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Executive Summary Report

One of the most complex and challenging security environments today are the Global Commons, that is, the domains that lie outside of the exclusive territory of a state but may be accessed and used by others. As such, the commons are stateless maneuver space, where no nation or entity can claim as theirs. These domains include Oceans, Antarctica, the Atmosphere, Space, and Cyber as well as Digital. Of course, global commons holds natural resources that present both opportunities and vulnerabilities due to congestion, overuse, degradation, and exploitation. Of note, these commons have interdependencies across all elements of national power: Diplomatic, Information, Military, and Economic (DIME) and in some cases, with each other. This White Paper Report will address each of the global commons with a focus on opportunities and vulnerabilities and offer some related implications to consider regarding the collective global future of geopolitical competition and cooperation.

Key Points:

- Global commons include the following domains:
 - **The Oceans (Maritime):** carry 80 percent of global trade by ship and are also home to undersea cables that carry data, representing \$10 trillion in daily financial transactions.
 - **Antarctica (the continent):** has been set aside by international agreements for scientific research yet Great Powers continue to press the limits of cooperation.
 - **The Atmosphere:** is seeing continued increases in temperature and is expected to reach a 1.5-degree Celsius tipping point sometime shortly after 2030; some consider this issue to be existential.
 - **Space:** has traditionally been the purview of relatively few nation states but now is seeing overall growth, evolution, emerging friction between authoritarian states (e.g. China and Russia) and liberal democracies, as well as an emerging private sector.
 - **Cyber/Digital:** is a domain that does not fit cleanly in the global commons' definition. However, the speed and sophistication of Generative Artificial Intelligence, Machine Learning, and the race to Quantum Computing is evolving in ways that exhibit characteristics of a global common.
- Critical choke points of high and accelerating risks in the global commons include:
 - Terrorism and piracy threaten commerce in the Bab-el-Mandeb Strait and Red Sea.
 - Coercion threatens freedom of navigation in the South China Sea.
 - Government, commercial, and private interruption, and interception of data transmitted through undersea cables.
 - Climate change affecting sea levels, melting ice sheets in polar regions, and altering environmental systems to include ocean currents, coral reefs, and rain forests.
 - Nation state vs private sector exploration, property rights, weaponization and governance of space, on top of the growing congestion, clutter and general competition that is increasing in space.
 - Generative Artificial Intelligence, Machine Learning, and Quantum Computing utilization acceleration is creating friction and competition among businesses, governments, legal and ethical systems, and incentivizing nefarious actors to include transnational criminal networks.



GEOIntelligence@bancroft4vets.com

DISCUSSION:

The Oceans (Maritime):

[\(Visualized: Mapping the World's Key Maritime Choke Points \(visualcapitalist.com\)\)](#)

The oceans are essential for sustaining human existence. Not only are the oceans a major route of trade volume and transportation, but a massive portion of all life on earth exists in its ocean, perhaps somewhere around 90 percent. Debatably, marine life is inextricably linked to life on earth as a source of food, medicine, and raw materials.

Economically, 80 percent of global trade volume travels by ship, equating to approximately \$25 Trillion USD per year. Additionally, according to the United States Naval Institute, financial transactions traveling through undersea cables within the oceans represents \$10 trillion USD daily; and future demand for more cables is expected to increase 30 percent per year. Incidents that impede the flow of goods or data can quickly and adversely impact the global economy as we saw during COVID and more recently with respect to Ukraine and Gaza.

Jurisdiction of the oceans is largely defined by both the Law of the Sea, which focuses on public international law related to coastal waters, Maritime or Admiralty law that focuses on domestic law governing maritime activities, and private international law addressing the relationships between private entities which operate vessels on the oceans. While they address maritime navigation, these bodies of law have little impact on the protection of the oceans from human threats. These threats are growing in their significance and impact on the global community. The UN Environment Program (UNEP) has identified: several areas of need in managing the global ocean: strengthening national capacities for action, especially in developing countries; improving fisheries management; reinforcing cooperation in semi-enclosed and regional seas; strengthening controls over ocean disposal of hazardous and nuclear wastes; and advancing the Law of the Sea. Specific programs identified as in need of attention include current rising sea levels; contamination by hazardous chemicals (including oil spills); microbiological contamination; ocean acidification; harmful algal blooms; and over-fishing and other overexploitation.

