## T

#### Interpretation: The aff must reduce the total number of patents that exist

#### Definitions:

#### [1] Reduce means According to

Merriam-Webster Dictionary, No Date “Reduce” [https://www.merriam-webster.com/dictionary/reduce] Accessed 8/25/21 SAO

Definition of reduce transitive verb 1a: to draw together or cause to converge : CONSOLIDATE reduce all the questions to one b(1): to diminish in size, amount, extent, or number reduce taxes reduce the likelihood of war (2): to decrease the volume and concentrate the flavor of by boiling add the wine and reduce the sauce for two minutes c: to narrow down : RESTRICT the Indians were reduced to small reservations d: to make shorter : ABRIDGE 2archaic : to restore to righteousness : SAVE 3: to bring to a specified state or condition the impact of the movie reduced them to tears 4a: to force to capitulate b: FORCE, COMPEL 5a: to bring to a systematic form or character reduce natural events to laws b: to put down in written or printed form reduce an agreement to writing 6: to correct (a fracture) by bringing displaced or broken parts back into their normal positions 7a: to lower in grade or rank : DEMOTE b: to lower in condition or status : DOWNGRADE 8a: to diminish in strength or density b: to diminish in value 9a(1): to change the denominations or form of without changing the value (2): to construct a geometrical figure similar to but smaller than (a given figure) b: to transpose from one form into another : CONVERT c: to change (an expression) to an equivalent but more fundamental expression reduce a fraction 10: to break down (as by crushing or grinding) : PULVERIZE 11a: to bring to the metallic state by removal of nonmetallic elements reduce an ore by heat b: DEOXIDIZE c: to combine with or subject to the action of hydrogen d(1): to change (an element or ion) from a higher to a lower oxidation state (2): to add one or more electrons to (an atom or ion or molecule) 12: to change (a stressed vowel) to an unstressed vowel

#### [2] Waivers are according to

Cambridge 21 - Cambridge Business English Dictionary, Updated August 18th, 2021 “Waiver” [https://dictionary.cambridge.org/us/dictionary/english/waiver] Accessed 8/25/21 SAO

Waiver Noun: an official decision that a rule, or agreement does not have to be obeyed, or that you will not ask for something that you have a right to: grant/obtain/sign a waiver Contributors signed a waiver giving up any rights to future profits. The company recovered $12 million of its start-up costs from a waiver of state income taxes.

#### Violation: Vaccine waivers do not eliminate the patents; they just allow people to produce and distribute the vaccine while companies still own the formula.

#### Standards

#### [1] Ground: The aff interp allows them to link out of core neg ground relating to patent reduction. I don’t get access to the drug innovation, science leadership, or biotech DAs or waiver CPs.

#### [2] Shiftiness: Waivers allow companies to reclaim rights at a later date. This destabilizes uniqueness and ensures no long-term link chains. Also key to truth testing since the resolution isn’t temporally modified.

#### [3] Limits: Changing patents but not reducing are unpredictable and kill clash which is k2 education and fairness

#### Voters

#### [1] Semantics first:

#### [A] Jurisdiction: They’re aff but not affirming the res. That’s an independent voter since the ballot asks who does the better debating in the context of the res.

#### [B] Limits: The topic is the only shared basis we have for preround prep and in-round clash on a stable advocacy. Pragmatics only matter if we have a topic to debate. Kills fairness since I have to prep for every aff while they have to prep for one. Even if there are some responses, the NC will always get destroyed by 1AR frontlines to generics. Also kills education because it forces a lack of engagement shallow debates which turns ed standards

#### First, vote on fairness. Debate is a competitive activity governed by rules. You can’t evaluate who did better debating if the round is structurally skewed, so fairness is a gateway to substantive debate.

#### Second, education, schools fund debate for its education value, and only education has out of round impacts.

#### Drop the debater on T: A. drop the arg is severance—it lets them read new args in the 1AR and connect the plan to the whole res B. drop the argument incentivizes abusive affs that bait theory and then collapse to substance by kicking case or extending tricks – means neg always loses. C. 2ar collapse ensures the aff will always win if they have free range of arguments – drop the debater is key to neg layering.

