### 1

#### Interpretation: “Appropriation of outer space” by private entities refers to the exercise of exclusive control or use of space.

TIMOTHY JUSTIN TRAPP, JD Candidate @ UIUC Law, ’13, TAKING UP SPACE BY ANY OTHER MEANS: COMING TO TERMS WITH THE NONAPPROPRIATION ARTICLE OF THE OUTER SPACE TREATY UNIVERSITY OF ILLINOIS LAW REVIEW [Vol. 2013 No. 4]

The issues presented in relation to the nonappropriation article of the Outer Space Treaty should be clear.214 The ITU has, quite blatantly, created something akin to “property interests in outer space.”215 It allows nations to exclude others from their orbital slots, even when the nation is not currently using that slot.216 This is directly in line with at least one definition of outer-space appropriation.217 [\*\*Start Footnote 217\*\*Id. at 236 (“Appropriation of outer space, therefore, is ‘the exercise of exclusive control or exclusive use’ with a sense of permanence, which limits other nations’ access to it.”) (quoting Milton L. Smith, The Role of the ITU in the Development of Space Law, 17 ANNALS AIR & SPACE L. 157, 165 (1992)). \*\*End Footnote 217\*\*]The ITU even allows nations with unused slots to devise them to other entities, creating a market for the property rights set up by this regulation.218 In some aspects, this seems to effect exactly what those signatory nations of the Bogotá Declaration were trying to accomplish, albeit through different means.219

#### Private appropriation of extracted space resources is distinct from appropriation “of” outer space. Despite longstanding permission of appropriation of extracted resources, sovereign claims are still universally prohibited.

Abigail D. Pershing, J.D. Candidate @ Yale, B.A. UChicago,’19, "Interpreting the Outer Space Treaty's Non-Appropriation Principle: Customary International Law from 1967 to Today," Yale Journal of International Law 44, no. 1