Here is a list of primary global maritime choke points for financial and business leaders to understand with respect to some basic facts and security considerations.

Strait of Hormuz:

Facts: Thirty miles wide at its narrowest point and 21 percent of global petroleum consumption passes through the Strait daily. The top export destinations include China, India, Japan, and South Korea.

Security: This strait is one of the most significant and volatile maritime chokepoints, affording no alternative maritime re-routes. Iran maintains claims over the contested islands in the strait (Abu Musa, Greater Tunb, and Lesser Tunb) and the Islamic Revolutionary Guard Corps (IRGC) has a long history of harassing, provoking, and seizing commercial vessels. Projection is sustainable tension and accommodation as neither the United States nor Iran seek a direct confrontation. The U.S. Navy would provide significant maritime overmatch should direct conflict occur; however, IRGC assets throughout the strait are formidable, volatile, and unpredictable.

Bab-el-Mandeb Strait/ Red Sea/Suez Canal (vs Cape of Good Hope):

Facts: This region has 3 choke points along a single trade route: Bab-el-Mandeb Strait – 20 miles wide at narrowest point; Red Sea – 1400 miles long and 221 miles wide; Suez Canal – 650 feet wide. Ten percent of all seaborne trade, 12 percent of seaborne oil and 8 percent of Liquefied Natural Gas. Top trading nations include: the EU, China, India, Saudi Arabia, and the UAE.

Security: Currently, this area is highly dangerous with the most active global security threats due to Houthi missile attacks against Israel and missile, as well as airborne and seaborne drones and piracy attacks on commercial vessels headed through the straits enroute to the Suez Canal. Economically, the re-routing alternative to navigating through the Suez requires transiting the Cape of Good Hope, 11,500 vs 8,500 nautical miles and taking 36 vs 26 transit days. Commercial shippers BP, CMA CGM, MSC, Hapag-Lloyd, and Maersk have suspended routing ships through the region opting for the longer, more expensive, but more secure route around the Cape of Good Hope. The U.S. led maritime coalition has been unable to fully deter Houthi attacks and has taken more aggressive direct-action measures while trying to prevent further expansion of the Israel-Hamas war.

Strait of Malacca/South China Sea/Taiwan Strait:

Facts: This area has three choke points in relatively proximity, all independent, but also interdependent trade routes: Strait of Malacca – 40 miles wide at its narrowest point; Taiwan Strait – 81 miles at its narrowest point; and the South China Sea – 1.4M square miles. Sixty six percent of China's maritime trade volume, 40 percent of Japan's maritime trade, and 33 percent of all worldwide trade transits this region. Territorial disputes exist among Brunei, China, Indonesia, Malaysia, Philippines, Taiwan, and Vietnam. China has aggressively claimed territory beyond its historic "9 dash line" which in 2016, the International Court concluded is illegal. Within this area, there are vast untapped strategic resources of oil, natural gas, and rare earth minerals, as well as ~10 percent of the world's fish.

Security: This area has the most complex, but least likely near-term flashpoint, as the region is an important trade route for global trade and more critical for the economic well-being of China, India, Japan, and nations bordering the south China Sea. Primary geopolitical flashpoints are Taiwan's independence from the PRC and the PRC's coercion and continued aggression toward unification. The second potential flashpoint is due to China's territorial disputes in the South China Sea and their aggressive overfishing. China will sustain its aggressive and provocative rhetoric and actions across all elements of national power to pressure Taiwan and influence the global community regarding their justification for unification. China will also continue their coercive maritime and economic pressure on neighbors to enforce their expanded boundaries throughout the South China Sea despite the illegality of its claims. The Strait of Malacca will continue to be a concern as it is reaching capacity, which means that accidents, piracy, or localized conflicts can quickly disrupt shipping, necessitating difficult rerouting decisions.