#### No aff RVI on T: A. they shouldn’t win for being topical because it’s their burden B. incentivizes aff to read abusive interps and arguments and just focus on prepping a long counterinterp to always win, C. creates a chilling effect – aff is uniquely dangerous on theory because they get to read a long counterinterp in the 1ar and then get the 2ar to collapse, weigh, and contextualize: negs would always be disincentives from reading theory against good theory debaters which leads to infinite abuse.

#### Prefer competing interps to reasonability because reasonability a. has no bright line for mitigating a shell b. invites huge judge intervention because thresholds for “unreasonable” abuse are different and c. creates a race to the bottom with both debaters being as abusive as they can conceivably justify.

## Hijack

#### Contracts hijack util –

#### 1. Pleasure and pain are only motivational to the individual who senses them, which means only a system of mutual self-restraint can enter agents into binding agreements to respect each others’ pleasure and pain.

#### 2. Even if there is an external source of the good, pain and pleasure are only examples of things that agents might find motivational, its not a wholistic account of everyone’s self-interest which means only contracts can ensure agents follow ethical principles.

#### That negates:

#### [1] Stronger IPRs help equalize the bargaining field for developing countries to check western coercion which would diminish their place as world enforcer. Therefore, it’s not in mutual self-interest for them to remove IPs because they want to keep their own economies ahead of others.

**Hassan et al 10** “Intellectual Property and Developing Countries: A review of the literature: by Emmanuel Hassan, Ohid Yaqub, Stephanie Diepeveen. RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world. [https://www.rand.org/content/dam/rand/pubs/technical\_reports/2010/RAND\_TR804.pdf] // ahs emi

Commonly, FDI and trade are seen as key determinants for economic development and poverty reduction in developing countries. Inward FDI can generate important spillovers for developing economies, resulting in the upgrading of domestic innovative capacity, increased R&D employment, better training and support to education. For most developing countries, international trade allows them to acquire high value-added goods through importation that are necessary for economic development, but which are not produced domestically. In turn, exports allow developing countries to transform underutilised natural resources and surplus labour into foreign exchange, in order to pay for imports to support economic growth. Consequently, a central aim of the literature has been to examine how **stronger IPRs in developing countries can give incentives to firms in developed countries to undertake cross-border investment in, and to export their goods** to, these countries. Recalling the ambiguous relationship between IPRs and the individual strategies of single firms from a theoretical point of view, researchers have investigated empirically the effects of stronger IPRs on inward FDI in developing countries and exports from developed to developing countries. The empirical **evidence suggests that** **stronger IPRs may positively affect the volume of FDI and exports, particularly in countries with strong technical absorptive capabilities where the risk of imitation is high. When such risk is weak, particularly in the poorest countries, firms in developed countries do not seem to be sensitive to the level of protection in developing countries.** Using disaggregated data on FDI and trade, the empirical literature also shows that stronger IPRs impact on the composition of FDI and trade. First, stronger IPRs seem to encourage FDI in production and R&D rather than in sales and distribution. Second – and more surprisingly – stronger IPRs do not have any effect on the exports of hightechnology products. There are at least two explanations for this somewhat surprising result. Many high-tech products are difficult to imitate, thereby international trade for these products is less sensitive to the level of protection than for other products. Furthermore, firms in developed countries may choose to distribute their high-tech products through FDI or licensing, instead of exporting them directly. Intellectual property rights, international technology transfer and domestic innovation Increasingly, harnessing technological progress is viewed by policymakers as a key priority to boost economic growth and improve living standards. In an open economy, technological progress can be driven either by technology diffusion or technology creation. In less advanced economies, technology absorption can drive economic growth because countries at the forefront of technology act as a driver for growth by expanding the stock of scientific and technological knowledge, pulling other countries through a ‘catch-up’ effect. However, the strength of this ‘catch-up’ effect at the technology frontier decreases with the level of technological development, to the benefit of technology creation. Indeed, technology creation by domestic firms becomes progressively more important as a country moves closer to the technology frontier, because catching up with the frontier translates into increasingly smaller technological improvement**. The empirical literature has examined the effects of IPRs on technological progress through these two main channels: technology absorption (i.e. international technology transfer) and technology creation (i.e. domestic innovation).** The empirical evidence suggests that **stronger IPRs in developing countries may encourage international technology transfer** through market-based channels,1 particularly licensing, at least in countries with strong technical absorptive capacities. In the context of strong IPRs, **firms in developed countries are more inclined to transfer** their technologies to developing countries through licensing rather than through exports and FDI, **since such rights allow them to retain control over their technologies. In the presence of weak IPRs, multinationals in developed countries seem to prefer to retain control over their technologies** through intra-firm trade with their foreign affiliates in developing countries or FDI. Nevertheless, the historical evidence shows that many developing countries have benefited from international technology transfer through non-market-based channels, especially reverse engineering and imitation, thanks to weak IPR regimes. The empirical literature **also shows that** **stronger IPRs can encourage domestic innovation**, at least in emerging industrialised economies. Nevertheless, the empirical literature suggests the existence of a non-linear function (i.e. a U-shaped curve) between IPRs and economic development, which initially falls as income rises, then increases after that.