II. THE FIRST SHIFT IN CUSTOMARY INTERNATIONAL LAW’S INTERPRETATION OF THE NON-APPROPRIATION PRINCIPLE Since the drafting of the Outer Space Treaty, several States have chosen to reinterpret the non-appropriation principle as narrower in scope than its drafters originally intended. This reinterpretation has gone largely unchallenged and has in fact been widely adopted by space-faring nations. In turn, this has had the effect of changing customary international law relating to the non-appropriation principle. Shifting away from its original blanket application in 1967, States have carved out an exception to the non-appropriation principle, allowing appropriation of extracted space resources.53 This Part examines this shift in the context of the two branches of the United Nation’s customary international law standard: State practice and opinio juris. A. State Practice The earliest hint of a change in customary international law relating to the interpretation of the non-appropriation clause came in 1969, when the United States first sent astronauts to the moon. As part of his historic journey, astronaut Neil Armstrong collected moonrocks that he brought back with him to Earth and promptly handed off to the National Aeronautics and Space Administration (NASA) as U.S. property.54 Later, the USSR similarly claimed lunar material as government property, some of which was eventually sold to private citizens. 55 These first instances of space resource appropriation did not draw much attention, but they presented a distinct shift marking the beginning of a new period in State practice. Having previously been limited by their technological capabilities, States could now establish new practices with respect to celestial bodies. This was the beginning of a pattern of appropriation that slowly unfolded over the next few decades and has since solidified into the general and consistent State practice necessary to establish the existence of customary international law. Currently, the U.S. government owns 842 pounds of lunar material.56 There is little question that NASA and the U.S. government consider this material, as well as other space materials collected by American astronauts, to be government property.57 In fact, NASA explicitly endorses U.S. property rights over these moon rocks, stating that “[l]unar material retrieved from the Moon during the Apollo Program is U.S. government property.”5 The U.S. delegation’s reaction to the language of the 1979 Moon Agreement further cemented this interpretation that appropriation of extracted resources is a permissible exception to the non-appropriation clause of Article II. Although the United States is not a party to the Moon Agreement, it did participate in the negotiations.59 The Moon Agreement states in relevant part: Neither the surface nor the subsurface of the moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or nongovernmental organization, national organization or nongovernmental entity or of any natural person.60 In response to this language, the U.S. delegation made a statement laying out the American view that the words “in place” imply that private property rights apply to extracted resources61—a comment that went completely unchallenged. That all States seemed to accept this point, even those bound by the Moon Agreement, is further evidence of a shift in customary international law.62 B. Opinio Juris: Domestic Legislation Domestic law, both in the United States and abroad, provides further evidence of the shift in customary international law surrounding the issue of nonappropriation as it relates to extracted space resources. Domestic U.S. space law is codified at Section 51 of the U.S. Code and has been regularly modified to expand private actors’ rights in space.63 Beginning in 1984, the Commercial Space Launch Act provided that “the United States should encourage private sector launches and associated services.”64 The goal of the 1984 Act was to support commercial space launches by private companies and individuals.65 It did not, however, specifically discuss commercial exploitation of space. The first such mention of commercial use of space appeared in 2004, with the Commercial Space Launch Amendments Act.66 This Act specifically aimed at regulating space tourism but did not explicitly guarantee any private rights in space.67 The most significant change in U.S. space law came with the passage of the Spurring Private Aerospace Competitiveness and Entrepreneurship (SPACE) Act in 2015. As incorporated into Section 51 of the Code, this Act provides: A United States citizen engaged in commercial recovery of an asteroid resource or a space resource under this chapter shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell the asteroid resource or space resource obtained in accordance with applicable law, including the international obligations of the United States.68 Whereas the idea that private corporations might go into space may have seemed far-fetched to the drafters of the Outer Space Treaty, the SPACE Act of 2015 was the first instance of a government recognizing such a trend and officially supporting private companies’ commercial rights to space resources under law. With the new 2015 amendment to Section 51 in place, U.S. companies can now rest assured that any profits they reap from space mining are firmly legal—at least within U.S. jurisdictions. Although the United States was the first country to officially reinterpret the non-appropriation principle, other countries are following suit. On July 20, 2017, Luxembourg passed a law entitled On the Exploration and Utilization of Space Resources with a vote of fifty-five to two.69 The law took effect on August 1, 2017.70 Article 1 of the new law states simply that “[s]pace resources can be appropriated,” and Article 3 expressly grants private companies permission to explore and use space resources for commercial purposes.71 Official commentary on the law establishes that its goal is to provide companies with legal certainty regarding ownership over space materials—a goal that the commentators regard as legal under the Outer Space Treaty despite the non-appropriation principle.72 The next country to enact similar legislation may be the United Arab Emirates (UAE). According to the UAE Space Agency director general, Mohammed Al Ahbabi, the UAE is currently in the process of drafting a space law covering both human space exploration and commercial activities such as mining.73 To further this goal, in 2017 the UAE set up the Space Agency Working Group on Space Policy and Law to specify the procedures, mechanisms, and other standards of the space sector, including an appropriate legal framework.74 C. Opinio Juris: Legal Scholarship Other major space powers are also considering similar laws in the future, including Japan, China, and Australia. 75 Senior officials within China’s space program have explicitly stated that the country’s goal is to explore outer space and to take advantage of outer space resources.76 The general international trend clearly points in this direction in anticipation of a potential “space gold rush.” 7 Mirroring the shift in State practice and domestic laws, the legal community has also changed its approach to the interpretation of the nonappropriation principle. Whereas at the time of the ratification of the Outer Space Treaty the majority of legal scholars tended to apply the non-appropriation principle broadly, most legal scholars now view appropriation of extracted materials as permissible.78 Brandon Gruner underscores that this new view is historically distinct from prior legal interpretation, noting that modern interpretations of the Outer Space Treaty’s non-appropriation principle differ from those of the Treaty’s authors.79 In contrast to earlier legal theory that denied the possibility of appropriation of any space resources, scholars now widely accept that extracting space resources from celestial bodies is a “use” permitted by the Outer Space Treaty and that extracted materials become the property of the entity that performed the extraction.80 Stressing the fact that the Treaty does not explicitly prohibit appropriating resources from outer space, other authors conclude that the use of extracted space resources is permitted, meaning that the new SPACE Act is a plausible interpretation of the Outer Space Treaty.81 However, scholars have been careful to cabin the extent to which they accept the legality of appropriation. For instance, although Thomas Gangale and Marilyn Dudley-Rowley acknowledge the legality of private appropriation of extracted space resources, they nonetheless emphasize that “[o]wnership of and the right to use extraterrestrial resources is distinct from ownership of real property” and that any such claim to real property is illegal.82 Lawrence Cooper is also careful to point out this distinction: “[t]he [Outer Space] Treaties recognize sovereignty over property placed into space, property produced in space, and resources removed from their place in space, but ban sovereignty claims by states; international law extends this ban to individuals.”83 Although there remain some scholars who still insist on the illegality of the 2015 U.S. law and State appropriation of space resources generally,84 their dominance has waned since the 1960s. These scholars are now a minority in the face of general acceptance among the legal community that minerals and other space resources, once extracted, may be legally claimed as property. 85 Taken together, the elements described above—statements made in the international arena, de facto appropriation of space resources in the form of moon rocks, the adoption of new national policies permitting appropriation of extracted space resources, and the weight of the international legal community’s opinion— indicate a fundamental shift in customary international law. The Outer Space Treaty’s non-appropriation clause has been redefined via customary international law norms from its broad application to now include a carve-out allowing appropriation of space resources once such resources have been extracted.

#### Violation: They defend \_\_\_\_

#### Standards:

#### [1] Limits – their interpretation means that affs about any outer space activity would be topical: tourism, mining, photography, rovers, ice cores, satellites, debris, can’t sell rocks on EBAY, etc. This explodes neg prep burdens since outer space activity is so vague– large caselists results in shallow debates and pushes argumentation to the fringes to find broad theses that disagree with everything. That prevents rigorous argument testing – anyone can skim a Wikipedia article, but the process of clash is unique to debate. At best the aff’s extra T which links to limits since the aff gets extra-T planks to solve negative DAs.

#### [2] Precision – the counter-interp justifies them arbitrarily doing away with random words in the resolution which decks negative ground and preparation because the aff is no longer bounded by the resolution. Independent voter for jurisdiction – the judge doesn’t have the jurisdiction to vote aff if there wasn’t a legitimate aff.

#### TVA – resource extraction and colonization affs have senses of permanence

#### Voters:

#### [1] Fairness – constitutive to the judge to decide the better debater, only fairness is in your jurisdiction because it skews decision making

#### [2] Education – the only portable education from debate that we care about

#### Drop the debater – 1] deter future abuse and 2] set better norms for debate.

#### Competing Interps:

#### [1] reasonability on t is incoherent: you’re either topical or you’re not – it’s impossible to be 77% topical, links to all limits offense

#### [2] functionally the same as reasonability – we debate over a specified briteline which is a counter interp

#### [3] judge intervention – judge has to intervene on what’s reasonable, creates a race to the bottom where debaters exploit judge tolerance for questionable argumentation.

