### **Mining CP**

**Text: States should amend the Outer Space Treaty to allow private appropriation for asteroid mining**

**Private appropriation is impossible without legal reform**

**Taylor 19 explains** [Kurt Taylor, Fictions of the Final Frontier: Why the United States SPACE Act of 2015 Is Illegal, 33 Emory Int'l L. Rev. 653 (2019). Available at: <https://scholarlycommons.law.emory.edu/eilr/vol33/iss4/6>]

The world today is very different than it was fifty years ago when the Outer Space Treaty emerged. American companies like SpaceX and Moon Express have shown the desirability that private development of outer space may have, and demonstrate that such development might be highly valuable in the future.148Through the SPACE Act of 2015, the United States recognizes this and is attempting to make it easier for these companies to do the work they aim to without significant interference.149 If it is desirable to allow appropriation of outer space resources, the current international governing regime under the Outer Space Treaty simply will not work. It clearly bars all forms of appropriation; therefore, the creation of a new regime is necessary to support those goals.

By its passage of the SPACE Act of 2015, the United States is implicitly adopting a hegemonic approach to future appropriation of celestial resources. The Act explicitly allows United States citizens to recover and own resources extracted from celestial bodies,156 thus creating a property right. Passage of the act is a signal that the United States, a sovereign, is creating and enforcing that property right. Because this creation of the property right deals with outer space and celestial resources, it directly implicates the Outer Space Treaty, which in Article II broadly rejects appropriation of any kind in outer space.157 The United States’ creation of a property right that an international treaty directly governs constitutes an act of sovereignty that is impermissible under the Outer Space Treaty. Through its current language, the SPACE Act of 2015 creates an illegal property right as against Article II of the Outer Space Treaty and is thus invalid without further amendment or replacement of the Treaty itself. The dreams and work of private aerospace organizations like SpaceX and Moon Express may be for nothing. While their milestones are commendable and their dreams desirable, they simply cannot achieve what they have set out to without valid assurance—both nationally and internationally—that once they reach outer space, they can reap what they sow. Article II of the Outer Space Treaty should be interpreted broadly as to cover both private and state entities. The resulting effect of Article II is a bar on all appropriation of celestial resources, thus impeding private development in outer space and invaliding the SPACE Act of 2015. For private aerospace companies to achieve their goals, a shift in the current international regulatory regime is necessary. Either the Outer Space Treaty must undergo amendment to specifically address private appropriation, or another treaty or international agency must replace it to oversee celestial development and ensure adherence to important considerations of safety and ecological fairness.

**Amending the OST is necessary for asteroid mining investment**

**Davies**, 2-6-20**16** - Rob Davies, "Asteroid mining could be space’s new frontier: the problem is doing it legally," *Guardian*, https://www.theguardian.com/business/2016/feb/06/asteroid-mining-space-minerals-legal-issues