#### [2] IP rights are included in multiple international contracts – the aff violates that.

**Franklin 13** - “International Intellectual Property Law” by Jonathan Franklin\* He earned his A.B., A.M. Anthropology and J.D. degrees from Stanford University and M.Libr. with a Certificate in Law Librarianship from the University of Washington. Prior to the University of Washington, he spent five years as an reference librarian and foreign law selector at the University of Michigan Law Library. In law school, he was a Senior Editor of the Stanford Environmental Law Journal and a Note Editor for the Stanford Law Review. He is a member of the American Association of Law Libraries. [https://www.asil.org/sites/default/files/ERG\_IP.pdf] // ahs emi

The most important international **agreements in intellectual property** law are listed here. Many of them are available in multiple formats, **includ**ing Microsoft Word, PDF, and HTML. In addition, This page was last updated February 8, 2013. 5 the links below link to the main pages for those treaties, rather than the HTML texts so that the reader can also find related protocols, notifications and signatories. ● Agreement on Trade-Related Aspects of Intellectual Property Rights ("**TRIPS**")(http://www.wto.org/english/docs\_e/legal\_e/legal\_e.htm#TRIPs) ● Berne Convention for the Protection of Literary and Artistic Works (http://www.wipo.int/treaties/en/ip/berne/index.html) ● **Hague Agreement** Concerning the Deposit of Industrial Designs (http://www.wipo.int/hague/en/legal\_texts/) ● International Convention for the Protection of New Varieties of Plants(http://www.upov.int/en/publications/conventions/index.html) ● **Madrid Agreement** Concerning the International Registration of Trademark (http://www.wipo.int/madrid/en/legal\_texts/) ● Paris Convention for the Protection of Industrial Property (http://www.wipo.int/treaties/en/ip/paris/index.html) ● **Patent Cooperation Treaty** (http://www.wipo.int/pct/en/texts/index.htm) ● **Trademark Law Treaty** (http://www.wipo.int/treaties/en/ip/tlt/index.html) ● **Universal Copyright Convention** (http://portal.unesco.org/en/) For other substantive, registration and classification treaties, see the treaty sections at the World Intellectual Property Organization (WIPO) (http://www.wipo.int/clea/en/index.jsp), IPRsonline (http://www.iprsonline.org/legalinstruments/international.htm), the Compleat World Copyright Web site (http://www.compilerpress.ca/CW/multi\_i.htm) and the intellectual property page at the Electronic Information System for International Law (EISIL) (http://www.eisil.org/). For bilateral treaties, one of the best sources is IPRsonline(http://www.iprsonline.org/legalinstruments/bilateral.htm). The focus of this Chapter is international law. Although it includes references to national domestic law (foreign law) **and** comparative law sources, other sites comprehensively cover national domestic law, such as WIPO’s Collection of Laws for Electronic Access (CLEA)(http://www.wipo.int/clea/en/index.jsp) (which is also referred to as WIPO Lex) or UNESCO’s Collection of National Copyright Laws(http://portal.unesco.org/culture/en/). For **additional** web sites that compile **national** intellectual property **laws** and decisions, see the relevant 6 section below. Practical Law Company’s Cross-border: Intellectual Property & Technology (http://us.practicallaw.com/about/cross-border-intellectual-property-technology) provides a substantial list of country comparisons touching on intellectual property law.

## K

#### Utilitarianism is morally repugnant:

#### 1. Util justifies atrocities since it justifies allowing us to harm some for the benefit of others – even if they spew some pain quantifiability argument that doesn’t solve since there are still instances some get great benefit from others harm.

