CHINA’S CLIMATE SECURITY VULNERABILITIES

By Erin Sikorsky
Edited by Francesco Femia

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China’s Climate Security Vulnerabilities
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By Erin Sikorsky, Director, CCS; Director, The International Military
Council on Climate and Security

Edited by Francesco Femia, Research Director, CSR

Research assistance provided by Brigitte Hugh and Elsa Barron

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Cover photo: A satellite image of Dazhou Island, a state-level nature
reserve located about 5 km off the coast of Wanning, Hainan, China.
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"Man must control nature."
—Mao Zedong

A satellite image of Dazhou Island, a state-level nature reserve located about 5 kilometers off the coast of Wanning, Hainan, China.

Image courtesy CNES/Airbus via Google.
Executive Summary

Like the United States, China faces serious risks to its national security from climate change. From melting glaciers in the Tibetan Plateau to the effect of rising sea levels on the heavily populated Yangtze River Basin and Pearl River Delta, from record heatwaves and drought to unprecedented flooding from extreme precipitation—a range of climate hazards threaten critical Chinese civilian and military infrastructure, risk domestic political instability, including in already restive regions of the country, and challenge Chinese geopolitical interests abroad.

China’s senior leadership appears to recognize climate change as a national security threat. Under Xi Jinping, China has adopted a broad concept of national security that encompasses internal and external, traditional and non-traditional threats. It is unclear, however, the extent to which ecological and climate security topics have permeated Chinese military strategy and doctrine, though public documents and statements provide some indications that the People’s Liberation Army (PLA) is at least considering these climate implications.

Key Vulnerabilities

The physical impacts of climate change will create national security vulnerabilities for China, particularly as they intersect with other trends and developments. These vulnerabilities can be organized into three general categories. First are direct risks to military and critical infrastructure, such as coastal shipyards, islands in the South China Sea, railways and energy infrastructure built on permafrost, and the highly populated southern river deltas. Second, are compounding risks to internal political stability, as climate change threatens food and water security across the country. Third are external risks, as climate change increases competition over shared resources and amplifies tensions with neighbors, many of whom are even more exposed than China to climate impacts.
The Chinese Response

China’s approach to climate security risks largely mirrors its approach to other perceived major challenges: first, the country is pursuing extensive infrastructure and public works interventions while boosting its disaster response capabilities, including in the military. At the same time, the government is attempting to muzzle or minimize public critiques or concerns. Meanwhile, on the international front, Beijing is trying to take advantage of the issue to advance its position vis-à-vis its neighbors and in competition with the United States by casting itself as a leader and partner on climate concerns on the world stage.

Key Uncertainties

China is often credited with better integrating a long-term approach to its strategic planning than countries in the West. Certainly, aspects of its climate response appear ahead of the curve: investing in icebreakers for the Arctic, positioning itself to dominate the market for critical minerals and clean energy infrastructure, and developing detailed, decades-long adaptation and mitigation strategies. Despite this foresight, there are still uncertainties regarding the trajectory of China’s approach to the security implications of climate change, including tensions between politics and strategic planning and the adequacy of its adaptation strategies, which are largely focused on hard physical infrastructure projects.
Recommendations for the United States

Given these dynamics, there are a number of implications for US foreign and defense analysis and policy toward China. Overall, the US government should aim to mainstream the range of climate considerations into its China analysis and policy. Additionally, US policy toward China should reflect the conclusion in the Biden Administration National Security Strategy that competition with China is intertwined with the US ability to tackle shared transnational threats like climate change. Specific recommendations include:

- **Build a better understanding of China’s physical climate risks**: As the US national security community invests in better data and predictive capabilities related to climate change, it should focus a significant portion of these investments in geographies of primary national security concern such as China and the greater Indo-Pacific.

- **Leverage forecasting tools to explore key uncertainties vis-à-vis China’s climate security response**: While better data on China’s physical climate hazards is a good starting point, such data must be married with analysis of the less certain dynamics that will shape security risks in the coming decades. This is where the use of forecasting tools such as wargaming, tabletop exercises, and scenarios planning can help US policymakers and practitioners.

- **Create A ‘Whole-of-Government’ China-Climate Security Working Group**: US officials focused on China will craft more effective policies not only by integrating better data and findings from the forecasting exercises outlined above, but also by engaging regularly with experts across the US government in different sectors and agencies. Such engagement can also drive research agendas in scientific agencies and inform the policy approaches of climate negotiators.

- **Prioritize climate adaptation and resilience programs for Indo-Pacific allies and partners**: To distinguish itself as the ‘partner of
choice’ for the region and to ensure Indo-Pacific countries are resilient to climate hazards, the United States should make a more significant investment in adaptation programs and climate finance. Key actions include fully funding the President’s Emergency Plan for Adaptation and Resilience (PREPARE), which calls for $3 billion annually for adaptation by FY2024.

