



CLIMATE AND SECURITY IN THE INDO-ASIA PACIFIC

PART OF THE "WORLD CLIMATE AND SECURITY REPORT 2020" BRIEFER SERIES

A Product of the Expert Group of the
INTERNATIONAL MILITARY COUNCIL ON CLIMATE AND SECURITY

JULY 2020



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Cover Photo:

Brig. Gen. Stephen K. Curda (center), Commander, 9th Mission Support Command, visits with U.S. and Japan Ground Self-Defense Force (JGSDF) service members at Sagamihara Depot Mission Training Complex during exercise Imua Dawn 2016, Sagamihara, Japan, June 18, 2016. The operation provided opportunities for U.S. and Japanese forces to prepare to support regional populations in all Humanitarian Assistance and Disaster Relief (HADR) and Noncombatant Evacuation Operations (NEO).

STAFF SGT. CHANELCHERIE DEMELLO.

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INTRODUCTION

This report is part of a “Briefer Series” derived from the World Climate and Security Report 2020.¹ Specifically, it is an expanded edition of the “Indo-Asia Pacific” section of the World Climate and Security Report 2020, published on February 13, 2020.² As an expanded edition, it includes new data and information, significantly updated sections, brand new sections (such as one on Japan, and another on cities), as well as some text that appears exactly as it did in the previous report. It presents an overview of climate change-related threats to security in the Indo-Asia Pacific region. The report also provides ideas on how increased security community engagement, alongside development and diplomatic actors, can help minimize and manage these threats. While no single volume can comprehensively evaluate climate security dynamics in this vast and diverse region, this report provides a detailed snapshot of several key issues at the climate change and security nexus (hereafter labeled “climate security”). It also illustrates how incorporating climate change into security and defense policy and planning, incorporating climate security issues into development policy and planning, and engaging with security professionals working in this region, can support regional stability in a changing world. Finally, the report makes the security case for major *civilian* investments in climate change adaptation and mitigation.

The Indo-Asia Pacific region is highly exposed to climate change-driven hazards, including extreme hydrometeorological and heat events, sea level rise and acidifying oceans. These unprecedented hazards arrive in a region that already faces a broad spectrum of conventional, unconventional and hybrid security risks and challenges. This includes growing geostrategic competition such as maritime boundary disputes and military buildup in contested zones of the South China Sea, expanding military capabilities across many countries (three of which are seeking to develop nuclear triads), weapons of mass destruction (WMD) threats from North Korea, ongoing conflicts related to separatist movements and transnational violent extremist organizations, as well as piracy and serious organized crime. Climate change-exacerbated impacts such as increasing food and water insecurity, forced migration and displacement, disaster response and recovery that does not meet expectations, and broader economic impacts, can seriously complicate these existing security vulnerabilities - eroding coping capacities, increasing grievances and worsening underlying tensions and fragilities. Climate change impacts will interact with an evolving regional security landscape and likely give rise to new and potentially catastrophic risks,³ which could emerge in ways that are foreseeable but difficult to predict.

The emergence and ongoing consequences of Covid-19 have exposed serious societal vulnerabilities, even in wealthy nations, and demonstrated that foreseeable crises can have severe social, economic, political and security consequences. The current situation also illustrates vulnerabilities related to global interdependencies that may be exacerbated by a changing climate – including supply chain disruptions, cascading natural disasters that could complicate future relief efforts and drive instability, and changing disease vectors. Climate change is intimately linked to broader ecological change, and rapid ecological change can play a major role in stressing health and sanitation – with consequences for both regional and global security.

These dynamics also have direct implications for regional militaries and the broader security sector. This includes increasing demand for Humanitarian Assistance and Disaster Relief (HADR) operations due to the rising frequency and intensity of extreme weather events, and related crises. Military capabilities will likely be essential to supporting comprehensive disaster resilience, and the long-range planning functions the military provides within government can influence their responses to threats that accelerate in the medium term. In this context, regional security communities may play an important role in managing current and future climate-related stressors, alongside and in support of development and diplomatic actors. These climate-driven phenomena are largely foreseeable, given the strength and accuracy of climate models to date. Armed with this foresight, security communities have a Responsibility to Prepare and Prevent.⁴ This includes preparing for the unavoidable effects of climate change through advancing adaptation, and working with other sectors to prevent adverse security outcomes through significant climate mitigation.

Indeed, the degree to which climate change acts as a driver of regional instability in the Indo-Asia Pacific in the future depends on global emissions trajectories and regional energy investment decisions. Addressing climate threats at their source by comprehensively reducing emissions will help to avoid tipping points in the climate system, and associated security consequences in the region – which under plausible scenarios, could prove catastrophic.⁵

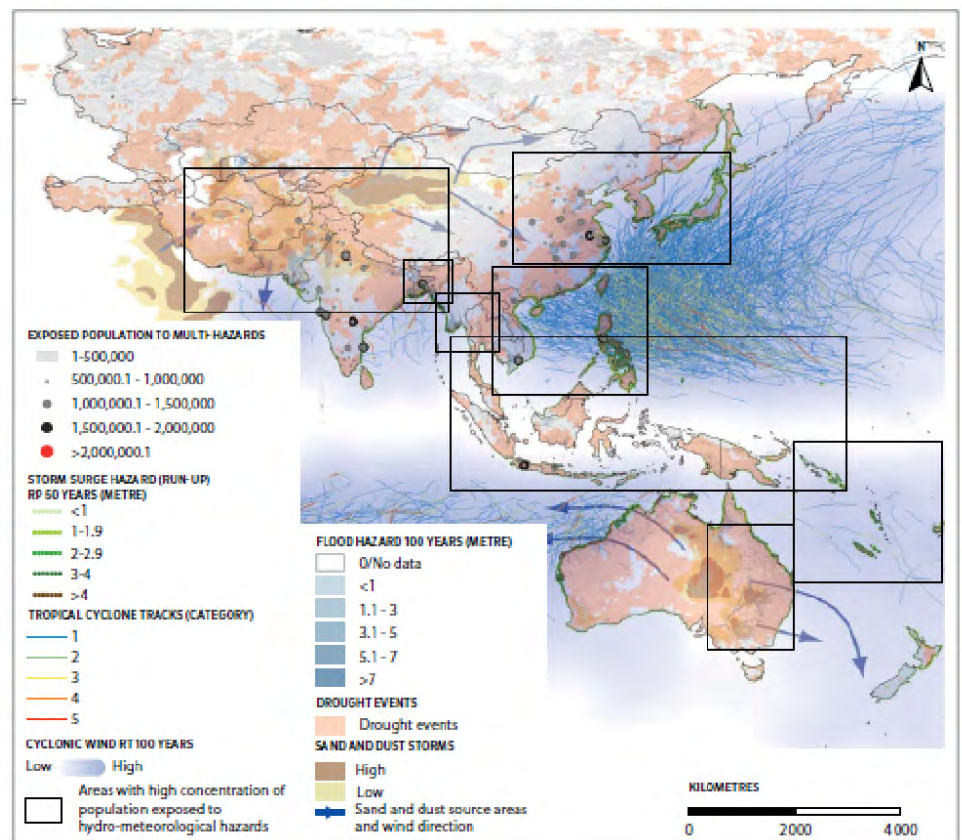
THE REGIONAL PICTURE

The strategic environment in the Indo-Asia Pacific region is complex and evolving. Ongoing issues and recent trends include intensifying geostrategic competition between the US and China, which is expressed in part through competition for bilateral security alliances and economic relationships across the region, maritime boundary disputes in the East and South China Seas, and challenges to international norms and rule of law. From North Korea's nuclear ambitions and threats to its neighbors, to the growing influence of non-state armed groups and transnational violent extremist organizations, including a significant ISIS-affiliated presence in the southern Philippines, security communities around the region face a range of conventional and non-conventional threats. Changing relationships between 'middle powers' in the region, such as a closer US-India partnership, or the deterioration of the Japan-South Korea relationship, also contribute to an evolving security landscape.

The vast Indo-Asia Pacific region is also on the front lines of acute climate-related challenges that may contribute to instability, forced migration and conflict. The fact that the Indo-Asia Pacific is the world's most natural disaster-prone region makes it particularly vulnerable. The region faces large-scale involuntary migration from extreme weather events. Dense populations near the coast face displacement, particularly in the Asia-Pacific "disaster alley." From 1970-2018, approximately 1.1 million people were killed in storms, floods and other disasters (excluding earthquakes/tsunamis) in the Indo-Asia Pacific, and people in the region are five times more likely to be affected by natural disasters than those elsewhere.⁶ Almost half of the 281 natural disaster events that occurred in 2018 were in the Asia-Pacific region, including eight out of the 10 deadliest.⁷ Asia's rising powers are the economic engine of the global economy, and responsible for over 50% of global greenhouse emissions. Across the Indo-Asia Pacific, populations are rapidly growing, urbanizing and industrializing.

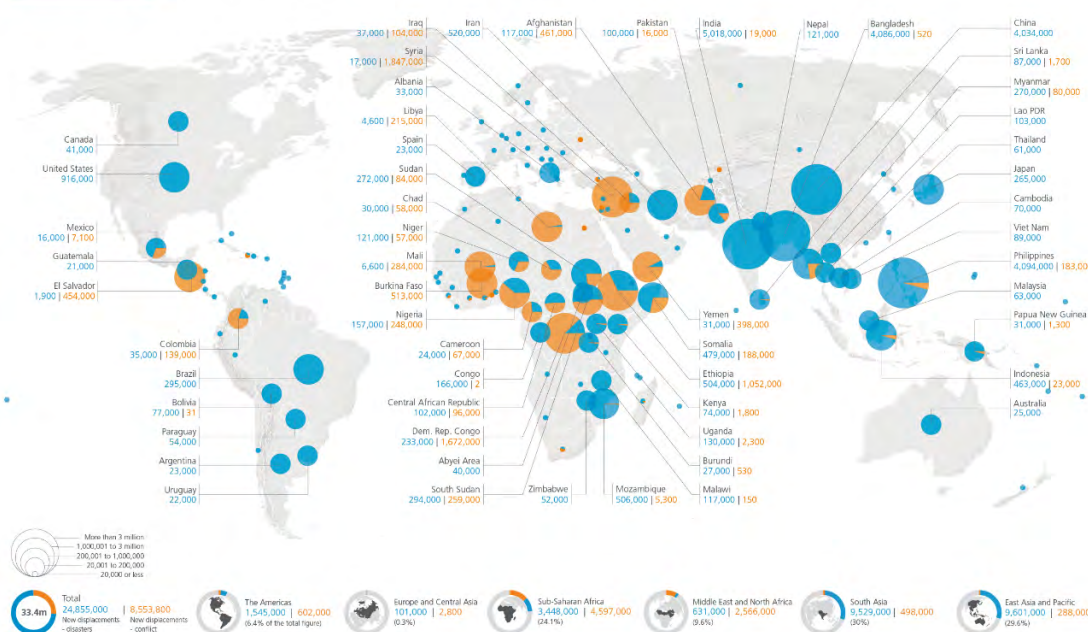
SOURCE: UN ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC, ASIAN AND PACIFIC CENTRE FOR THE DEVELOPMENT OF DISASTER MANAGEMENT INFORMATION, ASIA-PACIFIC DISASTER REPORT 2019.

FIGURE 1-11 Concentration of exposed population to climate-related hazards



Changes in the oceans pose a particular security threat to the Indo-Asia Pacific. The region's coastal megacities and its far-flung island nations are highly vulnerable to sea level rise, storm surge and saltwater intrusion into freshwater aquifers. Low-lying Pacific and Indian Ocean island nations face an existential threat from rising seas, with many unanswered questions around how they will manage the possibility of being erased from the map.⁸ Tens of millions residing less than a meter above sea level in the region's coastal megacities, such as Mumbai, Bangkok, Jakarta, and Ho Chi Minh City, face increasing difficulties from storm surge and coastal inundation.⁹ Populations in the Indo-Asia Pacific often depend on fishing for the bulk of their diet and income, and are likely to see increased vulnerability as warming increases.¹⁰ The region is experiencing ocean acidification, and rising temperatures are collapsing fisheries and altering migratory routes of economically vital fish.¹¹ The rapid depletion of fish stocks is already impacting food security across the Indo-Asia Pacific. This could further strain the international rules-based approach to fishing governance and could well increase tensions, violent confrontations and military brinkmanship over the multiple overlapping and competing territorial claims in the South China Sea.¹²

New displacements by conflict and disasters in 2019



Vulnerability to disaster-related internal displacement is highest in the Indo-Asia Pacific.

SOURCE: INTERNAL DISPLACEMENT MONITORING CENTRE, GLOBAL REPORT ON INTERNAL DISPLACEMENT 2020, GENEVA.
MAP CREATED BY MARIA TERESA MIRANDA ESPINOSA.

In Central Asia, melting Himalayan glaciers pose a grave threat to the freshwater supply for billions of people. The region is home to unstable states and international terror groups that make rising nuclear threats a particular concern. This confluence of strategic risks could have significant regional and global security implications.¹³

Central Asia is heavily reliant on climate-sensitive rural economic activity such as rain-dependent agriculture and pastoralism, making populations especially vulnerable to droughts, floods, and other natural disasters. As in other regions, the impacts of a warming climate on water security, food production, and the intensity of natural disasters in Central Asia is contributing to poverty and the displacement of rural residents to urban centers, as they pursue alternative livelihoods and food security. Melting glaciers present a significant flooding threat, and floods as destructive as the 2010 deluge that impacted nearly 20 million Pakistanis are projected to become more routine.¹⁴ Chronic conflict in countries such as Afghanistan and Pakistan has exacerbated vulnerability to climate stress, the impacts of which, in turn, help to create the conditions for continued violence.

SUB-REGIONAL CASES

Climate security exposure and vulnerability vary widely across the physical and political geographies of the Indo-Asia Pacific. The case studies below illustrate how climate impacts can act as a “threat multiplier” across the conflict and security spectrum.¹⁵ These range from strengthening violent extremist organizations in Afghanistan, to increasing confrontations over resources in the South China Sea, to endangering the human security of Pacific Islanders displaced by rising sea levels, and potentially disrupting supply chains essential to Japan’s economy. The case studies examine macro-level threats to Asia’s water supplies, from river systems originating in the ‘world’s water tower’ of the Himalayas, as well as city-level exposure and current capability gaps for managing water-related climate hazards. Following this survey of climate-related threats to stability in the Indo-Asia Pacific, the Australia and New Zealand militaries’ strategies for addressing climate change are outlined as examples of model practices for incorporating climate change into defense policy and planning.

AFGHANISTAN: A CONFLUENCE OF RISKS

Afghanistan has experienced a continuous state of conflict for over 40 years, leaving the country with deep internal divisions, limited central government and institutional capacities, political instability resulting in and from contested elections, ongoing humanitarian crises and a low ranking on the Human Development Index (170th out of 189 countries).¹⁶ The Taliban is increasing its territorial control and room for maneuver, as of this writing. Since the signing of an US-Taliban agreement in February 2020, the Taliban has increased violent attacks against Afghan forces, and a political settlement with the Afghan government that would bring the conflict to a potential close remains extremely challenging at present. Transnational violent extremist organizations (VEOs) such as Al Qaeda and the ISIS-affiliated Islamic State-Khorasan Province are also operating in the country, adding yet more conflict into the political and geopolitical landscape.