#### 2. Util can’t justify intrinsic wrongness – We can’t know whether our action was good until we’ve evaluated the states of affairs they’ve produced since it’s based on the outcome of the action. For Example if asked the question “is x okay?” a utilitarian would not be able to say yes because there are situations in which it would be morally obligatory to do so if it maximized pleasure. Probability doesn’t solve because that just allows for moral error and freezes action while attempting to calculate the perfect decision.

#### 3. Utilitarianism would justify that death is good—the absence of pleasure is not bad, and the absence of pain is good, so being nonexistent is best under util. This puts the affirmative in a double bind: Either A) we intuitively know killing people is wrong in which case you reject util out of principle or B) they condone death as good in which case their advantage would flow neg.

#### Two Impacts:

#### [1] It triggers permissibility since they can’t generate a correct moral obligation that justifies affirming. That negates: A) Semantics – Ought is defined as expressing obligation[[1]](#footnote-1) which means absent a proactive obligation you vote neg since there’s a trichotomy between prohibition, obligation, and permissibility and proving one disproves the other two and B) Safety – It’s ethically safer to presume the squo since we know what the squo is but we can’t know whether the aff will be good or not if ethics are incoherent.

#### [2] They read morally repugnant arguments. Thus the alternative is to drop the debater, to ensure that debate remains a space safe for all – the judge has a proximal obligation to ensure inaccessible practices don’t proliferate. Accessibility is a voting issue since all aff arguments presuppose that people feel safe in this space to respond to them.

## DA

#### Climate Patents and Innovation high now and solving Warming but COVID waiver sets a dangerous precedent for appropriations - the mere threat is sufficient is enough to kill investment.

Brand 5-26, Melissa. “Trips Ip Waiver Could Establish Dangerous Precedent for Climate Change and Other Biotech Sectors.” IPWatchdog.com | Patents & Patent Law, 26 May 2021, www.ipwatchdog.com/2021/05/26/trips-ip-waiver-establish-dangerous-precedent-climate-change-biotech-sectors/id=133964/. //sid