- **Explore areas of mutual climate security interest with China:** Climate-driven instability in China may have ripple effects that negatively impact US national security, such as interruption of supply chains, regional instability, or more aggressive Chinese behavior over shared resources. The United States should look for opportunities—beyond emissions reductions negotiations—for potential cooperation with China in addressing such risks, including sharing best practices in adaptation and resilience measures or collaborating on HA/DR exercises.
Introduction

Like the United States, China faces serious risks to its national security from climate change. From melting glaciers in the Tibetan Plateau to the effect of rising sea levels on the Yangtze River Basin and Pearl River Delta, from record heatwaves and drought to unprecedented flooding from extreme precipitation—a range of climate hazards threaten critical Chinese civilian and military infrastructure, risk domestic political stability, including in already restive regions of the country, and challenge Chinese geopolitical interests internationally. Though much attention is given to the role of climate negotiations in influencing Chinese behavior, Beijing’s perception of its national security plays an important role in driving government action. Therefore, understanding the security risks posed by climate change to China itself can help US policymakers and practitioners contextualize Chinese government actions and better integrate a climate lens into US foreign and security policy vis-à-vis China.

Methodology

The analysis in this report is based on findings from two expert roundtables, one held at The University of Pennsylvania’s Perry World House and another convened virtually by the Center for Climate and Security (CCS) (see Annex I). Throughout the paper, insights from these sessions are referred to in the text as comments from roundtable experts. It also relies on desk research by the author and research assistance from CCS research fellows Elsa Barron and Brigitte Hugh. It is meant as a starting point for further investigations of climate security dynamics in China, and concludes with a series of recommendations aimed at deepening practical understandings and applications of this research for the United States in particular.
Climate Change and China’s National Security Vision

Under the leadership of Xi Jinping, China has adopted a broad concept of national security that encompasses internal and external, traditional and non-traditional threats.1 The Chinese Communist Party (CCP) conception of “holistic national security,”2 first outlined in 2014, includes “environmental security” and “resource security” as two of its eleven components. The country’s National Climate Adaptation Strategy terms climate change an “important non-traditional security factor,”3 and the country’s Global Security Initiative, announced in April 2022, includes as one of its six pillars the exhortation for China to:

“...persist in coordinating the maintenance of security in traditional and non-traditional fields. Today’s world has not yet emerged from the haze of the COVID-19 pandemic. Non-traditional security threats such as supply chain disruptions, food crises, energy shortages, terrorism, and climate change have become increasingly prominent.”

China’s national security documents also offer Chinese support to other countries and the international system to tackle global climate risks, claiming that no country can stand alone in the face of today’s threats. However, China has

historically preferred international engagement on climate change to take place in the sustainable development context, not in a security context. For example, the Chinese Ambassador to the United Nations abstained from a UN Security Council vote on a climate security resolution in December 2021, stating:

“...we should avoid pan-securitization of climate issues. To arbitrarily consider climate change as the only security challenge for mankind is not a scientific attitude. And it will not be beneficial for international cooperation on climate change or for effective conflict resolution. On the contrary, it may actually distract attention to the core issues and have a negative impact.”

The extent to which ecological and climate security topics have permeated Chinese military strategy and doctrine is unclear, though public documents and statements provide some indications that the PLA is considering climate implications. In 2008, Gen. Xiong Guangkai (Ret.), then Chairman of the China Institute for International and Strategic Studies gave a speech highlighting the importance of “non-traditional” threats for the military such as climate security, and the PLA has had an expert committee on climate since that year. Another more recent clue was a 2020 article in the Chinese military’s official newspaper, the PLA Daily, which discussed a range of climate security risks. The piece covered both tactical threats to coastal installations and underwater precision weapons, and strategic concerns around geopolitics and conflict risk.

According to one roundtable expert, there is some Chinese national defense mobilization around green energy and technology, including regarding solar power and UAVs. However, though China’s 2010 Defense White Paper referenced climate change, recent Defense White Papers have not mentioned the topic directly. Additionally, one roundtable expert noted that some Chinese military leaders have complained about having too many functions and that too much energy is directed to national response to disasters, suggesting concerns regarding the impact climate response has on military readiness.

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Key Vulnerabilities

The physical impacts of climate change will create national security vulnerabilities for China, particularly as they intersect with other trends and developments. These vulnerabilities can be organized into three general categories—direct risks to military and critical infrastructure; compounding risks to internal political stability; and external risks, as climate change increases competition over shared resources and amplifies tensions with neighbors, many of whom are even more exposed than China to climate impacts.

Direct Risks to Military and Critical Infrastructure

Climate change poses threats to Chinese military installations and equipment, the country’s ports and coastal cities, as well as its transportation and energy infrastructure. Additionally, the intensity and frequency of climate hazards may strain the capacity of Chinese military and security forces, as they are called upon for humanitarian assistance and disaster relief (HA/DR) missions across the country.