Panama Canal:

Facts: This strait is 50 miles long with a width ranging from 500 to 1,000 feet and is a critical shipping route between the Atlantic and Pacific oceans. Three percent of global trade moves through the Panama Canal. Seventy two percent of ships transiting the canal are either departing from or destined for U.S. ports.

Security: The Panama Canal security risks for piracy and illicit trafficking are a concern, but geopolitical instability risk is low. The greatest current threat to the Panama Canal is currently environmental as severe record drought is depleting the freshwater lakes used to operate the locks in the canal thereby reducing shipping capacity through the canal. In 2023, shippers paid over \$235M in auction fees to jump ahead in the transit queue and are also seeking land bridge means to bypass the canal.

Bearing Strait/Arctic:

Facts: This strait is 55 miles wide at narrowest point between the United States (Alaska) and Russia (Siberia), providing direct connection from the North Pacific to the North Atlantic. Current shipping through the strait is the Northern Sea route through Russian waters and the Northwest Passage through Canadian Waters. Shipping has increased over 150 percent since 2008. The Arctic Institute projects 30 to 50 percent summer ice reduction by 2050 and 50 to 100 percent reduction by 2080. A transpolar route is expected to emerge by mid-century. The Arctic nations include Canada, Denmark, Norway, the U.S. (Alaska), Sweden, Finland, Iceland, and Russia. All eight are members of The Arctic Council, a treaty organization operating on environmental issues vice boundary or resource-related issues.

Security: The Arctic is an emerging and accelerating space of Great Power Competition and the Bearing Strait is a critical choke point providing access from the Pacific Ocean. Although Russia and China competition priorities are currently focused on Ukraine, Taiwan, the South China Sea, and BRICS, both are making strategic infrastructure and ship building decisions to compete in the Arctic. Russia has developed a Strategy for the Development of the Russian Arctic Zone and the Provision of National Security through 2035. China's "5-year plan" expresses their commitment to building an Arctic Silk Road and Blue Water partnerships. The United States has also produced an Arctic strategy focused on partnerships, long lead infrastructure and global commons governance. A recent report by RAND is critical of the U.S. efforts and recommended greater investments in DoD, DHS, and USCG infrastructure, capabilities, capacity, and training in the Arctic.

Antarctica:

Facts: The Antarctica treaty of 1959 was created to preserve the area for peaceful scientific investigation and cooperation; the treaty is part of the Antarctic Treaty System (ATS) comprising all Antarctic related agreements. Antarctica is the only global common with a land mass and the only continent without a native human population. Fifty-five countries are currently party to the treaty maintaining over 80 research stations. The treaty dates to 1961 and ensures that Antarctica is set aside as a scientific preserve, ensuring freedom of scientific investigation, and banning military activity continent-wide.

Security: No surprise, but Great Power Competition is active on the continent. According to a CSIS report, in February 2023, China announced plans to build a ground satellite station around its Zongshan Antarctic research facility in violation of the Antarctica Treaty. The report goes to highlight that Russia has been surveying Antarctica for hydrocarbons and China's illegal fishing could be a signal that their adherence to the treaty could be eroding leading to opportunity to undermine U.S. influence.

Atmosphere:

Facts: The atmosphere as a medium fits our working definition of domain that lies outside the exclusive jurisdiction of any state but may be accessed and used by those states or their nationals. The atmosphere is a complex dynamic natural gaseous system that is essential to support life on Earth and moves freely through and outside of any exclusive jurisdiction. The most dominant topics in relation to this global common domain are pollution, global warming and climate change, and global dimming.

Pollution relates to chemicals, particulates, or biological materials introduced into the atmosphere that according to a 2020 report, “cause discomfort, disease, or death to humans, damage other living organisms such as food crops, or damage the natural environment or built environment. Stratospheric ozone depletion due to air pollution has long been recognized as a threat to human health as well as to the Earth’s ecosystems.” The major jurisdiction for the atmosphere is called the Montreal Protocol, which since 1989 and has been widely successful in addressing the issue of ozone reductions.