When Buzz Aldrin and Neil Armstrong hoisted the Stars and Stripes on the moon, the act was purely symbolic. Two years earlier, mindful of Cold War animosity, the 1967 Outer Space Treaty (OST) had decreed that outer space, including the moon and other celestial bodies, “is not subject to national appropriation by claim of sovereignty”. In other words no country, not even the US, could own the moon or any other part of space, regardless of how many flags they erected there. Half a century on, though, the OST could prove the biggest obstacle to one of the most exciting new frontiers of space exploration: asteroid mining. The reason lawyers could soon be poring over that 48-year-old document is that space mining could become a reality within a couple of decades. In what is being seen as a major breakthrough for this embryonic technology, the government of Luxembourg has thrown its financial muscle behind plans to extract resources from asteroids, some of which are rich in platinum and other valuable metals. It plans to team up with private companies to help speed the progress of the industry and draw up a regulatory framework for it. One such firm, Deep Space Industries, wants to send small satellites, called Fireflies, into space from 2017 to prospect for minerals and ice. The satellites would hitch a ride on a rocket, and larger craft would then be used to harvest, transport and store raw materials. Metals such as nickel and iron, which are plentiful on Earth, could be processed while in orbit and used to build equipment or spacecraft. And it may eventually be possible to extract valuable minerals from asteroids **cheaply enough** for it to be worth bringing them back to Earth. Rival Planetary Resources has a slightly different plan, in which telescopes would be used to analyse asteroids before craft were sent to mine them. Its backers include Google co-founder Larry Page and billionaire businessman Ross Perot, and it thinks it could be operating in space by 2025. How would asteroid mining work? A visual guide **One of the difficulties** facing these would-be space miners **is cost**, which is **fittingly astronomical**. Nasa’s Osiris-Rex expedition, which aims to bring just two kilos of asteroid material back to Earth by 2023, is set to cost $1bn. But Deep Space Industries thinks it can get the ball rolling by putting three of its Fireflies in space for just $20m. The other obvious barrier is the **technological progress** that is still required if commercial asteroid mining is to become practically possible and economically viable. However, considerable as these hurdles are, **experts believe the legal component is the most pressing**. Late last year, the US government made an attempt to update the law on space mining, producing a bill that allows companies to “possess, own, transport, use, and sell” extra-terrestrial resources without violating US law. The problem is that **putting this into practice violates the OST**. “The way a private company would enforce their right to mine is through a national court,” says space law expert Dr Chris Newman of the University of Sunderland. “In making a ruling, that court would **exercise sovereign rights, contravening the OST**. We will only know how this would play out if it is tested in court.” US lawyer Michael Listner, who founded thinktank Space Law and Policy Solutions, says the US law is **incompatible** with the OST and risks **souring international relations**: “**China and Russia will want in.** If you have conflicts of law, things start getting dicey and that could lead to **legal and political conflict**.” Newman believes that one reason why Luxembourg has included plans for drawing up a **regulatory framework** is to show the world that work is under way on untangling such legal knots. “This is something for investors to hang their hat on,” he says, “to **give them confidence** and say that there is a nascent legal framework.” But Dr Gbenga Oduntan, a space law expert at the University of Kent, warns that the international community needs to get its act together quickly. “What we don’t want is a free-for-all over asteroids,” he says. “We need to come together and do that thinking, because the law we have right now does not allow us to repatriate resources for commercial purposes.” One way to do this, he suggests, is to draw on existing legislation such as the UN Convention on the Law of the Sea, which governs how nations use the ocean. Another option might be to revive the Moon Treaty of 1979, which deemed space to be the “common heritage of mankind” but failed to win support from any space-faring nation. Such complex legal wrangles could indeed prove harder to overcome than other difficulties, such as the **huge costs involved**. But some experts believe that investing large amounts early on could **create a space economy** in which **costs are forced down by collaboration**. Ian Crawford, professor of planetary science at Birkbeck, London, says asteroid miners would most probably start off by mining water-ice, which can be broken down into hydrogen (for fuel) and oxygen (for supporting life). It is much cheaper to produce water in space than to take it there, and this process could **generate revenue and technical support** from other players in the space game. Once companies had that revenue stream under their belts, they could start thinking more seriously about the more costly business of extracting minerals and bringing them back to Earth. “**Eventually you can imagine the whole process supporting itself**,” says Crawford. “The **main hurdle is the initial investment**, and it seems these companies think they can get started and jump over that hurdle.” But he agrees that **the more pressing concern is the legal picture**, which “badly needs to be updated”. Christopher Barnatt, professional futurist and author of The Next Big Thing: From 3D Printing to Mining the Moon, says history shows us that if governments such as Luxembourg’s get behind asteroid mining, the space industry will deliver on its promise. “With the moon landings, the aspiration was way ahead of the technology. [President] Kennedy had spoken to Nasa and they’d said it couldn’t be done. He thought it could. We’ve got evidence from throughout history that when we commit ourselves to a broad goal, we can achieve it.” The ramifications could be huge, he believes, as progress in one technology **spurs breakthroughs in another**. “If you can use asteroids to make fuel, a lot of space exploration becomes cheaper. Then there’s progress in robotics and artificial intelligence... it all starts to make things possible.”

**Asteroid mining is key to platinum.**

Steven **Melendez**, 6-27-**17**, (Steven Melendez is an independent journalist living in New Orleans, “Forget Coal: Asteroid Mining Is Coming Sooner Than You Think”, Fast Company, https://www.fastcompany.com/40419405/theres-gold-and-platinum-and-cobalt-in-them-thar-asteroids)