#### No RVIs

#### [1] illogical for you to get offense just for being fair – it’s the 1ac’s burden

#### [2] baiting - rvi’s incentivize debaters to read abusive positions to win off theory

#### [3] discourages checking abuse since debaters will be afraid to lose on theory

### 2

#### CP Text: Companies should use basic precaution measures to prevent harm from space dust.

#### The author concludes that techniques such as bagging are key to prevent dust from escaping.

#### He also says that this is essential to preserve uncluttered space and it solves sufficient.

1AC Scoles ’15 [Sarah Scoles, 5-27-2015, "Dust from asteroid mining spells danger for satellites," New Scientist, [https://www.newscientist.com/article/mg22630235-100-dust-from-asteroid-mining-spells-danger-for-satellites/]//](https://www.newscientist.com/article/mg22630235-100-dust-from-asteroid-mining-spells-danger-for-satellites/%5d//) recut akhileshp

IF THE gold mine is too far from home, why not move it nearby? It sounds like a fantasy, but would-be miners are already dreaming up ways to drag resource-rich space rocks closer to home. Trouble is, that could threaten the web of satellites around Earth. Asteroids are not only stepping stones for cosmic colonisation, but may contain metals like gold, platinum, iron and titanium, plus life-sustaining hydrogen and oxygen, and rocket-fuelling ammonia. Space age forty-niners can either try to work an asteroid where it is, or tug it into a more convenient orbit. NASA chose the second option for its [Asteroid Redirect Mission](http://www.nasa.gov/content/what-is-nasa-s-asteroid-redirect-mission/), which aims to [pluck a boulder from an asteroid’s surface](https://www.newscientist.com/article/dn27243-rock-grab-from-asteroid-will-aid-human-mission-to-mars/) and relocate it to a stable orbit around the moon. But an asteroid’s gravity is so weak that it’s not hard for surface particles to escape into space. Now a new model warns that debris shed by such transplanted rocks could intrude where many defence and communication satellites live – in geosynchronous orbit. According to [Casey Handmer](http://www.caseyhandmer.com/) of the California Institute of Technology in Pasadena and Javier Roa of the Technical University of Madrid in Spain, 5 per cent of the escaped debris will end up in regions traversed by satellites. Over 10 years, it would cross geosynchronous orbit 63 times on average. A satellite in the wrong spot at the wrong time will suffer a damaging high-speed collision with that dust. The study also looks at the “catastrophic disruption” of an asteroid 5 metres across or bigger. Its total break-up into a pile of rubble would increase the risk to satellites by more than 30 per cent ([arxiv.org/abs/1505.03800](http://arxiv.org/abs/1505.03800)). That may not have immediate consequences. But as Earth orbits get more crowded with spent rocket stages and satellites, we will have to worry about [cascades of collisions](https://www.newscientist.com/article/mg20727772-300-space-junk-hunting-zombies-in-outer-space/) like the one depicted in the movie Gravity. Handmer and Roa want to point out the problem now so that we can find a solution before any satellites get dinged. “It is possible to quantify and manage the risk,” says Handmer. “A few basic precautions will prevent harm due to stray asteroid material.” Mike Nolan of the [Arecibo Observatory in Puerto Rico](http://www.naic.edu/general/) agrees it’s an important issue. “They’re right to consider it,” he says, “and their first stab indicates that the answer isn’t obviously ‘don’t worry’.” However, the risk is less concerning for asteroids not in this particular lunar orbit, he says. Aspiring space miners are taking the risk seriously. “We will be utilising containment techniques,” says Meagan Crawford of Deep Space Industries, a California-based firm which hopes to be mining metals from asteroids by 2020. One possibility is bagging, in which the asteroid is placed in a kind of shroud to prevent dust and loose stones from escaping. “All of our mining targets will be chosen specifically to minimise the risk of particulate interaction with other bodies,” she says. The risk from NASA’s mission, planned for the 2020s, is small, Nolan points out. But if space mining takes off, things will get complicated. “The establishment of good asteroid mining practices early on is essential for the preservation of a non-renewable resource: uncluttered space,” says Handmer.

### 3

#### Asteroid mining solves water access – only NEOs are sufficiently proximate and hydrated – the plan independently harms this – turns case

Tillman 19 [(Nola Taylor, has been published in Astronomy, Sky & Telescope, Scientific American, New Scientist, Science News (AAS), Space.com, and Astrobiology magazine, BA in Astrophysics) “Tons of Water in Asteroids Could Fuel Satellites, Space Exploration,” Space, 9/29/2019] JL

When it comes to mining space for water, the best target may not be the moon: Entrepreneurs' richest options are likely to be asteroids that are larger and closer to Earth.

A recent study suggested that roughly 1,000 water-rich, or hydrated, asteroids near our planet are easier to reach than the lunar surface is. While most of these space rocks are only a few feet in size, more than 25 of them should be large enough to each provide significant water. Altogether, the water locked in these asteroids should be enough to fill somewhere around 320,000 Olympics-size swimming pools — significantly more than the amount of water locked up at the lunar poles, the new research suggested.

