaders as well as political leaders—who define the priorities for government policy and expenditures in dealing with what they perceive as the greatest threats to the country and its citizens. Such definitions of national security generally arise as narratives developed in the course or aftermath of major international attacks or threats of attack. Historical turning points in these narratives over the last hundred years include, for example, the German attacks on U.S. shipping that provoked the country into World War I; the Japanese attack on Pearl Harbor that plunged the United States into World War II; the Berlin crisis, Korean War, and Soviet nuclear tests that intensified the Cold War; and the September 11, 2001, attacks that provoked the U.S. War on Terror. Whether or not all Americans agreed with the security rationales their leaders offered at those times, they provided bold assessments of the threats confronting the country, which gained wide acceptance. Each narrative was a necessary, and apparently sufficient, political basis to enlist political support for executive orders, policies, legislation, appropriations, treaties, and other international commitments that were consistent with the leaders’ justifications. At present there is no reasonable prospect that U.S. leaders would create a national security narrative focused on the cumulative threats from an overstressed planet.54 To mobilize popular support for the major initiatives necessary to reduce foreseeable risks, U.S. leaders would eventually have to shift their characterizations of such threats from environmental to existential and from futuristic (after 2050) to imminent (before 2020). That shift is unlikely until Americans experience a pattern of severe crises that would shift popular perceptions and political attitudes in decisively different directions. No one wants to contemplate the horrific disasters that might drive such a shift in attitudes, especially when the destruction from Katrina and Sandy seem not to have had such an effect on most political leaders. Political resistance to the recognition of these likely threats is reinforced by a suspicion that those who highlight them are also seeking to justify major government interventions and expenditures, involving severe changes in lifestyles. References to global warming, or even to obvious climate changes, sound to some audiences as code words to justify carbon caps and oil taxes. Therefore this report assumes that such mitigation programs are not foreseeable in time to avoid the climatic, economic, and demographic consequences of current trends. Indeed, it is because these trends will not be changed in time that steps must be taken to adapt to their likely effects. U.S. political and thought leaders need to fulfill their highest responsibility—for the safety of citizens—by beginning to consider a range of risk reduction policies, infrastructure investments, and preparedness strategies, including the necessary legislative and budgetary changes, that might constitute an approach to national security aimed at reducing the direct and secondary consequences of natural disasters. Whether or not the necessary stoic and heroic steps are all politically palatable, the larger arguments for them should at least be actively under current debate. As Stephen Flynn has emphasized, most of these steps would not only reduce U.S. vulnerability to extreme natural events but would also reduce the opportunities for terrorists to exploit the same vulnerabilities.55 How these competing political pressures will play out depends not only on the timing and locations of disasters but also on how soon the growing public perception of our vulnerabilities becomes a political reality. The combination in 2012 of major tornados, midwestern drought, Texas floods, Hurricane Isaac, western wildfires, Arctic ice depletion, and Tropical Storm Sandy could mark the beginning of a sea change in the electorate’s expectations of present and future exposure to natural disasters. In that event, the hardest challenge for U.S. leaders may well be to prevent the country from turning inward to focus on domestic priorities and resisting involvement in the crises of other countries or regions. Such isolationism could be expressed through intensified calls for energy independence, food selfsufficiency, foreign assistance cutoffs, and even military retrenchment. Reversing decades of generosity and pragmatism, donor fatigue and domestic needs could generate a new version of an “America First” constituency that opposes all such international engagement and punishes at the polls any politician who supports it. Collective Containment U.S. leaders also cannot ignore the national security implications of the most serious risks of disaster beyond our borders. The safety of U.S. citizens is inextricably bound through the global economy with the course of environmental events in other parts of the world. Disasters or extreme conditions that degrade major agricultural areas (Russian, Australian, or Argentinean wheat fields, Japanese, Burmese, Philippine rice), disrupt for prolonged periods key manufacturing, transportation, or communications infrastructure (greater Bangkok, Bosporus, European airspace), or create immense casualties among large stressed populations (pandemics in Pakistan, Brazil, Nigeria) could affect the stability of entire regions. The severe degradation of a megacity could snowball into wider instability and conflict if not managed collaboratively. The sooner and more deliberately U.S. leaders can articulate geographic, cultural, or economic justifications for targeting scarce assistance, the sooner they are to be persuasive to U.S. citizens. Political preparation is equally required of other governments and populations. If disasters multiply, U.S. influence with these countries will likely depend on the level of U.S. engagement, generosity, and leadership in promoting a sense of global solidarity through an agenda for collaboration on resilience, relief, and relocation options. For this purpose, the U.S. government will need to complement its domestic security rationale with a compelling diplomatic narrative that advocates the needs and priorities for dealing with events that might otherwise spark major confrontations. The alternative could well be aggressive measures by governments, desperate for necessities, to bypass market allocations or seize supplies by intercepting transports, deploying covert operations, or even initiating outright invasions. A series of functionally focused collaborations to identify and manage key risks could be indispensable to contain the political consequences of future extreme events. Whether the Security Council, the G-20, the World Health Organization, or some new or combined political coalition would be the locus for such negotiated understandings is unclear. But the likelihood is that all international institutions will have to elevate their focus and resources to address disaster scenarios and environmental vulnerabilities. The security agendas of politicians, policymakers, and intelligence personnel will likely be distracted, for the time being, by perceived dangers from rogue states armed with nuclear weapons, failed states and ungoverned areas as safe havens for terrorists, and economic criminals, such as cyberburglars, unfair traders, and intellectual property thieves. Meanwhile, the safety and prosperity of the United States, as well as peace throughout the world, increasingly will be endangered by unaddressed vulnerabilities to natural disasters and extreme environmental crises. Contention and conflict could also result from the sudden realization—or opportunistic exaggeration—among large groups of alarmed citizens that such vulnerabilities are both existential and irreversible. Given demographic and environmental trends, and the increasing vulnerabilities and probable shortages to be expected within this decade—and certainly before 2030—the threats to the peace from Mother Nature may soon come to dwarf any of the threats posed by mere mortals.

