## 1

Interpretation—topical affirmatives must defend a legal regulation implementable in outer space.

Black Laws No Date "What is Unjust?" <https://thelawdictionary.org/unjust/> //Elmer

Contrary to right and justice, or to the enjoyment of his rights by another, or to the standards of conduct furnished by the laws.

#### Violation—the plan isn’t a legal regulation—it’s a temporary management tool meant to guide policymaking, not formal legislation in of itself. 1AC Babcock and their solvency advocate further prove the violation.

**1AC Babcock ’19** — Hope M. Babcock, Professor of Law, Georgetown University Law Center, B.A., Smith College, L.L.B., Yale University; (2019; “ARTICLE: THE PUBLIC TRUST DOCTRINE, OUTER SPACE, AND THE GLOBAL COMMONS: TIME TO CALL HOME ET”; University of Michigan Libraries, Nexis Uni; *Syracuse University Law Review*, Vol. 69; //LFS—JCM)//Recut Aanya

F. The Public Trust Doctrine (PTD) as a Gap Filling, Place-Holding Management Approach

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

#### a] Limits – not defending legislation explodes predictability – it means that Aff’s can just defend a model to manage extra-terrestrial resources without actually implementing anything.

#### b] Ground – wrecks Neg Generics – we can’t say appropriation good since the 1AC doesn’t defend a permanent action nor a policy that circumvent our Links since they can say they only defend a doctrine, not legislation.

#### 4] TVA – just defend that space appropriation is bad while implementing a policy that aligns with the foundations of the PTD.

#### a] Topicality is Drop the Debater – it’s a fundamental baseline for debate-ability.

#### b] Use Competing Interps – 1] Topicality is a yes/no question, you can’t be reasonably topical and 2] Reasonability invites arbitrary judge intervention and a race to the bottom of questionable argumentation.

#### c] No RVI’s - 1] Forces the 1NC to go all-in on Theory which kills substance education, 2] Encourages Baiting since the 1AC will purposely be abusive, and 3] Illogical – you shouldn’t win for not being abusive.

## 2

#### Current business sentiment promises a slow and steady recovery.

Dr. Mark Zandi 11/15, PhD from UPenn, economist, and director of economic research at Moody’s Analytics, 11/15/21, “Moody's Analytics Survey of Business Confidence,” <https://www.economy.com/economicview/indicator/usa_dsbc/5C438EAA-8AA1-484E-8931-62208FCACE22>, cc

Abstracting from the weekly ups and downs of responses to the global business survey, business sentiment remains stuck consistent with a slowly recovering global economy. Most encouraging, more than one-third of respondents to the survey say present business conditions are improving and more than half say their sales are strengthening. Hiring and investment intentions aren’t as strong, but they are much improved since the dark days of the pandemic. Demand for office space remains depressed, inventory accumulation is weak, and though financial conditions are good, they aren’t as good as they were prior to the pandemic.

#### Consistent space regulations are key to business confidence

Christensen ND [Ian Christensen is a Project Manager at Secure World Foundation, and has eight years of experience as a consultant and analyst focused on international and domestic commercial space, satellite, and aviation markets. "Building Confidence and Reducing Risk in Space Resources Policy," Room, The Space Journal, https://room.eu.com/article/building-confidence-and-reducing-risk-in-space-resources-policy]/ISEE

Like most areas of economic activity, space resource utilisation business plans are based upon the ability to access a resource, produce a product, service, or goods based from the resource, and produce revenue from that product based on established market activities. An economic system requires a level of regulation and oversight to ensure it functions. Regulation and governmental oversight is part of an overall market framework that provides stability and confidence in validity for commercial entities and those that invest in them. Just as the commercial companies are in the initial stages of developing and validating hardware, governments have begun to establish regulatory and policy frameworks.

#### The aff’s broad liberation of the PTD collapses business certainty over property rights and wrecks doctrinal flexibility which spillsover to investors

Huffman 15 – Dean Emeritus of Lewis & Clark Law School and a Visiting Fellow at the Hoover Institution [James L., Spring 2015, “Why Liberating the Public Trust Doctrine is Bad For the Public”, 45 Envtl. L. 337, acc. JSTOR] jmhe

Under the traditional public trust doctrine, **affected private property owners know with a** reasonable level of certainty **what their rights are**. Ifthey own riparian land on navigable waters they know that they havewharfing-out rights, for example, but not the right to obstruct navigationwhile exercising those rights. If they own submerged lands under navigablewaters, they know that they have a right to occupy those lands so long asthey do not interfere with navigation and fishing. If they own riparian orsubmerged lands on non-navigable waters they know they have the samerights they and others have on uplands. In other words, their lands are unaffected by the public trust doctrine. Whether or not lands are affected bythe public trust, property owners know that they cannot use their land inways that create a nuisance for their neighbors. **These are what Justice Scalia labeled background principles**.226 They are not crystal clear, nor couldthey be, but at some point they become so variable and uncertain as to losetheir effectiveness as sources of security for investors and entrepreneurs.

A **strength of the traditional common law method was in** adapting the law **to** **the** changing needs **and circumstances faced by investors and entrepreneurs while** not unreasonably upsetting expectations. If the public trust doctrine is liberated in the manner suggested by the theories described in this Article, or by many others to be found in the vast sea of public trust literature, private property rights **will become** so contingent **as to be all but** useless as assurances for those who might produce the wealth necessary for the public good. There is a powerful public interest in a secure and reliable system of property rights. By making private property rights increasingly contingent, a liberated public trust doctrine will not serve the public good.

#### Any expansion of public rights tanks private property usage by creating an end-run around just compensation for regulatory takings – collapses ag.

McEowen 20 – Kansas Farm Bureau Professor of Agricultural Law and Taxation at Washburn University School of Law in Topeka, Kansas (Roger A., “The Public Trust Doctrine – A Camel’s Nose Under Agriculture’s Tent?,” Agricultural Law and Taxation Blog, 10/20/2020, https://lawprofessors.typepad.com/agriculturallaw/2020/10/the-public-trust-doctrine-a-camels-nose-under-agricultures-tent.html)

Expanding the Doctrine?

As noted above, the public trust doctrine is an ancient concept that guarantees certain rights to the public and causes other rights to be vested in private owners.  Indeed, in the United States, one of the fundamental Constitutional rights denoted in the Bill of Rights is that of the ownership of private property.  Fifth Amendment, U.S. Constitution.  As a fundamental Constitutional right, any infringement on the right is subject to “strict scrutiny” by a court.  Of course, the government (state and federal) retains the right to “take” private property for a public use, but only upon the payment of “just compensation.”  But, any expansion of the doctrine does an “end-run” around the claim that the government has committed a taking that requires compensation – the theory being that the public rights pre-existed and private property rights are automatically subject to them.  An expansion would bring non-justiciable political questions into the courts.  This technique has been tried with attempts to get the courts to decide allegations of harm and restrict usage of private property based on “global warming.”  Largely, the courts have refused citing lack of standing, congressional delegation to administrative agencies and that such claims are non-justiciable political questions.  See, e.g., [American Electric Power Company v. Connecticut, 564 U.S. 410 (2011)](https://casetext.com/case/am-electric-power-co-inc-v-conn?ref=ArRBZs!bprEOm).

The notion that vested (e.g., settled, fixed, inalienable) rights can be usurped by an expanded application of the public trust doctrine makes it easier for regulation of property rights to occur without any concern that a non-physical taking of the property has occurred  that would require the private property owner to be compensated. That’s because the private property taken, the theory is, was a right that the owner never had to begin with.  In turn, an expanded public trust doctrine would require state (and, perhaps, federal) governments to take action to preserve public rights.  If they failed to do so, the legal system would be used to force action.  The courts, then, become a sort of “super legislature” via the public trust doctrine - a “court-packing” technique that is off the radar and out of public view.

How could an expanded public trust doctrine apply?  For farmers and ranchers, it could make a material detrimental impact on the farming operation.  For instance, many endangered species have habitat on privately owned land.  If wildlife and their habitat are deemed to be covered by the doctrine, farming and ranching practices could be effectively curtailed.  What about vested water rights?  A farming or ranching operation that has a vested water right to use water from a watercourse for crop irrigation or livestock watering purposes could find itself having those rights limited or eliminated if, under the public trust doctrine, a certain amount of water needed to be retained in the stream for a species of fish.

One might argue that the government already has the ability to place those restrictions on farming operations, and that argument would be correct.  But, such restrictions exist via the legislative and regulatory process and are subject to constitutional due process, equal protection and just compensation protections.  Conversely, land-use restrictions via the public trust doctrine bypass those constitutional protections.  No compensation would need to be paid, because there was no governmental taking – a water right, for example, could be deemed to be subject to the “public trust” and enforced without the government paying for taking the right.  That’s a much different outcome than the government imposing regulations on property uses that trigger compensation for an unconstitutional regulatory taking.  In essence the government, via the doctrine, acquires an easement for the protection of certain designated natural resources (such as wildlife and wildlife habitat) that are deemed to be in the public interest.  Instead of elected politicians making these decisions and being accountable to voters, the courts are the enforcers.