President Donald Trump is obsessed with returning America to its coal mining past—but scientists and entreprenurs have far more ambitious plans. As the planet’s **precious metal reserves tap out,** big business and NASA are looking to the skies. The race to mine asteroids swirling around the solar system is on. Space mining may sound like science fiction, **but it’s real**, and big developments are on tap in the next decade. Asteroids are essentially massive rocks that orbit the sun, and many are thought to consist of **platinum**, gold, iron, and more. **A single** 500-meter-wide **asteroid** can contain almost **175 times**Earth’s annual **platinum** mining output, according to Massachusetts Institute of Technology research. The metal, worth about $930 per ounce, is used in jewelry and is a byword for luxury—think platinum credit cards—but it’s also used in the **catalytic converters** installed in every modern car, in industrial chemical processes, and in many electronics. SPACE MINING ECONOMICS Conventional wisdom may be that going to space to bring back what is needed on terra firma is economically nuts. Not so, analysts insist. “While the psychological barrier to mining asteroids is high, the actual financial and technological barriers are far lower,” says a recent report prepared on the subject by Goldman Sachs. Proponents say that before long, robots could be traveling to asteroids to extract platinum and other valuable minerals to haul back to Earth or even one day to use in space-based manufacturing plants. A 2012 Caltech study found that it could cost just $2.6 billion to capture an asteroid and bring it into orbit near Earth, making human exploration and robotic mining that much easier. “We expect that systems could be built for less than that given trends in the cost of manufacturing spacecraft and improvements in technology,” the Goldman report says. It also predicts the eventual result would be far lower costs: “Successful asteroid mining would likely crater the global price of platinum” by dramatically increasing the supply. “The market is a big unknown because of things like platinum,” says Jay McMahon, an assistant professor at the University of Colorado’s Center for Astrodynamics Research. “You don’t know what’s going to happen if you bring back a big haul of platinum, what that would do to the market on Earth or how much demand there is.”