Further complicating the paths toward addressing this security environment are the security consequences of climate change, which are already manifesting in the country.¹⁷ Afghanistan is ranked the 26th most vulnerable nation in the 2019 Climate Risk Index, which assesses the level of exposure and vulnerability to extreme events.¹⁸ The geographic and topographical environment of Afghanistan predisposes millions of Afghans to natural hazards such as floods, droughts, avalanches, and landslides, a plight exacerbated by the impacts of climate change.

A critical reliance of over 80% of the population on rain-fed agriculture and livestock herding exacerbates Afghans’ precarious susceptibility to fluctuations in the climate. Changes in rain and snowmelt patterns (heavy rainfall has increased up to 25% over the past 30 years)¹⁹ have made flash flooding and runoff more pronounced. Paradoxically, these changes have led to drier conditions and increased drought, which has degraded the agricultural foundation of the Afghan economy.

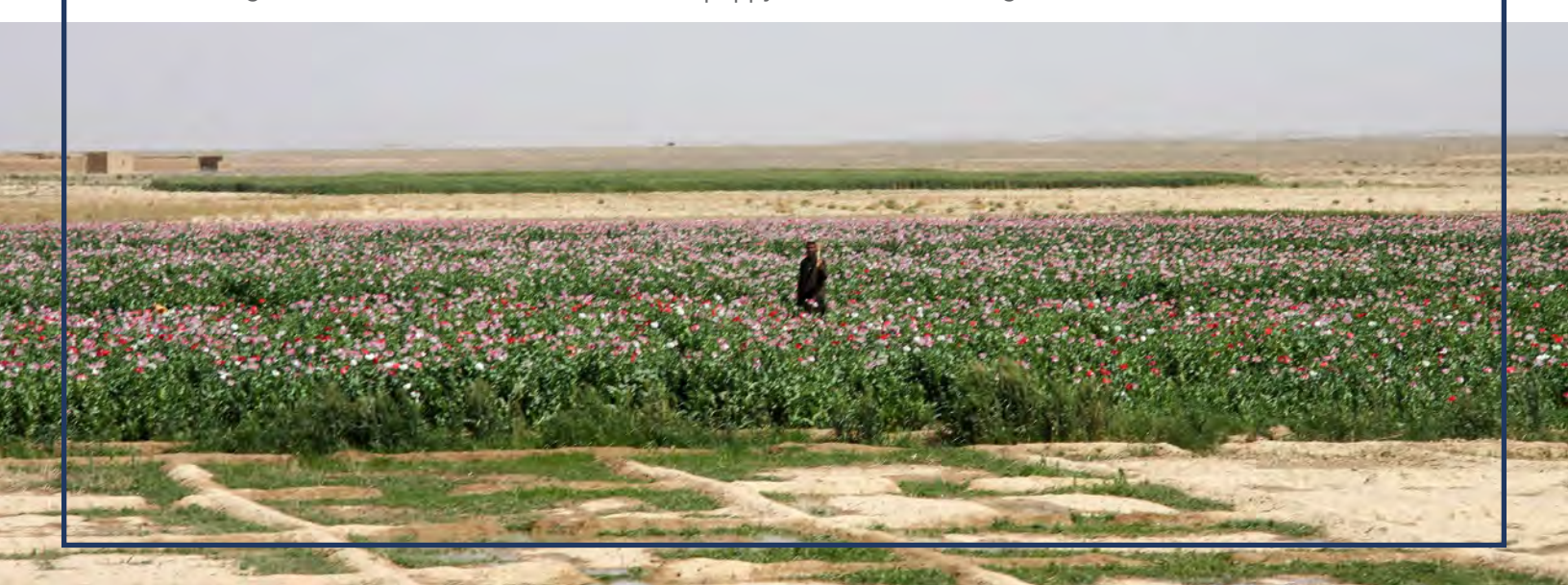
Forty years of internal conflict and governance dysfunction have been an important driver of Afghanistan's vulnerability. The past twenty years of conflict have led to the direct violent deaths of more than 43,000 civilians, alongside significant numbers of indirect civilian deaths due to displacement or destruction of infrastructure. This is within a total of over 157,000 deaths as of December 2019, of military, opposition fighters, police, contractors, humanitarian workers and others.²⁰ The extended and thus-far unsuccessful efforts to negotiate a sustainable political settlement to the conflict have contributed to ongoing tensions within the country and among neighbors, which will likely shape the security environment for decades to come.

Ongoing conflict has also damaged or destroyed large portions of the country's transportation and energy infrastructure and led to widespread deforestation.²¹ Critical water infrastructure has been destroyed or has fallen into disrepair leaving Afghanistan with the lowest per capita water storage capacity in the region.²² Afghanistan suffers significant community and inter-ethnic violent conflict over access to land, pastoral grazing rights and irrigation water. Armed opposition groups will likely take further advantage of these disputes as climate change makes them more acute.

THREE SPECIFIC AFGHANISTAN CLIMATE SECURITY TRENDS TO WATCH

RESILIENT DRUG TRADE. As the world's number one opium producer, Afghanistan's drug trade stands to further benefit from a drought-resilient, water-efficient, and highly lucrative poppy crop well-suited for projected climate changes. Farmers, armed opposition groups, and corrupt government officials will be further incentivized to oppose central government authority in drug-producing areas.²³ The Taliban thrives on the opium trade, which may strengthen their negotiating position or further disincentivize pursuing a peace deal with the Afghan government. A growing regional drug trade, which traffics Afghan opiates to all continents except south America via the Northern route (to Central Asia and Russia), the Southern route (Africa, Asia, Oceania and North America) and the Balkan route (toward Europe),²⁴ is driving serious organized crime in the Indo-Asia Pacific²⁵ and may continue to do so as climate increases supply dynamics.

An Afghani farmer stands in the middle of his poppy field in Delaram, Afghanistan, 2009.



TRANSBOUNDARY WATER INTRIGUE. Decades of war have not allowed the construction of adequate water-related storage infrastructure in Afghanistan to harness its five great rivers. Afghanistan's regional neighbors have benefited from the largely unimpeded discharge of these five rivers into their territories. As disappearing mountain snows and chronic drought deplete critical water supplies throughout the region, neighbors may consider "peace spoiler" gambits as a means to forestall Kabul's investment in its water infrastructure.²⁶

THE RESOURCE CURSE. Afghanistan has large reserves of lithium and a range of other minerals that are highly sought after in the renewable energy storage revolution. A country long devoid of abundant natural resources, Afghanistan could accrue tremendous economic benefit from supplying the growing global demand for lithium, for example.²⁷ Alternatively, Afghanistan could fall prey to the so-called "resource curse" associated with countries rich in natural resources that experience significantly less economic growth, democracy and development progress than countries with far fewer natural resources. Afghanistan already suffers from these challenges in spades and will have to navigate carefully the growing importance of strategic minerals as a force for desperately needed economic development while not inviting increased conflict, corruption and environmental degradation.

These challenges make achieving a sustainable peace in Afghanistan more complex. Instability on the ground impedes climate adaptation measures and licit economic development, creating a self-reinforcing dynamic as vulnerability to climate impacts and climate-related stressors in turn erode the security environment. This dynamic is not unique to Afghanistan; it affects many fragile and conflict-affected areas, and is particularly concerning where VEOs manipulate access to scarce natural resources to strengthen control over populations or drive recruitment, as in Afghanistan²⁸ and elsewhere. These converging risk factors complicate the country's future, and could well drive instability dynamics elsewhere across the Indo-Asia Pacific, including those related to serious organized crime and transnational VEO activity.

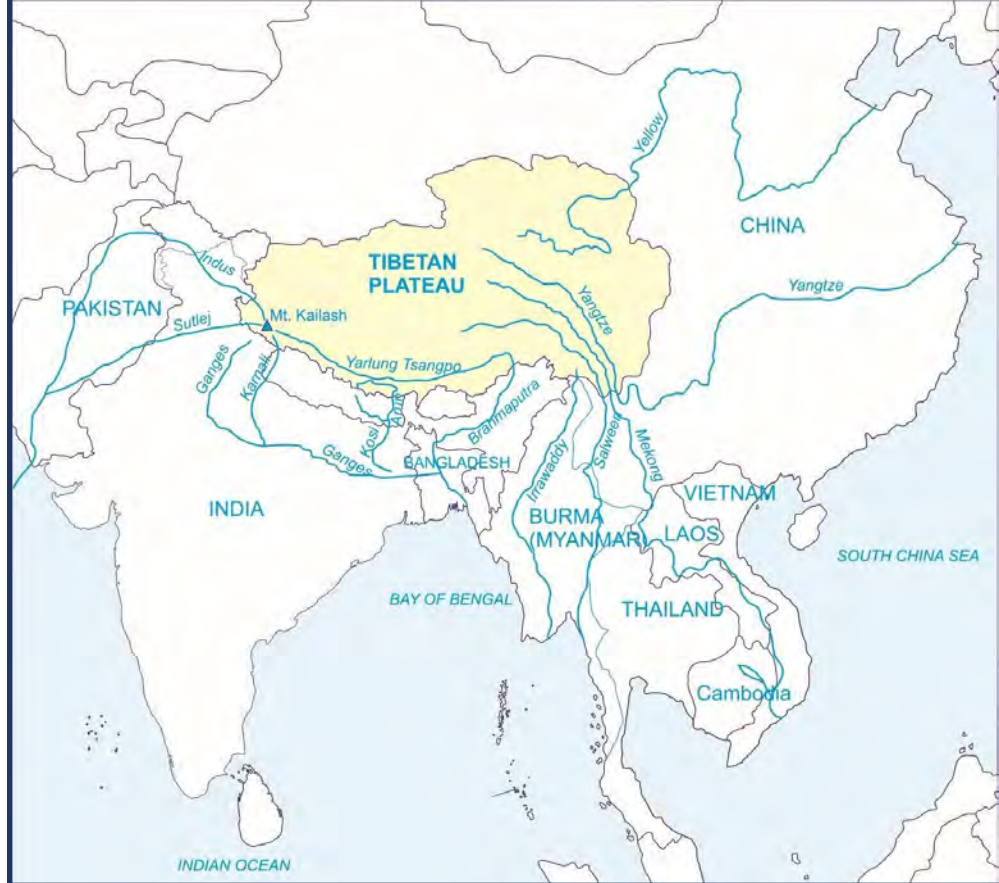
THE TIBETAN PLATEAU: CRUMBLING WATER TOWER OF ASIA

China is in control of the Tibetan plateau and the origins of Asia's major river systems. With 22% of the world's population and only 7% of its fresh water, and increasing water supply needs for domestic, agriculture and industrial growth, China's efforts to secure freshwater resources are in some cases contributing stress to its regional relationships.²⁹ Upstream dam-building and other control measures taken or planned for the Tibetan Plateau are contributing to regional hostilities among the 60 million people in China, Myanmar, Laos, Cambodia and Vietnam reliant on the Mekong river system for livelihoods and food security. The consequences for Vietnam-China relations are particularly acute, given ongoing maritime boundary conflicts and violent confrontations between the two countries in the South China Sea, and the importance of the Mekong Delta for Vietnam's food security.

Climate change complicates this picture primarily through placing significant strains on this transboundary water system.

The dramatic climate change impacts unfolding on the Tibetan Plateau are manifesting in water crises throughout the Himalayan region and greater Asia. Tibet is often referred to as the Earth's "third pole," as after Antarctica and the Arctic, the Tibetan Plateau holds the third largest reserve of ice on the planet. Melting has led to severe flooding, avalanches and landslides. Conservative projections indicate that at least 33% of Tibet's remaining 46,000 glaciers will disappear over the next 75 years.³⁰ That ice is the source of Asia's ten

major rivers supporting almost two billion people, many living on an immense arc of coastal river deltas reaching from the Arabian Sea (Indus), Bay of Bengal (Ganges, Brahmaputra), South China Sea (Mekong), East China Sea (Yangtze) and culminating as far north as the Bohai Gulf (Yellow). The more arid regions in Northern China are facing growing water insecurity, as demand from industrial cities grows and flow rates from the Yellow, Yangtze, and Mekong rivers decline.³¹



The stresses of climate change are exacerbating disputes that can turn dams and canals into sources of conflict. No water treaties exist between China, India and Bangladesh. In the face of that, there is a growing realization amongst downstream nations that China is developing formidable engineering and technical capacities to divert critical regional water supplies for its own growing needs.³² For example, New Delhi and Dhaka harbor serious security concerns that China has long term designs to divert water from the Yarlung Tsangpo River in southern Tibet (which turns into the Brahmaputra once it enters India) to the vast Taklamakan desert in Xinjiang.³³ Chinese engineers are testing techniques that may be used to build a 1,000 km tunnel intended to transform the barren Taklamakan into a breadbasket rivaling California's Central Valley, with serious consequences for Northeast India and Bangladesh.³⁴

Another project raising concerns in South and Southeast Asian countries is the geoengineering Sky River project, through which China intends to create artificial rainfall by seeding clouds across a 1.6 million km² area.³⁵ Based on studies from Tsinghua and Qinghai Universities,³⁶ this project could theoretically generate substantial additional rainfall, whose volume could total up to 7% of China's annual water consumption,³⁷ although some Chinese scientists have expressed doubts about the project's feasibility.³⁸ Such unilateral moves could be met with serious opposition from India, Bangladesh and others in the international community, potentially increasing regional tensions in an environment of ongoing climate disruptions.

CLIMATE SECURITY RISKS IN INDIA

India's core security challenges are driven by internal challenges and external competition and hostilities with its neighbors China and Pakistan. Sources of tension include the strategic partnership between China and Pakistan, which are nuclear weapon possessing states; competing territorial claims and occasional border confrontations with both; and Pakistan's inaction against terrorist groups based in its territory which carry out attacks in India. In this context, India's growing security cooperation with the US and allies in the Quadrilateral Security Dialogue (the Quad –including Australia and Japan) could significantly impact geostrategic relationships and power dynamics in the Indo-Asia Pacific.

Climate impacts in the Himalayas and Indus river basin could worsen the tense India-Pakistan relationship, further stressing the Indus Water Treaty and necessitating dam designs³⁹ that could lead to bad-faith actions, misunderstandings or manipulation of perceptions, e.g. around fears that India may intentionally release floodwaters or Pakistan may accuse India of this in the context of climate-driven flooding.⁴⁰ The Indus river system is particularly crucial to Pakistan's economy and energy security, and Chinese partnership to build a cascade of five dams in Pakistani-held Kashmir and Khyber-Pakhtunkhwa province under the Belt and Road Initiative has raised Indian sovereignty concerns, and threatens to deepen distrust and increase tensions between states.⁴¹ The complex nature of the two countries' joint dependence on the Indus river system creates a situation where tensions might more easily lead to hostilities, impacting the confrontation between the two countries.