Also, an expansion of the public trust doctrine, from an economic standpoint, would have the unintended consequence of diminishing the incentive of landowners to invest in and improve the natural resource at issue. Private property has value because of the ability to exclude others from use and ownership.  A fundamental principle of economics is that the ability to exclude others from use and ownership increases the owner’s incentive to use the resource wisely.  This was, indeed, borne out in [Bitterroot River Protective Association v. Bitterroot Conservation District, 346 Mont. 507 (2008)](https://casetext.com/case/bitterroot-v-bitterroot?ref=ArRBZs!1w5iR4).

Recent Case

[Mineral County v. Lyon County, No. 75917, 2020 Nev. LEXIS 56 (Nev. Sup. Ct. Sept. 17, 2020)](https://casetext.com/case/mineral-cnty-v-lyon-cnty?ref=ArRBZs!SVlBzy), involved the state of Nevada’s water law system for allocating water rights and an attempt to take those rights without compensation via an expansion of the public use doctrine.  The state of Nevada appropriates water to users via the prior appropriation system – a “first-in-time, first-in-right” system.  Over 100 years ago, litigation over the Walker River Basin began between competing water users in the Walker River Basin.  The Basin covers approximately 4,000 square miles, beginning in the Sierra Nevada mountain range and ending in a lake in Nevada.  In 1936, a federal court issued a decree adjudicating water rights of various claimants to water in the basin via the prior appropriation doctrine.

In 1987, an Indian Tribe intervened in the ongoing litigation to establish procedures to change the allocations of water rights subject to the decree.  Since that time, the state reviews all changes to applications under the decree.  In 1994, the plaintiff sought to modify the decree to ensure minimum stream flows into the lake under the “doctrine of maintenance of the public trust.”  The federal district (trial) court granted the plaintiff’s motion to intervene in 2013.  In 2015, the trial court dismissed the plaintiff’s amended complaint in intervention on the basis that the plaintiff lacked standing; that the public trust doctrine could only apply prospectively to bar granting appropriative rights; any retroactive application of the doctrine could constitute a taking requiring compensation; that the court lacked the authority to effectuate a taking; and that the lake was not part of the basin.

On appeal, the federal appellate court determined that the plaintiff had standing and that the lake was part of the basin.  The appellate court also held that whether the plaintiff could seek minimum flows depended on whether the public trust doctrine allowed the reallocation of rights that had been previously settled under the prior appropriation doctrine.  Thus, the appellate court certified two questions to the Nevada Supreme Court:  1) whether the public trust doctrine allowed such reallocation of rights; and 2) if so, whether doing so amounted to a “taking” of private property requiring “just compensation” under the Constitution.

The state Supreme Court held that that public trust doctrine had already been implemented via the state’s prior appropriation system for allocating water rights and that the state’s statutory water laws is consistent with the public trust doctrine by requiring the state to consider the public interest when making allocating and administering water rights.  The state Supreme Court also determined that the legislature had expressly prohibited the reallocation of water rights that have not otherwise been abandoned or forfeited in accordance with state water law.

The state Supreme Court limited the scope of its ruling to private water use of surface streams, lakes and groundwater such as uses for crops and livestock. The plaintiff has indicated that it will ask the federal appellate court for a determination of whether the public trust doctrine could be used to mandate water management methods.  If the court would rule that it does, the result would be an unfortunate disincentive to use water resources in an economically efficient manner (an application of the “tragedy of the commons”).  It would also provide a current example (in a negative way) of the application of the Coase Theorem (well-defined property rights overcome the problem of externalities).  See Coase, “The Problem of Social Cost,” Journal of Law and Economics, Vol. 3, October 1960.

Conclusion

Clearly, the state and federal governments can regulate natural resources.  The power to do so is vested in state legislatures and the Congress.  As such, the power is limited by Constitutional protections and by the voting public.  But, an expansion of the public trust doctrine would void those constraints on a theory that a property right that doesn’t exist cannot be taken.  The courts would become a “super legislature” gaining the authority to make public policy decisions.  That would further blur the distinction between legislative bodies and the judiciary and the fundamental legal principle of the separation of powers.

An expanded public trust doctrine is a big “camel’s nose under the tent” for agriculture.  Farmers and ranchers beware.

#### The plan’s encroachment on private property rights collapses investor and entrepreneurial certainty

Huffman, 2015 (James L., Dean Emeritus of Lewis & Clark Law School and a Visiting Fellow at the Hoover Institution, with degrees from Montana State University (BS), The Fletcher School of Tufts University (MA) and the University of Chicago (JD), “WHY LIBERATING THE PUBLIC TRUST DOCTRINE IS BAD FOR THE PUBLIC”, 5/14/2015, https://law.lclark.edu/live/files/19611-45-2huffman)

For public trust liberationists, however, there are at least a couple of problems with relying on legislatures and other governmental entities with proper authority. For one, notwithstanding what Professor Wood has called “mind-blowing urgency,”221 “[t]he international treaty process will probably fail, the legislature will not act, and the president will do too little too late.”222 But even if legislatures can be persuaded to act, there is another problem. Effectively expanding public rights has the consequence of limiting private rights. Private property owners have a tendency to object when they perceive that their vested rights have been infringed. Sometimes they sue, claiming that their property has been taken without just compensation. That is what happened in the Just v. Marinette County case. But the Wisconsin court negated the takings claim by asserting that the public right served by the wetlands conservation legislation was antecedent to the property rights of the plaintiff.223 As explained previously, that is the magic of the public trust doctrine. It evades all takings claims. Avoiding takings claims and bypassing recalcitrant legislatures seems to suit the public trust liberationists just fine, but it is difficult to square with a commitment to the rule of law. It is also difficult to understand how such judicial lawmaking serves the public good or the individual citizens who share in common not only the rights protected by the public trust doctrine but also private property rights and other individual liberties. What do judges know about the public good? How is the judicial process suited to hearing and evaluating the multitude of competing and conflicting claims on the public good? In the American system courts hear actual cases and controversies in which the opposing parties have stakes in the outcome.224 How is a court supposed to decipher the public good from arguments by self-interested public and private litigants about the facts of a particular case and the laws applicable to that case? Even assuming judges have special wisdom on natural resource-related public policy matters, how is the public good served by an ever-expanding doctrine of public rights that are antecedent to private property rights? It seems easy for public trust liberationists to dismiss private property as antithetical to the public good, but nothing could be further from the realities of public welfare. Absent secure property and contract rights, economic prosperity is illusive at best. Without economic prosperity, governments cannot garner the resources necessary to provide for the public good, whether in the form of infrastructure, education, or environmental protection. Under the traditional public trust doctrine, affected private property owners know with a reasonable level of certainty what their rights are. If they own riparian land on navigable waters they know that they have wharfing-out rights, for example, but not the right to obstruct navigation while exercising those rights. If they own submerged lands under navigable waters, they know that they have a right to occupy those lands so long as they do not interfere with navigation and fishing. If they own riparian or submerged lands on non-navigable waters they know they have the same rights they and others have on uplands. In other words, their lands are unaffected by the public trust doctrine. Whether or not lands are affected by the public trust, property owners know that they cannot use their land in ways that create a nuisance for their neighbors. These are what Justice Scalia labeled background principles.225 They are not crystal clear, nor could they be, but at some point they become so variable and uncertain as to lose their effectiveness as sources of security for investors and entrepreneurs. A strength of the traditional common law method was in adapting the law to the changing needs and circumstances faced by investors and entrepreneurs while not unreasonably upsetting expectations. If the public trust doctrine is liberated in the manner suggested by the theories described in this Article, or by many others to be found in the vast sea of public trust literature, private property rights will become so contingent as to be all but useless as assurances for those who might produce the wealth necessary for the public good. There is a powerful public interest in a secure and reliable system of property rights. By making private property rights increasingly contingent, a liberated public trust doctrine will not serve the public good.

#### **That wrecks the foundation of judicial legitimacy, democracy, SOP, and rule of law – that outweighs and turns case**

Huffman, 2015 (James L., Dean Emeritus of Lewis & Clark Law School and a Visiting Fellow at the Hoover Institution, with degrees from Montana State University (BS), The Fletcher School of Tufts University (MA) and the University of Chicago (JD), “WHY LIBERATING THE PUBLIC TRUST DOCTRINE IS BAD FOR THE PUBLIC”, 5/14/2015, https://law.lclark.edu/live/files/19611-45-2huffman)