The **biotech** industry is making remarkable **advances towards climate change solutions**, and it is precisely for this reason that it can expect to be in the crosshairs of potential IP waiver discussions. President Biden is correct to refer to climate change as an existential crisis. Yet it does not take too much effort to connect the dots between President Biden’s focus on climate change and his Administration’s recent commitment to waive global IP rights for Covid vaccines (TRIPS IP Waiver). “This is a global health crisis, and the extraordinary circumstances of the COVID-19 pandemic call for extraordinary measures.” If an IP waiver is purportedly necessary to solve the COVID-19 global health crisis (and of course [we dispute this notion](https://www.ipwatchdog.com/2021/04/19/waiving-ip-rights-during-times-of-covid-a-false-good-idea/id=132399/)), can we really feel confident that this or some future Administration will not **apply** the **same logic to** the **climate crisis**? And, without the confidence in the underlying IP for such solutions, what does this mean for U.S. innovation and economic growth? United States Trade Representative (USTR) [Katherine Tai](https://www.ipwatchdog.com/2021/05/05/tai-says-united-states-will-back-india-southafrica-proposal-waive-ip-rights-trips/id=133224/) was subject to questioning along this very line during a recent Senate Finance Committee hearing. And while Ambassador Tai did not affirmatively state that an IP waiver would be in the future for climate change technology, she surely did not assuage the concerns of interested parties. The United States has historically supported robust IP protection. This support is one reason the United States is the center of biotechnology innovation and leading the fight against COVID-19. However, a brief review of the domestic legislation arguably most relevant to this discussion shows just how far the international campaign against IP rights has eroded our **normative position**. The Clean Air Act, for example, contains a provision allowing for the mandatory licensing of patents covering certain devices for reducing air pollution. Importantly, however, the patent owner is accorded due process and the statute lays out a detailed process regulating the manner in which any such license can be issued, including findings of necessity and that no reasonable alternative method to accomplish the legislated goal exists. Also of critical importance is that the statute requires compensation to the patent holder. Similarly, the Atomic Energy Act contemplates mandatory licensing of patents covering inventions of primary importance in producing or utilizing atomic energy. This statute, too, requires due process, findings of importance to the statutory goals and compensation to the rights holder. A TRIPS IP waiver would operate outside of these types of frameworks. There would be no **due process**, no particularized findings, no **compensation and** no **recourse**. Indeed, the fact that the World Trade Organization (WTO) already has a process under the TRIPS agreement to address public health crises, including the compulsory licensing provisions, with necessary guardrails and compensation, makes quite clear that the waiver would operate as a free for all. Forced Tech Transfer Could Be on The Table When being questioned about the scope of a potential TRIPS IP waiver, Ambassador Tai invoked the proverb “Give a man a fish and you feed him for a day. Teach a man to fish and you feed him for a lifetime.” While this answer suggests primarily that, in times of famine, the Administration would rather give away other people’s fishing rods than share its own plentiful supply of fish (here: actual COVID-19 vaccine stocks), it is apparent that in Ambassador Tai’s view waiving patent rights alone would not help lower- and middle-income countries produce their own vaccines. Rather, they would need to be taught how to make the vaccines and given the biotech industry’s manufacturing know-how, sensitive cell lines, and proprietary cell culture media in order to do so. In other words, Ambassador Tai acknowledged that the scope of the current TRIPS IP waiver discussions includes the concept of forced tech transfer. In the context of climate change, the idea would be that companies who develop successful methods for producing new **seed technologies and sustainable biomass, reducing greenhouse gases** in manufacturing **and** transportation, **capturing** and sequestering **carbon** in soil and products, and more, **would be required to turn over their proprietary know-how** to global competitors. While it is unclear how this concept would work in practice and under the constitutions of certain countries, the suggestion alone could be devastating **to voluntary international collaborations**. Even if one could assume that the United States could not implement forced tech transfer on its own soil, what about the governments of our international development partners? It is not hard to understand that a U.S.-based company developing climate change technologies would be unenthusiastic about partnering with a company abroad knowing that the foreign country’s government is on track – with the assent of the U.S. government – to change its laws and seize proprietary materials and know-how that had been voluntarily transferred to the local company. Necessary Investment Could Diminish Developing climate change solutions is not an easy endeavor and bad policy positions threaten the likelihood that they will materialize. These products have long lead times from research and development to market introduction, owing not only to a high rate of failure but also rigorous regulatory oversight. Significant investment is required to sustain and drive these challenging and long-enduring endeavors. For example, synthetic biology companies critical to this area of innovation [raised over $1 billion in investment in the second quarter of 2019 alone](https://www.bio.org/sites/default/files/2021-04/Climate%20Report_FINAL.pdf). If investors cannot be confident that IP will be in **place to protect important climate change technologies** after their long road from bench to market, **it is unlikely they will** continue to **invest at** the current and **required levels.**

#### Private sector innovation is key to solve climate change – short term politicking and priority shifts means government can’t solve alone.

Henry 17, Simon. “Climate Change Cannot Be Solved by Governments Alone. How Can the Private Sector Help?” World Economic Forum, 21 Nov. 2017, www.weforum.org/agenda/2017/11/governments-alone-cannot-halt-climate-change-what-can-private-sector-do/.  Programme Director, International Carbon Reduction & Offset Alliance (ICROA) //sid

Climate leadership is also an opportunity for many organizations, and this was the most popular reason for purchasing carbon credits in Ecosystem Marketplace’s [2016 survey of buyers](http://www.forest-trends.org/documents/files/doc_5677.pdf%5Bforest-trends.org%5D). Companies are looking to differentiate from their competitors, and build their brand, by taking a leadership role on climate. Offsetting plays an integral role in delivering this climate leadership status, alongside direct emissions reductions. The survey indicated that companies that included offsetting in their carbon management strategy typically spend about 10 times more on emissions reductions activities than the typical company that doesn’t offset.

Beyond these direct commercial reasons for companies to take voluntary action, there are many broader, societal motivations at play. Climate change is a global, multidecade challenge that needs solutions and input from all stakeholders. It transcends the short-term nature of politics, which will inevitably experience changes in priorities, personnel and knowledge. Because of this, climate change cannot be solved by governments alone. Instead, it needs significant and long-term investment from the private sector. Companies that take a longer-term outlook recognise this and want to contribute to the solution to help secure the viability of their businesses.