India also has major internal security challenges that threaten state stability. Climate impacts could worsen these through pathways including increased tensions between states and the federal government; disputes between Indian states over water-sharing; rural issues like inequality, food insecurity and declining agricultural production; interstate and rural-urban migration; cross-border migration from Bangladesh, particularly in the context of the December 2019 Citizenship Amendment Act, that discriminated against Muslim migrants; urban violence; Maoist insurgency and territorial disputes in Kashmir.⁴²

India is highly exposed to climate hazards including heatwaves, increased rainfall and cyclone intensity,⁴³ and sea level rise.⁴⁴ By mid-century, these will impact the population by causing more severe drought, decreasing crop yields and increasing flooding events, including in coastal and other cities.⁴⁵ India's agricultural sector employs around 60% of the population, and has long been in crisis, deepening urban-rural inequalities and driving rural unrest.⁴⁶ Around 67% of India's population of 1.35 billion lived in rural areas in 2018;⁴⁷ rural and urban poverty rates are around 25% and 14% respectively, while 80% of India's poor live in rural areas.⁴⁸ Climate impacts will likely exacerbate threats to livelihoods and increase food insecurity, which could drive broader security issues. Three pathways for the food crisis translating to violence include 1) lowered opportunity costs of joining rebel groups (including India's Maoist insurgency); 2) increased opportunities for recruitment; and 3) accentuated and more widespread social grievances.⁴⁹ Instability and fragility related to economic and food security challenges can, in turn, decrease state capacities to address the underlying causes of these stressors, further increasing vulnerability and the risk of violence.⁵⁰

Issues around climate-related rural-urban, inter-state and cross-border migration may also drive friction and tensions; most states are nation-like entities organized on a linguistic basis, meaning inter-state population

flows can manifest as ethnic or sectarian conflict.⁵¹ High climate vulnerability in Bangladesh could drive migration into neighboring Indian states, as could the passage of India's 2019 Citizenship Amendment Act, which grants citizenship to Bangladesh's Hindu minority. This could exacerbate existing tensions in Northeast India and across the country, given existing anti-migrant politics in those states, including from indigenous communities whose separatist movements are concerned over such a population influx; these dynamics could in turn deepen the alienation of minority populations across India.⁵²

Security dynamics in some of India's most unstable regions intersect with climate-sensitive issues around water sharing and disaster risk and response. Climate change could drive increasing violence in the India-Pakistan standoff over Kashmir, which will see more floods, avalanches and other disasters as climate change increases glacier melt, extreme rainfall events and volatile river flows.⁵³ Inadequate disaster response could deepen the Kashmiri population's alienation and resentment toward the Indian state, as was the case after major floods in 2014, when local residents alleged neglect by the Indian military forces responsible for relief efforts.⁵⁴ Assam state in the Brahmaputra river basin, which is likely to experience more climate-related flooding, has experienced major protests in response to the December 2019 Citizenship Amendment Act, and although its separatist movement has waned, support for this cause and tensions with the central government may increase in the context of more frequent and severe flooding and disasters.⁵⁵ Interstate disputes over river water sharing could also be accentuated under climate change, potentially leading to the kinds of violence, protests and riots seen in the Cauvery river dispute, or contestations such as those over the Sutlej and Beas river waters that drove Punjab's Sikh insurgency in the 1980s.⁵⁶

Indus and Zaskar confluence in Kashmir



Urban violence in India has hitherto mainly taken the form of ethnic riots and violent protests, but climate-related events such as natural disasters, food price hikes or increased heat⁵⁷ could drive greater urban violence in the future, including violence between religious and ethnic communities.⁵⁸ Climate impacts on India's security situation are projected to be very serious even at 1.5°C mean temperature rise; exceeding that would mean far more severe impacts for human and national security.

Climate change is one of multiple risks that India is currently facing, and many of the country's hard security crises are driven primarily by other socio-political factors. But climate change looms large, particularly over the India-Pakistan and India-China relationships. In the context of increasing security tensions in South Asia and India's growing significance as a regional security actor, how successfully India manages climate-related challenges, and the impact they have on its domestic stability and national politics, will have a bearing on security not only in South Asia, but across the Indo-Asia Pacific and globally.

SOUTHEAST ASIA: FOOD AND WATER INSECURITY

Southeast Asia faces a broad set of security challenges including: multidimensional geopolitical tensions; contested maritime boundaries in the South China Sea; piracy in the Strait of Malacca and broader South China Sea; illegal, unregulated and unreported (IUU) fishing; and domestic insurgent groups and other sub-state organizations in many countries which, as of this writing, often align with the Islamic State or other VEOs. These security issues will likely be compounded as climate change raises sea levels, degrades marine food sources, undermines licit livelihoods and increases grievances with governments that may strain to meet additional demands for basic services provision, including disaster response.

Indeed, this region houses a daunting array of security challenges just as it grapples with dramatic climate change effects - and these trends often intertwine. This section outlines pathways through which climate impacts on natural resources, economic hubs and energy systems can affect domestic and regional security issues, highlighting ways in which these could drive fragility and instability within and among Southeast Asian countries.

WATER CYCLE DISRUPTIONS: SECURITY CONSEQUENCES EMERGING FROM MAJOR RIVER DEPLETION AND IRREGULAR MONSOON IN SOUTHEAST ASIA

Southeast Asian countries share a dependency for water on the region's major rivers – including the Mekong – as well as on the tropical monsoon. Their economies predominantly rely on natural resource exploitation (agriculture, aquaculture, forestry, mining) and are structured around rain-fed agriculture and rice cultivation. Climate change impacts on the water cycle will significantly affect its rural populations and could threaten food security in the region, which could have broader consequences for the security environment.

First, climate change might lead to periods of Himalayan glacial melt alternating with droughts. Dry soils are less permeable, and as a result, droughts could lead to faster runoff in waterways, generating floods. This could directly endanger subsistence livelihoods along these rivers. Local populations will also be exposed to landslides and soil erosion, accelerated by current deforestation rates. The Cambodian example is striking: since 2003, 23% of the Cambodian forest cover has been burned for agriculture, mining or coal production. On the other hand, the Mekong and Tonle Sap lake basins cover 80% of its territory, exposing a large zone to substantial river flooding risks.⁵⁹

In the longer term, major river flows will decrease with the cumulative effects of decreasing snow and rain falls on the Tibetan plateau, and significant glacier melting. The Mekong flow could shrink from 16% to 24% by 2050, affecting 60 million people.⁶⁰ As a significant part of South Asian agriculture is dependent on major river inputs, farmers will face increasing water shortages, closely connected with hydroelectric dam flow control.

Climate change impacts are not limited to changing weather patterns; the transition to low-carbon energy systems and growth of renewable energy is giving rise to new tensions and security dynamics. Hydroelectric dam flow control is also raising concerns as it could trigger interstate and interethnic tensions. Indeed, most dams on the Mekong and Irrawaddy rivers were built to provide neighboring countries – rather than local populations – with electricity. Chinese and Thai authorities largely invest in hydroelectric dams in Laos, Cambodia and Myanmar.⁶¹ With 72% of its electricity generation based on hydroelectric dams,⁶² Myanmar is highly dependent on river flow. Any disruption could hinder its energy security and ability to provide its population with essential development policies and programs, which could limit resilience to climate impacts. This constitutes a matter of concern for a country in which just 37% of the population had access to electricity in 2018.

Climate-related changes in the Tibetan plateau and major river disruptions will thus affect livelihoods – both food and energy security – and ecosystems in the area. With Southeast Asian countries' reliance on their river systems and agriculture, these changes could have important political and social

Submerged tree in the Mekong under a dark and cloudy sky during the monsoon, in Si Phan Don (4000 islands), Laos.



consequences. Indeed, the region is home to a large number of ethnic groups, with different religious and cultural backgrounds. These hundreds of ethnic groups – Laos alone hosts more than 150 – often have conflicting relationships. Recent events targeting the Rohingya minority in Myanmar illustrate the difficulties that countries in the region have had, in providing the many ethnic or religious groups with satisfying co-living conditions. Water or food shortages could reinforce tensions and could lead to displacements, with serious consequences for human security and the risk of violence.

Agriculture in the area is also characterized by dependency on rainfalls, and thus, on tropical monsoons. In Myanmar and Cambodia, where 80% of rice agriculture relies on rainfall, the monsoon provides 75% of annual precipitation.⁶³ The monsoon is highly influenced by the El Niño-Southern Oscillation (ENSO),⁶⁴ which is not deeply understood, and whose evolution in the context of climate change is highly uncertain. This leads to a problematic unpredictability of monsoon episodes. Furthermore, monsoon seasons are expected to get more intense and shorter, thus endangering local populations' current ability to harvest twice in one season.⁶⁵ Rain-fed agriculture will be directly affected by these disruptions, in addition to river droughts and high temperatures. It has indeed been estimated that each additional degree to the regional annual mean temperature could lead to a 10% decrease in rice yields.⁶⁶ More intense monsoons will also amplify the risks of extreme weather events, such as landslides and floods following heavy rains. These events will be harmful to agriculture and tourism, whether in rural or urban areas. Given widespread dependency on these sectors, such impacts could have disruptive social, economic, political and security consequences.

DENSELY POPULATED COASTAL AREAS VULNERABLE TO SEA LEVEL RISE: HUMAN DISPLACEMENTS AND ECONOMIC DIFFICULTIES

Southeast Asia is a region with large, often polluted, and densely populated cities. Among economic hubs, Dhaka (Bangladesh), Rangoon (Myanmar), Jakarta (Indonesia), Bangkok (Thailand) and Ho Chi Minh City (Vietnam) are located in deltaic or coastal areas, only a few meters above sea level. Sea level rise and subsidence, driven in these cities by intensive ground water extraction and heavy construction, add up. This leads to very high vulnerability to sea level rise for these economically essential cities, which anchor their countries' economies and stability.

In Vietnam, Ho Chi Minh City is home to 14% of the population and directly faces the consequences of sea level rise. The entire Mekong delta is less than 2 meters above sea level, making it particularly vulnerable to coastal flooding. This largely agricultural area will also have to manage the growing risks of groundwater salinization. Without adaptation, an estimated 590,000 hectares of the Mekong River Delta currently used for rice cultivation could be inundated or salinated by 2050, representing the area that produces around 13 percent of Vietnam's rice.⁶⁷ As one of the world's top rice exporters, the majority of which is grown in the Mekong Delta, this exposure increases demand for adaptation measures, including livelihood diversification from agriculture to aquaculture – although the latter is also vulnerable to climate impacts. Lack of resilience is driving urban migration from the Mekong Delta,⁶⁸ in part due to stress on natural resource-dependent livelihoods; this may add pressure to peri-urban areas and increase the likelihood of international migration.⁶⁹ According to the last IPCC report,⁷⁰ at least 50 million inhabitants will be exposed to climate change impacts across the country in 2040. By the end of the century, Vietnam could lose 10% of its territory, mainly around the Mekong and Hong deltas.



Floodwaters causing extensive damage to the manufacturing industry, in Ayutthaya Province, Thailand, 2011.

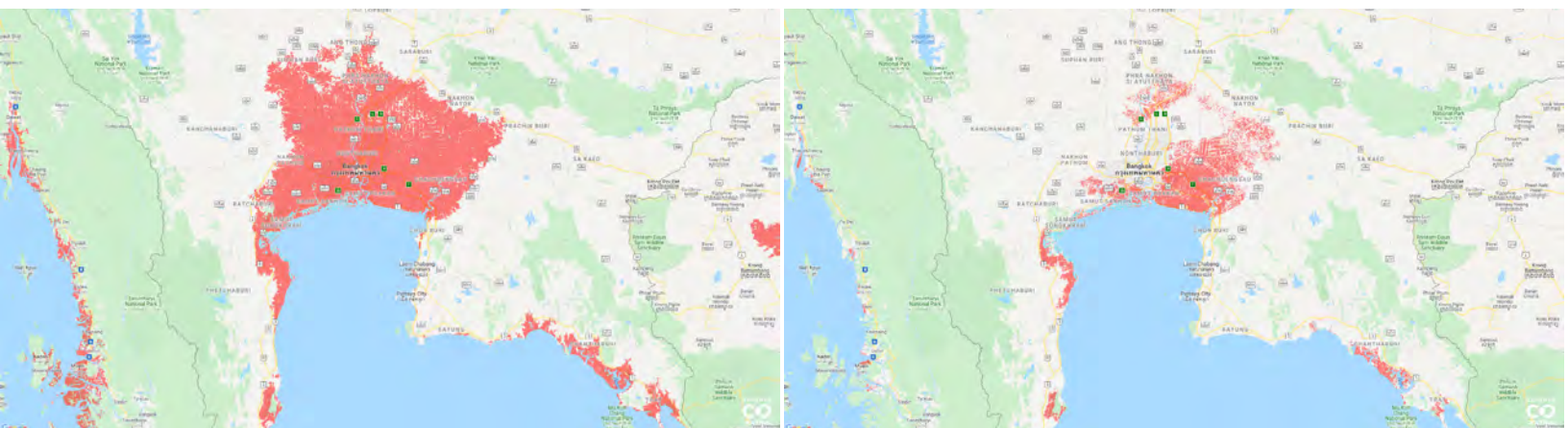
US MARINE CORPS PHOTO BY CPL. ROBERT J. MAURER.

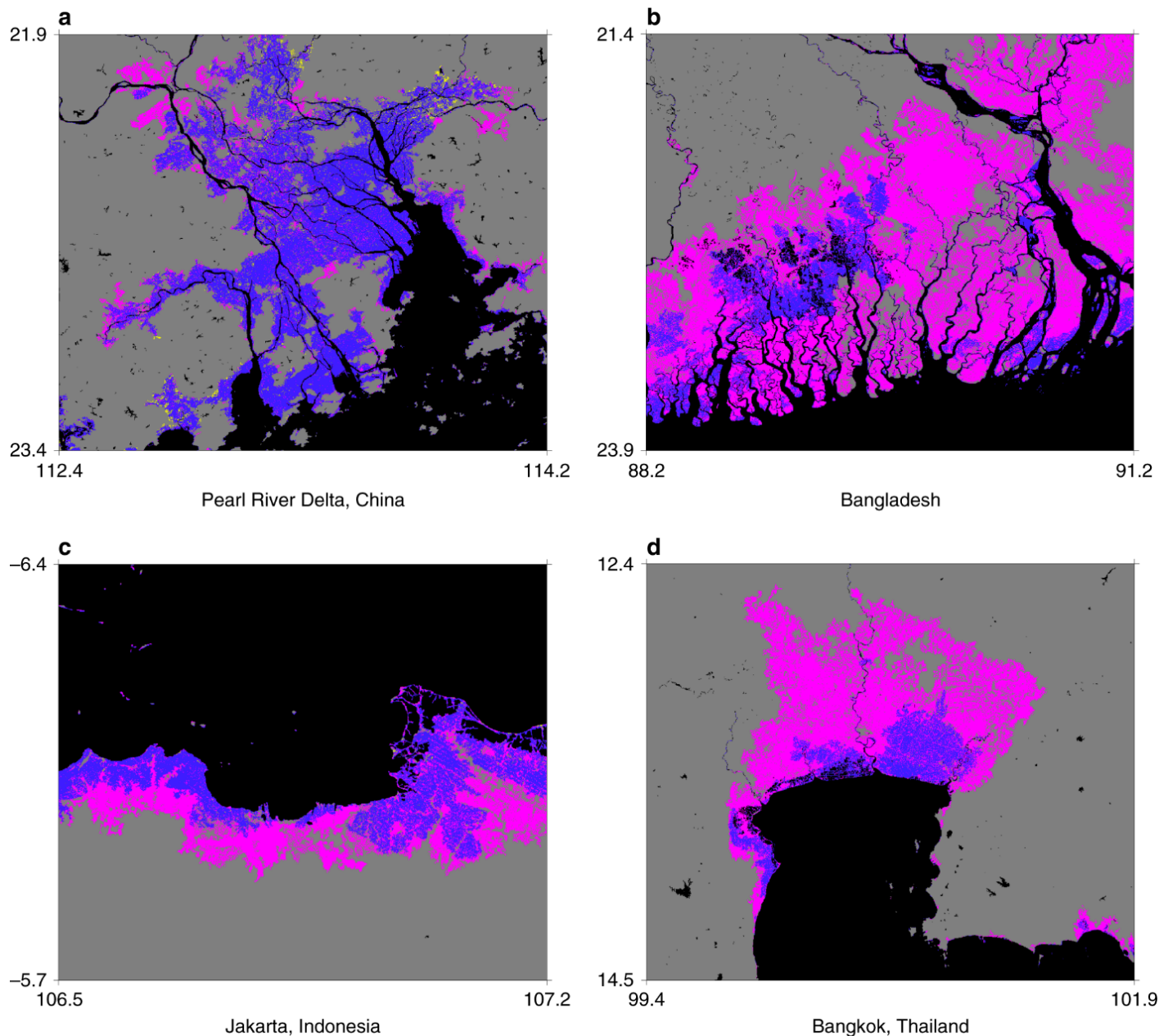
In Thailand, the current area exposed to coastal flooding will increase by 37% by 2100. Bangkok is subsiding by 10cm annually and at increasing risk of coastal flooding and inundation. It could lose 40% of its land;⁷¹ as with many large South Asian metropolitan areas, Bangkok's mean elevation is 1 meter above sea level. The city is the 7th most exposed to climate change impacts in the world.⁷² Recently, this diagnosis worsened, with new projections stating that almost the entire city could be subject to coastal flooding as early as 2050.⁷³