VIII. CONCLUSION Modern progressives, like their early twentieth century predecessors, tend to be skeptical of democratic policymaking. They prefer to rely on experts, scientific management and expeditious executive action to implement policies they know to be right and good. Democracy, the separation of powers, constitutional rights, and the rule of law all get in the way. It was early frustration with these traditional American principles that led Professor Sax to call for liberating the public trust doctrine from its historical shackles. He recognized that if courts could be persuaded to expand and extend the doctrine, environmentalists could revolutionize American property law while claiming the mantle of the rule of law. Courts would rule for environmentalist claims not because it was the right thing to do but because the law required it. That barely a handful of courts have even acknowledged Sax’s invitation to liberate the public trust doctrine underscores that most judges, most of the time, do their best to interpret and apply the law as those affected by the law would reasonably expect them to. Most judges understand that people rely on those expectations in their interactions with others and in the risks they assume and to which they expose others. If it were otherwise, people would soon lose confidence in the courts as objective arbiters of disputes. This does not mean that the law is stuck in the past. The common law has always evolved. But it has evolved in a way that respects rather than undermines expectations. One of the great strengths of the common law method is in “serving the rule of law by adapting legal rules to the demonstrated needs and wishes of those who rely on law to bring at least a degree of certainty to their day-to-day lives.”226 Perhaps the best indication of widespread commitment to the rule of law is that judges seduced into lawmaking of the kind urged by public trust liberationists, like the liberationists themselves, invariably appeal to precedent in seeking to justify their rulings. This does not mean that the lawmaking judges shy away from explaining the policy benefits of their decisions, but one would be hard pressed to find a case in which a court acknowledges that its new rule has no basis in preexisting law. Rather, lawmaking judges follow the path advocated by Judge Richard Posner in his commentary on the Supreme Court’s decision in Bush v. Gore.227 Posner explains that what he calls pragmatic judges should cover their lawmaking tracks by providing “legal-type judgment” as justification.228 Anyone who believes in the rule of law as a necessary principle of government in every free society should be troubled by this ends-driven, whatever-it-takes approach to judging in particular, and government in general. Even accepting, for the sake of argument, that we face a global environmental crisis as Professor Wood and many others assert,229 experience demonstrates that compromising the rule of law will harm rather than help efforts to meet any serious challenge. Saving a failing planet will require innovative thinking and creativity of the highest sort. History demonstrates that individual liberty and the rule of law are essential to such innovation and problem solving. Absent the rule of law, many a nation has failed to solve much lesser challenges.230 Like the public trust liberationists, those seeking exemptions from the rule of law always plead a higher good as their justification. Everyone claims to occupy the moral high ground. But constitutional government under the rule of law has long since proven to be the best means for determining where the moral high ground and the public good lie, while leaving ample space and flexibility for their pursuit.

#### Business confidence is tied to economic growth

Sarah Chaney Cambon 21, Reporter on The Wall Street Journal's Economics Team, BA in Business Journalism from the University of North Carolina-Chapel Hill, “Capital-Spending Surge Further Lifts Economic Recovery”, Wall Street Journal, 6/27/2021, https://www.wsj.com/articles/capital-spending-surge-further-lifts-economic-recovery-11624798800

Business investment is emerging as a powerful source of U.S. economic growth that will likely help sustain the recovery.

Companies are ramping up orders for computers, machinery and software as they grow more confident in the outlook.

Nonresidential fixed investment, a proxy for business spending, rose at a seasonally adjusted annual rate of 11.7% in the first quarter, led by growth in software and tech-equipment spending, according to the Commerce Department. Business investment also logged double-digit gains in the third and fourth quarters last year after falling during pandemic-related shutdowns. It is now higher than its pre-pandemic peak.

Orders for nondefense capital goods excluding aircraft, another measure for business investment, are near the highest levels for records tracing back to the 1990s, separate Commerce Department figures show.

“Business investment has really been an important engine powering the U.S. economic recovery,” said Robert Rosener, senior U.S. economist at Morgan Stanley. “In our outlook for the economy, it’s certainly one of the bright spots.”

Consumer spending, which accounts for about two-thirds of economic output, is driving the early stages of the recovery. Americans, flush with savings and government stimulus checks, are spending more on goods and services, which they shunned for much of the pandemic.

Robust capital investment will be key to ensuring that the recovery maintains strength after the spending boost from fiscal stimulus and business reopenings eventually fades, according to some economists.

Rising business investment helps fuel economic output. It also lifts worker productivity, or output per hour. That metric grew at a sluggish pace throughout the last economic expansion but is now showing signs of resurgence.

The recovery in business investment is shaping up to be much stronger than in the years following the 2007-09 recession. “The events especially in late ’08, early ’09 put a lot of businesses really close to the edge,” said Phil Suttle, founder of Suttle Economics. “I think a lot of them said, ‘We’ve just got to be really cautious for a long while.’”

Businesses appear to be less risk-averse now, he said.

After the financial crisis, businesses grew by adding workers, rather than investing in capital. Hiring was more attractive than capital spending because labor was abundant and relatively cheap. Now the supply of workers is tight. Companies are raising pay to lure employees. As a result, many firms have more incentive to grow by investing in capital.

Economists at Morgan Stanley predict that U.S. capital spending will rise to 116% of prerecession levels after three years. By comparison, investment took 10 years to reach those levels once the 2007-09 recession hit.

Company executives are increasingly confident in the economy’s trajectory. The Business Roundtable’s economic-outlook index—a composite of large companies’ plans for hiring and spending, as well as sales projections—increased by nine points in the second quarter to 116, just below 2018’s record high, according to a survey conducted between May 25 and June 9. In the second quarter, the share of companies planning to boost capital investment increased to 59% from 57% in the first.

“We’re seeing really strong reopening demand, and a lot of times capital investment follows that,” said Joe Song, senior U.S. economist at BofA Securities.

Mr. Song added that less uncertainty regarding trade tensions between the U.S. and China should further underpin business confidence and investment. “At the very least, businesses will understand the strategy that the Biden administration is trying to follow and will be able to plan around that,” he said.

#### Decline cascades---nuclear war

Dr. Mathew Maavak 21, PhD in Risk Foresight from the Universiti Teknologi Malaysia, External Researcher (PLATBIDAFO) at the Kazimieras Simonavicius University, Expert and Regular Commentator on Risk-Related Geostrategic Issues at the Russian International Affairs Council, “Horizon 2030: Will Emerging Risks Unravel Our Global Systems?”, Salus Journal – The Australian Journal for Law Enforcement, Security and Intelligence Professionals, Volume 9, Number 1, p. 2-8

Various scholars and institutions regard global social instability as the greatest threat facing this decade. The catalyst has been postulated to be a Second Great Depression which, in turn, will have profound implications for global security and national integrity. This paper, written from a broad systems perspective, illustrates how emerging risks are getting more complex and intertwined; blurring boundaries between the economic, environmental, geopolitical, societal and technological taxonomy used by the World Economic Forum for its annual global risk forecasts. Tight couplings in our global systems have also enabled risks accrued in one area to snowball into a full-blown crisis elsewhere. The COVID-19 pandemic and its socioeconomic fallouts exemplify this systemic chain-reaction. Onceinexorable forces of globalization are rupturing as the current global system can no longer be sustained due to poor governance and runaway wealth fractionation. The coronavirus pandemic is also enabling Big Tech to expropriate the levers of governments and mass communications worldwide. This paper concludes by highlighting how this development poses a dilemma for security professionals.

Key Words: Global Systems, Emergence, VUCA, COVID-9, Social Instability, Big Tech, Great Reset

INTRODUCTION

The new decade is witnessing rising volatility across global systems. Pick any random “system” today and chart out its trajectory: Are our education systems becoming more robust and affordable? What about food security? Are our healthcare systems improving? Are our pension systems sound? Wherever one looks, there are dark clouds gathering on a global horizon marked by volatility, uncertainty, complexity and ambiguity (VUCA).

But what exactly is a global system? Our planet itself is an autonomous and selfsustaining mega-system, marked by periodic cycles and elemental vagaries. Human activities within however are not system isolates as our banking, utility, farming, healthcare and retail sectors etc. are increasingly entwined. Risks accrued in one system may cascade into an unforeseen crisis within and/or without (Choo, Smith & McCusker, 2007). Scholars call this phenomenon “emergence”; one where the behaviour of intersecting systems is determined by complex and largely invisible interactions at the substratum (Goldstein, 1999; Holland, 1998).

The ongoing COVID-19 pandemic is a case in point. While experts remain divided over the source and morphology of the virus, the contagion has ramified into a global health crisis and supply chain nightmare. It is also tilting the geopolitical balance. China is the largest exporter of intermediate products, and had generated nearly 20% of global imports in 2015 alone (Cousin, 2020). The pharmaceutical sector is particularly vulnerable. Nearly “85% of medicines in the U.S. strategic national stockpile” sources components from China (Owens, 2020).

An initial run on respiratory masks has now been eclipsed by rowdy queues at supermarkets and the bankruptcy of small businesses. The entire global population – save for major pockets such as Sweden, Belarus, Taiwan and Japan – have been subjected to cyclical lockdowns and quarantines. Never before in history have humans faced such a systemic, borderless calamity.

COVID-19 represents a classic emergent crisis that necessitates real-time response and adaptivity in a real-time world, particularly since the global Just-in-Time (JIT) production and delivery system serves as both an enabler and vector for transboundary risks. From a systems thinking perspective, emerging risk management should therefore address a whole spectrum of activity across the economic, environmental, geopolitical, societal and technological (EEGST) taxonomy. Every emerging threat can be slotted into this taxonomy – a reason why it is used by the World Economic Forum (WEF) for its annual global risk exercises (Maavak, 2019a). As traditional forces of globalization unravel, security professionals should take cognizance of emerging threats through a systems thinking approach.