#### Warming causes Extinction

Kareiva 18, Peter, and Valerie Carranza. "Existential risk due to ecosystem collapse: Nature strikes back." Futures 102 (2018): 39-50. (Ph.D. in ecology and applied mathematics from Cornell University, director of the Institute of the Environment and Sustainability at UCLA, Pritzker Distinguished Professor in Environment & Sustainability at UCLA)//Re-cut by Elmer

In summary, six of the nine proposed planetary boundaries (phosphorous, nitrogen, biodiversity, land use, atmospheric aerosol loading, and chemical pollution) are unlikely to be associated with existential risks. They all correspond to a degraded environment, but in our assessment do not represent existential risks. However, the three remaining boundaries (**climate change**, global **freshwater** cycle, **and** ocean **acidification**) do **pose existential risks**. This is **because of** intrinsic **positive feedback loops**, substantial lag times between system change and experiencing the consequences of that change, and the fact these different boundaries interact with one another in ways that yield surprises. In addition, climate, freshwater, and ocean acidification are all **directly connected to** the provision of **food and water**, and **shortages** of food and water can **create conflict** and social unrest. Climate change has a long history of disrupting civilizations and sometimes precipitating the collapse of cultures or mass emigrations (McMichael, 2017). For example, the 12th century drought in the North American Southwest is held responsible for the collapse of the Anasazi pueblo culture. More recently, the infamous potato famine of 1846–1849 and the large migration of Irish to the U.S. can be traced to a combination of factors, one of which was climate. Specifically, 1846 was an unusually warm and moist year in Ireland, providing the climatic conditions favorable to the fungus that caused the potato blight. As is so often the case, poor government had a role as well—as the British government forbade the import of grains from outside Britain (imports that could have helped to redress the ravaged potato yields). Climate change intersects with freshwater resources because it is expected to exacerbate drought and water scarcity, as well as flooding. Climate change can even impair water quality because it is associated with heavy rains that overwhelm sewage treatment facilities, or because it results in higher concentrations of pollutants in groundwater as a result of enhanced evaporation and reduced groundwater recharge. **Ample clean water** is not a luxury—it **is essential for human survival**. Consequently, cities, regions and nations that lack clean freshwater are vulnerable to social disruption and disease. Finally, ocean acidification is linked to climate change because it is driven by CO2 emissions just as global warming is. With close to 20% of the world’s protein coming from oceans (FAO, 2016), the potential for severe impacts due to acidification is obvious. Less obvious, but perhaps more insidious, is the interaction between climate change and the loss of oyster and coral reefs due to acidification. Acidification is known to interfere with oyster reef building and coral reefs. Climate change also increases storm frequency and severity. Coral reefs and oyster reefs provide protection from storm surge because they reduce wave energy (Spalding et al., 2014). If these reefs are lost due to acidification at the same time as storms become more severe and sea level rises, coastal communities will be exposed to unprecedented storm surge—and may be ravaged by recurrent storms. A key feature of the risk associated with climate change is that mean annual temperature and mean annual rainfall are not the variables of interest. Rather it is extreme episodic events that place nations and entire regions of the world at risk. These extreme events are by definition “rare” (once every hundred years), and changes in their likelihood are challenging to detect because of their rarity, but are exactly the manifestations of climate change that we must get better at anticipating (Diffenbaugh et al., 2017). Society will have a hard time responding to shorter intervals between rare extreme events because in the lifespan of an individual human, a person might experience as few as two or three extreme events. How likely is it that you would notice a change in the interval between events that are separated by decades, especially given that the interval is not regular but varies stochastically? A concrete example of this dilemma can be found in the past and expected future changes in storm-related flooding of New York City. The highly disruptive flooding of New York City associated with Hurricane Sandy represented a flood height that occurred once every 500 years in the 18th century, and that occurs now once every 25 years, but is expected to occur once every 5 years by 2050 (Garner et al., 2017). This change in frequency of extreme floods has profound implications for the measures New York City should take to protect its infrastructure and its population, yet because of the stochastic nature of such events, this shift in flood frequency is an elevated risk that will go unnoticed by most people. 4. The combination of positive feedback loops and societal inertia is fertile ground for global environmental catastrophes **Humans** are remarkably ingenious, and **have adapted** to crises **throughout** their **history**. Our doom has been repeatedly predicted, only to be averted by innovation (Ridley, 2011). **However**, the many **stories** **of** human ingenuity **successfully** **addressing** **existential risks** such as global famine or extreme air pollution **represent** environmental c**hallenges that are** largely **linear**, have immediate consequences, **and operate without positive feedbacks**. For example, the fact that food is in short supply does not increase the rate at which humans consume food—thereby increasing the shortage. Similarly, massive air pollution episodes such as the London fog of 1952 that killed 12,000 people did not make future air pollution events more likely. In fact it was just the opposite—the London fog sent such a clear message that Britain quickly enacted pollution control measures (Stradling, 2016). Food shortages, air pollution, water pollution, etc. send immediate signals to society of harm, which then trigger a negative feedback of society seeking to reduce the harm. In contrast, today’s great environmental crisis of climate