Regarding pollution writ large, a key issue is the reduction of pollution across the world. Governance enforcement policy concepts include:

- Polluter pays principle, “which makes the party responsible for producing pollution responsible for paying for the damage done to the natural environment.”
- Extended producer responsibility “seeks to shift the responsibility dealing with waste from governments (and thus taxpayers and society at large) to the entities producing it. In effect, it attempts to internalize the cost of waste disposal into the cost of the product, theoretically resulting in producers improving the waste profile of their products, decreasing waste, and increasing possibilities for reuse and recycling.

Global commons impacts of atmospheric pollution include:

- Global warming: The Intergovernmental Panel on Climate Change established in 1988 to develop a scientific consensus, concluded “in a series of reports that reducing emissions of greenhouse gases was necessary to prevent catastrophic harm.”
- Global dimming: according to an energy Think Tank, global dimming is “the gradual reduction in the amount of global direct irradiance at the Earth’s surface, which has been observed for several decades after the start of systematic measurements in the 1950s. This phenomenon is “thought to have been caused by an increase in particulates such as sulfate aerosols in the atmosphere due to human action. It has interfered with the hydrological cycle by reducing evaporation and may have reduced rainfall in some areas.” Global dimming also creates a cooling effect that may have partially masked the effect of greenhouse gases on global warming.
- Attempts to attach atmospheric pollution and curb the climate change impacts include the 1997 Kyoto Protocol and 2015 Paris Agreement.
- IPCC concluded in a 2018 report that “dangerous climate change was inevitable unless much greater reductions were promised and carried out.” Atmospheric tipping point thresholds, according to the World Economic Forum, include a 1.5 degree Celsius that will lead to low-latitude coral reefs dying off and the collapse of the Greenland and West Antarctic ice sheets. If the world reaches a 3-degree Celsius increase, according to the United Nations, more catastrophic impacts will include events such as runaway ice sheets and the drying up of the Amazon rain forest.

Security: Primary threats to the atmospheric domain are in the realm climate change manifesting itself primarily through global warming that impacts the interdependent environmental systems of the planet. According to the World Economic Forum 2024 Global Risks Report, the 1.5-degree tipping point will be surpassed in the early 2030s and could accelerate without further reductions in carbon emissions.

Space:

Facts: Although there is no international consensus on whether space is a global common, we are treating it as such within our working definition. When it comes to international cooperation in space, the United Nations Office for Outer Space Affairs 1967 Outer Space Treaty provides the framework by which the “exploration and use of outer space shall be carried out for the benefit and in the interests of all countries and shall be the province of all mankind.” However, great power competition, commercialization of space, and the subdomains of space create complexity and uncertainty for governance and enforcement.

[\(Countries with Space Programs 2024 \(worldpopulationreview.com\)\)](#) There are currently over 70 space agencies worldwide: 16 can launch rockets into space to include probes and satellites, and 3 have conducted human space flight.

Sub Domains: The term “space” like Global commons, is dynamic with subdomains such as equipment and activities at various states of earth orbit, how to handle celestial bodies such as the moon, and interplanetary space all which may have different geopolitical and economic interests and governance challenges.

Commercialization: To date, space exploration has been the domain of governments; however, NASA has incentivized the commercialization of launch, delivery, and research, to include private sector development of space stations to replace the International Space Station. Mineral extraction is an emerging issue serving as an incentive for commercialization and also a friction point in great power competition. A major challenge is delineating between property rights and governance. Concerningly, commercial competition may run into conflict with the geopolitical interests of authoritarian nation states.

Great Power Competition: [China-Russia Space Cooperation: Implications of a Growing Relationship | CNA](#) The International Space Station (ISS) has been a success story in the cooperation of the international community to treat space exploration as a global commons, and expand space exploration opportunities. However, China has been barred from participation for national security concerns. The ISS is expected to complete its useful life in 2031 and commercialization incentives will drive more private sector entrants into space. In 2021 and 2022, China launched three modules to establish its own space station, the Tiangong Space Station. In March 2021, according to the Center for Naval Analysis, China and Russia signed an agreement for joint space exploration to include establishing a research base on the surface of the moon and/or in lunar orbit.