METHODOLOGY

An EEGST sectional breakdown was adopted to illustrate a sampling of extreme risks facing the world for the 2020-2030 decade. The transcendental quality of emerging risks, as outlined on Figure 1, below, was primarily informed by the following pillars of systems thinking (Rickards, 2020):

• Diminishing diversity (or increasing homogeneity) of actors in the global system (Boli & Thomas, 1997; Meyer, 2000; Young et al, 2006);

• Interconnections in the global system (Homer-Dixon et al, 2015; Lee & Preston, 2012);

• Interactions of actors, events and components in the global system (Buldyrev et al, 2010; Bashan et al, 2013; Homer-Dixon et al, 2015); and

• Adaptive qualities in particular systems (Bodin & Norberg, 2005; Scheffer et al, 2012) Since scholastic material on this topic remains somewhat inchoate, this paper buttresses many of its contentions through secondary (i.e. news/institutional) sources.

ECONOMY

According to Professor Stanislaw Drozdz (2018) of the Polish Academy of Sciences, “a global financial crash of a previously unprecedented scale is highly probable” by the mid- 2020s. This will lead to a trickle-down meltdown, impacting all areas of human activity.

The economist John Mauldin (2018) similarly warns that the “2020s might be the worst decade in US history” and may lead to a Second Great Depression. Other forecasts are equally alarming. According to the International Institute of Finance, global debt may have surpassed $255 trillion by 2020 (IIF, 2019). Yet another study revealed that global debts and liabilities amounted to a staggering $2.5 quadrillion (Ausman, 2018). The reader should note that these figures were tabulated before the COVID-19 outbreak.

The IMF singles out widening income inequality as the trigger for the next Great Depression (Georgieva, 2020). The wealthiest 1% now own more than twice as much wealth as 6.9 billion people (Coffey et al, 2020) and this chasm is widening with each passing month. COVID-19 had, in fact, boosted global billionaire wealth to an unprecedented $10.2 trillion by July 2020 (UBS-PWC, 2020). Global GDP, worth $88 trillion in 2019, may have contracted by 5.2% in 2020 (World Bank, 2020).

As the Greek historian Plutarch warned in the 1st century AD: “An imbalance between rich and poor is the oldest and most fatal ailment of all republics” (Mauldin, 2014). The stability of a society, as Aristotle argued even earlier, depends on a robust middle element or middle class. At the rate the global middle class is facing catastrophic debt and unemployment levels, widespread social disaffection may morph into outright anarchy (Maavak, 2012; DCDC, 2007).

Economic stressors, in transcendent VUCA fashion, may also induce radical geopolitical realignments. Bullions now carry more weight than NATO’s security guarantees in Eastern Europe. After Poland repatriated 100 tons of gold from the Bank of England in 2019, Slovakia, Serbia and Hungary quickly followed suit.

According to former Slovak Premier Robert Fico, this erosion in regional trust was based on historical precedents – in particular the 1938 Munich Agreement which ceded Czechoslovakia’s Sudetenland to Nazi Germany. As Fico reiterated (Dudik & Tomek, 2019):

“You can hardly trust even the closest allies after the Munich Agreement… I guarantee that if something happens, we won’t see a single gram of this (offshore-held) gold. Let’s do it (repatriation) as quickly as possible.” (Parenthesis added by author).

President Aleksandar Vucic of Serbia (a non-NATO nation) justified his central bank’s gold-repatriation program by hinting at economic headwinds ahead: “We see in which direction the crisis in the world is moving” (Dudik & Tomek, 2019). Indeed, with two global Titanics – the United States and China – set on a collision course with a quadrillions-denominated iceberg in the middle, and a viral outbreak on its tip, the seismic ripples will be felt far, wide and for a considerable period.

A reality check is nonetheless needed here: Can additional bullions realistically circumvallate the economies of 80 million plus peoples in these Eastern European nations, worth a collective $1.8 trillion by purchasing power parity? Gold however is a potent psychological symbol as it represents national sovereignty and economic reassurance in a potentially hyperinflationary world. The portents are clear: The current global economic system will be weakened by rising nationalism and autarkic demands. Much uncertainty remains ahead. Mauldin (2018) proposes the introduction of Old Testament-style debt jubilees to facilitate gradual national recoveries. The World Economic Forum, on the other hand, has long proposed a “Great Reset” by 2030; a socialist utopia where “you’ll own nothing and you’ll be happy” (WEF, 2016).

In the final analysis, COVID-19 is not the root cause of the current global economic turmoil; it is merely an accelerant to a burning house of cards that was left smouldering since the 2008 Great Recession (Maavak, 2020a). We also see how the four main pillars of systems thinking (diversity, interconnectivity, interactivity and “adaptivity”) form the mise en scene in a VUCA decade.

ENVIRONMENTAL

What happens to the environment when our economies implode? Think of a debt-laden workforce at sensitive nuclear and chemical plants, along with a concomitant surge in industrial accidents? Economic stressors, workforce demoralization and rampant profiteering – rather than manmade climate change – arguably pose the biggest threats to the environment. In a WEF report, Buehler et al (2017) made the following pre-COVID-19 observation:

The ILO estimates that the annual cost to the global economy from accidents and work-related diseases alone is a staggering $3 trillion. Moreover, a recent report suggests the world’s 3.2 billion workers are increasingly unwell, with the vast majority facing significant economic insecurity: 77% work in part-time, temporary, “vulnerable” or unpaid jobs.

Shouldn’t this phenomenon be better categorized as a societal or economic risk rather than an environmental one? In line with the systems thinking approach, however, global risks can no longer be boxed into a taxonomical silo. Frazzled workforces may precipitate another Bhopal (1984), Chernobyl (1986), Deepwater Horizon (2010) or Flint water crisis (2014). These disasters were notably not the result of manmade climate change. Neither was the Fukushima nuclear disaster (2011) nor the Indian Ocean tsunami (2004). Indeed, the combustion of a long-overlooked cargo of 2,750 tonnes of ammonium nitrate had nearly levelled the city of Beirut, Lebanon, on Aug 4 2020. The explosion left 204 dead; 7,500 injured; US$15 billion in property damages; and an estimated 300,000 people homeless (Urbina, 2020). The environmental costs have yet to be adequately tabulated.

Environmental disasters are more attributable to Black Swan events, systems breakdowns and corporate greed rather than to mundane human activity.

Our JIT world aggravates the cascading potential of risks (Korowicz, 2012). Production and delivery delays, caused by the COVID-19 outbreak, will eventually require industrial overcompensation. This will further stress senior executives, workers, machines and a variety of computerized systems. The trickle-down effects will likely include substandard products, contaminated food and a general lowering in health and safety standards (Maavak, 2019a). Unpaid or demoralized sanitation workers may also resort to indiscriminate waste dumping. Many cities across the United States (and elsewhere in the world) are no longer recycling wastes due to prohibitive costs in the global corona-economy (Liacko, 2021).

Even in good times, strict protocols on waste disposals were routinely ignored. While Sweden championed the global climate change narrative, its clothing flagship H&M was busy covering up toxic effluences disgorged by vendors along the Citarum River in Java, Indonesia. As a result, countless children among 14 million Indonesians straddling the “world’s most polluted river” began to suffer from dermatitis, intestinal problems, developmental disorders, renal failure, chronic bronchitis and cancer (DW, 2020). It is also in cauldrons like the Citarum River where pathogens may mutate with emergent ramifications.

On an equally alarming note, depressed economic conditions have traditionally provided a waste disposal boon for organized crime elements. Throughout 1980s, the Calabriabased ‘Ndrangheta mafia – in collusion with governments in Europe and North America – began to dump radioactive wastes along the coast of Somalia. Reeling from pollution and revenue loss, Somali fisherman eventually resorted to mass piracy (Knaup, 2008).

The coast of Somalia is now a maritime hotspot, and exemplifies an entwined form of economic-environmental-geopolitical-societal emergence. In a VUCA world, indiscriminate waste dumping can unexpectedly morph into a Black Hawk Down incident. The laws of unintended consequences are governed by actors, interconnections, interactions and adaptations in a system under study – as outlined in the methodology section.

Environmentally-devastating industrial sabotages – whether by disgruntled workers, industrial competitors, ideological maniacs or terrorist groups – cannot be discounted in a VUCA world. Immiserated societies, in stark defiance of climate change diktats, may resort to dirty coal plants and wood stoves for survival. Interlinked ecosystems, particularly water resources, may be hijacked by nationalist sentiments. The environmental fallouts of critical infrastructure (CI) breakdowns loom like a Sword of Damocles over this decade.

GEOPOLITICAL

The primary catalyst behind WWII was the Great Depression. Since history often repeats itself, expect familiar bogeymen to reappear in societies roiling with impoverishment and ideological clefts. Anti-Semitism – a societal risk on its own – may reach alarming proportions in the West (Reuters, 2019), possibly forcing Israel to undertake reprisal operations inside allied nations. If that happens, how will affected nations react? Will security resources be reallocated to protect certain minorities (or the Top 1%) while larger segments of society are exposed to restive forces? Balloon effects like these present a classic VUCA problematic.

Contemporary geopolitical risks include a possible Iran-Israel war; US-China military confrontation over Taiwan or the South China Sea; North Korean proliferation of nuclear and missile technologies; an India-Pakistan nuclear war; an Iranian closure of the Straits of Hormuz; fundamentalist-driven implosion in the Islamic world; or a nuclear confrontation between NATO and Russia. Fears that the Jan 3 2020 assassination of Iranian Maj. Gen. Qasem Soleimani might lead to WWIII were grossly overblown. From a systems perspective, the killing of Soleimani did not fundamentally change the actor-interconnection-interaction adaptivity equation in the Middle East. Soleimani was simply a cog who got replaced.