**Key to hydrogen energy.**

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Hydrogen as a clean energy source for fuel cells in the transportation and power generation sectors, as well as an effective reducing agent for transforming carbon dioxide to value-added chemicals and fuels, could solve some of the adverse consequences of burning fossil fuels that release greenhouse gas into the atmosphere and chemicals that pollute the environment [1, 2]. Today, hydrogen is produced by steam reforming, gasification and electrolysis. Most of hydrogen is produced from fossil fuels (48% natural gas, 30% oil, 18% coal) while electrolysis of water accounts for only 4%. The electricity to enable water electrolysis has traditionally come from fossil and nuclear sources, which are increasingly being replaced by clean, renewable electrical energy from solar, hydro and wind. The practical realization of the full environmental and security benefits of clean and renewable hydrogen for use in fuel cells and conversion of carbon dioxide to chemicals and fuels, will necessitate the development of large-scale, low-cost hydrogen generation methods from renewable resources with a minimal carbon footprint. Amongst the different options for generating hydrogen, the photo-electrochemical approach, which utilizes sunlight to directly split water is considered to be amongst the most promising technologically and economically. Nevertheless, efficiency, figures-of-merit and longevity issues, requiring basic-directed research to improve loss mechanisms and increase electrodes, materials and device performance and stability, ultimately to develop operationally safe systems, remain the most challenging and critically important issues to enable advances in the field [3]. Photo-electrochemistry is an electrochemical technique, which employs light harvesting catalysts most often based on specialized semiconductor and metal nanostructures and combinations thereof. It is a truism that many research scientists, who recognize the axiom of the ‘**materials dilemma’**, remain skeptical of finding a practical and efficient photo-catalyst that can enable the light-assisted electrochemical H2 evolution reaction from H2O at a sufficiently large scale to facilitate a TW H2 economy. This refers to the challenge often confronted by scientists, engineers, industry and manufacturers trying to discover champion materials for a large scale catalytic process, where **the best** performers are comprised of elemental compositions **in short supply** and **too pricey** while inferior performers consist of earth abundant low cost elemental compositions. This is certainly true for the catalytically active **platinum group metals** Ru, Os, Rh, Ir, Pd and Pt in nanostructured forms as well as the catalytic sites of diverse classes of molecules, clusters, polymers and materials. In the case of the photo-electrochemical H2 evolution reaction from aqueous phase H2O, the champion catalyst remains Pt [Platinum] **despite** **much research devoted**to find a more **abundant cheaper alternative**. This is simply because Pt [platinum] as a H2 evolution catalyst still has the **world-record exchange current density** and **low Tafel slope**. Moreover, Pt is reported to be more durable in acidic environments, which is the common case in photo-electrochemical devices. This illustrates the difficult choice one has to make in translating solar fuels materials science to a technology that could be implemented on a large scale. Should one continue to focus attention on bringing down the cost of rare and expensive superior performance materials like Pt or devote time and effort to improving the poorer performance of common cheap materials? It turns out not surprisingly that the efficiency of the H2 evolution reaction sensitively depends on the loading and size of the nanostructured Pt catalyst integrated with the photon harvesting, electron transporting photocathode. In this context, it is pertinent that a recent study has quantified how much Pt is actually required to optimise the H2 evolution rate in a photo-electrochemistry experiment using an exceptionally well-defined Pt-TiO2-Ti-pn+Si composite photocathode [4]. In this experiment, the size and loading of Pt nanoparticles were controlled using a sophisticated supersonic molecular beam source that was able to deposit mass-selected Pt nanoparticles from the gas-phase, with retention of their size, onto the photocathode. From detailed materials characterization measurements and in depth photo-electrochemistry experiments, it was found that the size of the most active Pt nanoparticles for the H2 evolution reaction was 5 nm at a loading level of 100 ng/cm2 on the photocathode. For a state-of-the-art over-potential of 50 mV this translated to about 54 tons of Pt in order to create a TW