change may cause some harm but there are generally long time delays between rising CO2 concentrations and damage to humans. The consequence of these delays are an absence of urgency; thus although 70% of Americans believe global warming is happening, only 40% think it will harm them (http://climatecommunication.yale.edu/visualizations-data/ycom-us-2016/). Secondly, unlike past environmental challenges, **the Earth’s climate system is rife with positive feedback loops**. In particular, as CO2 increases and the climate warms, that **very warming can cause more CO2 release** which further increases global warming, and then more CO2, and so on. Table 2 summarizes the best documented positive feedback loops for the Earth’s climate system. These feedbacks can be neatly categorized into carbon cycle, biogeochemical, biogeophysical, cloud, ice-albedo, and water vapor feedbacks. As important as it is to understand these feedbacks individually, it is even more essential to study the interactive nature of these feedbacks. Modeling studies show that when interactions among feedback loops are included, uncertainty increases dramatically and there is a heightened potential for perturbations to be magnified (e.g., Cox, Betts, Jones, Spall, & Totterdell, 2000; Hajima, Tachiiri, Ito, & Kawamiya, 2014; Knutti & Rugenstein, 2015; Rosenfeld, Sherwood, Wood, & Donner, 2014). This produces a wide range of future scenarios. Positive feedbacks in the carbon cycle involves the enhancement of future carbon contributions to the atmosphere due to some initial increase in atmospheric CO2. This happens because as CO2 accumulates, it reduces the efficiency in which oceans and terrestrial ecosystems sequester carbon, which in return feeds back to exacerbate climate change (Friedlingstein et al., 2001). Warming can also increase the rate at which organic matter decays and carbon is released into the atmosphere, thereby causing more warming (Melillo et al., 2017). Increases in food shortages and lack of water is also of major concern when biogeophysical feedback mechanisms perpetuate drought conditions. The underlying mechanism here is that losses in vegetation increases the surface albedo, which suppresses rainfall, and thus enhances future vegetation loss and more suppression of rainfall—thereby initiating or prolonging a drought (Chamey, Stone, & Quirk, 1975). To top it off, overgrazing depletes the soil, leading to augmented vegetation loss (Anderies, Janssen, & Walker, 2002). Climate change often also increases the risk of forest fires, as a result of higher temperatures and persistent drought conditions. The expectation is that **forest fires will become more frequent** and severe with climate warming and drought (Scholze, Knorr, Arnell, & Prentice, 2006), a trend for which we have already seen evidence (Allen et al., 2010). Tragically, the increased severity and risk of Southern California wildfires recently predicted by climate scientists (Jin et al., 2015), was realized in December 2017, with the largest fire in the history of California (the “Thomas fire” that burned 282,000 acres, https://www.vox.com/2017/12/27/16822180/thomas-fire-california-largest-wildfire). This **catastrophic fire** embodies the sorts of positive feedbacks and interacting factors that **could catch humanity off-guard and produce a** true **apocalyptic event.** Record-breaking rains produced an extraordinary flush of new vegetation, that then dried out as record heat waves and dry conditions took hold, coupled with stronger than normal winds, and ignition. Of course the record-fire released CO2 into the atmosphere, thereby contributing to future warming. Out of all types of feedbacks, water vapor and the ice-albedo feedbacks are the most clearly understood mechanisms. Losses in reflective snow and ice cover drive up surface temperatures, leading to even more melting of snow and ice cover—this is known as the ice-albedo feedback (Curry, Schramm, & Ebert, 1995). As snow and ice continue to melt at a more rapid pace, millions of people may be displaced by flooding risks as a consequence of sea level rise near coastal communities (Biermann & Boas, 2010; Myers, 2002; Nicholls et al., 2011). The water vapor feedback operates when warmer atmospheric conditions strengthen the saturation vapor pressure, which creates a warming effect given water vapor’s strong greenhouse gas properties (Manabe & Wetherald, 1967). Global warming tends to increase cloud formation because warmer temperatures lead to more evaporation of water into the atmosphere, and warmer temperature also allows the atmosphere to hold more water. The key question is whether this increase in clouds associated with global warming will result in a positive feedback loop (more warming) or a negative feedback loop (less warming). For decades, scientists have sought to answer this question and understand the net role clouds play in future climate projections (Schneider et al., 2017). Clouds are complex because they both have a cooling (reflecting incoming solar radiation) and warming (absorbing incoming solar radiation) effect (Lashof, DeAngelo, Saleska, & Harte, 1997). The type of cloud, altitude, and optical properties combine to determine how these countervailing effects balance out. Although still under debate, it appears that in most circumstances the cloud feedback is likely positive (Boucher et al., 2013). For example, models and observations show that increasing greenhouse gas concentrations reduces the low-level cloud fraction in the Northeast Pacific at decadal time scales. This then has a positive feedback effect and enhances climate warming since less solar radiation is reflected by the atmosphere (Clement, Burgman, & Norris, 2009). The key lesson from the long list of potentially positive feedbacks and their interactions is that **runaway climate change,** and runaway perturbations have to be taken as a serious possibility. Table 2 is just a snapshot of the type of feedbacks that have been identified (see Supplementary material for a more thorough explanation of positive feedback loops). However, this list is not exhaustive and the possibility of undiscovered positive feedbacks **portends** even greater **existential risks**. The many environmental crises humankind has previously averted (famine, ozone depletion, London fog, water pollution, etc.) were averted because of political will based on solid scientific understanding. We cannot count on complete scientific understanding when it comes to positive feedback loops and climate change.