Because asteroids are small, they have less gravity than Earth or the moon do, which makes them easier destinations to land on and lift off from. If engineers can figure out how to mine water from these space rocks, they could produce a source of ready fuel in space that would allow spacecraft designers to build refuelable models for the next generation of satellites. Asteroid mining could also fuel human exploration, saving the expense of launching fuel from Earth. In both cases, would-be space-rock miners will need to figure out how to free the water trapped in hydrated minerals on these asteroids.

"Most of the hydrated material in the near-Earth population is contained in the largest few hydrated objects," Andrew Rivkin, an asteroid researcher at Johns Hopkins University Applied Physics Research Laboratory in Maryland, told Space.com. Rivkin is the lead author on the paper, which estimated that near Earth asteroids could contain more easily accessible water than the lunar poles.

According to the United Nations Office for Outer Space Affairs, more than 5,200 of the objects launched into space are still in orbit today. While some continue to function, the bulk of them buzz uselessly over our heads every day. They carry fuel on board, and when they run out, they are either lowered into destructive orbits or left to become space junk, useless debris with the potential to cause enormous problems for working satellites. Refueling satellites in space could change that model, replacing it with long-lived, productive orbiters.

"It's easier to bring fuel from asteroids to geosynchronous orbit than from the surface of the Earth," Rivkin said. "If such a supply line could be established, it could make asteroid mining very profitable."

Hunting for space water from the surface of the Earth is challenging because the planet's atmosphere blocks the wavelength of light where water can be observed. The asteroid warming as it draws closer to the sun can also complicate measurements.

Instead, Rivkin and his colleagues turned to a class of space rocks called Ch asteroids. Although these asteroids don't directly exhibit a watery fingerprint, they carry the telltale signal of oxidized iron seen only on asteroids with signatures of water-rich minerals, which means the authors felt confident assuming that all Ch asteroids carry this rocky water.

Based on meteorite falls, a previous study estimated that Ch asteroids could make up nearly 10% of the near-Earth objects (NEOs). With this information, the researchers determined that there are between 26 and 80 such objects that are hydrated and larger than 0.62 miles (1 km) across.

Right now, only three NEOs have been classified as Ch asteroids, although others have been spotted in the asteroid belt. Most NEOs are discovered and observed at wavelengths too short to reveal the iron band that marks the class. Carbon-rich asteroids, which include Ch asteroids and other flavors, are also darker than the more common stony asteroids, making them more challenging to observe.

Although Ch asteroids definitely contain water-rich minerals, that doesn’t necessarily mean that they will always be the best bet for space mining. It comes down to risk. Would an asteroid-mining company rather visit a smaller asteroid that definitely has a moderate amount of water, or a larger one that could yield a larger payday but could also come up dry?

"Whether getting sure things with no false positives, like the Ch asteroids, is more important or if a greater range of possibilities is acceptable with the understanding that some asteroids will be duds is something the miners will have to decide," Rivkin said.

In addition to estimating the number of large, water-rich asteroids might be available, the study also found that as many as 1,050 smaller objects, roughly 300 feet (100 meters) across, may also linger near Earth. Their small bulk will make them easier to mine because their low gravity will require less fuel to escape from, but they will produce less water overall, and Rivkin expects that the handful of larger space rocks will be the first targets.

"It seems likely that the plan for these companies will be to find the largest accessible asteroid with mineable material with the expectation that it will be more cost-effective than chasing down a large number of smaller objects," Rivkin said. "How 'accessible' and 'mineable material' and 'cost-effective' are defined by each company is to be seen."

#### Asteroid mining solves climate change through solar-powered satellites – provides infrastructure for existing tech

**Faure 11** (Jamie Faure, 7-15-2011, "Can space-based solar power save the climate? – Young Scientists Journal," No Publication, <https://ysjournal.com/can-space-based-solar-power-save-the-climate/>) // VS

Introduction How shall we tackle climate change? This is still an unresolved question. Here, I will put forward an idea and argue its case. Burning fuels creates carbon dioxide, which thickens the atmosphere. Consequently, an increasing amount of the Sun’s heat is trapped. So, to tackle climate change, we must stop burning fuels. However, fuel is needed for energy. Therefore, we (can use) need to find other sources of energy that do not adversely impact the environment. Space-based Solar Power What I think has the most potential in reducing global warming is Space-based Solar Power (SBSP) . This technology involves placing solar satellites in space, where their energy production is unaffected by seasons, weather, the day and night cycle, and the filtering effect of the Earth’s atmosphere, learn more at solar the gap. The Sun’s energy for us is virtually unlimited (around 5 billion years to go). In addition, the satellites are placed nearer to the Sun in space than to the Earth, so they receive more of the Sun’s energy. The satellite then transmits power to the Earth using a laser or microwave beam. Transmission by microwaves has already been tested by NASA, and proven possible. In space, solar irradiance is 144% higher than in the Earth, which means there is a lot more power available up there! Japan has already been working on this idea for 30 years and invested over 20 billion dollars, hoping to finish their project by 2030. The Americans and the Russians are also at the breach, working on a similar idea. The problem with this solution is that we would need to make sure the laser or microwave beam is perfectly orientated toward its receptor on Earth, and would not hit planes or other satellites. Further development is needed before this method is actually feasible.