## 2

#### The meta-ethic is procedural moral realism.

#### This entails that moral facts stem from procedures while substantive realism holds that moral truths exist independently of that in the empirical world. Prefer procedural realism –

#### [1] Collapses – the only way to verify whether something is a moral fact is by using procedures to warrant it.

#### [2] Uncertainty – our experiences are inaccessible to others which allows people to say they don’t experience the same, however a priori principles are universally applied to all agents.

#### Regress – I can keep asking “why should I follow this” which results in skep since obligations are predicated on ignorantly accepting rules. Only reason solves since asking “why reason?” requires reason which is self-justified.

#### That means we must universally will maxims— any non-universalizable norm justifies someone’s ability to impede on your ends.

#### Thus, the standard is consistency with the categorical imperative.

#### Prefer –

#### [1] Performativity—freedom is the key to the process of justification of arguments. Willing that we should abide by their ethical theory presupposes that we own ourselves in the first place.

#### Impact calc – the only relevant offense under my framework is that of libertarian ownership. The universality of freedom justifies a libertarian state which outweighs on actor specificity.

**Otteson 9** \*\*brackets in original\*\* James R. Otteson (professor of philosophy and economics at Yeshiva University) “Kantian Individualism and Political Libertarianism” The Independent Review, v. 13, n. 3, Winter 2009

In a crucial passage in Metaphysics of Morals, Kant writes that the “Universal Principle of Right” is “‘[e]very action which by itself or by its maxim enables the freedom of each individual’s will to co-exist with the freedom of everyone else in accordance with a universal law is right.’” He concludes, “Thus the universal law of right is as follows: let your external actions be such that the free application of your will can co-exist with the freedom of everyone in accordance with a universal law” (1991, 133, emphasis in original).5 This stipulation becomes for Kant the grounding 5. Other statements of this law of equal freedom appear in the Critique of Pure Reason (Kant [1781] 1965, 312; see also 1991, 191, “Universal History,” 45 and 50, and “Theory and Practice,” 73 and 80). 394 ✦ JAMES R. OTTESON THE INDEPENDENT REVIEW justification for the existence of a state, its raison d’être, and the reason we leave the state of nature is to secure this sphere of maximum freedom compatible with the same freedom of all others. Because this freedom must be complete, in the sense of being as full as possible given the existence of other persons who demand similar freedom, it entails that the state may—indeed, must—secure this condition of freedom, but undertake to do nothing else because any other state activities would compromise the very autonomy the state seeks to defend. Kant’s position thus outlines and implies a political philosophy that is broadly libertarian; that is, it endorses a state constructed with the sole aim of protecting its citizens against invasions of their liberty. For Kant, individuals create a state to protect their moral agency, and in doing so they consent to coercion only insofar as it is required to prevent themselves or others from impinging on their own or others’ agency. In his argument, individuals cannot rationally consent to a state that instructs them in morals, coerces virtuous behavior, commands them to trade or not, directs their pursuit of happiness, or forcibly requires them to provide for their own or others’ pursuits of happiness. And except in cases of punishment for wrongdoing,6 this severe limitation on the scope of the state’s authority must always be respected: “The rights of man must be held sacred, however great a sacrifice the ruling power may have to make. There can be no half measures here; it is no use devising hybrid solutions such as a pragmatically conditioned right halfway between right and utility. For all politics must bend the knee before right, although politics may hope in return to arrive, however slowly, at a stage of lasting brilliance” (Perpetual Peace, 1991, 125). The implication is that a Kantian state protects against invasions of freedom and does nothing else; in the absence of invasions or threats of invasions, it is inactive.