Prominent examples of military infrastructure threatened by climate hazards are China’s artificial islands in the South China Sea (SCS). In 2013, China began buttressing existing atolls and building up artificial islands to install military infrastructure and assert its territorial control in the contested waters of the SCS. In doing so, Beijing damaged critical coral reefs, key buffers against storm damage and sea level rise for these islands. As typhoons strengthen in the SCS due to climate change, the military and economic infrastructure on the islands is at increasing risk of destruction.8,9 Sea level rise will also impact

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8 Steve Mollman, “It’s typhoon season in the South China Sea—and China’s fake islands could be washed away,” Quartz, August 1, 2016.

these islands, some of which already only appear at low-tide.10

Melting permafrost is another climate hazard threatening key Chinese national security projects. For example, over one-quarter of the 2000 km Qinghai-Tibet Railway—which allows Beijing to more quickly move military personnel near contested areas of the Indian border—is situated on permafrost. The UN warns that glaciers on the Tibetan plateau will shrink by one-third by 2050, while other research indicates that the building of the railway itself has likely sped up warming of the ice.11 Similarly, pipelines connecting China to Russian supplies of oil and gas are threatened by permafrost thaw. The China-Russia Crude Oil Pipeline includes 441 kms of permafrost in northeast China.12 Scientists have recorded subsidence, or sinking, due to warming permafrost around the pipeline.13 Also, the new “Power of Siberia” natural gas pipeline from Russia to China, which Beijing touts as key to its transition away from oil and coal, traverses significant swaths of permafrost.14

Much of China’s critical economic infrastructure is housed in urban areas of the country that are at high risk from climate hazards—particularly in the deltas. For example, the Yangtze River basin is home to 400 million people, with an average density of 214 people/km², making it the most densely populated basin in the world. In June and July of 2020, the middle and lower Yangtze basin experienced the highest rainfall on record since 1961. The floods displaced millions of people, caused billions of dollars in economic losses, and Chinese airborne forces and People’s Armed Police (PAP) carried out thousands of disaster

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relief missions in response. Additionally the Delta is home to major Chinese shipyards that are in areas expected to be underwater by 2060 due to sea level rise in an unchecked warming scenario (see graphic 1).

Graphic 1: Two of China’s major shipyards, which produce military vessels, are currently located in areas of the Yangtze River delta expected to be underwater by 2060 due to sea level rise and annual floods, in a high emissions scenario.16

The Pearl River delta is another region extremely vulnerable to climate hazards, due to both its geography and its rapid development in the past few decades. Explosive growth of cities and manufacturing has weakened the area’s natural ability to absorb rising tides and extreme storms. Expanses of concrete and high rises are causing the land to sink, trapping pollutants, and driving

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16 CSIS ChinaPower; IPCC 2021 data, from Climate Central.
temperatures to increase more quickly than other parts of the country - and increasing the risks of diseases like Dengue Fever.\textsuperscript{171819} The World Bank has identified the region’s major cities Guangzhou and Shenzhen as among the top ten world cities with the most to lose from climate change.

Heatwaves also pose threats to critical urban infrastructure in China. Climate scientists assess that temperatures in some regions of the country will cross the threshold of livability by the end of the century. These areas include the most densely populated regions of eastern China and the Sichuan basin, including super cities Beijing, Shanghai, Guangzhou and Chongqing.\textsuperscript{20} Heatwaves do not have to cross the livability threshold to create significant problems, however. Already in July 2022 a country-wide heatwave affected 900 million people or 64 percent of the population, resulting in blackouts, buckled roads, and interruptions to the country’s efforts to manage COVID-19.\textsuperscript{21}

\textbf{Compounding Risks to Domestic Stability}

Climate change impacts are likely to threaten China’s economic growth, its food and water security, and its efforts at poverty eradication, as well as exacerbate inequality within the country. The risks go in both directions. As the World Bank has noted, “The country’s poverty and inequality dynamics increase not only China’s vulnerability to climate change, but also climate


\textsuperscript{18} Canfei He and Lei Yang, “Urban Development and Climate Change in China’s Pearl River Delta,” Land Lines July 2011.


\textsuperscript{21} Nectar Gan, “China endures summer of extreme weather as record rainfall and scorching heat wave cause havoc,” CNN July 20, 2022.
change will further exacerbate these trends.”

As is the case in many countries, these developments will likely increase the country’s vulnerability to political instability, as climate change undermines the government’s ability to meet its citizens’ demands. As one China roundtable expert argued, domestic stability is the biggest risk facing the Chinese government vis-à-vis climate change. He noted that when the population is trained to expect everything from the government, it then also blames the government for everything that goes wrong.

Climate change poses a range of threats to future economic prosperity in China. While Beijing has made significant gains in eradicating extreme poverty, hundreds of millions of Chinese citizens still live on less than $200 a month—and inequality is high. Climate hazards will affect poor citizens the most—rural populations that depend on agriculture and manual labor are particularly vulnerable to heat stress and extreme weather, as will those living on the margins of urban areas in hastily-constructed developments. Specifically, extreme heat will negatively affect the ability to work outdoors. A 2020 study from McKinsey found that under the current warming trajectory, China would face an average 6.5 percent loss of its working hours each year to extreme heat and humidity in 2030 and 9.0 percent in 2050. This equals $1 trillion to $1.5 trillion in GDP at risk in an average year by 2050. Already in 2022, the summer’s historic heatwave and drought across China, on top of the country’s strict COVID restrictions, has led to significant economic stress. The government has imposed restrictions on energy usage, leading to factory shutdowns, and GDP growth predictions for the year have been slashed.