Tourism is a key economic sector for most Southeast Asian countries and will be directly affected by rising sea levels. Coastal erosion, beach inundation and salinity infiltration in water reservoirs will impact seaside hosting capacities. While Thailand's tourist sector accounts for 12% of its GDP, 23 of its 64 beach regions could disappear under water by 2100, losing no less than 46% of their surface in an optimistic perspective (RCP2.6 scenario) and up to 72% in a pessimistic scenario (RCP8.5).⁷⁴ The social and political consequences of this loss could be devastating and politically disruptive across the region.

Coastal flooding simulation for Bangkok, Thailand in 2050, indicating significant increases (left image) in land below projected average annual flood heights, over previous projections (right image), using the new digital elevation model CoastalDEM.

SOURCE: CLIMATE CENTRAL, 'REPORT: FLOODED FUTURE: GLOBAL VULNERABILITY TO SEA LEVEL RISE WORSE THAN PREVIOUSLY UNDERSTOOD', OCTOBER 29, 2019, [HTTPS://WWW.CLIMATECENTRAL.ORG/NEWS/REPORT-FLOODED-FUTURE-GLOBAL-VULNERABILITY-TO-SEA-LEVEL-RISE-WORSE-THAN-PREVIOUSLY-UNDERSTOOD](https://www.climatecentral.org/news/report-flooded-future-global-vulnerability-to-sea-level-rise-worse-than-previously-understood).





Coastal flooding simulation for Bangkok, Jakarta, Bangladesh and the Pearl River Delta, indicating land projected to be permanently inundated by 2100, using the new digital elevation model CoastalDEM and the median K17/RCP 8.5/2100 sea-level projection.

SOURCE: KULP, S.A., STRAUSS, B.H. NEW ELEVATION DATA TRIPLE ESTIMATES OF GLOBAL VULNERABILITY TO SEA-LEVEL RISE AND COASTAL FLOODING. NATURE COMMUNICATIONS 10, 4844 (2019). [HTTPS://DOI.ORG/10.1038/s41467-019-12808-z](https://doi.org/10.1038/s41467-019-12808-z)

With estimations forecasting a minimum 1-meter sea level rise by 2100, countries started implementing large scale relocations (the Indonesian government planning to build a new capital city) or medium-term solutions such as dams (in Thailand). It is a striking fact: millions of people will face coastal flooding in Southeast Asia, whether it be short-term or permanent flooding. With a rapid – yet disorganized – urbanization process, megacities in the region will have to deal with the dramatic consequences of combined risks such as sea level rise, extreme weather events and ever-rising temperatures.

RISING TEMPERATURES IN SOUTHEAST ASIA: A THREAT TO REGIONAL GROWTH

Southeast Asia's climate is hot and humid, shaped by high temperatures and the monsoon cycle. The region is both highly sensitive and highly exposed to climate change impacts. In a high-emissions scenario, the temperature is projected to rise 3.7°C by 2100.

The region's GDP depends on agriculture, industry, services, and tourism which contribute to the countries' continued economic growth. Nevertheless, a large part of the population remains extremely poor and lives on less than 2 USD per day.⁷⁵

This continuous and essential economic growth is directly threatened by climate change impacts and by steadily rising temperatures. Extreme heat waves can cause death in at-risk populations (such as the elderly), weaken individual metabolism and reduce one's ability to work, both in the fields for agricultural production and in cities. The wet-bulb globe temperature (WBGT) index helps determine the negative impact magnitude of warm, humid weather on human productivity. Studies indicate that occupational heat strain during work in heat stress conditions could decrease productivity by 2-6% on a country level, for each additional degree the temperature rises above 24°C, depending on the humidity rate.⁷⁶ Climate change has already had a negative economic impact, decreasing regional GDP by 4.6% in 2015, against a projected 1993-2015 baseline GDP if climate change had not affected the region.⁷⁷

Over the next three decades, Southeast Asia could lose 16% of its work capacity due to increased heat stress.⁷⁸ According to the Business as Usual GHG emissions IPCC scenario, climate change impacts could reduce the region's GDP by 11% by the end of the century. These consequences will have an even more significant impact in the most populated areas, i.e. the economic centers, which are also highly exposed to climate change (including Bangkok and Ho Chi Minh City). It is highly likely that some form of urban unrest may result from these increased risks, which could contribute to state and regional instability.

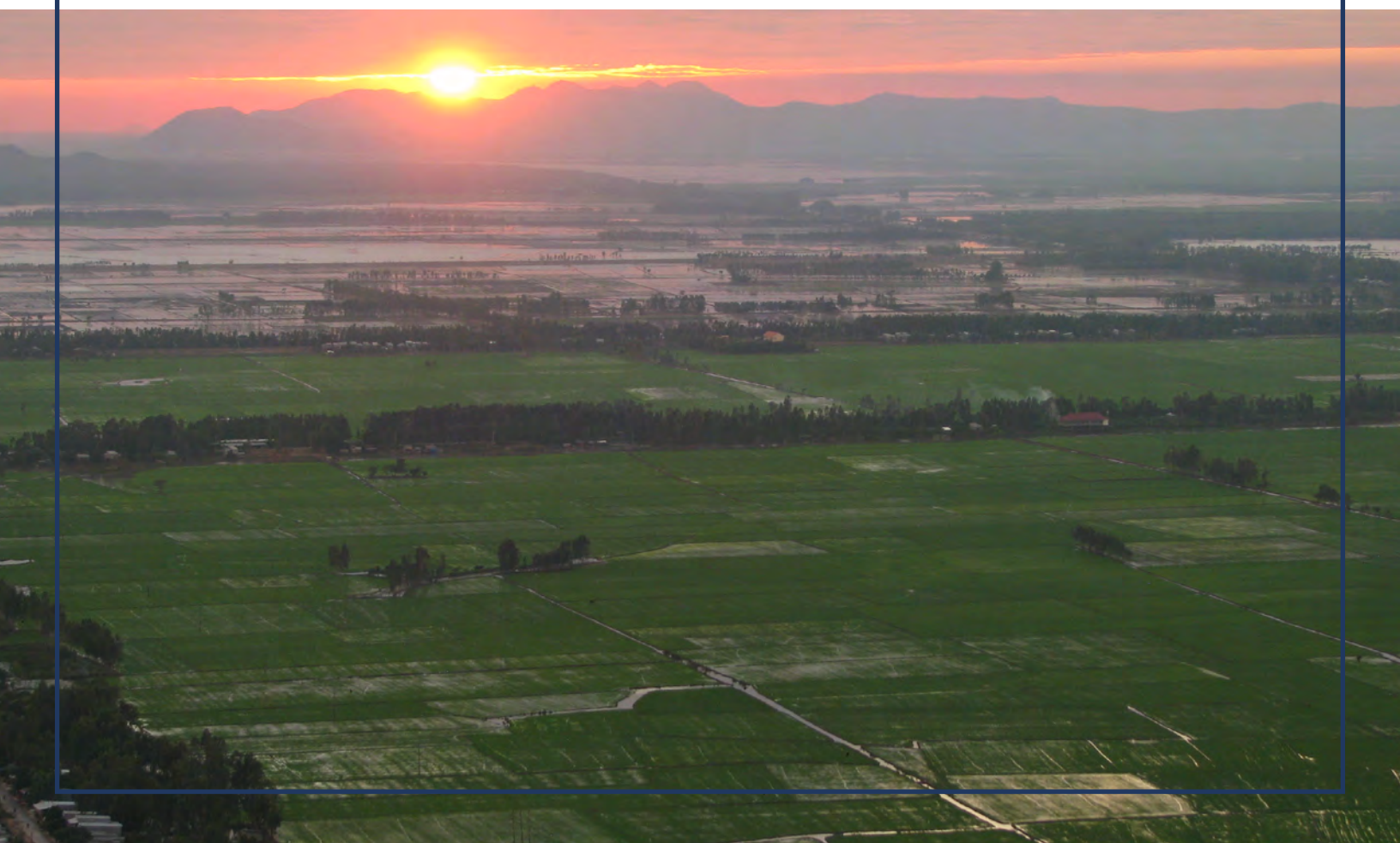
Taken together, this array of challenges to the underpinnings of stability and prosperity in Southeast Asia indicate the seriousness of climate change as a non-traditional security threat, and its relevance to militaries and regional security organizations. A comprehensive approach to national security that prioritizes homegrown issues and trans-regional threats, in combination with widespread recognition of climate change as a major threat in Southeast Asia,⁷⁹ supports firmly grounding climate change in the regional security agenda.

VIETNAM: FAILING FISHERIES A MAJOR CLIMATE SECURITY CHALLENGE

Vietnam's main national security issues are sensitive to climate impacts. Tensions with China over sovereignty in the South China Sea risk being exacerbated by sea level rise, which will strengthen the rationale for building up Vietnam's 49 outposts on submerged reefs and banks in the Spratly Islands.⁸⁰ Rising sea levels also threaten to flood and salinate the Mekong Delta, where economic productivity is already threatened by changing weather patterns and upstream hydroelectricity projects. This could further complicate existing tensions with China over water rights. Maritime boundary disputes between Vietnam's Exclusive Economic Zone and China's '9-dash line' claim are driven in part by oil and gas resource claims that have a bearing on Vietnam's energy security and economic performance, as well as fishing access that is essential to its economy.

Clearly, Vietnam's national interests are closely tied to the sea, and it is highly exposed to climate-related changes to the surrounding ocean. The country's more than 2,000 miles of coastline and its extensive river systems make it vulnerable to sea level rise and saltwater intrusion into freshwater aquifers and arable lands. This is particularly the case in the Mekong River Delta, Vietnam's breadbasket, where a quarter of the population lives. The nation's biggest climate challenge is the impact on its fisheries. Vietnam's renowned aquaculture production is concentrated in the Mekong River Delta where sea level rise is causing saline intrusion into brackish and freshwater hatcheries, depleting yields.⁸¹

Sunset over the endless paddy fields of the Mekong delta, looking out from Sam Peak, Chau Doc. Vietnam, 2008.



It is hard to overstate East Asia's global dominance in fisheries. China, Thailand and Vietnam accounted for 80% of world fishery production in 2008 and 50% of fishery export value. Asian populations often depend on fishing for the bulk of their diet and income. It is equally hard to overstate Vietnamese reliance on fisheries.⁸² From the mid-1980s, the country reformed its economy to rely less on agriculture and move toward services and manufacturing, under the Doi Moi reform program. Despite this, fisheries - including aquaculture - remain a critically important economic sector. The country has doubled the number of aquaculture farms since 2000, becoming the third-largest fishery and aquaculture producer globally, and increased its export turnover to USD\$6.5bn in 2015, a sixteen-fold increase over the previous 20 years.⁸³ A comprehensive study of the importance of fisheries to national economic and food security ranks Vietnam as the most sensitive country in the world.⁸⁴ Rising ocean acidification and temperature spikes are also contributing to collapsing reefs and fish stocks.

Migration of economically vital fish stocks into more northern waters claimed by China is an emerging security concern. Southeast Asia's open sea fisheries are located amidst a complex security environment featuring several overlapping maritime territorial claims. Vietnamese fishing vessels following the northward fish migration or reacting to fisheries depletion within their Exclusive Economic Zone (EEZ) risk confrontation with Chinese patrol vessels, inflaming existing maritime territorial disputes.⁸⁵ Escalating confrontation over fisheries in the South China Sea has led to violence in the past and risks a wider regional security conflagration potentially involving the United States and others.⁸⁶ Regular floods in rural areas have been a push factor driving farmers to pursue alternative livelihoods as fishermen. These boats travel far from Vietnam's EEZ, towards Malaysia, Indonesia, Palau, Australia, Papua New Guinea, Solomon Islands and France (New Caledonia)'s EEZs, creating tensions between governments, partly due to Vietnam's denial – presenting these borders crossing as unintentional – in what is known as "blue boats" phenomenon.⁸⁷

The regional security environment and geostrategic competition in Southeast Asia will be shaped by how successfully Vietnam negotiates climate-related pressures on its national interests, and how these considerations affect its engagement with partner nations.

JAPAN: ECONOMIC VULNERABILITIES TO REGIONAL CLIMATE SECURITY THREATS⁸⁸

Japan's security environment is much more volatile than is often appreciated. The country is directly threatened by North Korea's WMD program and ballistic missile capabilities. Increasing tensions with China, including over disputed maritime claims in the East China Sea, along with actions that could threaten the sea lines of communication in the South China Sea, have led Japan to reinforce its approach to defending its interests. Japan's relationship with South Korea deteriorated in 2018 over historic grievances and a territorial dispute; escalatory actions by both parties in trade and defense have complicated prospects for improving bilateral relations. Japan is also concerned about transnational threats including cyber threats and terrorism.

However, the impacts of an evolving security situation in the region are not limited to direct impacts on countries' national security, but may indirectly affect national security interests in other critical ways. For example, Japan has exceptional disaster response capabilities and is a regional leader in risk reduction. However, its most important economic sectors are dependent on both supply chain components and revenue from locations at risk from climate change, including key countries in Southeast Asia. The intersection of climate hazards and security risks is under-examined in many countries Japan's economy is entwined with, including Indonesia, the Philippines, Thailand, Vietnam and Malaysia.