itself—you wouldn’t use modesty to adjudicate whether to be modest on the framework.

#### [2] Banning private space appropriation inhibits the sale and use of spacecraft and fuel- that’s a form of restricting the free economic choices of individuals

**Richman 12**, Sheldon. “The free market doesn’t need government regulation.” Reason, August 5, 2012. // AHS RG

Order grows from market forces. But where do **market forces** come from? They **are the result of human action. Individuals select ends and act to achieve them by adopting suitable means.** Since means are scarce and ends are abundant, **individuals economize in order to accomplish more rather than less.** And they always seek to exchange lower values for higher values (as they see them) and never the other way around. In a world of scarcity, tradeoffs are unavoidable, so one aims to trade up rather than down. (One’s trading partner does the same.) **The result of this**, along with other **features of human action**, and the world at large **is what we call market forces. But really, it is just men and women acting rationally in the world.**

### Case

### Debris

#### China is a huge alt cause

Chaturvedi 1/29 (Amit Chaturvedi, [Hindustan Times, New Delhi, ], 1-29-2022, “China plans 'megaconstellation' of 13,000 satellites, claims report“, Hindustan Times, accessed: 1-30-2022, https://www.hindustantimes.com/world-news/china-plans-megaconstellation-of-13-000-satellites-claims-report-101643421318766.html) ajs

China is embarking on a mission that has renewed concerns about spying. It plans to send upto 13,000 satellites in space - a ‘megaconstellation’ - that will encircle the Earth in the lower orbit, a report in the Daily Mail said.

The company that has got the responsibility of this work has said that the main goal of the mission is to establish supremacy in lower Earth orbit, the report further said.

Strengthening of 5G network is the aim: China

China's State Administration of Science, Technology and Industry for National Defense (SASTIND) has called for orderly development of small satellites, according to the Daily Mail report.

It said that the group of satellites will be able to provide surveillance over much of the Earth and strengthen internet facilities.

#### Collision risk is infinitesimally small

Fange 17 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/

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.

#### Lack of attribution means no retal

Schwarzer et al ’19 [Daniela, Eva-Marie McCormack, and Torben Schutz; Director, Editor, and Associate Fellow in the Security, Defense, and Armaments Program at the German Council of Foreign Relations; Deutsche Gesellschaft fur Auswartige Politik, “Technology and Strategy: The Changing Security Environment in Space Demands New Diplomatic and Military Answers,” [https://www.ssoar.info/ssoar/bitstream/handle/document/63288/ssoar-2019-schutz-Technology\_and\_Strategy\_the\_Changing.pdf](https://www.ssoar.info/ssoar/bitstream/handle/document/63288/ssoar-2019-schutz-Technology_and_Strategy_the_Changing.pdf?sequence=1&isAllowed=y&lnkname=ssoar-2019-schutz-Technology_and_Strategy_the_Changing.pdf);]

However, even a (misinterpreted) threat to space assets could start a chain reaction and quickly escalate an incident in space to a wider war. Successful deterrence, therefore, requires situational awareness, attribution capabilities and resilient assets. Especially the latter two are notoriously difficult to achieve in space. While it might be easy to attribute a kinetic attack executed with a missile, the same is not true for ASAT attacks by other satellites, and, especially, not for cyberattacks and electronic warfare measures. Without clear attribution, however, it is difficult to deter any adversary, since he could speculate that an attack cannot be traced back to him – making deterrence and retaliation more difficult. Although cross-domain deterrence, i.e. threatening an actor through potential retaliation attacks on or by other-than-space assets, is always possible, it also amplifies the problems involved in traditional deterrence: A response has to be timely and proportionate, and it should not further expand of the conflict.