## Case

#### No solvency – it won’t gain broader doctrinal influence and cases aren’t based around it

Owen 12 – Associate Professor, University of Maine School of Law [Dave, “The Mono Lake Case, the Public Trust Doctrine, and the Administrative State”, 45 U.C. Davis L. Rev. 1099, p. 1122-1125] jmhe

A. The Public Trust Doctrine in the Courts

1. The Unused Lever

The clearest lesson from an empirical review is that California’s freshwater public trust doctrine has exerted very little influence in the courts.143 The Mono Lake Case did have one clear consequence: no one disputes the decision was crucially important to the process of restoring Mono Lake.144 But **later cases have hardly ever produced similar results**. In the cases available on Lexis or Westlaw,145 not one has set aside an agency decision on public trust grounds, or has ordered the re-examination of an existing (or applied-for) water right.

Since the Mono Lake Case, **no plaintiff in that pool of decisions has prevailed on any public trust claim**.146 Few plaintiffs have tried, **even as** water litigation **remains a** constant feature **of California** **life**.147 The pool of freshwater cases includes only fourteen instances when plaintiffs asserted a public trust argument.148

Numbers of wins and losses may be deceptive, for sometimes a losing party can obtain judicial language that favorably develops doctrine or that improves its position in future disputes.149 In the postMono Lake cases, however, such discussion is rare at best. **Some** of the **decisions provide** only passing reference **to the existence of a public trust claim**.150 Others involve plaintiffs asserting that an agency decision neglected to provide “feasible” protection for public trust resources.151 All of these **arguments failed**, with courts consistently allowing the agencies to balance public trust protection against competing resource claims.152 Many of the claims appear to have assumed secondary importance within the litigation, **with plaintiffs** focusing **their attentions upon** other arguments.153 Most decisions’ discussions of public trust claims are terse, and the more extensive discussions provide little encouragement to plaintiffs contemplating public trust claims.154

The first hypothesis about the public trust’s influence — that it provides a lever to compel environmental protection — therefore finds **hardly any support** in freshwater case law emerging from California. In those cases, plaintiffs are neither winning on public trust claims nor obtaining favorable doctrinal development.155 If the doctrine truly encourages judges to issue environmentally protective orders, it is doing so entirely in undocumented ways.

#### No spillover to OST – Courts rejected PTD’s application to climate, GHGs wildlife, and anything outside of water.

Jamin and Glick 20 [Olivier Jamin, Richard M. Glick; Published: 12-2-2020; "Oregon Supreme Court Rejects Expansion of Public Trust Doctrine in Climate Change Lawsuit"; Davis Wright Tremaine LLP; Accessed: 9-3-2021; https://www.dwt.com/blogs/energy--environmental-law-blog/2020/12/climate-change-public-trust-doctrine-oregon]//KL

In Chernaik v. Brown, the Oregon Supreme Court rejected claims by young climate activists that the public trust doctrine compelled government action to combat climate change. The lawsuit was part of a broader local and national effort led by Our Children's Trust, a non-profit public interest law firm that has brought legal action in all 50 states over the last 10 years in an attempt to compel more aggressive action against climate change. Similar litigation was brought by many of the same plaintiffs in federal court but asserting constitutional claims. In Juliana v. U. S., the 9th Circuit Court of Appeals brought that case to a near-certain end as well. The Public Trust Doctrine (PTD) is a mostly judge-made concept under which a government, as sovereign, has a duty to preserve certain natural and cultural resources for the benefit of the public. Throughout the United States, courts have generally limited application of the PTD to navigable streams and their tributaries or beaches and shores. To that end, climate activists have sought to expand the PTD to the atmosphere. The Oregon lawsuit was filed in 2011 against then-Governor John Kitzhaber and sought declaratory relief that the PTD covers water resources, navigable waters, submerged and submersible lands, islands, shorelands, coastal areas, wildlife and fish, and the atmosphere. Plaintiffs also argued that Oregon had failed to uphold its fiduciary obligations under the PTD by failing to regulate and reduce carbon dioxide emissions. After a complicated procedural history, the case eventually made it to the Oregon Supreme Court on two primary issues: the scope of the PTD, and the obligations that it imposes on the State. On the first issue, the Court held that the PTD covers all submerged and submersible lands as well as navigable waters but declined to extend it further to cover all waters of the state, to wildlife, or to the atmosphere. While the Court recognized that the common law doctrine was not fixed and "can be modified to reflect changes in society's needs," it was not the time to do so. Specifically, the Court rejected plaintiffs' two-pronged test to justify the expansion of the PTD to resources that were (1) "not easily held or improved" and (2) "of great value to the public for uses such as commerce, navigation, hunting, and fisheries." The Court reasoned that it was difficult to conceive of a resource that would not satisfy the test but declined to adopt a test of its own. The Court dealt another blow to plaintiffs by rejecting the argument that the PTD imposed on the state obligations similar to the ones of trustee of a private trust to beneficiaries. Instead, the majority left it at the "recognized duty that the state has to protect public resources for the benefit of the public's use of navigable waterways for navigation, recreation, commerce, and fisheries." Plaintiffs will find no more comfort in Chief Justice Walters' dissent that "the time is now" for the court to act than they did from the words of support for that position in the 9th Circuit's Juliana opinion. Nevertheless, similar legal actions remain ongoing in many states, and the U.S. Supreme Court is set to hear arguments in another case brought by the city of Baltimore seeking damages against energy companies for harms sustained due to those companies' impact on climate change. Expect climate activists to continue testing various legal theories in court to compel government action.

#### PTD causes overuse— that alone turns all of theimpacts in the 1AC.

Simmons 07 [Randy T. Simmons — Ph.D. from the University of Oregon in Political Economy, Professor of Political Economy and Director of the Institute of Political Economy, Senior Fellow at the Property and Environment Research Center as well as the Independent Institute; "Property and the Public Trust Doctrine"; The Property and Environment Research Center; April 2007; Accessible Online at https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.331.8362&rep=rep1&type=pdf] DL 9-6-2021

CONSEQUENCES OF THE PUBLIC TRUST DOCTRINE

The public trust doctrine returns resources to their open-access past. Everyone who wants access to the resources gets it. Overuse results. This raises the question of the desirability of applying the public trust doctrine to Montana lands and streams. I would contend that Montana’s ranches and farms are too important to put in the public trust. They need far better protection than an open-access rule allows.

A key reason not to apply the public trust doctrine to private lands has to do with investment and expectations. Without the ability to exclude, owners cannot know if an investment will pay off because they will not be able to control the actions of non-owners. As the Supreme Court has explained, “The right to exclude others” is “one of the most essential sticks in the bundle of rights that are commonly characterized as property” (Kaiser Aetna v. United States 1979, 164). The degree of exclusivity determines a property owner’s expectations about whether his decisions about the uses of his property are likely to be effective. “The greater the probability those expectations will be upheld in one way or another (custom, social ostracism, or government punishment of violators), the stronger are his property rights” (Alchian and Allen 1977, 114). When exclusivity rules are clearly defined and enforced, they would require me to gain your permission to your property through sale or gift. To do otherwise would be to trespass on your property or to convert (steal) it.

Gaining permission illustrates a unique feature of private property—owners can transfer their rights to others. Unlike open access, private property owners may sell or lease hunting rights for mule deer to one set of users, fishing rights to others, and upland game rights to still others, while retaining the right to raise crops. We also see in Montana many examples of property owners kindly granting public access to designated trails that pass through their property.

The ability to transfer property holds people accountable for their choices about their property. If they treat their property poorly, its value decreases. If they treat it well, its value increases. Higher value means that others approve of the actions owners are taking and indicates that approval through market prices to purchase or use the property. Besides the personal pleasure a property owner may obtain by treating property well, owners have a financial incentive to care for and improve their property’s value. If, however, owners cannot control access to their property, they have little incentive to care about others’ preferences.

Because public trust rights cannot be sold—owners cannot transfer their rights to others—there are no owners to capture the benefits of good decisions or pay the costs of poor decisions. Members of the public may use, but do not manage, control, or have reason to evaluate the costs they impose on others or on the resource.

This section began by asking if rivers, streams, and beaches should be open for public access. Why not do the same with land? The purpose in asking if the public trust doctrine should be applied to resources currently considered private is to demonstrate the costs that occur from such an action. If public access to ranches would cause overuse and reduce incentives to protect, invest, and care about others’ preferences, might it not do the same to rivers, streams, watersheds, beaches, and shorelines and all the other resources exposed to public trust?