With the third largest economy in the world and the fourth largest volume of trade, Japan's economy is inextricably linked to the fortunes of its trading partners and their vulnerabilities. Japan has developed the third-largest automotive manufacturing capability globally, as well as the world's largest consumer electronics industry. This wealth creation is heavily dependent on a few Southeast Asian countries for both growth markets and production of supplies for products sold in Japan. These dependencies create vulnerabilities which are important to assess for future risk and overall business continuity, such as those undertaken through Japan's Fundamental Plan for National Resilience, which examines potential supply chain disruptions from a range of sources, including natural disasters.⁸⁹

Assessments of Southeast Asia's climate-related economic vulnerability have been revised upwards, specifically when the broader impacts of climate change are considered together in the modeling. Despite the high degree of certainty that climate change will continue to generate unprecedented and disruptive weather extremes, most countries remain in a reactive posture, and are not adequately preparing for the scale and pace of threats climate change poses to their economies. These include risks to infrastructure for manufacturing and transporting goods, as well as energy infrastructure, such as manufacturing sites, power plants or ports, which are concentrated on coasts and river deltas in Southeast Asia and increasingly vulnerable to sea level rise, more destructive storm surges and coastal flooding and inundation.

High population densities along rivers and low-elevation coastal zones increase the disaster-related consequences for local populations, with the potential to cause mass casualties and loss of life. This set of circumstances could easily lead to forced displacement, disrupting livelihoods and economies, overwhelming state capacities and creating significant fiscal burdens that further erode resilience to escalating climate impacts. In addition, delayed or unevenly distributed disaster relief can aggravate political grievances, which may be expressed through, for example, local unrest or forced changes of government.

Longer-term degradation of and disruption to supply chains could be caused by a broader spectrum of direct and indirect climate impacts including strained government capacities or political fractiousness as countries balance the adaptation needs of industry and other national interests with limited budgets. Other relevant risks that are worthy of further assessment include longer-term climate-related economic contraction, due to climate impacts in Japan itself or in countries which supply or are the target markets for Japanese goods. These eventualities could both impair market demand and further limit finance capacities for implementing adaptation measures that protect industry alongside other users.

Awareness of climate-related exposures has contributed to Japan's momentum for engaging with the Financial Stability Board Taskforce for Climate-related Financial Disclosures (TCFD), through which

companies disclose risk to investors, lenders, insurers and others. Japan formed a TCFD Consortium in 2019, and has a higher number of institutions supporting TCFD than any other country.⁹⁰ However, without these wider dimensions of climate risk being taken into consideration in financial risk disclosures, the picture of systemic exposure to these threats is incomplete.

Japan is a major aid donor in the Indo-Asia Pacific, including through exporting expertise in disaster risk management. This has a significant positive effect on regional disaster resilience, and so Japan's status as an aid donor, underpinned by its economic heft, is an important climate security risk management factor. Because of this, as the regional security environment becomes increasingly complex, causes of additional stress on Japan's key industries are worth considering as potential drivers of insecurity, including the effects that climate change and climate-related insecurity may have on Japan's economy or trade partners.

AUSTRALIA: CLIMATE SECURITY LEADERSHIP DOWN UNDER

Australia's security interests are tied to its relationships with the US and China, and growing geostrategic competition between the two. Australia has contributed to counterterrorism efforts against the Islamic State, and faces regional terrorist threats from radicalization and returned foreign terrorist fighters. Regional instability issues related to crime, uneven economic growth and climate change are driving Australia's engagement with partners on humanitarian and security assistance, an area that will demand significantly more resources both domestically and internationally as climate impacts accelerate.

Australia also faces significant climate-related challenges domestically, which have led to severe disasters in recent years, prompting a fresh look at the issue from its defense establishment. The unprecedented wildfires in Australia in 2020, coming on the heels of Australia's hottest and driest year on record, were a climate-related catastrophe that captured the world's attention. The devastating fires were one of the most acute of many climate challenges Australians have faced in recent years. To cope with the crisis, the Australian Cabinet's National Security Committee deployed the Australian Defence Force (ADF) under the authority of its Australia's Defence Assistance to the Civil Community Arrangement. More than 6,500 ADF personnel supported Operation Bushfire Assist. The ADF was also supported by more than 300 regional military personnel from New Zealand, Papua New Guinea, Singapore and Japan.⁹¹

Australia is vulnerable to climate change, especially threats related to sea-level rise (coastal flooding, coastal retreat, erosion and beach losses), drought and wildfires.⁹² While the extraordinary response to the 2020 wildfires could catalyze a sea change in how the Australian military and security institutions around the world prioritize and plan for the consequences of climate change, it also showed the tensions within Australian politics. As a major coal exporter, the alternation between a Labour Party government and the Conservative government has caused profound shifts between a frontrunner position and a laggard on climate change policies.⁹³

Despite changing commitments within the government on the need for climate action, the military is still active with regard to preparing for climate impacts, and continues to consider its contributions to emission reductions.⁹⁴ Under the previous government, Australia enhanced its efforts in the field of climate security by crafting a Defence Environmental Policy outlining a 20-year vision, followed by a Defence Environmental Strategy that articulates how to achieve this vision, and the Defence Environmental Plan that sketches the necessary actions and responsibilities and corresponding timelines to successfully implement the strategy.

In the Australian Senate, the committee on Foreign Affairs, Defense and Trade conducted an inquiry in 2017-2018 into the implications of climate change for Australia's national security, which concluded that climate change presented a "current and existential national security risk." The inquiry's final report was prescient in recognizing climate change not only as a "threat multiplier,"⁹⁵ but also as a "burden multiplier."⁹⁶ The report found that coping with the effects of climate change will "place additional stress on military resources, including ADF estate, personnel, support systems, facilities, supplies, collective training activities and command structures."⁹⁷ At the national level, the Department of Foreign Affairs depends on the ADF for emergency assistance, as the military can deploy its personnel and equipment quickly in crisis-times. This assistance is often referred to as Defence Assistance to the Civil Community (DACC).⁹⁸

The USCGC Sequoia (WLB-215) maintains position off the Jinn Hsing Tsai No. 3 in the Philippine Sea while a joint boarding team conducts a boarding of the vessel to enforce fisheries regulations, Sept. 2, 2016. The U.S. Coast Guard and Australian Fisheries Management Authority boarded the vessel to ensure compliance with Western and Central Pacific Fisheries Convention regulations. U.S. COAST GUARD PHOTO BY CHIEF PETTY OFFICER SARA MOOERS.



With regard to climate change impacting on Australia's Defence's installations, Australian Air Vice Marshal Hupfeld, Head Force Design, told the Senate committee that climate change "can certainly directly affect Defence's operations, our bases, our infrastructure, our equipment and our personnel."⁹⁹ This is mainly due to numerous key defense installations being located at or just above sea-level.¹⁰⁰ The Ministry of Defence acknowledges climate change effects on the military, as well as the need to adopt 'greenification' measures to reduce emissions. The Australian Department of Defence aims to become a leader in sustainable environmental management by creating programs to build energy resilience, improve energy efficiency and reduce energy costs and greenhouse gas emissions.¹⁰¹

The Australian Department of Defence also recognizes that climate change will increase demand for the use of assets in support of HADR operations.¹⁰² Commitments extend beyond Australian territory, as it supports a range of partners in the region, and cooperates closely with the South Pacific Defence Ministers Meeting (SPDMM) alongside the Ministries of Defence of Chile, Fiji, New Zealand, Papua New Guinea and Tonga under the coordination of France.¹⁰³ Together with France and New Zealand, Australia coordinates civil and military engagement in HADR in the Pacific under the FRANZ agreement.¹⁰⁴

Addressing domestic and regional climate-related challenges requires a diverse set of capabilities for disaster response; these are not always easily interchangeable or transferable with traditional defense requirements.¹⁰⁵ Effectively integrating climate change mitigation and response into the way militaries operate, "will require new thinking about force structures, capability and equipment choices, and training and exercise regimes".¹⁰⁶

Attitudes toward climate change among Australia's political leadership have made addressing these challenges significantly harder, with turbulent responses to climate policies contributing to the ousting of multiple Prime Ministers and changes of government in recent years.¹⁰⁷ The contentiousness of climate legislation has compounded the country's physical exposure to climate hazards, for example in a failure by political leaders to recognize climate change's role in increasing wildfire risk and severity, or to adequately prepare for compound disasters, when drought, fires and floods overlap.

As climate change continues to have an increasing impact on strategic dynamics in the Indo-Asia Pacific, and Australia's security interests and relationships, the pressure on senior political leadership and the security community in Australia to provide sustained attention to the issue will likely grow.

NEW ZEALAND: A GROWING LEADERSHIP ROLE

New Zealand takes a regionalist approach to international security, participates in international counter-terrorism and WMD proliferation efforts, and actively supports regional security through the Pacific Islands Forum, the Association of Southeast Asian Nations (ASEAN) and UN frameworks. It emphasizes cooperation and capacity-building with partner nations, maritime domain awareness and border security.

This approach is informed by concern over transnational issues including crime and piracy, (including cybercrime, and human and drug trafficking), as well as climate change and domestic biosecurity concerns.

New Zealand also faces threats from radicalization and returning foreign terrorist fighters, and in March 2019 Christchurch suffered a white supremacist terrorist attack on two mosques that killed 51 people.

This regionalist approach also informs New Zealand's treatment of climate security risks, though it has recently played a more global leadership role on the issue. For example, the New Zealand Defense Force (NZDF) has shown global and regional leadership in developing a clear strategic response to climate threats and promoting global recognition of climate change as a security risk. New Zealand Defence Minister Ron Mark has made climate change and security a key element of his tenure. This includes the December 2019 release of their core policy "*Responding to the Climate Crisis: An Implementation Plan*," co-produced by the New Zealand Ministry of Defence and the NZDF.¹⁰⁸

At the domestic level, New Zealand's military installations are vulnerable to floods and rising sea levels, specifically the Devonport Naval Base, Ngataranga Bay and training areas in Whangaparaoa, Waiouru and Tekapo.¹⁰⁹ Military equipment is also at risk as temperatures rise and precipitation increases, and the Ministry of Defence allocated \$20 billion to update its military equipment to deal with climate change effects by 2030.¹¹⁰

3 Sqn supports Taupo Land Search and Rescue by providing an Iroquois to performing winch training and personnel movement during an annual exercise in the Kaimanwa Forest Park. 2011.



In addition to installations or equipment at risk, the New Zealand militaries are increasingly called upon to respond to climate-related disasters, both domestically and abroad. These missions not only compete with traditional security commitments and preparedness, but also present fundamental challenges to those charged with manning, training, and equipping their forces.¹¹¹ Climate change impacts the readiness of armed forces in the region by disrupting carefully choreographed training, exercise, maintenance and deployment cycles and by diverting resources needed to core national defense missions. Moreover, climate-related disasters also require a more diverse array of aid and skills within the NZDF, such as army engineers to help rebuild bridges damaged by torrential rain or floods.¹¹² Another example is increased NZDF capacity to counter disruptive maritime challenges, such as illegal, unreported and unregulated fishing (IUU) as a result of irregular fish migration caused by rising sea temperatures, in cooperation with member nations of the Pacific Islands Forum Fisheries Agency.¹¹³

New Zealand also has regional responsibilities to assist Pacific Small Island Developing States (SIDS) with pre- and post-disaster management caused by natural disasters exacerbated by climate change.¹¹⁴ These commitments to its neighbors are informed by New Zealand's stance that its national security is tied to stability in the Pacific.¹¹⁵ In order to maintain stability and support the SIDS, New Zealand initiates and supports dialogue within the South Pacific Defence Ministers Meeting (SPDMM).¹¹⁶ Additionally, New Zealand and its UN Mission in New York have supported the Pacific Islands Forum (PIF) efforts to secure UN Security Council consideration of climate security issues, and have worked closely with the UN Secretariat to improve climate security capacity within the UN.¹¹⁷ In addition to cooperation on climate and, in particular, Humanitarian Assistance and Disaster Relief (HADR), New Zealand will also support ASEAN's Vision On Disaster Management.¹¹⁸

NZ Army Engineers working at New Brighton beach to provide desalinated water for residents affected by the Christchurch Earthquake.



The international efforts of New Zealand's Ministry of Defense and NDZF are also focused on Antarctica, including the Ross Sea Marine Protected Areas.¹¹⁹ The continent is heavily affected by rising surface and ocean temperatures, and the NZDF provides assistance in the summertime, including to the US Antarctic Program.¹²⁰

The kind of leadership New Zealand displays on climate security is needed across Indo-Asia Pacific regional institutions to avoid a deteriorating security situation as climate impacts accelerate. Given the collective threat and benefits of joint action to preserve livelihoods and economies, support human security, push back on illicit economic activity and associated security threats, the benefits of such leadership should be clear.

CITIES: URBAN RISKS AND RESPONSES

As this report makes clear, the Indo-Asia Pacific region is highly vulnerable to extreme weather events associated with climate change. Seven of the top ten countries identified by the Global Climate Risk Index (CRI) as most affected by the impacts of extreme weather events over the period 1999-2018 are located in the Indo-Asia Pacific.¹²¹ Megacities in the Indo-Asia Pacific are often located along the coast where rising sea levels are exposing their populations to sudden and extreme weather conditions, including a higher frequency and intensity of coastal flooding.¹²² In recent years, urban flooding has afflicted millions of urban residents in, among others, Karachi, Bangkok, Manila, and Dhaka.¹²³

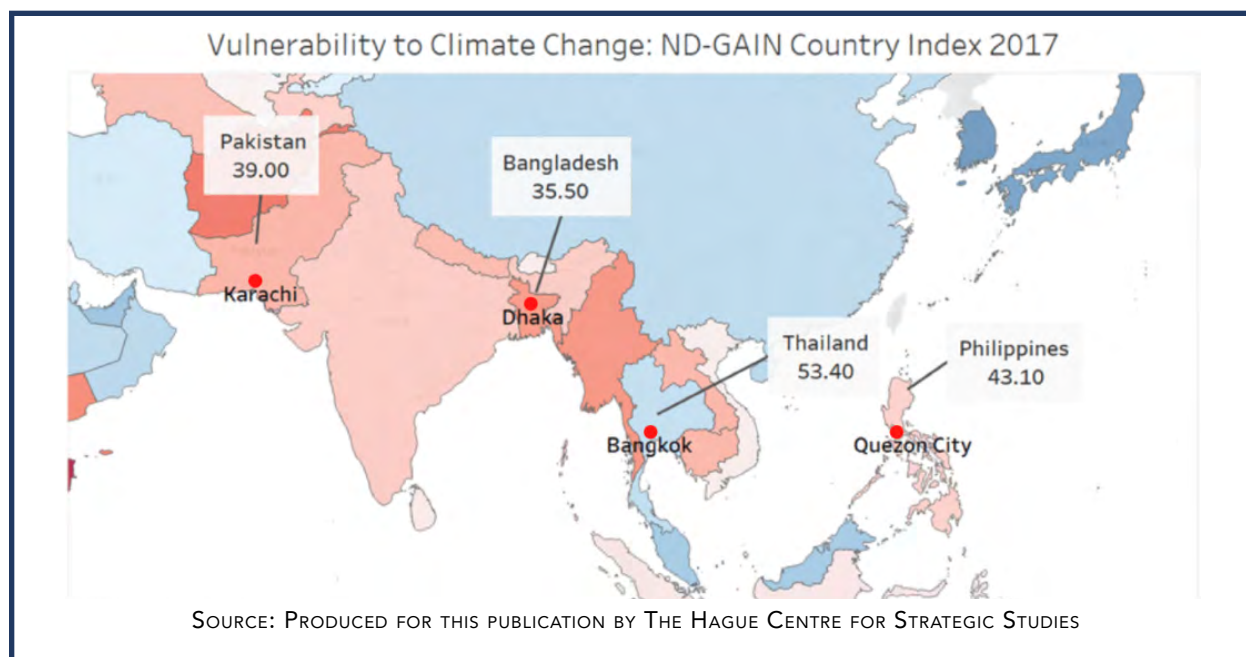
Significant differences in climate risk vulnerability remain across the Indo-Asia Pacific region as the capacity to respond to such risks varies extremely between countries. For example, Japan is highly exposed to extreme weather events. However, the country possesses substantial coping and adaptation capabilities that mitigate its ultimate climate vulnerability. Countries like Papua New Guinea, the Philippines, and Bangladesh, on the other hand, are more vulnerable due to critical deficiencies in coping and adaptive capacities.¹²⁴ This can partly be explained by the massive equity gaps in the Indo-Asia Pacific region. While the region contains some of the world's richest countries, such as New Zealand and Japan, it also includes countries with far lower Human Development Index scores.¹²⁵