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23 China Expert Roundtable, In-Person Convening, Perry World House University of Pennsylvania, 6 April 2022.
27 Laura He, “China’s growth forecasts slashed as heatwave hits industrial heartlands,” CNN Business August 18, 2022.
Graphic 2: China identified the highlighted “major strategic regions” as areas of high concern in its 2035 adaptation plan, noting that in each climate issues intertwine and overlap with population, resource, environmental, and other issues.

Climate impacts on food security are another serious concern. President Xi appears to recognize the risks and has called for China to become “self sufficient” in food security, stating, “The food of the Chinese people must be made by and remain in the hands of the Chinese.” Yet China supports nearly 20 percent of the world’s population, with only 12 percent of the world’s arable land, and much of that land is threatened by climate change. China’s own Third Climate Assessment, released in 2015, found that climate change will negatively affect the country’s agriculture due to less reliable rains, the spread of pests to new regions, and shorter growing seasons. A 2022 study by researchers at the Potsdam Institute found that crop pests and diseases have already grown 400 percent in China since the 1970s, and climate change was

China’s food security challenges pose risks to the country’s water security as well. Efforts to maximize food production in recent years have relied on unsustainable groundwater extraction, which has depleted reserves in North China that are critical for water resilience through times of drought.\textsuperscript{30} This creates a dangerous cycle of insecurity wherein efforts to ensure food security exacerbate water insecurity and vice versa. During periods of drought, already depleted water reserves (due to increased agricultural production) run low while crops become increasingly water-stressed. This makes sufficient agricultural production impossible and ultimately creates more food insecurity for communities that increasingly rely on domestic food production.

Internally, the Chinese government may be particularly concerned about the intersection of these kinds of climate impacts in regions it already considers areas of national security concern, such as Xinjiang and Tibet.\textsuperscript{31} Both face significant climate change hazards. In Xinjiang, extreme precipitation events have been increasing since the 1990s\textsuperscript{32}, while recent heatwaves are accelerating the pace of glacial melt. These combined factors in a traditionally arid region increase the risk of disasters such as flash flooding, dam failure, and mudslides that destroy infrastructure, ecosystems, and crops. Tibet faces similar climate impacts including rising temperatures, precipitation, and glacial melt.


\textsuperscript{31} For example, see: Scott Moore and Michelle Melton, “China’s Pivot on Climate Change and National Security,” Lawfare, 2 April 2019.

In both cases, the actions the government has taken in these regions in the name of ‘security’ to marginalize Uighur and Tibetan populations have made the areas more vulnerable to climate change-related instability. Dr. Josh Busby’s work has found that exclusive political institutions, those that withhold rights, opportunities, and resources from one or more groups, are one of three factors contributing to climate security risks for a region or country. The other two factors—low capacity to deliver services and lack of foreign aid—are also present in the Xinjiang and Tibetan regions.33 In the case of extreme climate disasters in either region in the coming decades, it may become more challenging for the Chinese government to continue to suppress local opposition to its rule.

Amplifying Tensions in the Indo–Pacific Region

Warming temperatures will increasingly impact key resources that China shares with its neighbors, such as freshwater river basins and ocean fish stocks. For example, the Tibetan Plateau, where 10 of Asia’s major rivers originate, providing fresh water to around a fifth of the world’s population, is expected to experience an increase in glacial runoff through the mid-21st century due to warming temperatures, with an eventual permanent decline in glacier mass. China’s control of the headwaters of these rivers, combined with its aggressive dam building and often tense relationships with its neighbors, means that climate shocks to the river basins will further stress regional geopolitics. For example, in 2019 an extreme drought in Thailand and Laos along the lower part of the Mekong River combined with an unprecedented blockage of water supply by Chinese dams in the upper part of the river, leaving millions of people in the Mekong Delta without freshwater for months.34

Of particular concern is the strain climate change will place on China’s already challenging relationship with India. A 2020 report from the Council on Strategic Risks and the Woodwell Climate Research Center found three areas in which climate change will intersect with existing tension between the two countries. First, warming and subsequent glacial melt in the mountainous border area between the two countries along the Line of Actual Control will allow for more military activity in the region. Second, the Brahmaputra River basin is vulnerable to increased flooding during the July and August monsoon season due to climate change, leading to potential misperceptions of Chinese water manipulation by India. Third, the increased flow of water in the Indus River due to glacial melt is likely to encourage additional Chinese dam building in Pakistan-controlled Kashmir, potentially sharpening South Asian tensions.35