#### If Kessler gets triggered then overwhelming likelihood is downed sats because of debris – woulnd’t trigger 1st strike

#### Geosynch private satellites are an alt cause to hacking – aff only bans leo megaconstellations

**Nichols 21** ‘Steven Vaughan-Nichols, 8-5-2021, "Starlink is better than its satellite competition but not as fast as landline internet," ZDNet, <https://www.zdnet.com/article/starlink-is-better-than-its-satellite-competition-but-not-as-fast-as-landline-internet//> MonVis RD

To no great surprise, [Ookla found Starlink beats HughesNet and Viasat handly](https://www.speedtest.net/insights/blog/starlink-hughesnet-viasat-performance-q2-2021/). The company found that "Starlink was the only satellite internet provider in the United States with fixed-broadband-like latency figures, and median download speeds fast enough to handle most of the needs of modern online life at 97.23 Megabits per second (Mbps) during Q2 2021. HughesNet was a distant second at 19.73 Mbps and Viasat third at 18.13 Mbps." As for latency, the time between when you start an activity over the internet and when you get a response back, it's not even a competition. Starlink's median latency, 45 milliseconds (ms) is close to fixed broadband's 14 ms. Low latency is vital for voice and video calling, gaming, and live content streaming. By comparison, Viasat, 630 ms, and HughesNet, 724 ms, are almost unusable for these purposes. Why was there such a huge difference? It's simple physics. Unless we ever get [quantum networking](https://www.energy.gov/articles/us-department-energy-unveils-blueprint-quantum-internet-launch-future-quantum-internet), we can't network faster than the speed of light. Starlink uses low earth orbit (LEO) satellite constellations, flying above us at a relatively close 550 to 1,200 kilometers (km), while HughesNet and Viasat have far higher geosynchronous orbits of about 35,000km.

### India

#### The aff doesn’t get rid of starlink it just caps the quantity of satellites it can use – can’t solve.

#### Their ev doesn’t say it literally causes war – “smoldering border war in all but name” refers to status quo conditions i.e. tensiuons – no AC ev proves why that would escalate to india launching a nuke

#### China won’t care – starlink doesn’t pose a threat to authoritairanism

Caster 21 “Blog: Why Elon Musk won’t save us from internet shutdowns” May 10, 2021 Michael Caster, [Asia Digital Programme Manager] <https://www.article19.org/resources/elon-musk-internet-shutdowns/> SM

While next generation satellite internet may be appealing for journalists, activists or opposition figures struggling with oppressive internet controls, there’s the challenge of getting the signal into the country. It needs hardware on the ground, not an easy feat in any tightly controlled civic space.

A Starlink user, for example, needs a router and antenna. Although much smaller than traditional GEO satellite antennas, a Starlink shipping container weighs around 30 lbs., and with dimensions of 30″x20″x10″ its not an easily concealed package. As the technology improves, surely antennas might shrink. Until then, if satellite internet providers made their receiver blueprints opensource, it could create possibilities for 3D printing, bypassing import barriers in closed societies.

Even if civil society in digital dictatorships manage to smuggle in or fabricate their own next generation satellite internet antennas, authorities can still go around confiscating or smashing dishes as indeed they began doing with satellite television receivers in Myanmar in early April. Criminalising their possession in May, Myanmar authorities announced penalties of up to a year in prison or a fine of $320 for anyone caught using satellite television dishes.

Regulations and Business Conflicts

There are more pesky challenges to overcome, starting with spectrum allocation. The International Telecommunications Union (ITU) is responsible for regulating telecommunication services, including satellite internet, and the allocation of spectrum, radio frequencies used for wireless communication. Just having the technology isn’t enough to start providing wide-scale internet connection where it has not been approved and is actively opposed by the government. Radioelectric spectrum is regulated as a natural resource and countries have sovereignty claims over spectrum allocation related to broadcast in their territory. If a satellite internet provider attempted to broadcast into a given country without spectrum approval, the pirate satellite would no doubt face interference and jamming.

With Starlink or Amazon’s satellite internet programs, for example, should they attempt to disregard spectrum allocation and broadcast into closed jurisdictions, in addition to signal jamming, we should expect corporate sanctioning. This includes both the satellite companies themselves, and their more profitable parent companies. If Elon Musk was persuaded to force Starlink internet into China’s backyard, Beijing would likely retaliate with production or import bans on Tesla, and recent developments show how sensitive the company is to losing market access there. Likewise, Musk’s SpaceX company behind Starlink, recently valued at $74 billion, may face related financial retaliation. Should Amazon’s Project Kuiper, once off the ground, attempt to skirt broadcast regulations, the company’s $13.5 billion yearly market in cloud computing services may find pushback and fewer government contracts around the world.