#### Space colonization financially, scientifically, and logistically infeasible.

Impey 19 — Chris Impey, a faculty member at the University of Arizona, served as Vice-President of the American Astronomical Society, a Fellow of the American Association for the Advancement of Science, and a Howard Hughes Medical Institute Professor, serves on the Advisory Council of METI (Messaging Extraterrestrial Intelligence), 2019 (“Chapter 5: Mars and Beyond: The Feasibility of Living in the Solar System,” *The Human Factor in a Mission to Mars: An Interdisciplinary Approach*, Edited by Konrad Szocik, Published by Springer, ISBN 978-3-030-02059-0, Accessed 08-30-2019, pp. 97-99)

5.2 Establishing a Colony Robert Zubrin never lost the faith. With a Ph.D. in Nuclear Engineering and over 200 technical papers to his credit, Zubrin has been a staunch advocate of human exploration of Mars for 30 years. He holds patents for hybrid rocket-planes, synthetic fuel manufacturing, magnetic sails, salt-water nuclear reactors, and three-person chess, but his true passion is Mars. He thinks we can lower the cost and complexity of a Mars mission by “living off the land,” or utilizing many resources as possible from the air and soil. His ideas were strong enough to be adopted by NASA as their “design reference mission,” but he became frustrated at NASA’s glacial progress and anemic government support so he founded the advocacy group Mars Society in 1998. He’s written a series of books that make the case for going to Mars (Zubrin and Wagner 1996; Zubrin 2008). His most recent book brings Mars exploration up to date with the Mars Direct proposal using the DragonX rocket (Zubrin 2013). Asked about saving costs with a one-way journey, Zubrin has said: “Life is a one-way trip, and one way to spend it is by going to Mars and starting a new branch of human civilization there” (Zubrin 2011). Mars is a challenging goal for human exploration. The problem isn’t energy. The energy cost of going to Mars is less than 10% more than the energy cost of going to the Moon. The problem is the distance. An energy-efficient trajectory involves a travel time of 9 months each way. The trip can be shortened to 6–7 months at the expense of extra energy—a far cry from the week it takes to get to the Moon. The cost of transporting 2 years of supplies for even a small crew is daunting. Wernher von Braun was the first to make a technical study of a Mars mission in the 1950s but it was hopelessly grandiose, using a thousand Saturn V rockets to build a fleet of ten spacecraft in Earth orbit to then carry seventy astronauts to Mars. He pitched a scaled-down concept to Richard Nixon but it was passed over in favor of the Space Shuttle. Former NASA administrator Thomas Paine tried next. Perhaps he’d watched too much Star Trek, but he aimed to conquer and industrialize the Moon with nuclear space tugs, launch a fleet of space stations into orbit around the Earth, and send several dozen spaceships a year to Mars to build a space station and support the settlement The Reagan administration was happy to shelve his report. In 2014, the National Research Council revisited human flight, as directed by Congress. Its sweeping 286-page report concluded bluntly that NASA had an unsustainable and unsafe strategy that will prevent the United States from achieving a human landing on Mars any time in the foreseeable future (National Research Council 2014). With current budgets, they suggest that it can’t happen before mid-century. Along the way, the report addresses the philosophical question of why we should send people into space at all, concluding that purely practical and economic benefits don’t justify the cost, but the aspirational aspect of the endeavor might make it worthwhile. There must be good reasons and a strong will, because Mars is hard. One risk is radiation. Earth dwellers are sheltered from high-energy cosmic rays and solar flares by our atmosphere and magnetic field. When the Curiosity rover headed to Mars, [end page 96] scientists switched on a radiation detector and found that the radiation environment in deep space is far more intense than it is on Earth. An astronaut on a 2-year trip to Mars would get 200 times more radiation dose than an Earth dweller over that same period (Fig. 5.2). However, to put it in perspective, the adventure only increases the lifetime risk of cancer from 21 to 24%. The risk of some sort of spacecraft malfunction is likely to be much higher. Another risk is weightlessness. Substantial physiological changes result from a microgravity environment. Russian cosmonaut Valeri Polyakov spent 438 days on board Mir, making a dizzying 7000 orbits of the Earth, in part to see if humans could handle a trip to Mars. The Russians reported that he suffered no long-term ill-effects from his 14 months in space. There is extensive literature on the adverse effects of microgravity on humans, including bone loss, muscle atrophy, cardiovascular dysfunction, and reduced functioning of the immune system (White and Averner 2001). Some of these effects, like bone loss, can be mitigated but not completely compensated for, by exercise and diet (Grimm et al. 2016). [end page 97] Robert Zubrin notes that the used upper stage of a Mars launch vehicle could be employed as a counterweight. With a mile-long tether and a spin rate of 2 rpm, Earth gravity would be simulated. With a spin rate of 1 rpm, it would be Mars gravity and the astronauts could get acclimatized to the new situation before landing. Materials exist with the requisite tensile strength to construct such a tether, but it would add cost to a mission so it is not clear if such technology is warranted by the health risks. A third risk is being cooped up. A Mars traveler would have to spend a year and a half in a cabin the size of a school bus, and as much as a year at their destination in a space no bigger than a large motor home. The Mars500 mission locked an international crew of six volunteers in a mock spaceship bound for Mars, but actually sitting in Moscow for a year and a half. The crew “returned to Earth” in 2011. Most of them experienced severely disrupted sleep patterns and all of them reduced their activity levels in the confined space, something researchers call a behavioral torpor (Vigo et al. 2013). The experiment made clear how important it will be to simulate Earth life rhythms in the spaceship or on Mars, and how important it will be to stay physically active. It’s hard to judge the psychological impacts of such a trip. People who winter in Antarctica experience a diluted version of the problems. But travelers to Mars will be the most isolated humans who ever lived. They’ll have real-time interactions with a small number of companions and delayed communications with friends and loved ones who are tens of millions of miles away. They’ll be in a confined space with no option to simply go out for a walk, and they’ll be continuously monitored by anxious ground crews and scientists on Earth. If anyone spins out of control, there’s no real-time access to mental health services such as counseling or psychotherapy. The visionaries are undeterred. Apollo astronaut Buzz Aldrin put it like this: “Going to Mars means staying on Mars—a mission by which we are building up a confidence level to become a two-planet species. At Mars, we’ve been given a wonderful set of moons which can act as offshore worlds from which crews can robotically preposition hardware and establish radiation shielding on the Martian surface to begin sustaining increasing numbers of people” (Aldrin 2013). Two new ventures are trying to put Mars within reach without using any government resources. Inspiration Mars is the brainchild of Dennis Tito, an engineer turned tycoon who was the world’s first space tourist in 2001. Tito plans to keep costs down by not landing. His billion-dollar fly-by plans to use an upgraded version of the SpaceX Dragon capsule. With a cleverly designed trajectory, he can get there with a single burn of the engine. The return is challenging. The capsule will slam into the Earth’s atmosphere at 32,000 mph, requiring new materials for a heat shield. The project is currently aiming for a launch in 2021. Mars One is run by Dutch entrepreneur Bas Lansdorp, who also plans to use a SpaceX capsule. He plans to keep costs down by leaving his four passengers on Mars. If they survive the trip, they will build a habitat from their spacecraft and adjacent inflated areas covered by Martian regolith. They’ll create water, oxygen, and some food locally, augmented by regular supply missions, and every 2 years they will be joined by four more refugees from Earth. Gradually, they will build a settlement (Fig. 5.3). Lansdorp estimates his costs to be $6 billion for the first trip and $4 billion [end page 98] for each crew that follows. Space experts judge the plan to be very ambitious; some judge it to be impossible. Everyone agrees that it is audacious (Do et al. 2014). NASA has a plan that will take several decades and cost about $100 billion, which makes the claims of Mars One seem unrealistic. Would-be Martians are in a race against time. The red planet has its next close approach to the Earth in 2018, and it won’t get as close again until 2035. Inspiration Mars and Mars One have both had to slip past the most favorable 2018 launch date. Mars One accepted over 200,000 applications online for the chance to live and die on Mars. In 2014 the number was culled to 1058, and then to 705. Those who remain will go endure rigorous physical and psychological testing to generate a final group of 24. Lansdorp plans to finance his venture by turning it into a reality TV epic—think Survivor meets The Truman Show meets The Martian Chronicles.

#### We won’t care about losing a satellite

Bleddyn Bowen 18, University of Leicester International Relations Lecturer, "The Art of Space Deterrence," European Leadership Network, 2-20-18, https://www.europeanleadershipnetwork.org/commentary/the-art-of-space-deterrence/

As consensus emerges on the possibility that, should a major war occur, satellites will mostly likely be attacked or harassed in one way or another, there is increasing deliberation on ‘space deterrence’, or how to prevent would-be aggressors from attacking satellites and other parts of space infrastructure on Earth. Reasoned analysis focuses on applying imagined thresholds of sensitivity and reaction based on the types of satellites attacked, how they are attacked, and when they are attacked in a crisis. For example, a Planet Labs imaging satellite being jammed outside of a crisis is a different incident compared to a Keyhole imagery satellite being destroyed during a Taiwan crisis.

Indeed, it is crucial to think about what systems any space power may value above all others, which they may be able to suffer losing, and which losses may provoke a stern reaction. Most tools of space warfare today, of which America, China, and Russia lead, include jamming and Earth-based kinetic-kill capabilities that are ground, sea, or air missile based. Additionally, many Earth-based weapons such as missiles, attack aircraft, and naval vessels can bombard ground facilities if they are in range. However, as those narrow discussion tend to delve into the technical and tactical weeds, there are useful principles to remember when considering space deterrence on a more strategic level.