Another climate, ecological, and food security flashpoint in the region is China’s aggressive effort to secure fish stocks, including its participation in illegal, unreported, and unregulated (IUU) fishing. China is the world’s largest consumer of fish, consuming around 36 percent of the global total in 2017.36 As fish stocks have diminished in nearby waters—for example, stocks in the South China Sea have already declined by one-third over the past 30 years—China has become the world’s largest operator of distance water fishing fleets.37 China regularly uses its coast guard and maritime militia to defend its fishing claims at sea, and at times reportedly uses its fishing vessels as cover for gray zone military activity.38 In recent years, China’s Coast Guard has regularly gone after fishing boats from Vietnam, Indonesia and the Philippines in the South China Sea, claiming they were operating in Chinese territory, raising

tensions with those countries and with the United States. A report from the University of British Columbia found that under a scenario of 2 degrees warming by 2050, the regional fishing economies of the South China sea will be, “at risk of devastating failure.”\(^{39}\) In such a scenario, the risk of conflict in the region increases, as states scramble to secure access to the remaining resources.\(^{40}\)

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40 For more detail on these types of dynamics, see: Michael Thomas, “Fish, Food Security, and Future Conflict Epicenters,” Epicenters of Climate and Security: The New Geostrategic Landscape of the Anthropocene Eds. Caitlin Werrel and Francesco Femia, June 2017.
The Chinese Response

China’s approach to climate security risks largely mirrors its approach to other perceived major challenges: first, the country is pursuing extensive infrastructure and public works interventions while boosting its disaster response capabilities, including in the military. At the same time, the government is attempting to muzzle or minimize public critiques or concerns. Meanwhile, on the international front, Beijing is trying to take advantage of the issue to advance its position vis-à-vis its neighbors and in competition with the United States by casting itself as a leader and partner on climate concerns on the world stage.

Investing in Innovation, Adaptation, and Disaster Response

China has focused heavily on adaptation for almost two decades, releasing its first National Climate Adaptation Strategy in 2013, after discussing some key adaptation priorities in its 2008 National Climate Change Programme. Its latest National Strategy for Climate Adaptation, released in June 2022, claims the country will be a “basically climate-resilient society” by 2035. The strategy is comprehensive and focuses heavily on technical fixes and exerting control over the environment. The scale of China’s infrastructure adaptation efforts is massive. Its South-to-North Water Diversion project, for example, is the most expensive and expansive infrastructure project in the country since 1949, and is designed to bring water from the wet south to the dry north. The ambitious project has faced criticism for its negative environmental impact and concern that it privileges Beijing over other parts of the country.41 Another

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The People’s Liberation Army (PLA) and People’s Armed Police (PAP) play a significant role in domestic disaster response, falling under what the CCP calls “non-war military activities,” which the government considers a strategic means for the military to serve the national political interest. Under the Emergency Response Law of 2007, disaster response is one area in which civil authority has authorization to direct PLA and PAP units, and since 2016, the military has focused more on disaster response, including pushing more money and decision-making down to provincial levels. The 2019 Chinese Defense White Paper reported that the PLA/PAP had “deployed 950,000 soldiers, 1.41 million militia, 190,000 vehicles and items of equipment, and sortied 26,000 vessels and 820 aircraft in emergency response and disaster relief,” since 2012. It further noted the role the Chinese military has played in responding to floods and typhoons, including by transporting goods and rescuing people, as well as reinforcing levees. As one roundtable expert noted, however, the military disaster response system is designed to react to, not prevent disasters.

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45 China Expert Roundtable, Virtual Convening, Center for Climate and Security, DC roundtable, 14 April 2022.
46 China Expert Roundtable, In-Person Convening, Perry World House University of Pennsylvania, 6 April 2022.
Controlling Public Responses and Perceptions

Though overall space for civil society in China has shrunk under the Xi regime, the environmental and climate domain is one area in which there is still some room for Chinese non-governmental organizations to operate. The government has long recognized that environmental issues can be a key source of population displeasure (e.g. air pollution) and according to one roundtable expert, Beijing allows environmental groups to operate because they can help provide observations and accountability regarding whether local officials are meeting government-set targets on decarbonization and energy efficiency.

At the same time, a key tool in the Chinese Government toolbox for preventing social and political unrest in response to climate hazards is the suppression of criticism or opposing voices. One roundtable expert noted that disaster responses are high stakes moments for the government, and there is usually significant attention paid to the risk of protests or flash online organizing. For example, in 2021, Henan province, in the central part of China, experienced the heaviest single hour of rainfall ever recorded in a major city, resulting in devastating floods, including in the public subway system. The government acted quickly to remove social media posts critical of its response and spurred harassment of foreign journalists covering the events to distract from its failures. The PAP forces are also used to prevent internal societal unrest, so their deployment in response to disasters allows double duty—the forces are used to prevent or suppress societal unrest.

Leveraging Climate Concerns Abroad

China is attempting to portray itself as a key partner on climate adaptation for other countries, in part to preempt criticism about its own emissions and contrast itself with the United States. Its most recent adaptation plan notes that China has, “actively promoted South-South cooperation on climate change adaptation, and donated small satellites...mobile weather stations, and other equipment to developing countries like Ethiopia, Bolivia, and Uruguay, helping them raise their climate change adaptation ability, thereby demonstrating the image of a responsible great power.” The plan also notes that Beijing sees broad opportunities to lead international cooperation on climate change adaptation through entities such as the World Bank, UN Environment Program, Asian Infrastructure Development Bank, and the Green Climate Fund. One roundtable participant saw China attempting to use its approach to managing climate disasters as a selling point for the CCP compellence architecture to deal with social unrest. He summarized the Chinese pitch as, “The world is going to get worse, don’t you want our system to manage the chaos?”