#### Climate change exacerbates existing water shortages

**WMO 10/5** (World Meteorological Organization, 5-10-2021, "Wake up to the looming water crisis, report warns," World Meteorological Organization, <https://public.wmo.int/en/media/press-release/wake-looming-water-crisis-report-warns>) // VS

Geneva 5 October 2021 - Water-related hazards like floods and droughts are increasing because of climate change. The number of people suffering water stress is expected to soar, exacerbated by population increase and dwindling availability. But management, monitoring, forecasting and early warnings are fragmented and inadequate, whilst global climate finance efforts are insufficient according to a new multi-agency report. The State of Climate Services 2021: Water highlights the need for urgent action to improve cooperative water management, embrace integrated water and climate policies and scale up investment in this precious commodity which underpins all the international goals on sustainable development, climate change adaptation and disaster risk reduction. “Increasing temperatures are resulting in global and regional precipitation changes, leading to shifts in rainfall patterns and agricultural seasons, with a major impact on food security and human health and well-being,” says World Meteorological Organization Secretary-General Prof. Petteri Taalas. “This past year has seen a continuation of extreme, water-related events. Across Asia, extreme rainfall caused massive flooding in Japan, China, Indonesia, Nepal, Pakistan and India. Millions of people were displaced, and hundreds were killed. But it is not just in the developing world that flooding has led to major disruption. Catastrophic flooding in Europe led to hundreds of deaths and widespread damage,” he said. “Lack of water continues to be a major cause of concern for many nations, especially in Africa. More than two billion people live in water-stressed countries and suffer lack of access to safe drinking water and sanitation,” he told the official high-level launch event. “We need to wake up to the looming water crisis,” said Prof. Taalas. The report was coordinated by WMO and contains input from more than 20 international organizations, development agencies and scientific institutions. It is accompanied by a Story Map. Water-related hazards and stress Terrestrial Water Storage (TWS) trends of the past 20 years (2002-2021) According to figures cited in the report, 3.6 billion people had inadequate access to water at least one month per year in 2018. By 2050, this is expected to rise to more than five billion. In the past 20 years, terrestrial water storage – the summation of all water on the land surface and in the subsurface, including soil moisture, snow and ice – has dropped at a rate of 1cm per year. The biggest losses are occurring in Antarctica and Greenland, but many highly populated lower latitude locations are experiencing significant water losses in areas that are traditionally providing water supply, with major ramifications for water security. The situation is worsening by the fact that only 0.5% of water on Earth is useable and available freshwater. Water-related hazards have increased in frequency over the past 20 years. Since 2000, flood-related disasters have risen by 134% compared with the two previous decades. Most of the flood-related deaths and economic losses were recorded in Asia, where end-to-end warning systems for riverine floods require strengthening. The number and duration of droughts also increased by 29% over this same period. Most drought-related deaths occurred in Africa, indicating a need for stronger end-to-end warning systems for drought in that region.

#### Climate change makes water shortages inevitable – that causes hydro-political conflict escalation which goes nuclear

Harvey 8/17 [(Fiona, the Guardian's environment correspondent, won the Foreign Press Association award for Environment Story of the Year and the British Environment and Media Awards journalist of the year) “Global water crisis will intensify with climate breakdown, says report,” The Guardian, 8/17/2021] JL

Mark’s words should be a call to attention, and a call to action. The plight of farmers in Australia illustrates a larger reality: As planetary temperatures continue to increase and rainfall patterns shift due to human-caused climate disruption, our ability to grow crops and have enough drinking water will become increasingly challenged, and the outlook is only going to worsen.

The most recent United Nations Intergovernmental Panel on Climate Change report warned of increasingly intense droughts and mass water shortages around large swaths of the globe.

But even more conservative organizations have been sounding the alarm. “Water insecurity could multiply the risk of conflict,” warns one of the World Bank’s reports on the issue. “Food price spikes caused by droughts can inflame latent conflicts and drive migration. Where economic growth is impacted by rainfall, episodes of droughts and floods have generated waves of migration and spikes in violence within countries.”

Meanwhile, a study published in the journal Global Environmental Change, looked at how “hydro-political issues” — including tensions and potential conflicts — could play out in countries expected to experience water shortages coupled with high populations and pre-existing geopolitical tensions.

The study warned that these factors could combine to increase the likelihood of water-related tensions — potentially escalating into armed conflict in cross-boundary river basins in places around the world by 74.9 to 95 percent. This means that in some places conflict is practically guaranteed.

These areas include regions situated around primary rivers in Asia and North Africa. Noted rivers include the Tigris and Euphrates, the Indus, the Nile, and the Ganges-Brahmaputra.

Consider the fact that 11 countries share the Nile River basin: Egypt, Burundi, Kenya, Eritrea, Ethiopia, Uganda, Rwanda, Sudan, South Sudan, Tanzania and the Democratic Republic of Congo. All told, more than 300 million people already live in these countries, — a number that is projected to double in the coming decades, while the amount of available water will continue to shrink due to climate change.

For those in the US thinking these potential conflicts will only occur in distant lands — think again. The study also warned of a very high chance of these “hydro-political interactions” in portions of the southwestern US and northern Mexico, around the Colorado River.

Potential tensions are particularly worrisome in India and Pakistan, which are already rivals when it comes to water resources. For now, these two countries have an agreement, albeit a strained one, over the Indus River and the sharing of its water, by way of the 1960 Indus Water Treaty.

However, water claims have been central to their ongoing, burning dispute over the Kashmir region, a flashpoint area there for more than 60 years and counting.

The aforementioned treaty is now more strained than ever, as Pakistan accuses India of limiting its water supply and violating the treaty by placing dams over various rivers that flow from Kashmir into Pakistan.