With the tools of space warfare spreading, then, how does one deter an adversary from attacking one’s valuable and essential space infrastructure that is responsible for precision warfare as well as precision farming? This is a very difficult question to answer, and there are no direct and holistic ones to be given. But general ground rules for strategic thought can be provided. The difficulty is that any reason to think that space deterrence may be easier to achieve than equivalents on Earth has a counter that may highlight why, in some circumstances, space deterrence may be harder to impose in the mind of the adversary.

First, politics, strategy, and deterrence relationships in space are extensions of those on Earth. Space deterrence remains an art of understanding the opponent’s psychology, valued possessions, and political objectives, as space deterrence is just a thematic or geographic variant of deterrence in general. Although space specialists are needed to understand spacepower, war in space is still subject to the same strategic logic as other terrestrial environments, and therefore deterrence in space cannot ignore events on Earth. Space warfare is merely the continuation of Terran politics by other means; a shooting war is space does not occur in a political vacuum. Additionally, some countries may have an ability to attack or disrupt satellites but possess no space-based assets of their own. Therefore, a tit-for-tat exchange of responding to a satellite attack with a satellite attack will not always be an option. Terrestrial threats and retaliation may be called for to deter attacks on space assets and space deterrence requires a joint approach, just as a joint approach to modern deterrence on Earth requires spacepower to function.

Adhering too narrowly to the concept of ‘space deterrence’ can mislead analysis to isolate space from Earth. It is as misleading as speaking in terms of ‘air deterrence’ or ‘sea deterrence’. Deterring a state from taking a particular action in any environment requires more than one method of deterring by denial or punishment. Rather, modern deterrence relationships need to account for the role space systems play in building holistic deterrent and warfare capabilities in every environment, as well as the role satellites and space infrastructure may play in triggering, exacerbating, or resolving crises on Earth, as well as winning wars.

Space is often an afterthought or a miscellaneous ancillary in the grand strategic views of top-level decision-makers. A president may not care that one satellite may be lost or go dark; it may cause panic and Twitter-based hysteria for the space community, of course. But the terrestrial context and consequences, as well as the political stakes and symbolism of any exchange of hostilities in space matters more. The political and media dimension can magnify or minimise the perceived consequences of losing specific satellites out of all proportion to their actual strategic effect.

#### No retal or escalation from satellite attacks

Dr. Eric J. Zarybnisky 18, MA in National Security Studies from the Naval War College, PhD in Operations Research from the MIT Sloan School of Management, Lt Col, USAF, “Celestial Deterrence: Deterring Aggression in the Global Commons of Space”, 3/28/2018, https://apps.dtic.mil/dtic/tr/fulltext/u2/1062004.pdf

PREVENTING AGGRESSION IN SPACE

While deterrence and the Cold War are strongly linked in the public’s mind through the nuclear standoff between the United States and the Soviet Union, the fundamentals of deterrence date back millennia and deterrence remains relevant. Thucydides alludes to the concept of deterrence in his telling of the Peloponnesian War when he describes rivals seeking advantages, such as recruiting allies, to dissuade an adversary from starting or expanding a conflict.6F6 Aggression in space was successfully avoided during the Cold War because both sides viewed an attack on military satellites as highly escalatory, and such an action would likely result in general nuclear war.7F7 In today’s more nuanced world, attacking satellites, including military satellites, does not necessarily result in nuclear war. For instance, foreign countries have used high-powered lasers against American intelligence-gathering satellites8F8 and the United States has been reluctant to respond, let alone retaliate with nuclear weapons. This shift in policy is a result of the broader use of gray zone operations, to which countries struggle to respond while limiting escalation. Beginning with the fundamentals of deterrence illuminates how it applies to prevention of aggression in space.

#### Squo debris thumps

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Earth orbit is getting more and more crowded as the years go by. Humanity has launched about 12,170 satellites since the dawn of the space age in 1957, [according to the European Space Agency](https://www.esa.int/Safety_Security/Space_Debris/Space_debris_by_the_numbers) (ESA), and 7,630 of them remain in orbit today — but only about 4,700 are still operational. That means there are nearly 3,000 defunct spacecraft zooming around Earth at tremendous speeds, along with other big, dangerous pieces of debris like upper-stage rocket bodies. For example, orbital velocity at 250 miles (400 kilometers) up, the altitude at which the ISS flies, is about 17,100 mph (27,500 kph). At such speeds, even a tiny shard of debris can do serious damage to a spacecraft — and there are huge numbers of such fragmentary bullets zipping around our planet. ESA estimates that Earth orbit harbors at least 36,500 debris objects that are more than 4 inches (10 centimeters) wide, 1 million between 0.4 inches and 4 inches (1 to 10 cm) across, and a staggering 330 million that are smaller than 0.4 inches (1 cm) but bigger than 0.04 inches (1 millimeter). These objects pose more than just a hypothetical threat. From 1999 to May 2021, for example, the ISS conducted 29 debris-avoiding maneuvers, including three in 2020 alone, [according to NASA officials](https://www.nasa.gov/mission_pages/station/news/orbital_debris.html). And that number continues to grow; the station performed [another such move in November 2021](https://www.space.com/space-station-dodging-chinese-space-junk-spacex-crew-3), for example. Many of the smaller pieces of space junk were spawned by the explosion of spent rocket bodies in orbit, but others were more actively emplaced. In January 2007, for instance, China intentionally destroyed one of its defunct weather satellites in a much-criticized test of anti-satellite technology that generated [more than 3,000 tracked debris objects](https://swfound.org/media/9550/chinese_asat_fact_sheet_updated_2012.pdf) and perhaps 32,000 others too small to be detected. The vast majority of that junk remains in orbit today, experts say. Spacecraft have also collided with each other on orbit. The most famous such incident occurred in February 2009, when Russia's defunct Kosmos 2251 satellite slammed into the operational communications craft Iridium 33, producing [nearly 2,000 pieces of debris](https://swfound.org/media/6575/swf_iridium_cosmos_collision_fact_sheet_updated_2012.pdf) bigger than a softball. That 2009 smashup might be evidence that the Kessler Syndrome is already upon us, though a cataclysm of "Gravity" proportions is still a long way off. "The cascade process can be more accurately thought of as continuous and as already started, where each collision or explosion in orbit slowly results in an increase in the frequency of future collisions," [Kessler told Space Safety Magazine in 2012](http://www.spacesafetymagazine.com/space-debris/kessler-syndrome/don-kessler-envisat-kessler-syndrome/).

#### Commercial mining solves extinction from scarcity, climate, terror, war, and disease.

Pelton 17—(Director Emeritus of the Space and Advanced Communications Research Institute at George Washington University, PHD in IR from Georgetown).. Pelton, Joseph N. 2017. The New Gold Rush: The Riches of Space Beckon! Springer. Accessed 8/30/19.