scale photo-electrochemical H2 generation infrastructure. How often this 54 tons have to be replaced is a crucial question. The issue of a well-designed Pt recycling system is clearly advisable. This tonnage amounts to around 30% of the current global annual production of Pt most of which is currently used in automobile catalytic converters and jewellery. In terms of known Pt mineral resources (earth abundance 3.7×10-6 %) this does not seem like an insurmountable obstacle if it was decided by policy makers, the renewable energy industry and process engineers to establish an economically and environmentally viable TW H2 clean and green global technology founded upon the photo-electrochemical splitting of H2O using Pt as the metal of choice. It is pertinent to note that it may prove possible to reduce this amount of Pt by many orders of magnitude if the size of the Pt nanoparticles could be reduced from 5 nm to the atomically dispersed state and the catalytic activity for the H2 evolution reaction maintained if not improved [5]. Encouragingly in this context, a recent report revealed that the readily accessible, nanoporous layered material carbon nitride (C3N4), can anchor individual Pd atoms at the N sites and is able to function as a thermally stable hydrogenation catalyst for the production of many organic substances [6]. If this breakthrough can be extended to Pt atoms on C3N4-based photocathodes, this has the potential to reduce the Pt catalyst tonnage requirement by orders of magnitude. For photo-electrochemical hydrogen generating systems, besides the availability and cost of Pt, techno-economic challenges will also be encountered by constraining the area for water splitting to that of the light harvesting units and the area and cost of required land. The overall cost analysis of this kind of integrated photo-electrochemistry system will have to be compared with the cost efficiency of competing hydrogen producing technologies that employ Pt electro-catalysts based upon electrically integrated photovoltaic-electrolysis systems and grid integration of decoupled photovoltaics and electrolysis systems [7]. It is worth noting that the production of Pt since the early 2000s has varied between just over 150 tons to about 220 tons. Obviously there is scope for further production if necessary. **The price has been volatile**. It was stable from 1992 to 2000 and then steadily rose until it touched about $2,252 per ounce in 2008. It then fell off a cliff later in 2008 falling to $774 per ounce. It has since gone up and down, as high as $1,900 per ounce and today stands at about $950 per ounce [8]. The price of Pt seems to be related to the fortunes of the economy, when the economy is good and growing so does the price of Pt. A big question is, do we want to base a H2 economy on a rare element like Pt, where countries could be held to ransom on either the price or supply rather like the current situation with oil? Perhaps, when more research scientists challenge the doctrine of the ‘materials dilemma’ by using new value propositions with economic models for producing Pt, they may entice business and industry leaders to produce Pt as if it were a ‘common element’, one that was absolutely essential for creating a sustainable future. Currently, fossil fuel industry methods remain economically advantageous, despite the adverse consequences on our environment and climate. A transition to clean energy technologies **will take time,** nevertheless many companies have already realized the benefits of this ground-breaking change. An impressive example of the conversion from fossil to H2 fuel is seen with Toyota. After more than twenty years of rigorous research and development they have manufactured automobiles with H2 fuel-cell powered engines to become commercially available later this year [9]. To enable this transition, H2 fuel stations as well as H2 generators integrated into automobiles will have to be rapidly developed. It seems that we should not yet write off rare expensive Pt [platinum] as the catalytic metal of choice for making solar H2 on an industrially significant scale to power a global hydrogen economy. If Pt is selected as the catalyst of choice, there should as well be alternative choices of cheap and abundant elemental compositions, which can quickly take the place of Pt as a photo-catalyst. We shouldn’t stop looking for cheaper alternatives as there’s a whole bunch of interesting alternative materials out there. To invoke the wisdom of the American novelist, Mark Twain: “It ain’t what you don’t know that gets you into trouble. It’s what you’re sure you know that does.” If we’re so sure that Pt [platinum] is too **rare** and expensive to process on a global industrial scale, we may be adding to our troubles, rather than resolving them with this nano solution.