Countries with higher inequality and more poverty will be most severely affected by the impacts of climate change.¹²⁶ In fact, among the most pertinent challenges for the Indo-Asia Pacific's expanding cities are urban poverty and inequality as well as social exclusion resulting from shortcomings in national and local governments' efforts to organize and adapt to rapidly increasing urban populations. Many suffer from poor infrastructure and facilities, including inadequate housing and basic services such as public water supply, sanitation, drainage, sufficient education, and health care.¹²⁷ The share of urban residents living in slums is 55 percent in Bangladesh and Nepal, 45 percent in Pakistan, and 38 percent in the Philippines. Moreover, a large number of people are employed in agricultural or informal sectors that offer little certainty, and critical gender disparities persist due to low female labor force participation.¹²⁸

Consequently, the region experiences some of the highest levels of exposure and vulnerability to the impacts of climate change, while also accommodating populations with the lowest capacity to respond and adapt.¹²⁹ Improved and sustainable city planning, accurate and timely early warning systems, and efficient urban governance could enhance resilience to the security impacts of climate change and extreme weather events. Improving urban governance requires a better understanding and communication of climate-related security risks, as well as better management to reduce the impacts of these risks.

URBAN RISK HOTSPOTS

Cities in the Indo-Asia Pacific region are especially vulnerable to the impacts of climate change, particularly those located on coasts and deltas. Security risks can arise in megacities that experience rapid urbanization and high income and development inequalities. These densely-populated areas contain large numbers of people living in urban poverty and inequality, and who suffer social exclusion from basic infrastructure and facilities, which could serve to protect against and mitigate the impacts of floods. These include adequate housing, education and employment, water supply, sanitation, drainage and waste infrastructure, transportation networks, health services, and social safety nets.¹³⁰



The following section analyzes a number of Indo-Asia Pacific countries and cities, identified based on a combination of demographic developments and climate change vulnerability and risk criteria. The countries most affected by the impacts of climate change in the past two decades were selected based on their rankings in the Global Climate Risk Index 2020 and the University of Notre Dame's 2017 GAIN Country Index.¹³¹ Secondly, hazard exposure in these countries was calculated based on their urban population ratio, the number of people living in the country's largest city, as well as their projected population growth for the year 2030, to account for trends in urbanization.

Based on these criteria, four cities from the Indo-Asia Pacific region in which the population is highly vulnerable and experiences weak resilience to the impacts of climate change stand out as ‘hotspot areas of risk’ in the Indo-Asia Pacific region: Dhaka, Karachi, Quezon City and Bangkok. A matrix overview of the types of risk these cities experience and their capability gaps are presented in Table 1 below.

Table 1. Snapshot overview of four megacities in the Indo-Asia Pacific vulnerable to climate-related threats

	Country	City	Inhabitants in City Area (Million)	Climate Threat	Non-climatic stress factors	Current capabilities	Capability gaps	Strategic policy hurdles
	Thailand	Bangkok	10.1	Floods; Heavy rainfall; Salt water intrusion from the ocean in the dry season	Population growth	Comprehensive water management plan (2018); Water obstructing measures such as water diversions and water storage infrastructure (Limited river discharge into the Gulf of Thailand during high tide and riverbanks can overflow)	Ineffective flood drainage systems and prevention measures	Implementation - water management plans are relatively recent (2017)
	Pakistan	Karachi	11.6	Earth quakes; Excessive rainfall; Droughts; Landslides; Sea level rises; Floods	Population growth; Low human development; Poverty; Gender inequality	National flood plans and management strategies; Flood protection infrastructure includes embankments, spurs and water reservoirs.	Inadequate and ineffective water policies; Poor water management infrastructure	Insufficient flood planning and strategies due to ineffective coordination; Lack of integrated and comprehensive flood management strategies.
	Bangladesh	Dhaka	10.4	Flooding; Excessive rainfall; Cyclone and storm surges	Population growth; Population density; Rural-urban migration; Poverty	Disaster Risk Reduction framework (2012); Emergency Response Management; Standing Order on Disasters	Improved drainage system; Pumping facilities; Embankments	Planning and design of flood protection;
	Philippines	Quezon City	2.9	Tropical cyclones and storms; Excessive rainfall; Landslides; Floods; Sea level rise; Increased water threat; Disturbed water budgets	Urbanization; Population density; Poverty	National and Local Climate Change Action Plans: NCCAP and LCCAP; Early warning systems and rain measurement instruments; Slope, shoreline and seawall protection (structural mitigation strategies)	Early warning systems; Disaster preparedness; Flood management systems; Information dissemination; Long term water security capacity	Flood forecasting and monitoring; Policy implementation and enforcement; Centralized authority and command; Coordination among local units and external organisations

SOURCE: PRODUCED FOR THIS PUBLICATION BY THE HAGUE CENTRE FOR STRATEGIC STUDIES

The section below outlines the climate security vulnerabilities, particularly related to water management, of the four megacities described in Table 1 in more detail.



SOURCE: PRODUCED FOR THIS PUBLICATION BY THE HAGUE CENTRE FOR STRATEGIC STUDIES

DHAKA, BANGLADESH.

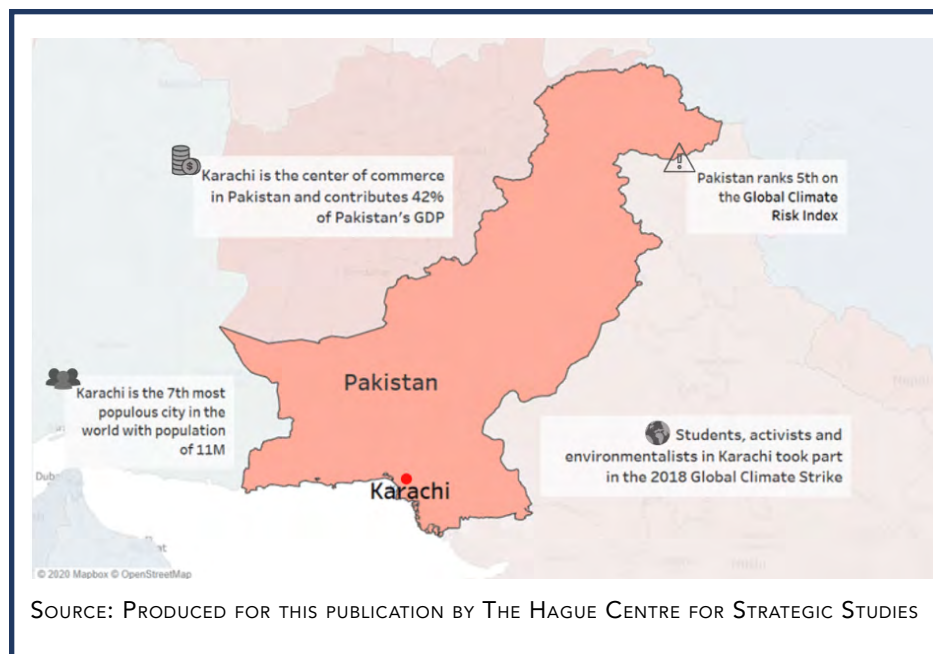
Bangladesh ranks seventh on the Global Climate Risk Index 2020, indicating the country's extreme vulnerability to climate change. Dhaka, the capital and only megacity in the country, will continue to be acutely affected. It is exposed to excessive rainfall, flooding, cyclones, and heat and cold waves.¹³² These environmental stressors combine with non-

climatic factors such as extreme population density, poverty, rural-to-urban migration, uncoordinated urbanization and lack of basic public services to increase exposure and vulnerability.¹³³ In response to these environmental threats, the government of Bangladesh passed the Disaster Management Act in 2012 to set the framework for the country's current Disaster Risk Reduction (DRR) policies and Emergency Response Management (ERM) plans. The Standing Order on Disasters describes the roles and responsibilities of the relevant government bodies at the central and local level.¹³⁴ In 2015 the World Bank approved funding for the Urban Resilience Project, supporting the government's capacity to reduce disaster vulnerability of future infrastructure construction in Dhaka and Sylhet.¹³⁵

KARACHI, PAKISTAN.

Pakistan ranks fifth on the Global Climate Risk Index of countries most affected by climate change from 1999 to 2018.¹³⁶ The largest metropolitan area in Pakistan is the megacity of Karachi, with over 11.6 million people.¹³⁷ Pakistan's coastal regions, specifically the Karachi metropole, suffers from erosion, cyclones and floods due to a steady rise in sea level.¹³⁸ The potential impact of these risks on security is compounded by significant population

growth, high levels of poverty and gender inequality.¹³⁹ Pakistan's current flood management system consists of national flood policies and strategies for flood management intended to improve forecasting and flood infrastructure, and various flood institutions that either focus on flood risk or crisis management functions.¹⁴⁰ Near Karachi, river and coastal flood protection infrastructure includes embankments, spurs and water reservoirs that are used to regulate flood flows. However, flood protection infrastructure is often old and insufficiently maintained, water resources are poorly managed, and water policies have not been effectively designed, implemented, or coordinated between institutions. For instance, flood policies and strategies for river floods are frequently used in response to flash floods. Also, no holistic basin-level flood management plan has been formulated on the national level.¹⁴¹ Moreover, while policy frameworks and institutional mandates are designed to achieve comprehensive Disaster Risk Management (DRM), government interventions remain primarily responsive in nature rather than focusing on preparedness and risk reduction.¹⁴²



QUEZON CITY, THE PHILIPPINES.

The Philippines ranks second in the Global Climate Risk Index of the countries most affected by extreme weather events in 2018 and fourth on the countries most affected by climate change from 1999 to 2018.¹⁴³ The largest metropolitan area in the Philippines is Quezon City (Metro Manila) with approximately 2.9 million inhabitants.¹⁴⁴ Due to its geographical composition and location in the world's most cyclone-prone region, the Philippines is highly vulnerable

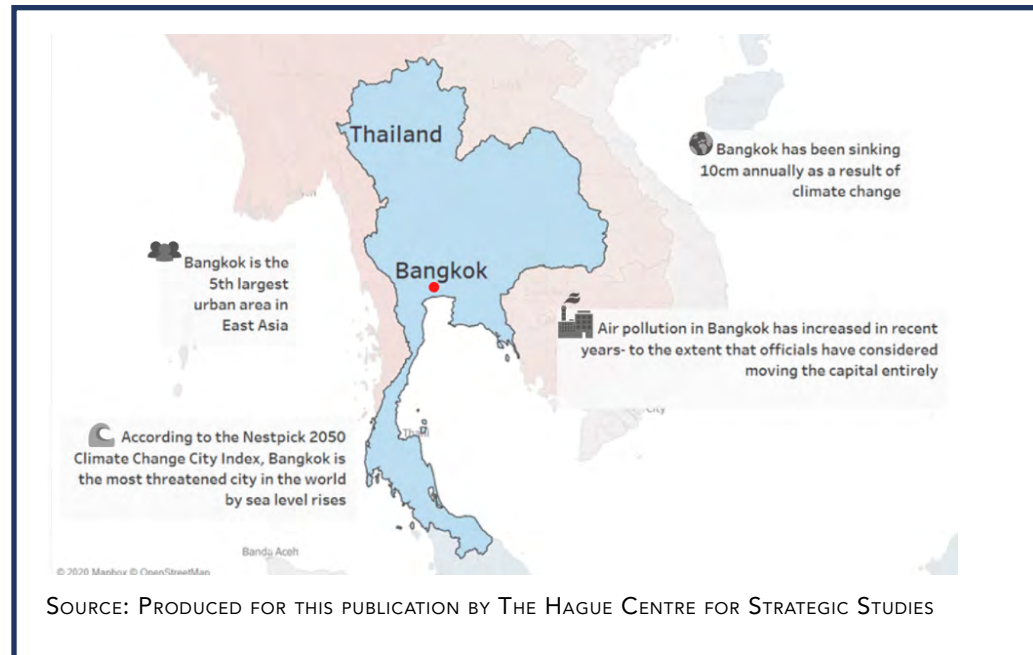
to the effects of climate change.¹⁴⁵ Quezon City is particularly vulnerable to the increased frequency and intensity of tropical storms, extreme heat events, extreme rainfall events, landslides, sea level rise, increasing ocean temperatures, and changing water availability. The most pertinent challenge is the frequency and intensity of tropical storms, including excessive rainfall, cyclones, and typhoons, that lead to coastal floods.¹⁴⁶ The impact of these security risks is exacerbated by urbanization, population density, and the fact that poverty and inequality remain significant challenges in the Philippines.¹⁴⁷ In rural and coastal municipalities, natural hazards often have destructive socio-economic effects that cause a continuous cycle of poverty and inequity.¹⁴⁸ In addition to both National and Local Climate Change Action Plans, the Philippine national government has formulated policies aimed at building long-term (and community-based) resiliency to the impacts of climate change and disaster risk preparedness strategies.¹⁴⁹ Quezon City has endeavored to improve early warning systems and rain measurement instruments and strengthened slope protection, shoreline protection, and seawalls as part of structural mitigation strategies.¹⁵⁰ Moreover, the city has integrated disaster risk preparedness and reduction as well as climate change adaptation into its local development strategy and initiatives in order to strengthen the capacity of its community to prepare for and manage the impacts of disasters, such as tropical storms.¹⁵¹ Quezon City shows resilience in relation to its response capacity. However, in terms of preparedness, particularly risk management and vulnerability reduction, significant improvements can be made.¹⁵² Flood forecasting and monitoring can still be more accurate and timelier, and first responders often lack sufficient training and exercises. Moreover, policy implementation and enforcement of disaster risk reduction policy and adaptation strategies and initiatives remain deficient.¹⁵³ Specifically, challenges remain to centralize authority and command capabilities as well as coordination among local units and external organizations in order to achieve coherence and harmonize policies.¹⁵⁴



BANGKOK, THAILAND.