In fact, a 2018 report from the International Monetary Fund ranked Pakistan third among countries facing severe water shortages. This is largely due to the rapid melting of glaciers in the Himalaya that are the source of much of the water for the Indus.

To provide an idea of how quickly water resources are diminishing in both countries, statistics from Pakistan’s Islamabad Chamber of Commerce and Industry from 2018 show that water availability (per capita in cubic meters per year) shrank from 5,260 in 1951, to 940 in 2015, and are projected to shrink to 860 by just 2025.

In India, the crisis is hardly better. According to that country’s Ministry of Statistics (2016) and the Indian Ministry of Water Resources (2010), the per capita available water in cubic meters per year was 5,177 in 1951, and 1,474 in 2015, and is projected to shrink to 1,341 in 2025.

Both of these countries are nuclear powers. Given the dire projections of water availability as climate change progresses, nightmare scenarios of water wars that could spark nuclear exchanges are now becoming possible.

## Case

### AT: Space Debris

#### 1] Collision is unlikely – all countries receive collision warnings THREE days ahead AND their evidence doesn’t assume new technology.

**Mosher** **’19** [Dave; September 3rd; Journalist with more than a decade of experience reporting and writing stories about space, science, and technology; Business Insider, “Satellite collisions may trigger a space-junk disaster that could end human access to orbit. Here’s How,” <https://www.usafa.edu/app/uploads/Space_and_Defense_2_3.pdf>; GR]//ww pbj

The Kessler syndrome plays center-stage in the movie "Gravity," in which an accidental space collision endangers a crew aboard a large space station. But Gossner said that type of a runaway space-junk catastrophe is unlikely. "Right now I don't think we're close to that," he said. "I'm not saying we couldn't get there, and I'm not saying we don't need to be smart and manage the problem. But I don't see it ever becoming, anytime soon, an unmanageable problem." There is no current system to remove old satellites or sweep up bits of debris in order to prevent a Kessler event. Instead, space debris is monitored from Earth, and new rules require satellites in low-Earth orbit be deorbited after 25 years so they don't wind up adding more space junk. "Our current plan is to manage the problem and not let it get that far," Gossner said. "I don't think that we're even close to needing to actively remove stuff. There's lots of research being done on that, and maybe some day that will happen, but I think that — at this point, and in my humble opinion — an unnecessary expense." A major part of the effort to prevent a Kessler event is the Space Surveillance Network (SSN). The project, led by the US military, uses 30 different systems around the world to identify, track, and share information about objects in space. Many objects are tracked day and night via a networkof radar observatories around the globe. Optical telescopes on the ground also keep an eye out, but they aren't always run by the government. "The commercial sector is actually putting up lots and lots of telescopes," Gossner said. The government pays for their debris-tracking services. Gossner said one major debris-tracking company is called Exoanalytic. It uses about 150 small telescopes set up around the globe to detect, track, and report space debris to the SSN. Telescopes in space track debris, too. Far less is known about them because they're likely top-secret military satellites. Objects detected by the government and companies get added to a catalog of space debris and checked against the orbits of other known bits of space junk. New orbits are calculated with supercomputers to see if there's a chance of any collisions. Diana McKissock, a flight lead with the US Air Force's 18th Space Control Squadron, helps track space debris for the SSN. She said the surveillance network issues warnings to NASA, satellite companies, and other groups with spacecraft, based on two levels of emergency: basic and advanced. The SSN issues a basic emergency report to the public three days ahead of a 1-in-10,000 chance of a collision. It then provides multiple updates per day until the risk of a collision passes. To qualify for such reporting, a rogue object must come within a certain distance of another object. In low-Earth orbit, that distance must be less than 1 kilometer (0.62 mile); farther out in deep space, where the precision of orbits is less reliable, the distance is less than 5 kilometers (3.1 miles). Advanced emergency reports help satellite providers see possible collisions much more than three days ahead. "In 2017, we provided data for 308,984 events, of which only 655 were emergency-reportable," McKissock told Business Insider in an email. Of those, 579 events were in low-Earth orbit (where it's relatively crowded with satellites).

#### 2] No debris impact at every layer of space

Fange 17 (Daniel von Fange. Web Application Engineer. “Kessler Syndrome is Over Hyped,” *Braino*, 5/21/17, <http://braino.org/essays/kessler_syndrome_is_over_hyped/>) dwc 19)//ww pbj

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

#### 3] Alternative measures solve misclac from satellite takeout

Lambakis 01 (Steven Lambakis is a senior defense analyst at the National Institute for Public Policy and the author of On the Edge of Earth: The Future of American Space Power (University Press of Kentucky, 2001). “Space Weapons: Refuting the Critics” <http://www.hoover.org/publications/policy-review/article/6612>, Donnie)//ww pbj

In other words, it is not at all self-evident that a sudden loss of a communications satellite, for example, would precipitate a wider-scale war or make warfare termination impossible. In the context of U.S.-Russian relations, communications systems to command authorities and forces are redundant. Urgent communications may be routed through land lines or the airwaves. Other means are also available to perform special reconnaissance missions for monitoring a crisis or compliance with an armistice. While improvements are needed, our ability to know what transpires in space is growing — so we are not always in the dark.