**Hydrogen energy production is try-or-die to solve 2°C warming – negative emissions AND solves oceans.**

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According to scientists who track humanity’s greenhouse gas budget, it’s looking more and more likely that we will emit more carbon dioxide than is compatible with limiting global warming to **2 °C**, let alone 1.5 °C, as envisioned in the Paris Agreement. That reality has focused more attention on negative emissions – technologies for pulling carbon dioxide out of the air and sequestering it more or less permanently. Many attempts to model different emissions pathways and predict future climate now assume that negative emissions will be necessary to plug the hole in our carbon budget. So far, most attention has focused on a method called bioenergy with carbon capture and storage (BECCS): grow certain trees or grasses on large plantations, harvest and burn them for energy, capture the resulting carbon dioxide, and inject it underground. The problem is that **this might not be feasible in practice**. For one thing, **the scale** of carbon removal needed **is so massive** that there may not be enough land to grow bioenergy crops without putting natural ecosystems or food production at risk. And scientists aren’t sure that storing huge quantities of carbon dioxide underground will be safe and secure over the long term. But **there may be other options**. According to an analysis published yesterday in Nature Climate Change, negative-emissions methods to produce hydrogen fuel could have **even greater power generation** and **carbon storage potential** than BECCS, and cost less. What’s more, negative-energy hydrogen would yield **byproducts** that **fight ocean acidification.**The process uses renewable energy to split water to yield hydrogen fuel. Meanwhile, a series of additional chemical reactions convert dissolved carbon dioxide to bicarbonate. Scientists have recently developed several different methods that are variations on this same basic theme. Bicarbonate is an important component of seawater and is used as raw material by shell-forming organisms. One effect of ocean acidification is that bicarbonate is in shorter supply, making it more difficult for marine organisms to make shells. Negative-emissions hydrogen would **replenish the ocean’s stock of bicarbonate while sequestering** **carbon**. It’s essentially an accelerated version of a natural process, called mineral weathering, that has kept ocean chemistry in balance across geologic time scales. In the new analysis, researchers evaluated the potential of negative-emissions hydrogen energy production and carbon dioxide removal. They calculated that the global energy system could produce between 300 and 3,000 exajoules of negative-emissions hydrogen energy per year. (One exajoule is equivalent to the amount of energy contained in 174 million barrels of oil.) The method could remove between 90 and **900 gigatonnes of carbon dioxide** from the air annually. Anthropogenic carbon dioxide emissions are currently about 41 gigatonnes per year. By comparison, other scientists have calculated that **BECCS could** produce as much as 300 exajoules of energy yearly, and **sequester up to 12 gigatonnes** of carbon per year. The new analysis also suggests that negative-emissions hydrogen is more efficient than BECCS, in that it removes about seven times more carbon dioxide per unit of energy generated. How much this would all cost depends on what form of renewable electricity is used. The researchers estimate that using hydropower to split water would cost 7 per kilowatt hour of hydrogen fuel produced, while using high-cost solar electricity would cost 64 cents. Carbon removal would cost between $3 and $161 per tonne, again depending on the form of energy used. Overall, these estimates are less than or roughly equal to the cost of carbon capture and storage in fossil fuel-based systems. They are also equivalent to or much lower than the costs associated with BECCS. On the other hand, a downside of negative-emissions hydrogen is that hydrogen fuel is not as readily used by the global energy system as the electricity produced by BECCS is. But this could change in a future **“hydrogen economy”** as this fuel gets more integrated into the transportation system and the energy grid. Negative-emissions hydrogen could also have its own environmental impacts from mining minerals and water use. And it remains to be seen how well this would work in practice, especially at a large scale. But as an argument that it’s worth exploring alternatives to BECCS, negative-emissions hydrogen looks pretty compelling. “The negative-emissions energy field is in its infancy and therefore the methods discussed here are unlikely to be the only ones ultimately worth considering,” the researchers write.