Are We Humans Doomed to Extinction? What will we do when Earth’s resources are used up by humanity? The world is now hugely over populated, with billions and billions crammed into our overcrowded cities. By 2050, we may be 9 billion strong, and by 2100 well over 11 billion people on Planet Earth. Some at the United Nations say we might even be an amazing 12 billion crawling around this small globe. And over 80 % of us will be living in congested cities. These cities will be ever more vulnerable to terrorist attack, natural disaster, and other plights that come with overcrowding and a dearth of jobs that will be fueled by rapid automation and the rise of artifi cial intelligence across the global economy. We are already rapidly running out of water and minerals. Climate change is threatening our very existence. Political leaders and even the Pope have cautioned us against inaction. Perhaps the naysayers are right. All humanity is at tremendous risk. Is there no hope for the future? This book is about hope. We think that there is literally heavenly hope for humanity. But we are not talking here about divine intervention. We are envisioning a new space economy that recognizes that there is more water in the skies that all our oceans. Th ere is a new wealth of natural resources and clean energy in the reaches of outer space—more than most of us could ever dream possible. There are those that say why waste money on outer space when we have severe problems here at home? Going into space is not a waste of money. It is our future. It is our hope for new jobs and resources. The great challenge of our times is to reverse public thinking to see space not as a resource drain but as the doorway to opportunity. The new space frontier can literally open up a “gold rush in the skies.” In brief, we think there is new hope for humanity. We see a new a pathway to the future via new ventures in space. For too long, space programs have been seen as a money pit. In the process, we have overlooked the great abundance available to us in the skies above. It is important to recognize there is already the beginning of a new gold rush in space—a pathway to astral abundance. “New Space” is a term increasingly used to describe radical new commercial space initiatives—many of which have come from Silicon Valley and often with backing from the group of entrepreneurs known popularly as the “space billionaires.” New space is revolutionizing the space industry with lower cost space transportation and space systems that represent significant cost savings and new technological breakthroughs. “New Commercial Space” and the “New Space Economy” represent more than a new way of looking at outer space. These new pathways to the stars could prove vital to human survival. If one does not believe in spending money to probe the mysteries of the universe then perhaps we can try what might be called “calibrated greed” on for size. One only needs to go to a cubesat workshop, or to Silicon Valley or one of many conferences like the “Disrupt Space” event in Bremen, Germany, held in April 2016 to recognize that entrepreneurial New Space initiatives are changing everything [ 1 ]. In fact, the very nature and dimensions of what outer space activities are today have changed forever. It is no longer your grandfather’s concept of outer space that was once dominated by the big national space agencies. The entrepreneurs are taking over. The hopeful statements in this book and the hard economic and technical data that backs them up are more than a minority opinion. It is a topic of growing interest at the World Economic Forum, where business and political heavyweights meet in Davos, Switzerland, to discuss how to stimulate new patterns of global economic growth. It is even the growing view of a group that call themselves “space ethicists.” Here is how Christopher J. Newman, at the University of Sunderland in the United Kingdom has put it: Space ethicists have offered the view that space exploration is not only desirable; it is a duty that we, as a species, must undertake in order to secure the survival of humanity over the longer term. Expanding both the resource base and, eventually, the habitats available for humanity means that any expenditure on space exploration, far from being viewed as frivolous, can legitimately be rationalized as an ethical investment choice. (Newman) On the other hand there are space ethicists and space exobiologists who argue that humans have created ecological ruin on the planet—and now space debris is starting to pollute space. Th ese countervailing thoughts by the “no growth” camp of space ethicists say we have no right to colonize other planets or to mine the Moon and asteroids—or at least no right to do so until we can prove we can sustain life here on Earth for the longer term. However, for most who are planning for the new space economy the opinion of space philosophers doesn’t really fl oat their boat. Legislators, bankers, and aspiring space entrepreneurs are far more interested in the views of the super-rich capitalists called the space billionaires. A number of these billionaires and space executives have already put some very serious money into enterprises intent on creating a new pathway to the stars. No less than five billionaires with established space ventures—Elon Musk, Paul Allen, Jeff Bezos, Sir Richard Branson, and Robert Bigelow—have invested millions if not billions of dollars into commercializing space. They are developing new technologies and establishing space enterprises that can bring the wealth of outer space down to Earth. This is not a pipe dream, but will increasingly be the economic reality of the 2020s. These wealthy space entrepreneurs see major new economic opportunities. To them space represents the last great frontier for enterprising pioneers. Th us they see an ever-expanding space frontier that offers opportunities in low-cost space transportation, satellite solar power satellites to produce clean energy 24h a day, space mining, space manufacturing and production, and eventually space habitats and colonies as a trajectory to a better human future. Some even more visionary thinkers envision the possibility of terraforming Mars, or creating new structures in space to protect our planet from cosmic hazards and even raising Earth’s orbit to escape the rising heat levels of the Sun in millennia to come. Some, of course, will say this is sci-fi hogwash. It can’t be done. We say that this is what people would have said in 1900 about airplanes, rocket ships, cell phones and nuclear devices. The skeptics laughed at Columbus and his plan to sail across the oceans to discover new worlds. When Thomas Jefferson bought the Louisiana Purchase from France or Seward bought Alaska, there were plenty of naysayers that said such investment in the unknown was an extravagant waste of money. A healthy skepticism is useful and can play a role in economic and business success. Before one dismisses the idea of an impending major new space economy and a new gold rush, it might useful to see what has already transpired in space development in just the past five decades. The world’s first geosynchronous communications satellite had a throughput capability of about 500 kb / s. In contrast, today’s state of the art Viasat 2 —a half century later— has an impressive throughput of some 140 Gb/s. Th is means that the relative throughput is nearly 300,000 greater, while its lifetime is some ten times longer (Figs. 1.1 and 1.2 ). Each new generation of communications satellite has had more power, better antenna systems, improved pointing and stabilization, and an extended lifetime. And the capabilities represented by remote sensing satellites , meteorological satellites , and navigation and timing satellites have also expanded their capabilities and performance in an impressive manner. When satellite applications first started, the market was measured in millions of dollars. Today commercial satellite services exceed a quarter of a billion dollars. Vital services such as the Internet, aircraft traffi c control and management, international banking, search and rescue and much, much more depend on application satellites. Th ose that would doubt the importance of satellites to the global economy might wish to view on You Tube the video “If Th ere Were a Day Without Satellites?” [ 2 ]. Let’s check in on what some of those very rich and smart guys think about the new space economy and its potential. (We are sorry to say that so far there are no female space billionaires, but surely this, too, will come someday soon.) Of course this twenty-fi rst century breakthrough that we call the New Space economy will not come just from new space commerce. It will also come from the amazing new technologies here on Earth. Vital new terrestrial technologies will accompany this cosmic journey into tomorrow. Information technology, robotics, artificial intelligence and commercial space travel systems have now set us on a course to allow us humans to harvest the amazing riches in the skies—new natural resources, new energy, and even totally new ways of looking at the purpose of human existence. If we pursue this course steadfastly, it can be the beginning of a New Space renaissance. But if we don’t seek to realize our ultimate destiny in space, Homo sapiens can end up in the dustbin of history—just like literally millions of already failed species. In each and every one of the five mass extinction events that have occurred over the last 1.5 billion years on Earth, some 50–80 % of all species have gone the way of the T. Rex, the woolly mammoth, and the Dodo bird along with extinct ferns, grasses and cacti. On the other hand, the best days of the human race could be just beginning. If we are smart about how we go about discovering and using these riches in the skies and applying the best of our new technologies, it could be the start of a new beginning for humanity. Konstantin Tsiokovsky, the Russian astronautics pioneer, who fi rst conceived of practical designs for spaceships, famously said: “A planet is the cradle of mankind, but one cannot live in a cradle forever.” Well before Tsiokovsky another genius, Leonardo da Vinci, said, quite poetically: “Once you have tasted flight, you will forever walk the earth with your eyes turned skyward, for there you have been, and there you will always long to return.” The founder of the X-Prize and of Planetary Resources, Inc., Dr. Peter Diamandis, has much more brashly said much the same thing in quite diff erent words when he said: “The meek shall inherit the Earth. The rest of us will go to Mars.” The New Space Billionaires Peter Diamandis is not alone in his thinking. From the list of “visionaries” quoted earlier, Elon Musk, the founder of SpaceX; Sir Richard Branson, the founder of Virgin Galactic; and Paul Allen, the co-founder of Microsoft and the man who financed SpaceShipOne, the world’s first successful spaceplane have all said the future will include a vibrant new space economy. Th ey, and others, have said that we can, we should and we soon shall go into space and realize the bounty that it can offer to us. Th e New Space enterprise is today indeed being led by those so-called space billionaires , who have an exciting vision of the future. They and others in the commercial space economy believe that the exploitation of outer space may open up a new golden age of astral abundance. They see outer space as a new frontier that can be a great source of new materials, energy and various forms of new wealth that might even save us from excesses of the past. Th is gold rush in the skies represents a new beginning. We are not talking about expensive new space ventures funded by NASA or other space agencies in Europe, Japan, China or India. No, these eff orts which we and others call New Space are today being forged by imaginative and resourceful commercial entrepreneurs. Th ese twenty-fi rst century visionaries have the fortitude and zeal to look to the abundance above. New breakthroughs in technology and New Space enterprises may be able to create an “astral life raft” for humanity. Just as Columbus and the Vikings had the imaginative drive that led them to discover the riches of a new world, we now have a cadre of space billionaires that are now leading us into this New Space era of tomorrow. These bold leaders, such as Paul Allen and Sir Richard Branson, plus other space entrepreneurs including Jeff Bezos of Amazon and Blue Origin, and Robert Bigelow, Chairman of Budget Suites and Bigelow Aerospace, not only dream of their future in the space industry but also have billions of dollars in assets. These are the bright stars of an entirely new industry that are leading us into the age of New Space commerce. These space billionaires, each in their own way, are proponents of a new age of astral abundance. Each of them is launching new commercial space industries. They are literally transforming our vision of tomorrow. These new types of entrepreneurial aerospace companies—the New Space enterprises—give new hope and new promise of transforming our world as we know it today. The New Space Frontier What happens in space in the next few decades, plus corresponding new information technologies and advanced robotics, will change our world forever. These changes will redefi ne wealth, change our views of work and employment and upend almost everything we think we know about economics, wealth, jobs, and politics. Th ese changes are about truly disruptive technologies of the most fundamental kinds. If you thought the Internet, smart phones, and spandex were disruptive technologies, just hang on. You have not seen anything yet. In short, if you want to understand a transition more fundamental than the changes brought to the twentieth century world by computers, communications and the Internet, then read this book. There are truly riches in the skies. Near-Earth asteroids largely composed of platinum and rare earth metals have an incredible value. Helium-3 isotopes accessible in outer space could provide clean and abundant energy. There is far more water in outer space than is in our oceans. In the pages that follow we will explain the potential for a cosmic shift in our global economy, our ecology, and our commercial and legal systems. These can take place by the end of this century. And if these changes do not take place we will be in trouble. Our conventional petro-chemical energy systems will fail us economically and eventually blanket us with a hydrocarbon haze of smog that will threaten our health and our very survival. Our rare precious metals that we need for modern electronic appliances will skyrocket in price, and the struggle between “haves” and “have nots” will grow increasingly ugly. A lack of affordable and readily available water, natural resources, food, health care and medical supplies, plus systematic threats to urban security and systemic warfare are the alternatives to astral abundance. The choices between astral abundance and a downward spiral in global standards of living are stark. Within the next few decades these problems will be increasingly real. By then the world may almost be begging for new, out of- the-box thinking. International peace and security will be an indispensable prerequisite for exploitation of astral abundance, as will good government for all. No one nation can be rich and secure when everyone else is poor and insecure. In short, global space security and strategic space defense, mediated by global space agreements, are part of this new pathway to the future.