According to the Global Climate Risk Index 2020, Thailand is among the top ten countries most affected by extreme weather events. Bangkok, the rapidly growing capital city of Thailand, is situated in a flood-prone area. The city's vulnerability to flooding is attributable to its geographical characteristics, such as the low-lying terrain, seasonal heavy rainfall, tidal bores and soil subsidence. Bangkok has 20 flood-prone locations and four flood-sensitive districts. The city's

climate-specific vulnerabilities and recurring floods can be attributed to ineffective flood drainage systems and prevention measures. In 2017, the Bangkok Metropolitan Administration announced a comprehensive set of 28 flood protection projects to tackle the danger of inundation.¹⁵⁵ Despite these ambitious projects, the city remains vulnerable on several fronts. First, while the adopted protection measures might appear promising, it will take years for some of these large-scale infrastructure projects to be constructed and for them to become fully operational. Second, a lack of cooperation between upstream provinces, inside and outside Thailand, has limited the effectiveness of water-slowing strategies. Third, illegal construction of residences on greenfield sites further obstructs the drainage of floodwater from the city.¹⁵⁶ Fourth, combined risks can create devastating scenarios in case of floods from the Chao Phraya River and high tides in the Thailand Gulf that reduce the possibility to evacuate water.¹⁵⁷



TRENDS AND INSTITUTIONS

Climate change will add to existing human development, economic and security challenges in the region by, for example, driving migration and forced displacement, and degrading coastal infrastructure, including military infrastructure. Managing these challenges requires effective institutional frameworks and regional governance bodies, to coordinate responses such as military contributions to Humanitarian Assistance and Disaster Relief (HADR) efforts. Equally, ensuring the rule of law through international legal frameworks such as the UN Convention on the Law of the Sea (UNCLOS) will have a significant bearing on stability in a changing physical and geopolitical environment.

CLIMATE MIGRATION: A REGIONAL CHALLENGE

Migration is an important climate adaptation strategy to avoid hazards, but the phenomenon (and responses to it) can also increase drivers of fragility and instability. Large and sudden influxes of migrants, coupled with intolerant policy responses from receiving areas, can contribute to increasing intercommunal tensions, particularly in ethnically-fractionalized contexts.¹⁵⁸ Where population movements and receiving area responses worsen underlying social and political tensions between communities, they can exacerbate existing conflicts and increase the potential for new ones. New arrivals with few resources can also swell informal settlements, which may be constructed on marginal lands such as floodplains that are particularly vulnerable to climate impacts.

Climate-related instability can also act as a push factor for further displacement. This can increase the number of migrants relying on human traffickers to cross borders, which can in turn contribute to the strengthening of serious organized crime, undermining the authority of the state. Limited livelihood options and increasing poverty may also increase recruitment to organized criminal or extremist groups.

Sea level rise will continue to drive migration in the Indo-Asia Pacific, with human security consequences for displaced people and communities, and potential increased friction in receiving areas. Kiribati, a vast Pacific island chain of tiny coral atolls barely two meters above sea level at their highest, is a nation facing an existential territorial crisis. In 2014, intent on the future survival of his nation, former Kiribati President Anote Tong purchased six thousand acres over 1,000 miles away on Fiji's second largest island.¹⁵⁹ The UN IPCC's 5th report made Kiribati's fate clear, stating that small islands in the Pacific and Indian oceans face total submergence. Low lying islands will be uninhabitable well before they slip under the sea due to acute coastal flooding and erosion resulting in saltwater intrusion into freshwater aquifers.¹⁶⁰ Tong stated, "The message was loud and clear: whether you believe it or not, whether you are going to do anything about it or not, our fate is sealed. At some point within this century the water will be higher than the highest point in our lands."¹⁶¹

In 2013, Kiribati citizen Ioane Teitiotia applied for asylum in New Zealand claiming that sea level rise put his family's lives at risk in Kiribati. On January 7, 2020, a landmark ruling by the UN Human Rights Committee stated it is unlawful under international law for governments to return people to countries where their lives might be threatened by the climate crisis.¹⁶² Although the first of its kind judgment opens a path for future climate migrant claims, in this instance the UN Human Rights Committee upheld the decision of New Zealand's High Court to return Teitiotia to Kiribati on the grounds that while "sea level rise is likely to render the Republic of Kiribati uninhabitable ... the timeframe of 10 to 15 years could allow for intervening acts by the Republic of Kiribati, with the assistance of the international community, to take affirmative measures to protect and, where necessary, relocate its population."¹⁶³ As part of its argument, Kiribati stated that in "removing him to Kiribati, New Zealand violated his right to life under the Covenant. Sea level rise in Kiribati has resulted in: (a) the scarcity of habitable space, which has in turn caused violent land disputes that endanger [Teitiotia's] life; and (b) environmental degradation, including saltwater contamination of the freshwater supply."¹⁶⁴

Kiribati President Tong recognizes that the more he and others spread awareness of the existential threat climate change poses, the more citizens like Ioane Teitiotia will want to leave their homeland. In an effort to ease this transition, Kiribati has created skills training programs to provide their youth an economic lifeline when they are forced to seek higher ground in a new land.¹⁶⁵ "Migration with dignity is a real strategy... they will go on merit. We will prepare them."¹⁶⁶ Whether or not the new communities they seek out for refuge will welcome them is an open question. Seventy-five million others around the globe who are living less than a meter above sea level, including in megacities such as Mumbai, Bangkok, Jakarta and Ho Chi Minh City, also face needing to relocate, and the potential political and security implications of such mass displacements could be significant.

South Tarawa atoll in Kiribati, one of the most vulnerable nations to sea level rise. PUBLIC DOMAIN.



REGIONAL SECURITY INSTITUTIONS: READY FOR CLIMATE RISKS?

Asia as a whole does not benefit from a set of well-established security institutions or multilateral arrangements to deal with climate security issues, especially those manifesting around trade, territorial claims and migration. Pacific Island nations on the frontlines of climate change have initiated steps to rectify the institutional climate security vacuum.

In 2018, Pacific Islands Forum (PIF) leaders affirmed, through the *Boe Declaration on Regional Security*,¹⁶⁷ that climate change is the single greatest threat facing the region. At their 50th meeting in Tuvalu in 2019, leaders issued the *Kainaki II Declaration for Urgent Climate Change Action Now*, the strongest statement the Pacific Islands Forum has ever issued collectively on climate change. The support of the Declaration from PIF's two largest and most influential members, Australia and New Zealand, adds considerable weight to the Pacific's negotiating priorities at the international level.

In addition, the region's militaries are starting to engage on the issue. At the 2019 South Pacific Defense Ministers Meeting (SPDMM) in Fiji, military leaders issued a communiqué acknowledging the 2018 Boe Declaration's affirmation that "climate change presents the single greatest threat to the livelihood, security and wellbeing of Pacific peoples," and recognizing climate change as a "challenge for which regional defence organizations must be ready".¹⁶⁸ The Defense Ministers explored defense force climate mitigation possibilities and accepted New Zealand's offer to hold a Climate Change and Defence Working Group Meeting in 2020 to assist member progress on climate and security. The SPDMM "emphasized the unique and important role of defense forces in dealing with climate change."

Over the past nine years, the Association of Southeast Asian Nations (ASEAN) Defense Ministers Meeting Plus (ADMM Plus) has quickly evolved into the principal forum for multilateral defense engagement in Asia. The Plus members include Australia, the United States, China, India, Japan, Russia, New Zealand and South Korea. Its 2019 Joint Declaration on Sustainable Security called for a focus on non-traditional security threats to the region, but the forum has not addressed climate change directly. ADMM Plus should add climate security as a key focus into its framework of seven Expert Working Groups (EWG) that cover issues from maritime security to counter-terrorism to cyber threats.

Joint Statement by The ADMM-Plus Defence Ministers on Advancing Partnership for Sustainable Security.





Ronald Reagan Ballistic Missile Defense Test Site at Kwajalein Atoll, Republic of the Marshall Islands.
PUBLIC DOMAIN.

SECURITY INFRASTRUCTURE AND SEA LEVEL RISE: TURNING THE TIDE

The Indo-Asia Pacific is an arena of geostrategic competition with correspondingly relevant military infrastructure. The United States, for example, is an Asia Pacific nation with critical security architecture based on its territories, possessions, as well as with its Compact of Free Association (COFA) partners and regional allies. Many U.S. military installations are threatened by climate change, with those on Diego Garcia and the Marshall Islands especially exposed to sea level rise and saltwater intrusion into freshwater.¹⁶⁹

The destructiveness of rising seas is an everyday worry for inhabitants of the Republic of the Marshall Islands, who have experienced seas that have risen over a foot in the past 30 years, faster than anywhere else on Earth.¹⁷⁰ The Marshall Islands brought international attention to the existential threat of sea level rise by declaring a national emergency in 2013 due to severe drought accompanied by rising seas. The United States military, with the help of several thousand civilian contractors, operates several strategic national security capabilities in the Marshall Islands, a COFA state. Space Fence, a \$1 billion U.S. Air Force space object-tracking radar critical for keeping astronauts and satellites safe from space debris, was recently installed on Kwajalein Atoll despite warnings of inundation due to sea level rise. A subsequent U.S. Geological Survey study, funded primarily by the U.S. Department of Defense (DoD), found that Kwajalein Atoll will be submerged by tide surge at least once annually in a few decades.¹⁷¹ In addition, deadly bleaching of coral in warming waters smooths reefs, degrading their ability to absorb wave energy and serve as effective breakwaters.¹⁷² Within the DoD, a growing awareness of climate change impacts on security operations and requirements has continued to support climate-resilient decision making.¹⁷³

THE LAW OF THE SEA: RISING SEAS AND UNCHARTED LEGAL WATERS

The UN Convention on the Law of the Sea (UNCLOS) and its three institutions (the International Tribunal for the Law of the Sea, the International Seabed Authority and the Commission on the Limits of the Continental Shelf) will be increasingly tested by competing ocean resource claims in the Indo-Asia Pacific. The status of legal maritime boundaries based on baseline territorial features are entirely uncertain if such features are submerged due to sea level rise or are declared uninhabitable under current legal definitions. The loss of sovereign terrestrial territory due to rising seas could have an enormous impact on national waters and exclusive economic zones (EEZs) over which a coastal or island state has special rights regarding the exploration and use of marine resources, including energy.

In the Pacific, for example, the submergence of small outlying reefs and atolls in vast island nation archipelagos may result in the loss of hundreds of thousands of square miles of a nation's EEZ. Alternatively, for small, low-lying Pacific islands that will eventually be submerged by rising seas, China could offer its dredging capacities and island-building expertise it has developed in the South China Sea, perhaps in exchange for access to the vast EEZs of these sparsely populated, geographically dispersed and increasingly geostrategically important nations.¹⁷⁴

Similar EEZ baseline controversies will arise in the already contested South and East China Seas, which have regularly seen confrontations between navy, coast guard and fishing vessels, as well as the buildup of Chinese military assets (airstrips, port facilities, long-range sensor arrays) on constructed artificial islands in the South China Sea. Maritime boundary disputes are already highlighting the limits of the rule of international law and the power of the International Court of Justice to enforce rulings on the South China Sea.¹⁷⁵ This sets a dangerous precedent for managing conflicts of interest over highly contested territories that are likely to become more strategically significant in a climate-changed future, as fish stocks relocate and are depleted, countries pursue their energy security through subsea oil and gas, and global economic interdependencies rely on sea lines of communication through the region.

MILITARIES: HUMANITARIAN ASSISTANCE AND DISASTER RELIEF IN A CLIMATE-CHANGED WORLD

Militaries' roles in confronting the increasing disaster risks resulting from climate change are a dynamic and important set of issues for countries in the Indo-Asia Pacific to address. Many countries across the region need to build capability and capacity in order to better manage natural disasters; at the same time, climate change is adding uncertainty and complexity to disaster management and resilience planning. Even while technologies for tracking extreme weather events such as typhoons have improved, climate change will continue to generate 'surprises in the system', such as the July 2018 floods and heatwave in Japan, which created a multi-hazard situation and led to 300 fatalities and an evacuation order affecting more than eight million people, in one of the world's most disaster-prepared countries.¹⁷⁶



A Philippine Air Force Photographer hands out packs of biscuits to Filipinos while they wait to be manifested for air transport to Manila at the Tacloban Air Field, 2013. SGT. JONATHAN WRIGHT.

Climate change also increases the risk of complex crises around natural disasters, of the kind illustrated by Japan's 2011 'triple disaster' earthquake, tsunami and Fukushima Daiichi nuclear accident, which resulted in more than 22,000 fatalities. Biological hazards such as the Covid-19 pandemic escalating just as countries in the disaster-prone Indo-Asia Pacific enter their cyclone, drought, heatwave or monsoon seasons is likely to compound vulnerabilities. Military planning for Humanitarian Assistance and Disaster Relief (HADR) capacities needs to consider the increasing likelihood of multiple hazards and converging risks in a climate-changed future. One example is the back-to-back disasters in July and August 2018 affected over five million people, when floods resulting from monsoon rains, tropical storms and a dam collapse on a Mekong tributary affected parts of Myanmar, Laos, Cambodia, Vietnam and the Philippines, while an earthquake and multiple aftershocks struck Indonesia's Lombok Island, West Nusa Tenggara.¹⁷⁷

HADR AND MILITARIES

Disaster and emergency management is often described as a process comprising four essential activities: Reduction (mitigation), Readiness (preparedness), Response, and Recovery. When disaster strikes, governments can seek the support of the military in the Response and Recovery phases. With its unique capabilities (including trained and disciplined personnel), the military can be deployed rapidly to support first responders and other stakeholders tasked with tackling complex disaster operations. Effective disaster response is an important part of strengthening resilience to climate impacts and climate security risk management.

The benefits of using the military start with reconnaissance operations in a disaster area: to identify specific capabilities required (minimize suffering, loss of life, property damage, disaster relief, and – especially in the case of climate-related disaster – degradation to the environment); organize a command center; and deploy into the relevant disaster area. An overview of typical military responses to a disaster or emergency is provided in Table 2 below.

Table 2: Typical military responses to a disaster or emergency

DISASTER PHASE	MILITARY PHASE	MILITARY ACTIONS
Reduction (Mitigation)	N/A	<ul style="list-style-type: none"> • Assist with scenario and response development • Help identify weaknesses in infrastructure and resources in order to reduce risk
Readiness (Preparedness)	N/A	<ul style="list-style-type: none"> • Participate in contingency planning and exercises • Formulate military HADR response plan
Response	<ol style="list-style-type: none"> 1. Reconnaissance / activation / mobilization 2. Deployment of military response 3. Sustain 	<ul style="list-style-type: none"> • Reconnaissance and disaster need assessment • Mobilization of forces • Deployment of immediate response team for HADR • Civil-military coordination • Sustain military contribution to the disaster operation • Third party logistics • Augment disaster HADR supply lines of communication
Recovery	4. Redeployment	<ul style="list-style-type: none"> • Hand over / hand back HADR to civil authorities • Withdraw military back to base camps

HADR AND MILITARIES IN THE INDO-ASIA PACIFIC REGION – READY FOR CLIMATE CHANGE?