Security: Space is a Global Common that is increasingly daily in its significance. The fact that the United States military has created a global four-star combatant command – U.S. SPACECOM (Space Command) is indicative of the importance that space plays in the realm of national security. Space unquestionably relates to all other global commons. Also, the high-risk high reward will be if in the competition among great powers, private sector entities, and the emerging space faring nations to avoid militarizing space and incentivizing exploring space as a marketplace for all of humanity. Further, growing congestion, clutter and debris pose threats to satellites in many orbits, and this probably will almost certainly worsen over time, especially after some states such as the Chinese test destructive anti-satellite capabilities, creating tens of thousands of debris.

Cyberspace, Internet, Electromagnetic Spectrum, or Digital Commons

The Department of Defense defines the cyberspace domain as an “interdependent network of information technology infrastructures and resident data, including the Internet, telecommunications networks, computer systems, and embedded processors and controllers.” Although the digital space does not meet the strictest definition of a global commons, its creation, the freedom of digital movement, variability in governance, and control certainly exhibit characteristics of a Global Common.

Facts: Cybercrime, cyber terrorism, nation state network attack and defense, espionage, and spying all happen in the cyber domain. In an era of satellites, cell towers, and wi-fi, 99% of internet traffic eventually travels through undersea cables. Concerns with China’s cyber espionage capabilities and behaviors even resulted in the U.S. Government denying approval of four landing sites for cables by Google, Meta, and Amazon in the Pacific, rerouting them to be connected to Taiwan and the Philippines. China has also withheld approval of new cables in the South China Sea. Global demand for more undersea cables is expected to increase 30 percent per year over the next several years. Because global commons are maneuver space where nations or entities cannot claim preeminence, cyberspace is considered by some to not be a global common as cyberspace is primarily owned by public or private entities. Also, the emergence and acceleration of Artificial Intelligence, Machine Learning, and Quantum Computing, although having a high potential for being a force for good, is also adding to the argument that this domain is going to be more of a Global Common in the future.

Security: Cyberspace, although again debatable as a global common, is certainly a domain where the global common security outlook is critical. Cyber, like space, enjoys a longer standing global four-star combatant command within the U.S. military and an area of fierce competition. Control or dominance within the cyberspace domain by one nation’s military could impact dominance in all others to include space, air, ground, and the sea. Generative Artificial Intelligence, Machine Learning, and Quantum Computing acceleration is the joker in the deck that is going to challenge business, governments, legal systems, ethics, and nefarious actors to include transnational criminal networks.

IMPLICATIONS AND FORECAST:

The global commons will become increasingly interdependent (arguably an ecosystem of ecosystems) in ways that will only increase their significance in relation to global diplomatic, informational, military, and economic dialogue, cooperation, competition, and potential conflict.

Governance of the global commons is based on limited universally agreed-to forums, which impedes the ability to globally moderate or adjudicate international or supranational cooperation or disagreements.

Each of the global commons: Oceans, Atmosphere, Antarctica and Space, Cyber/Digital commons have their own set of intra- and interdependent complexities, requiring increased understanding, monitoring, and strategies for leaders to maneuver through and manage risk at all levels.

From a forecast perspective, the adverse impact of changes in climate on the Atmosphere, Oceans and Antarctica appears to be trending toward existential. Additionally, there also appears to be a disconnect between government and private sector policy maker priorities and those who are likely to be most impacted. This presents risk in gaining cooperation for planning and execution, but also presents opportunities for investments in regional and global cooperation.

Emerging opportunities related to global commons are likely in the following areas:

- Undersea cable installers/ships
- Ice breakers
- Digital infrastructure (undersea, atmospheric, and space)
- Long-lead time infrastructure investments
- Space commercialization
- Maritime security
- Cyber security

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