## Case

#### US treaty abrogation breaks the foundations of international law

Koplow 13 - David Koplow Professor of Law and Director of the Center for Applied Legal Studies at Georgetown University Law Center, former Special Counsel for Arms Control to the DOD General Counsel, Winter 2013,[ “Indisputable Violations: What Happens When the United States Unambiguously Breaches a Treaty?” Fletcher Forum of International Affairs Vol. 37:1, http://www.fletcherforum.org/wp-content/uploads/2013/02/Koplow\_37-1.pdf]cdm

However, there is a cost when the world’s strongest state behaves this way. One potential danger is that other countries may mimic this disregard for legal commitments and justify their own cavalier attitudes toward international law by citing U.S. precedents. Reciprocity and mutuality are fundamental tenets of international practice; it is foolhardy to suppose that other parties will indefinitely continue with treaty compliance if they feel that the United States is taking advantage of them by **unilateral** avoidance of shared legal obligations. So far, there has not been significant erosion of the treaties discussed in the three examples. The United States and Russia will fall years short of compliance with the CWC destruction obligations, but other parties, with the notable exception of Iran, have reacted with aplomb, comfortable with the two giants’ unequivocal commitment to eventual compliance. Likewise, the VCCR is not unraveling, even if other states lament the asymmetry in consular access to detained foreigners. And while many states pay their UN dues late and build up substantial arrearages, that recalcitrance seems to stem more from penury than from a deliberate choice to follow the U.S. lead. But that persistent flouting undermines the treaties—and by extension, it jeopardizes the entire fabric of international law. Chronic noncompliance— especially ostentatious, unexcused, unjustified noncompliance— also sullies the nation’s reputation and degrades U.S. diplomats’ ability to drive other states to better conform with their obligations under the full array of treaties and other international law commitments from trade to human rights to the Law of the Sea. The United States depends upon the international legal structure more than anyone else: Americans have the biggest interest in promoting a stable, robust, reliable system for international exchange. It is shortsighted and self-defeating to publicly and unblushingly undercut the system that offers the United States so many benefits. It is especially damaging when, following an indisputable violation, the United States acknowledges its default, participates in an international dispute resolution procedure, and apologizes—but then continues to violate the treaty. The CWC implementation bodies, the International Court of Justice, and even the UN General Assembly and Security Council are unable to effectively do much to sanction or penalize the mighty United States, but it is still terrible for U.S. interests to disregard those mechanisms.

1. <https://www.merriam-webster.com/dictionary/ought> [↑](#footnote-ref-1)