The role of the military in natural disaster relief operations is increasing in the Indo-Asia Pacific region.¹⁷⁸ One indicative example is the rapid military response to Typhoon Yolanda/Haiyan, which struck the Philippines in November 2013, that included US and British naval forces, as well as the Japanese Self Defense Forces.¹⁷⁹ Japan's response represented the largest mobilization of these forces



Japan Ground Self-Defense Force soldiers wait to board a U.S. Marine Corps MV-22B Osprey tiltrotor aircraft at Tacloban Air Base, Philippines, Nov. 14, 2013, during Operation Damayan. CPL CODEY UNDERWOOD.

outside of the country since their founding, after World War II.¹⁸⁰ Other countries in the region, including China, are increasing their HADR capabilities. The People's Liberation Army has provided HADR in 16 instances in 13 Asian countries since 2002, including through the China International Search and Rescue Team and two hospital ships for responding to international emergencies.¹⁸¹

Across South and Southeast Asia, the military traditionally plays an important role in disaster response, and will continue to do so as climate change drives more frequent and severe extreme weather events. Ensuring HADR capabilities can meet the scale of the threat is important in South and Southeast Asia. The region is highly exposed to extreme weather events, and the regional economic impact of disasters is accentuated by the concentration of economic infrastructure along coasts and in the region's coastal megacities, and the importance of economic growth in underpinning stability for many countries in the region. Adequate disaster response is a key component of the social contract between governments and citizens, and inadequate provision of these services can prompt discontent and changes in government, or strengthen the legitimacy of non-state actors. These include serious organized crime or armed groups, who can opportunistically provide relief where state services are absent in the wake of disasters.

The military is integral to disaster response systems across both sub-regions. With their surge capacity and command-and-control structure, the militaries in the region are the first *de facto* national responders in the emergency phase of a disaster event in coordination with civilian authorities.¹⁸² Civil-military relations are critical during the disaster response phase as oversight is provided by government structures involving both civilian authorities and the national military. The specific roles and responsibilities of the military in disaster management systems nonetheless differ, and are largely determined at national and sub-national level.

In Southeast Asia, countries are committed to nationally-led, regionally-supported disaster management systems. An increasing number of regional agreements and initiatives have emerged that serve as legal and organizational foundations for effective and coordinated regional disaster relief operations, including the various arrangements and mechanisms on regional cooperation that the Association of Southeast Asian Nations (ASEAN) has developed. These include, among others, the ASEAN Agreement on Disaster Management and Emergency Response (AADMER) and a Joint Task Force to Promote Synergy on HADR in the ASEAN region.¹⁸³ The AADMER was signed in 2008 and came into force in 2009. Through this, the regional ASEAN Coordinating Centre on Humanitarian Assistance on disaster management (AHA Centre) gets its mandate and is the operational component of the agreement. The arrangements and mechanisms of ASEAN are intended to enhance civil-military coordination in humanitarian response operations in the region, to effectively allocate military assets, capabilities, and expertise for rapid humanitarian assistance, and to facilitate possible joint military operations in disaster areas.¹⁸⁴ Moreover, ASEAN aims to enhance regional disaster preparedness through cooperation in monitoring natural hazards with transboundary effects, exchanging knowledge and expertise, and establishing regional disaster prevention and mitigation programs.¹⁸⁵

The Philippines is governed by the National Disaster Risk Reduction and Management Council which is administered by the Office of Civil Defense (OCD) under the Department of National Defense (DND). The country has led the way in the region to decentralize and localize disaster response with greater responsibility given to sub-national governments. Thailand's disaster management system, in turn, has an important civilian component and the military formally plays a supportive role in disaster response and recovery operations. Recent internal political developments, however, underline the military's continued overall importance in governing the country, suggesting their involvement in steering operations remains significant.

In South Asia, the South Asian Association for Regional Cooperation (SAARC) has an agreement for sub-regional disaster management collaboration, but this has not yet taken effect in any substantive way. Notably, disaster management systems in South Asia tend to be highly centralized. In Bangladesh, disaster management falls directly under the Prime Minister who chairs the National Disaster Management Council (NDMC) and In-Ministerial Disaster Management Coordination Committee (IMDMCC). The Bangladeshi Prime Minister is also the Defense minister, bringing civil-military disaster management operations together under a centralized system of command. The Bangladesh Standing Order on Disasters (SOD) places the military as a primary responder in disasters in a number of key areas: emergency evacuation, search and rescue, removal of bodies and debris, provide medical services, temporary shelter, damage, loss and needs assessments, transport, distribution of relief goods and logistics.¹⁸⁶ The military has a presence throughout the country and is able to respond quicker and on a larger scale than civilian actors can. In Pakistan, disaster management structures also report directly to the Prime Minister and its civil-military coordination systems are similarly subject to centralized control.

The military role in HADR often focuses on engineering and logistic capabilities via air, sea and land. While the capabilities that militaries bring during a disaster are important, the boundaries between military and civil humanitarian organizations should be respected in order to maximize effectiveness and legitimacy, and ensure humane responses. It is particularly important to treat this sensitively and avoid reinforcing conflict patterns when responding to disasters in areas experiencing ethnic or social conflict, where these conflicts may be linked to violence in which the military is (or is perceived to

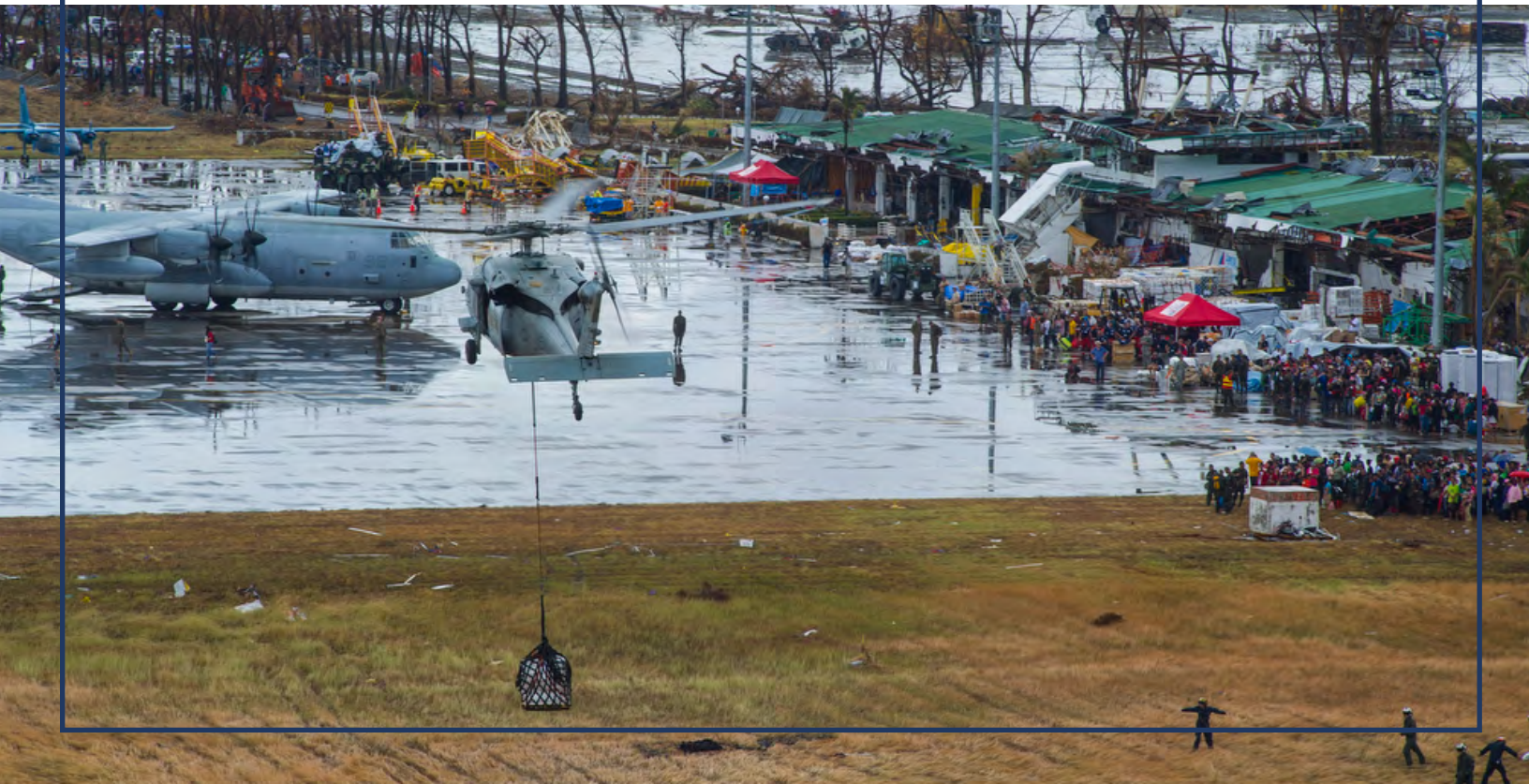
be) not a neutral party, or is perceived to be pursuing military objectives in the wake of a disaster.¹⁸⁷ As this report has outlined, climate change will drive both disasters and instability, making thorough consideration of risk mitigation and potential unintended security consequences all the more important.

QUESTIONS FOR THE FUTURE OF HADR IN A CLIMATE-CHANGED WORLD

Important questions remain around adapting HADR capacities for a climate-changed future. The following is a list of such questions designed to prompt further research and analysis.

- As disasters become more frequent and intense with the effects of climate change, how will citizens view the roles of their militaries in HADR and how might that affect the overall trust in military forces within countries in the region?
- How should military involvement in HADR be managed in climate- and conflict-affected contexts where militaries may be perceived as non-neutral actors, potentially reinforcing conflict patterns?
- Are militaries that conduct HADR in the Indo-Asia Pacific preparing adequately for complex emergencies, such as those that involve pandemics or radiological events alongside traditional disaster response?
- After the Covid-19 pandemic subsides, will countries continue building all hazards preparedness approaches, or might there be a shift toward devoting resources to specific hazards over others?
- How might economic downturn in the wake of the Covid-19 pandemic affect military investment in the assets and training needed for disaster preparedness?

A U.S. Navy MH-60S Seahawk helicopter, center, assigned to Helicopter Sea Combat Squadron (HSC) 25 prepares to drop supplies over Tacloban airfield in Tacloban, Leyte province, Philippines, 2013. MC3 RICARDO R. GUZMAN.



- Will countries start creating more specific roles for civilian vs. military forces in HADR?
- If partner countries like the US or Australia become more domestically-focused, what might be the impact on HADR preparedness and readiness for the region in the future?
- What is the future of 'disaster diplomacy' in the Indo-Asia Pacific?

TOOLS FOR CLIMATE SECURITY CAPABILITIES PLANNING

The International Military Council on Climate and Security (IMCCS) is in a unique position to support decision-makers in their operational efforts to manage climate-related threats. In addition to its experience with HADR support efforts in different parts of the world, members of the IMCCS consortium have developed a toolkit of training and capability-development materials,¹⁸⁸ which can help relevant stakeholders to identify current gaps, strengthen their capabilities and prioritize response actions in the event of climate-related emergencies. This can be done through workshop sessions, in-person and online serious game tools, and/or general advisory services.

Strengthening the community of defense and security actors examining how climate change will impact the security environment, and ways to integrate climate-related threats into defense policy and planning, can improve the effectiveness of these efforts by sharing best practices and leveraging expertise on HADR and resilience. As a relatively new and dynamic non-traditional security issue, collaboration between security communities to understand and address climate security threats can improve preparedness for a changing security environment.



Col. John E. Merna, commanding officer of the 31st Marine Expeditionary Unit, assists Angel Pana, of the Philippine Department of Social Welfare and Development, and members of the Armed Forces of the Philippines in talking with local leadership and checking the needs of a small village destroyed in Typhoon Haiyan. A bilateral assessment team, composed of U.S. Marines, Philippine DSWD, and members of the Armed Forces of the Philippines, landed in an MV-22B Osprey to determine needs and deliver relief to remote areas in and near Leyte to assess the needs of people isolated by the storm. U.S. military assets have delivered relief supplies provided by the U.S. Agency for International Development since the start of Operation Damayan, in support of the Government of the Philippines in the wake of Typhoon Haiyan. CAPT. CALEB EAMES.

CONCLUSION

Climate change will alter the physical and strategic environment, profoundly and potentially catastrophically, creating a range of threats to the wellbeing and security of countries in the Indo-Asia Pacific. Security communities across the region need to comprehensively address this high-probability, high-impact threat in order to achieve their mission in the coming years. Considering climate security consequences with a broad aperture, including how they affect current and future drivers of fragility and instability, can improve the ability of civil and military institutions to coordinate comprehensive responses and shift to a more preventive posture.

There is good practice to build on. Countries and militaries in the Indo-Asia Pacific have world-leading expertise in responding to climate-driven disasters, while regional security and governance institutions such as the Pacific Islands Forum have emphasized the security dimensions of the threats climate change poses, and advocated for greater international attention to addressing these, not least through the United Nations.¹⁸⁹

Engaging with regional and international partners on this threat nexus, such as via the International Military Council on Climate and Security (IMCCS), can facilitate the sharing of best practices on incorporating climate change into defense policy and planning, including capabilities planning. Routinizing, institutionalizing and elevating the issue, while improving rapid-response capabilities, can support ‘climate-proofing’ security institutions in a changing future.¹⁹⁰ Regional security and governance fora continuing to treat climate threats as strategically-relevant, such as the South Pacific Defence Ministers Meeting, the Pacific Islands Forum, the ASEAN Defence Ministers Meeting – Plus and others, can help to strengthen climate security risk management through existing institutional architecture.

Security communities, which are often some of the most committed to maintaining foresight of upcoming threats, also have a role in conveying the future threat landscape to other areas of government, including the scope of challenges climate change poses to countries’ wellbeing and security. This can inform risk management strategies and approaches to climate-related threats.

Climate science presents some of the most accurate information available about the future, and it paints a deeply concerning risk picture for the Indo-Asia Pacific. Taking a preventive and precautionary approach to addressing the significant climate security challenges in the region can help to ensure it remains a zone of stability and prosperity, despite the unprecedented changes ahead.



THE CENTER FOR
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STRATEGIC RISKS



The International Military Council on Climate and Security (IMCCS) is a group of senior military leaders, security experts, and security institutions across the globe dedicated to anticipating, analyzing, and addressing the security risks of a changing climate. The IMCCS is co-led by a Secretary General and Chair:

IMCCS Secretary General

The Honorable Sherri Goodman
Former Deputy Undersecretary of Defense (Environmental Security)
US Department of Defense
Senior Strategist, The Center for Climate and Security

IMCCS Chair

General Tom Middendorp (RET)
Chief of Defence of the Netherlands
Senior Associate Fellow, Clingendael Institute

The IMCCS Expert Group consists of IMCCS leaders committed to driving analysis, policy and communications on climate and security, including through the development, publication and endorsement of the World Climate and Security Report, as well as other timely analysis driven by demand signals from the IMCCS. The IMCCS Expert Group currently consists of representatives from four institutions:

- The Center for Climate and Security (CCS), an institute of the Council on Strategic Risks (CSR)
- The Planetary Security Initiative of the Netherlands Institute of International Relations (Clingendael)
- *The Hague* Centre for Strategic Studies (HCSS)
- The French Institute for International and Strategic Affairs (IRIS)

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NOTES

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