Across the Pacific, China has focused on climate change in its regional engagements, HA/DR response, resilience funding, and critiquing Western involvement. Chinese state media has portrayed the government’s Belt and Road Initiative (BRI) partnerships with Pacific islands as climate adaptation and resilience measures. According to one Chinese government-associated institute report on BRI, “China could help Pacific island countries build infrastructure that could counter climate change threats, absorb carbon emissions and even establish a fully-fledged carbon emission trading market in the Pacific in the future.”

A key provision in the security agreement China signed with the Solomon Islands in 2022 centers around China’s commitment to provide HA/DR support to the country; there are concerns from US analysts that this

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48 China Expert Roundtable, Virtual Convening, Center for Climate and Security, DC roundtable, 14 April 2022.

activity could be used as a cover for strengthening Chinese military capacity and access in the Pacific more broadly. At the same time, CCP leaders and state-run media regularly criticize US overtures toward the Pacific Islands as ignoring climate considerations, claiming China is the better partner.

Shaping Rules of the Road in Its Interests

As climate change opens up access to new domains, such as the Arctic, or shifts access to existing resources, such as water or fish stocks, China has consistently attempted to shape international norms and influence relevant international institutions in its favor. Declaring itself a ‘near Arctic’ state in 2018, China has inserted itself into key scientific and diplomatic processes related to the Arctic, with an eye toward gaining access to, or control of, potentially lucrative mineral and fossil fuel deposits, newly accessible fish stocks and transit routes. It has also sought to shape international norms and rules around illegal, unreported, and unregulated (IUU) fishing to its advantage, giving it cover for aggressive behavior. At times when the United States has stepped back from global engagement on climate related issues, as it did during the Trump Administration, China has stepped up to not only create the perception that it is a responsible actor in comparison to the United States, but also to bend international institutions and systems to its interests.


51 See for example, Alfred Sasako, "Useless for US to Use Symbolism to Woo PICs," Global Times September 29, 2022.

Key Uncertainties

China is sometimes credited with better integrating a long-term approach to its strategic planning than countries in the West.\textsuperscript{53} Certainly, aspects of its climate response appear ahead of the curve, investing in icebreakers for the Arctic, positioning itself to dominate the market for critical minerals and clean energy infrastructure, and developing detailed, decades-long adaptation and mitigation strategies. Despite this foresight, there are still uncertainties regarding the trajectory of China’s climate security landscape, including tensions between politics and strategic planning and the adequacy of its adaptation planning.

Providing additional uncertainty is the fact that there are differing views within the Chinese government on how fast to move toward decarbonization. As one scholar explained at the Perry World House roundtable, since the 2060 net-zero target was announced, there have been ups and downs in terms of which faction has the upper hand. On one side has been former Premier Li Keqiang, whom the scholar identified as the locus of the “let’s do this slowly” faction, noting that anyone in government who has responsibility for GDP growth, energy security, or poverty reduction tends to be in this camp. This group is not composed of climate deniers, but those who push for a slower, more deliberate transition. The scholar argued the other side is represented by President Xi, those in the Environmental Ministry and the National Development and Reform Commission. Of course, the current global energy crunch and the heatwaves across the country this summer have also affected China’s emissions trajectory, particularly its reliance on coal.

\textsuperscript{53} See for example, Rush Doshi, The Long Game: China’s Grand Strategy to Displace American Order, Oxford University Press, 8 July 2021.
Competence Versus Politics

China’s COVID-19 response exemplifies the tensions within the country between competence and politics. In the wake of the 2007 SARS crisis, China adopted a sophisticated Emergency Response Law, which developed a tiered response of coordination at the local level of all resources and built a national early warning system for infectious disease. As multiple roundtable experts noted, this law meant China had the right approach on paper for a robust response to the initial COVID-19 outbreak, but political considerations prevented the implementation of such a response. Instead, given the political incentives to report only positive news up the chain of command, the initial outbreak in Wuhan was covered up and minimized.

Similar political dynamics are at play in the country’s response to climate hazards. On the one hand, the country has built relatively sophisticated flood and drought management programs. On the other, as reported in the Washington Post, Professor Luo Jingjia from the Nanjing University of Science Information and Technology noted, “Meteorological departments often worry about being held responsible for predicting a severe event that doesn’t materialize, especially because local governments want a clear, yes-or-no answer.”54 Similarly, as one China expert argued, though national level politicians are focused on long-term planning, at the local level political party officials live and die by how the economy is doing today—so long-term climate considerations will not drive their actions.55

Multiple roundtable experts noted that the Chinese government has relied on stirring up nationalism to manage public responses to climate disasters.56 For example, in the wake of the 2021 Henan floods, the government valorized


55 China Expert Roundtable, In-Person Convening, Perry World House University of Pennsylvania, 6 April 2022.

56 Ibid.
emergency responders as heroes and encouraged attacks against foreign reporters that questioned the government response. It is unclear, however, if nationalism is a strong enough driver to overcome extreme, prolonged hardship that may arise from more intense climate disasters. By way of comparison, one roundtable scholar suggested the COVID-19 pandemic initially drove a strong wave of patriotism and nationalism, rooted in a willingness to bear hardship. However, as strict lockdowns have continued over the years as the rest of the world has moved on, there are suggestions that there is more resentment building among the populace. There is little reporting available on public reaction to the 2022 summer heatwave and drought, and whether patriotism is acting as a curb on public concern with the government response.