**Warming causes extinction.**

**Torres 16** (Phil, PhD candidate @ Rice in tropical conservation biology, affiliate scholar @ Institute for Ethics and Emerging Technologies, July 22, 2016, “Op-ed: **Climate Change Is the Most Urgent Existential Risk**,” <http://ieet.org/index.php/IEET/more/Torres20160807>)

Humanity faces a number of formidable challenges this century. Threats to our collective survival stem from asteroids and comets, supervolcanoes, global pandemics, climate change, biodiversity loss, nuclear weapons, biotechnology, synthetic biology, nanotechnology, and artificial superintelligence. With such threats in mind, an informal survey conducted by the Future of Humanity Institute placed the probability of human extinction this century at 19%. To put this in perspective, it means that the average American is more than a thousand times more likely to die in a human extinction event than a plane crash.\* So, given limited resources, which risks should we prioritize? Many intellectual leaders, including Elon Musk, Stephen Hawking, and Bill Gates, have suggested that artificial superintelligence constitutes one of the most significant risks to humanity. And this may be correct in the long-term. But I would argue that two other risks, namely **climate change**and biodiveristy loss, **should take priority**right now over **every other known threat**. Why? Because **these** ongoing **catastrophes in slow-motion** will frame our **existential predicament** on Earth not just for the rest of this century, but for literally **thousands of years** to come. As such, they have the capacity to **raise**or lower the **probability of other risks scenarios** unfolding. Multiplying Threats Ask yourself the following: are **wars** more or less likely in a world marked by **extreme weather events**, **megadroughts**, **food supply disruptions**, and sea-level rise? Are **terror**ist attacks **more** or less **likely** in a world beset by **the collapse of global ecosystems**, **agricultural** failures, **econ**omic uncertainty, and political instability? Both government officials and scientists agree that the answer is **“more likely.”** For example, the current Director of the CIA, John Brennan, recently identified “the impact of **climate change**” as one of the “deeper causes of this rising instability” in countries like **Syria**, **Iraq**, **Yemen**, **Libya**, and **Ukraine**. Similarly, the former Secretary of Defense, Chuck Hagel, has described climate change as **a “threat multiplier”** with “the potential to exacerbate many of the challenges we are dealing with today — from infectious disease to terrorism.” The Department of Defense has also affirmed a connection. In a 2015 report, it states, “Global climate change will aggravate problems such as **poverty**, **social tensions**, environmental degradation, **ineffectual leadership** and **weak political institutions** that threaten stability in a number of countries.” **Scientific studies have further shown a connection between the environmental crisis and violent conflicts.** For example, a 2015 paper in the Proceedings of the National Academy of Sciences argues that climate change was a causal factor behind the record-breaking 2007-2010 drought in Syria. This drought led to a mass migration of farmers into urban centers, which fueled the 2011 Syrian civil war. Some observers, including myself, have suggested that this struggle could be the beginning of World War III, given the complex tangle of international involvement and overlapping interests. The study’s conclusion is also significant because the Syrian civil war was the Petri dish in which the Islamic State consolidated its forces, later emerging as the largest and most powerful terrorist organization in human history. A Perfect Storm The point is that climate change and biodiversity loss could very easily push societies **to the brink of collapse**. This will exacerbate **existing geopolitical tensions** and introduce entirely **new power struggles** between state and nonstate actors. At the same time, advanced technologies will very likely become increasingly powerful and accessible. As I’ve written elsewhere, the malicious agents of the future will have bulldozers rather than shovels to dig mass graves for their enemies. The result is a perfect storm of more conflicts in the world along with unprecedentedly dangerous weapons. If the conversation were to end here, we’d have ample reason for placing climate change and biodiversity loss at the top of our priority lists. But there are other reasons they ought to be considered urgent threats. I would argue that they could make humanity more vulnerable to a catastrophe involving superintelligence and even asteroids. The basic reasoning is the same for both cases. Consider superintelligence first. Programming a superintelligence whose values align with ours is a formidable task even in stable circumstances. As Nick Bostrom argues in his 2014 book, we should recognize the “default outcome” of superintelligence to be “doom.” Now imagine trying to solve these problems amidst a rising tide of interstate wars, civil unrest, terrorist attacks, and other tragedies? The societal stress caused by climate change and biodiversity loss will almost certainly compromise important conditions for creating friendly AI, such as sufficient funding, academic programs to train new scientists, conferences on AI, peer-reviewed journal publications, and communication/collaboration between experts of different fields, such as computer science and ethics. It could even make an “AI arms race” more likely, thereby raising the probability of a malevolent superintelligence being created either on purpose or by mistake. Similarly, imagine that astronomers discover a behemoth asteroid barreling toward Earth. Will designing, building, and launching a spacecraft to divert the assassin past our planet be easier or more difficult in a world preoccupied with other survival issues? In a relatively peaceful world, one could imagine an asteroid actually bringing humanity together by directing our attention **toward a common threat**. **But** if the “**conflict multipliers**” of climate change and biodiversity loss have already **catapulted civilization** into chaos and turmoil, I strongly suspect that humanity will become more, rather than less, susceptible to dangers of this sort. Context Risks We can describe the dual threats of climate change and biodiversity loss as “context risks.” Neither is likely to directly cause the extinction of our species. But **both will define the context in which civilization confronts all the other threats** before us. In this way, they could **indirectly** contribute to the **overall danger of annihilation** — and this worrisome effect could be significant. For example, according to the Intergovernmental Panel on Climate Change, the effects of climate change will be “severe,” “pervasive,” and “irreversible.” Or, as a 2016 study published in Nature and authored by over twenty scientists puts it, the consequences of climate change “will extend longer than the entire history of human civilization thus far.” Furthermore, a recent article in Science Advances confirms that humanity has already escorted the biosphere into the sixth mass extinction event in life’s 3.8 billion year history on Earth. Yet another study suggests that we could be approaching a **sudden**, **irreversible**, catastrophic **collapse of the global ecosystem**. If this were to occur, it could result in “widespread social unrest, economic instability and loss of human life.” Given the potential for environmental degradation to elevate the likelihood **of nuclear wars, nuclear terrorism**, **engineered pandemics**, a **superintelligence takeover**, and perhaps even **an impact winter**, it ought to take precedence **over all other risk concerns** — at least in the near-term. Let’s make sure we get our priorities straight.