#### 4] Kessler’s Syndrome wrong and super long timeframe

Kurt 15 – JD-William & Mary Joseph Kurt, JD- William & Mary School of Law, BA-Marquette University, NOTE: TRIUMPH OF THE SPACE COMMONS: ADDRESSING THE IMPENDING SPACE DEBRIS CRISIS WITHOUT AN INTERNATIONAL TREATY, 40 Wm. & Mary Envtl. L. & Pol'y Rev. 305 (2015)//ww pbj

A. Practical Considerations: Feasible Solutions to the Space Debris Problem Are on Their Way One key question in assessing whether an international treaty is a requisite for solving the space debris problem is just how difficult it will be to fashion a remedy. The more complex and costly are feasible solutions, the more likely it is that a comprehensive regime is necessary to bind the various actors together. 93Link to the text of the note A good place to begin is to determine just how imminent is the onset of the cascade of exponentially more frequent debris-creating collisions, known as the Kessler Syndrome. 94Link to the text of the note To be certain, no one can be sure--this phenomenon being subject to highly complex probabilities. 95Link to the text of the note Indeed, experts' estimates of when such a cascade will become irreversible vary [\*316] widely. 96Link to the text of the note The National Research Council produced a report in 2011 that suggested that "space might be just 10 or 20 years away from severe problems." 97Link to the text of the note In fact, the cascading effect has already begun, albeit at a modest pace. 98Link to the text of the note However, Donald Kessler, who first described the eponymous effect in 1978, has significantly recalibrated his own outlook over the years. 99Link to the text of the note Originally, Kessler predicted that catastrophe would result by the year 2000. 100Link to the text of the note That date long passed, Kessler now speaks of a century-long process that "we have time to deal with." 101Link to the text of the note

#### 5] No solvency – detection isn’t prevention – squo trying to prevent climate change but not working – they don’t solve

### AT: Africa

#### **1] TURN - Space mining saves African econ**

Oni 19 [(David, a space industry and technology analyst at Space in Africa. He’s a graduate of Mining Engineering from the Federal University of Technology Akure.) “The Effect of Asteroid Mining on Mining Activities in Africa,” Africa News, 9/24/19, <https://africanews.space/the-effect-of-asteroid-mining-on-mining-activities-in-africa/>]

At the moment, Asteroid mining poses no threat to terrestrial mining; however, this will not hold for long. The space industry is progressing at such a rapid pace, and the prospects are unequivocally mouth-watering. The big question is, will asteroid mining lure away investors in Africa? The planetary resources company estimates that a single 30-m asteroid may contain 30 billion dollars in platinum alone and a 500m rock could contain half the entire world resources of PGM. Considering the abundance of minerals in asteroids, once asteroid mining materialises, it will severely affect the precious metals market, usurp the prices of rare earth minerals, and a whole lot more because minerals that are usually somewhat scarce on earth will be easily accessible on asteroids. While foreign investors run the majority of the large-scale mining activities in the region, reports say that many African countries are dangerously dependent on mining activities. For some African countries, despite massive mineral wealth, their mining sectors are underdeveloped, and this is as a result of much focus on oil resources and a couple of other challenges. The million-dollar question is, what will become of the mining activities in Africa?

#### 2] No Africa escalation

Barrett 05 [(Robert Barrett, PhD Conflict & Post Doctoral Fellow, Conflict Analysis - University of Calgary & Principal and Senior Partner De Novo Group LLC) “Understanding the Challenges of African Democratization through Conflict Analysis,” IACM 18th Annual Conference, June 1, 2005]

Westerners eager to promote democracy must be wary of African politicians who promise democratic reform without sincere commitment to the process. Offering money to corrupt leaders in exchange for their taking small steps away from autocracy may in fact be a way of pushing countries into anocracy. As such, world financial lenders and interventionists who wield leverage and influence must take responsibility in considering the ramifications of African nations who adopt democracy in order to maintain elite political privileges. The obvious reason for this, aside from the potential costs in human life should conflict arise from hastily constructed democratic reforms, is the fact that Western donors, in the face of intrastate war would then be faced with channeling funds and resources away from democratization efforts and toward conflict intervention based on issues of human security. This is a problem, as Western nations may be increasingly wary of intervening in Africa hotspots after experiencing firsthand the unpredictable and unforgiving nature of societal warfare in both Somalia and Rwanda. On a costbenefit basis, the West continues to be somewhat reluctant to get to get involved in Africa’s dirty wars, evidenced by its political hesitation when discussing ongoing sanguinary grassroots conflicts in Africa. Even as the world apologizes for bearing witness to the Rwandan genocide without having intervened, the United States, recently using the label ‘genocide’ in the context of the Sudanese conflict (in September of 2004), has only proclaimed sanctions against Sudan, while dismissing any suggestions at actual intervention (Giry, 2005). Part of the problem is that traditional military and diplomatic approaches at separating combatants and enforcing ceasefires have yielded little in Africa. No powerful nations want to get embroiled in conflicts they cannot win – especially those conflicts in which the intervening nation has very little interest. It would be a false statement for me to say that there has never been a better time to incorporate the holistic insights of conflict analysis. The most opportune time has likely come and gone. Yet, Africa remains at a crossroads – set amidst the greatest proliferation of democratic regimes in history. It still has a chance. Yet, it is not only up to the West, but also Africans themselves, to stand against corruption, to participate in civil society and to ultimately take the initiative in uncovering and acknowledging the deep underlying issues perpetuating African conflict in order to open the door to democratic advancement and global interaction. Analysis will be the key that unlocks that door.