Adequacy of Physical Adaptation Measures

Some experts argue China has adopted an intensive adaptation focus because it views mitigation as unrealistic as it tries to meet its goals for economic growth, yet the climate disasters across the country in 2022 underscore the potential limits of such a strategy. The physical hazards from climate change are coming sooner, more intensely and more frequently than most climate models have predicted, suggesting even China’s monumental investments in infrastructure adaptation may not come quickly enough to forestall significant impacts. Additionally, given the disincentive in authoritarian regimes for reporting up bad news, it’s possible that some climate-related challenges facing China, such as water insecurity, are much worse than currently assessed by government departments.57

Additionally, the country’s adaptation strategy does not include discussion of less tangible adaptation and resilience measures related to governance and societal trust. An assessment of the components of resilience by the US Director of National Intelligence in its 2035 Global Trends report, Paradox of

Progress, noted that resilient states are ones that invest not only in infrastructure, but also in relationships and people. One roundtable expert argued that the Chinese social science community was not particularly active in efforts to think holistically about political risks associated with climate change.

One roundtable expert mused that as climate hazards intensify, China may focus more on drastic technological solutions related to geoengineering and noted that some PLA thinkers are exploring the possibility of weather weapons.\(^58\) Given the range of unknowns related to such interventions, these activities could have significant unintended consequences that could negatively impact China’s relationships with its neighbors, its population and the international community writ large.

\(^{58}\) China Expert Roundtable, Virtual Convening, Center for Climate and Security, DC roundtable, 14 April 2022.
Recommendations for the United States

Given these dynamics, there are a number of implications for US foreign and defense analysis and policy toward China. Overall, the US government should aim to mainstream the range of climate considerations into China analysis and policy making. Additionally, US policy toward China should reflect the conclusion in the Biden Administration National Security Strategy that competition with China is intertwined with the US ability to tackle shared transnational threats like climate change. Specific recommendations include:

Build a better understanding of China’s physical climate risks: As the US national security community invests in better data and predictive capabilities related to climate change, it should focus these investments in geographies of primary national security concern such as China and the greater Indo-Pacific. In particular, it should focus on developing a clearer picture of climate change impacts on Chinese urban environments, food security, and military installations and capabilities in the region. Such information should be made accessible across the US national security apparatus, with a focus on ensuring regional and country analysts and policymakers regularly receive such assessments and incorporate the findings into their analysis and policies.

One approach for the United States to consider is the expansion of the US Global Change Research Program, which provides a deep dive analysis of physical climate risks to the United States. A similar scientific approach towards foreign geographies, informed by US national security interests, could significantly improve US analysis.

Leverage forecasting tools to explore key uncertainties about China’s climate security response: While better data on China’s physical climate hazards is a good starting point, such data must be married with analysis of the less certain dynamics that will shape security risks in the coming decades. This
is where the use of forecasting tools such as wargaming, tabletop exercises, and scenarios planning can help US policymakers and practitioners. For example, the US military should regularly integrate a climate lens to existing China or Indo-Pacific focused wargames. How might multi-year intense heatwaves and drought across the Chinese mainland, combined with an exceptionally strong typhoon season, shape outcomes in a Taiwan wargame? Or what role might glacial melt in the Himalayan Plateau play in shaping conflict risks or conflict outcomes between India and China? Additionally, the military should expand its humanitarian assistance/disaster relief (HA/DR)-focused exercises in the Indo-Pacific, layering in considerations of the role China may play in response to regional climate disasters going forward.

For their part, the US intelligence community and the National Security Council should consider tabletop and scenarios exercises that explore the regional and global geopolitical impacts of different types of climate catastrophes in mainland China over the next decade. Given the interconnectedness of US-Chinese supply chains and China’s control over access to critical minerals and certain clean energy technologies, major climate disasters in China will have follow-on economic and infrastructure security impacts for the United States. Participation in at least some such exercises should be as broad as possible—including the Departments of Energy and Treasury, major International Financial Institutions, and potentially US private sector actors.

The United States should also conduct forecasting exercises related to China’s potential use of solar geoengineering, the geopolitical implications of which are currently under-explored. Such exercises should include a cross section of foreign policy and scientific experts, and potentially be conducted with key allies and partners at the table.