Reality Check

Satellite internet may seem like an appealing answer to internet shutdowns and rampant censorship. Next generation technologies and satellite constellations do address some speed and security challenges of their predecessors. However, although satellite technology already provides limited opportunities for civil society in closed spaces, even next generation satellite internet isn’t a ready mainstream tool for circumventing digital dictatorship. Until there are many more satellites in orbit, geographic range is limited, and there are challenges to getting antenna receivers into closed civic spaces. Even then, international spectrum regulation concerns may position political sovereignty at odds with the right to freedom of expression and access to information online.

### Astronomy

#### Space astronomy solves – goes above the bad orbits

#### No warrant

#### Urban illumination is a massive alt cause that overwhelms satellites in low earth orbit

ISC 12/21/21 (International Science Council Interviewing Piero Benvenuti of the International Astronomical Union, "The artifical constellations impacting on astronomical science," <https://council.science/current/blog/the-artificial-constellations-impacting-on-astronomical-science/> DD)

The urban illumination or ALAN (Artificial Light At Night); The optical/infrared trails of the satellites in low-Earth orbits (LEO); The radio transmission by ground and space emitters that affects radio astronomy. The interference by ALAN, that affects both amateur and professional astronomers, has become an acute problem with the advent of the LED (Light Emission Diodes), particularly by those with a high level of blue light. The International Astronomical Union has established a recommended maximum tolerable threshold of light pollution for astronomical sites of 10% a

bove natural background levels. Light pollution is growing globally at an estimated rate of 2 to 6 % per year and is reducing darkness everywhere, including at observatory sites where world-class sites risk hitting the 10% threshold in the next decade. In addition to the impact on astronomy, artificial light at night may have significant biological effects, to flora and fauna, vertebrates and invertebrates, which requires further study by appropriate experts.

#### Colissions wont happen and their own ev says centuries

**Baum 19** (Seth. 5/31. Executive Director of the Global Catastrophic Risk Institute. “Risk-Risk Tradeoff Analysis of Nuclear Explosives for Asteroid Deflection” Risk Analysis.)

As of 22 June 2018, NASA lists 18,438 known NEOs, including 18,331 asteroids and 107 comets (NASA Jet Propulsion Laboratory 2018). Mainzer et al.(2011) estimate approximately 1,000 NEOs of diameter 1km or larger and approximately 20,000 NEOs of diameter 100m or 5 larger; Harris and D’Abramo (2015) report similar results.9 Additional NEOs are identified on an ongoing basis, indicating that the total number is larger than this. Larger NEOs are easier to identify, so the unidentified NEOs will tend to be of smaller size (Mainzer et al., 2014). The long-term rate of asteroid-Earth collisions is commonly taken to follow an approximately power-law distribution as a function of asteroid diameter. 10m asteroids collide approximately once per 10 years, 100m once per 1,000 years, and 1km once per one million years (Harris et al., 2015). More precisely, Harris (2008) gives a 10-8 annual probability for collision with 10km diameter asteroids (as in the Cretaceous-Paleogene extinction event) and a 6.7x10-4 annual probability for 50m diameter asteroids (as in the 1908 Tunguska collision). Chapman and Morrison (1994) estimate a 10-6 annual probability for asteroids of diameter 2km or larger. Recent research proposes that asteroid collision probability estimates are significantly underestimated due to undercounting of hard-to-detect ocean collisions (Gusiakov, Abbott, Bryant, Masse, & Breger, 2010), but this proposal has been disputed on scientific grounds (Bourgeois & Weiss, 2009; Goff, Dominey-Howes, Chagué-Goff, & Courtney, 2010). The estimated rate of asteroid collision can change over time. On astronomical time scales, the collision rate has gradually lowered due to the stabilization of planetary orbits

and the accretion of small asteroids and comets (NRC, 2010). On human time scales, the estimated rate is changing due to the findings of asteroid monitoring programs, especially for larger asteroids, which are easier to detect. Mainzer et al. (2011) report the detection of 90% of NEOs of diameter 1km or larger, 25% at 100m, and less than 1% at 20m, with none found to be on course for Earth collision. Harris et al. (2015) estimate ~100% of asteroids of diameter≥4km have been detected, with detection rates decreasing down to a minimum of ~10m.

### Ozone

#### Ev doesn’t get to a terminal impact – says some plant loss and UV rays – no reason that causes extinction

#### A bajillion alt causes – rockets other GSO sats, etc.