#### 3] Regional cooperation checks

**Straus ’13** (Scott Straus for African Arguments, part of the Guardian Africa Network, Scott Straus is a professor in the Department of Political Science at the University of Wisconsin, “Africa is becoming more peaceful, despite the war in Mali”, http://www.guardian.co.uk/world/2013/jan/30/africa-peaceful-mali-war, January 30, 2013)

Finally, conflict reduction mechanisms, in particular international peacekeeping and regional diplomacy, **have substantially increased** on the continent. Peacekeeping is more prevalent and **especially more robust** than in the 1990s. Regional bodies such as the African Union, Eccowas, Eccas, IGAD, and SADC are quite active in most conflict situations. They have exhibited greater resolves in conflicts as diverse as Côte d'Ivoire, Sudan, the Central African Republic, and Madagascar.

### Circumvention

#### Outer Space Laws are unclear – private corporations are still capable of escaping due to loopholes in the plan.

Green and Stark 17 [Christopher and Eda, “Outer Space Treaty and Beyond: Do Existing Space Laws Put an Astronomical Barrier to Private IP Rights in Space?”, JDSUPRA. 8 September 2020 https://www.jdsupra.com/legalnews/outer-space-treaty-beyond-do-existing-44028/] //DebateDrills LC

Our limited body of space law provides little guidance. The first international treaty, the “Outer Space Treaty,” was signed by the U.S., Russia, and the U.K. in 1967, quickly followed by the Rescue Agreement. Over the next two decades, three other treaties—the Liability Convention, the Registration Convention, and the Moon Agreement—were also signed by these nations, with most countries following in their footsteps.[3] But after that rapid succession of international treaties, there have since been few others. These five documents form the basis of the international space law we have today, but none address the issue of [intellectual property rights in space](https://www.fr.com/fish-litigation/ip-rights-outer-space/). Rather, upon inspection, it appears that the stated purpose of these treaties may be antithetical to intellectual property protection.

The “Outer Space Treaty” espouses communal themes in characterizing space as the “province of all mankind,” the “common heritage of mankind” and to the “benefit of all countries.”[4] Unsurprisingly, Article II of the Outer Space Treaty prohibits any appropriation of areas in space, keeping in line with its principle of communal property.[5] On the other hand, patents are fundamentally territorial and grant monopoly rights for a period of time. Applied to space, it is unclear just what is open for patent protections.

For example, can private companies patent orbital patterns of satellites? Currently, companies may patent the technology or design of satellites that stay in a particular orbit, even if not the orbital pattern itself.[6] The practical implications of this are significant, especially with the advent of satellite constellations. If particular satellite technologies, and, indirectly, their orbital patterns, are patentable, then a significant portion of space may be occupied by one satellite constellation, i.e. one company alone.[7] Does this private apportionment of space run counter to our notions of sharing space? Some argue that the Outer Space Treaty only bans sovereign appropriation and does not limit private entities from exerting claims. Others counter that private property rights flow from sovereign property claims, so the former is meaningless without the latter.[8] So the question remains, can the stated goals of sharing outer space be reconciled with the proprietary nature of patents?

Our current corpus of space treaties comes from a period of history when space exploration was undertaken primarily by governments rather than private actors. The cooperative goals were likely a reaction to the time, as the world was coming out of a charged space race. The silence of these space treaties on intellectual property rights presents an opportunity for modern-day agreements to provide patent protections for private companies. Without robust international agreement on patents for space, we may even see less international cooperation as companies refuse to divulge their discoveries.[9] Now, as more and more private companies enter space exploration and carry the torch of innovation, it is more important than ever to strike a balance between sharing our “common heritage” and providing patent protections that incentivize invention.[10]

#### The affirmative has no enforcement mechanism – private corporations can just circumvent since they have the funding to launch rockets on their own.

Sheetz 21 [Michael, “Elon Musk’s SpaceX raised about $850 million, jumping valuation to about $74 billion”, CNBC. 16 February 2021. https://www.cnbc.com/2021/02/16/elon-musks-spacex-raised-850-million-at-419point99-a-share.html] //DebateDrills LC

SpaceX completed another monster equity funding round of $850 million last week, people familiar with the financing told CNBC, sending the company’s valuation skyrocketing to about $74 billion.

The company raised the new funds at $419.99 a share, those people said — or just 1 cent below the $420 price that [Elon Musk](https://www.cnbc.com/elon-musk/) [made infamous in 2018](https://www.cnbc.com/2018/09/28/sec-says-elon-musk-at-tesla-chose-420-price-as-pot-reference.html) when he declared he had “funding secured” to take [Tesla](https://www.cnbc.com/quotes/TSLA) private at that price.

The latest round also represents a jump of about 60% in the company’s valuation from its previous round in August, when [SpaceX raised near $2 billion at a $46 billion valuation](https://www.cnbc.com/2020/10/14/tesla-investor-ron-baron-spacex-has-a-chance-to-be-just-as-large.html).

SpaceX did not immediately respond to CNBC’s request for comment. In addition to SpaceX further building a war chest for its ambitious plans, company insiders and existing investors were able to sell $750 million in a secondary transaction, one of the people said.

The people spoke on condition of anonymity because SpaceX is not a publicly traded company and the fundraising talks were private. SpaceX raised only a portion of the funding available in the marketplace, with one person telling CNBC that the company received “insane demand” of about $6 billion in offers over the course of just three days.