Create A ‘Whole-of-Government’ China-Climate Security Working Group: US officials focused on China will craft better policies not only by integrating better data and findings from forecasting exercises outlined above, but also by engaging regularly with experts across the USG in different sectors and agencies. Also, such engagement can drive research agendas in scientific
agencies and inform the policy approaches of climate negotiators. One model for such a group could be the Climate Security Advisory Council—a Congressionally mandated body connecting the US intelligence community and the USG scientific community. Such a working group could include relevant regional policymakers (e.g. A/S at State and DoD, NSC Senior China Directors, INDO-PACOM Commander, National Intelligence Office for East Asia), functional policy leads (e.g. Special Envoy for Climate Change, A/S State for Oceans, Environment, and International Scientific Affairs, NSC Senior Director for Climate and Energy), and USG experts from scientific agencies and offices (e.g. OSTP, NOAA, NASA, DOE).

Prioritize climate adaptation and resilience programs for Indo-Pacific allies and partners: Both the US National Defense Strategy (NDS) and National Security Strategy (NSS) emphasize the centrality of allies and partners, with the NSS noting, “...our alliances and partnerships around the world are our most important strategic asset and an indispensable element contributing to international peace and stability.” It goes on to highlight the importance of Indo-Pacific allies in particular. In the past year, the United States has taken positive steps toward strengthening its support to the Pacific Islands in particular, expanding its diplomatic presence and preparing to open a new USAID regional mission. The United States has promised more funding for climate forecasting as well. However, to truly distinguish itself as the ‘partner of choice’ for the region and to ensure Indo-Pacific countries are resilient to climate hazards, the United States should make a more significant investment in adaptation programs and climate finance. Key actions include fully funding the President’s Emergency Plan for Adaptation and Resilience (PREPARE), which calls for $3 billion annually for adaptation by FY2024. As I argued with a colleague previously, such investments “could both blunt China’s soft power success by providing alternative clean energy options while also slowing the damaging climate effects of China’s Belt and

59 A version of this has been a long-standing recommendation from the Center for Climate and Security, beginning with its promotion of a “Climate Investment Plan” for the Asia-Pacific in 2012, from “A Marshall Plan to Combat Climate Change in the Asia-Pacific,” accessed at: https://www.e-ir.info/2012/02/07/a-marshall-plan-to-combat-climate-change-in-the-asia-pacific/.

60 US National Security Strategy, Biden Administration, October 2022.
In addition to increased funding, the United States should explore ways in which to reduce the time and bureaucratic effort it takes for allies and partners to access climate adaptation and development funds. The relative speed with which China can deliver funds compared to the United States has been highlighted as a challenge by countries in the region.

**Explore areas of mutual climate security interest with China:** Climate-driven instability in China may have ripple effects that negatively impact US national security. For example, the interruption of manufacturing due to heat waves or flooding will likely hurt the US supply chain, similar to the impact of COVID-19 lockdowns in China. If China faces struggles domestically in maintaining food and water security, it may act more aggressively on the world stage to secure such resources elsewhere. Additionally, the United States and China likely share an interest in avoiding massive climate-related instability and migration in the broader Indo-Pacific region. Given these dynamics, the United States should look for opportunities—beyond emissions reductions negotiations—for potential cooperation with China in addressing climate security risks. There may be opportunities for sharing best practices in adaptation and resilience measures, particularly at the city-to-city level or via private sector relationships. The US could also consider reinvigorating collaborative HA/DR exercises with China, provided sensitive US military information and equipment can be adequately protected.

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Conclusion

Climate change is reshaping the national security landscape across the globe. In the years to come, climate hazards will regularly threaten critical infrastructure, strain governance capacity and impact geopolitics in many countries, including China. Building a better understanding of these dynamics is a critical step toward crafting better US climate and security policy toward China. Integrating a climate lens into analyzing China’s national security interests will strengthen Washington’s ability to both cooperate and compete with Beijing, and help prepare the United States for climate security challenges in the Indo-Pacific region going forward.
Annex I: Roundtable Participants

Center for Climate and Security Virtual Roundtable Participants

John Culver, Atlantic Council

Alex Hackbarth, E3G

Elsa Kania, Center for a New American Security

Ilaria Mazzocco, CSIS

Rod Schoonover, Ecological Futures Group

Christopher Schwalm, Woodwell Climate Research Center

Erin Sikorsky, The Center for Climate and Security, an institute of the Council on Strategic Risks

Jennifer Turner, China Environment Forum, Wilson Center

Jiayi Zhou, Stockholm International Peace Research Institute
Perry World House University of Pennsylvania Roundtable Participants

**Jacques deLisle**, Stephen A. Cozen Professor of Law, University of Pennsylvania

**LaShawn Jefferson**, Senior Executive Director, Perry World House, University of Pennsylvania

**Neysun A. Mahboubi**, Research Scholar, Center for the Study of Contemporary China, University of Pennsylvania

**Scott Moore**, Director of China Programs and Strategic Initiatives, University of Pennsylvania

**Guobin Yang**, Grace Lee Boggs Professor of Communication and Sociology, Annenberg School for Communication and Department of Sociology, University of Pennsylvania