### CASE

## Their totalizing reading is inaccurate and demobilizing---law is a malleable technology of set col that should assist decolonization

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Indigenous land rights in Kenya were and are still largely guided by customary law, which evolved over millennia to describe clan and community rights to cultivation, freedom of use, and stewardship of land. Under customary law, land often cannot be permanently alienated into property. Nineteenth-century British colonial authorities found it convenient to respect customary law, as it seemed to preclude African land titles, and colonialists actually used customary law to justify the forced labor of Indigenous Africans as “cultivators.” However, Kenya’s “white highlands” of the Gĩkũyũ became one of the few hotbeds of white settlement outside of South Africa. There, lands of Indigenous Africans were declared terra nullius, making way for white land titles, and as the land was bought and sold under their homes and under their feet, the Gĩkũyũ became tenants on their own land. When needed to be removed, they became designated as “squatters.” In 1948, British colonialists extended the Indian Act to Kenya, a legal claim to convert (Black) Indigenous land into British Crown lands and Black (Indigenous) peoples into Crown subjects.[1] In this example, we can see the separations of Black–Indigenous, people–land, and the simultaneous extension of white sovereignty over these now separate lands and peoples. Technologies of alienation, separation, conversion of land into property and of people into targets of subjection, continue to mutate. Black bodies become squatters, become subjects of the Crown, then of the colonial state, and now of the state of Kenya. Settlers become protected by rule of force; their violence against Black “squatters” becomes legitimate; state violence becomes normalized repertoire. Black bodies become exchangeable juridical objects to be recast as needed for settler property making. Settler colonialism is about the land. Yet, technologies to make land into property also remake Indigenous African bodies. Land is the prime concern of settler colonialism, contexts in which the colonizer comes to a “new” place not only to seize and exploit but to stay, making that “new” place his permanent home. Settler colonialism thus complicates the center–periphery model that was classically used to describe colonialism, wherein an imperial center, the “metropole,” dominates distant colonies, the “periphery.” Typically, one thinks of European colonization of Africa, India, the Caribbean, the Pacific Islands, in terms of external colonialism, also called exploitation colonialism, where land and human beings are recast as natural resources for primitive accumulation: coltan, petroleum, diamonds, water, salt, seeds, genetic material, chattel. Theories named as “settler colonial studies” had a resurgence beginning around 2006.[2] However, the analysis of settler colonialism is actually not new, only often ignored within Western critiques of empire.[3] The critical literatures of the colonized have long positioned the violence of settlement as a prime feature in colonial life as well as in global arrangements of power. We can see this in Franz Fanon’s foundational critiques of colonialism. Whereas Fanon’s work is often generalized for its diagnoses of anti/colonial violence and the racialized psychoses of colonization upon colonized and colonizer, Fanon is also talking about settlement as the particular feature of French colonization in Algeria. For Fanon, the violence of French colonization in Algeria arises from settlement as a spatial immediacy of empire: the geospatial collapse of metropole and colony into the same time and place. On the “selfsame land” are spatialized white immunity and racialized violation, non-Native desires for freedom, Black life, and Indigenous relations.[4] Settler colonialism is too often thought of as “what happened” to Indigenous people. This kind of thinking **confines the experiences of Indigenous people**, their critiques of settler colonialism, their decolonial imaginations, to an **unwarranted historicizing parochialism**, as if settler colonialism were a past event that “happened to” Native peoples and not generalizable to non-Natives. Actually, settler colonialism is something that “happened for” settlers. Indeed, it is happening for them/us right now. Wa Thiong’o’s question of how instead of why directs us to think of land tenancy laws, debt, and the privatization of land as settler colonial technologies that enable the “eventful” history of plunder and disappearance. Property **law is a settler colonial technology**. The weapons that enforce it, the knowledge institutions that legitimize it, the financial institutions that operationalize it, are also technologies. Like all technologies, they evolve and spread. Recasting land as property means severing Indigenous peoples from land. This separation, what Hortense Spillers describes as “the loss of Indigenous name/land” for Africans-turned-chattel, recasts Black Indigenous people as black bodies for biopolitical disposal: who will be moved where, who will be murdered how, who will be machinery for what, and who will be made property for whom.[5] In the alienation of land from life, alienable rights are produced: the right to own (property), the right to law (protection through legitimated violence), the right to govern (supremacist sovereignty), the right to have rights (humanity). In a word, what is produced is whiteness. Moreover, it is not just human beings who are refigured in the schism. Land and nonhumans become alienable properties, a move that first alienates land from its own sovereign life. Thus we can speak of the various technologies required to create and maintain these separations, these alienations: Black from Indigenous, human from nonhuman, land from life.[6] “How?” is a question you ask if you are concerned with the mechanisms, not just the motives, of colonization. Instead of settler colonialism as an ideology, or as a history, you might consider settler colonialism as a set of technologies—a frame that could help you to forecast colonial next operations and to plot decolonial directions. This chapter proceeds with the following insights. (1) The settler–native–slave triad does not describe identities. The triad—an analytic mainstay of settler colonial studies—digs a pitfall of identity that not only chills collaborations but also implies that the racial will be the solution. (2) Technologies are trafficked. Technologies generate patterns of social relations to land. Technologies mutate, and so do these relationships. Colonial technologies travel. In tracing technologies’ past and future trajectories, we can connect how settler colonial and antiblack technologies circulate in transnational arenas. (3) Land—not just people—is the biopolitical target.[7] The examples are many: fracking, biopiracy, damming of rivers and flooding of valleys, the carcasses of pigs that die from the feed additive ractopamine and are allowable for harvest by the U.S. Food and Drug Administration. The subjugation of land and nonhuman life to deathlike states in order to support “human” life is a “biopolitics” well beyond the Foucauldian conception of biopolitical as governmentality or the neoliberal disciplining of modern, bourgeois, “human” subject. (4) (Y)our task is to theorize in the break, that is, to **refuse the master narrative that technology is loyal to the master**, that (y)our theory has a Eurocentric origin. Black studies, Indigenous studies, and Other-ed studies have already made their breaks with Foucault (over biopolitics), with Deleuze and Guatarri (over assemblages and machines), and with Marx (over life and primitive accumulation). (5) **Even when they are dangerous, understanding technologies provides us some pathways for decolonizing work**. We can identify projects of collaboration on decolonial technologies. Colonizing mechanisms are evolving into new forms, and they **might be subverted toward decolonizing operations.**