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Security Nexus Perspectives

A Climate Resilience Toolkit for Security Practitioners and National Policy Recommendations for Big Ocean Small State (BOSS) Islands

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Abstract

This paper describes the results of a foresight tabletop exercise looking at the security implications of climate change in Big Ocean Small State (BOSS) islands in the Indian Ocean Region. As these nations face rising temperatures, sea level rise, and increasing climate variability, their adaptive capacity is crucial to achieving the best possible outcomes. Through a structured analysis of three potential future climate scenarios, this exercise identified 34 policy recommendations that focus on whole-of-society capacity building; risk assessments, strategies, and plans; governance and security sector reforms; international cooperation; resilient infrastructure; financial mechanisms; and ecosystem-based management. The resulting Climate Resilience Toolkit aims to better equip BOSS islands with the resilience needed to withstand both direct and cascading risks associated with climate change. The findings underscore the utility of foresight exercises as an important tool for building climate literacy and facilitating strategic planning. The resulting toolkit can assist policymakers in small island nations as they try to adapt to and mitigate the worst impacts of climate change and identify opportunities for sustainable development and long-term security.

Introduction

The complexities of modern crises present a formidable challenge for national security decision-makers, who often face high-pressure situations with limited or rapidly changing information. The urgency of emerging threats, coupled with pressures from stakeholders, media, and public scrutiny, requires a sophisticated approach to decision-making that is both rapid and evidence-based. In such volatile environments, preparedness is critical; it enables security professionals to navigate the intricacies of crises and make informed choices that safeguard both responders and communities. A deep understanding of interconnected systems, collaborative thinking, and the application of analytical tools are essential for anticipating and managing the cascading effects of potential threats.

The Daniel K. Inouye Asia-Pacific Center for Security Studies (DKI APCSS) plays a pivotal role in fostering these capabilities through specialized workshops and educational initiatives. One such initiative, the "Building Climate Resilience in Small Island Developing States: Partnerships for Adaptation in the Indian Ocean Region," workshop took place from September 9-12, 2024, in the Maldives. During this event, an integral foresight-based tabletop exercise was conducted over four days, focused on exploring future scenarios shaped by varying degrees of climate change and regional adaptive capacity.

The workshop convened 28 mid-to-senior level military and national security professionals and subject matter experts from Big Ocean Small State (BOSS) islands across the Indian Ocean region, including Maldives, Mauritius, Madagascar, Seychelles, Comoros, Fiji, and Sri Lanka. Additional subject matter experts working on these issues came from India, France, Germany, and the United States. Forty-two percent of the participants were women. The workshop featured Hugo Yon, the U.S. Ambassador to Maldives, and five DKI APCSS alumni, including high-profile leaders such as the Maldives Chief of Defence, the Minister of State for Defence, and the Deputy Minister of State for Defence. Their involvement underscored the workshop's strategic value in enhancing the adaptive capacity of small island states in the face of escalating climate challenges.

Participants engaged in plenary panels addressing critical areas such as policy and governance for climate resilience, resilient infrastructure, sustainable energy, financing adaptation, and the security implications of climate change. Participants were divided into three seminars, guided by DKI APCSS faculty and experienced alumni from the Maldives, to explore potential 2040 scenarios through an iterative tabletop exercise. Exercise sessions involved future scenario building; evaluation of direct and cascading impacts of climate change (including implications for the military and security services); and generation of policy recommendations aimed at bolstering regional resilience. This paper outlines the exercise's structure, objectives, and key findings, highlighting the strategic importance of building climate literacy within the security sector as part of a comprehensive approach to proactive adaptation in small island contexts.

Aim of the Exercise

The primary purpose of the tabletop exercise was to build climate literacy among partner security forces and to facilitate critical thinking about the possible future impacts of climate change, including both direct and cascading risks. Additionally, the exercise aimed to identify policy recommendations for strengthening climate adaptation and resilience in the Indian Ocean region, with a particular focus on small island developing states and other island nations, and inclusive of the military and security services.

Rationale

According to the Intergovernmental Panel on Climate Change (IPCC), "Human activities, principally through emissions of greenhouse gasses, have unequivocally caused global warming, with global surface temperature reaching 1.1°C above 1850–1900 in 2011–2020." Scientists have furthermore discovered that six out of nine ''planetary boundaries—a set of 'safe operating' limits within which humanity can continue to develop and thrive for generations to come— have already been transgressed, placing the stability of the Earth's climate and ecosystems in jeopardy.

Observed direct impacts of climate change are already wide-ranging and significant, including sea-level rise, warming, acidification and deoxygenation of the oceans, coastal flooding, erosion and salinization, changing patterns of precipitation, increased frequency and intensity of natural disasters, and extreme weather and sea-level events such as land-based and marine heatwaves, droughts, wildfires, cyclones, floods, land degradation, and loss of biodiversity. The Indian Ocean (which is rich in minerals, biodiversity, and fisheries, and provides protein and livelihoods to an estimated 2.7 billion people) is warming faster than any other ocean except the Arctic, placing delicate marine ecosystems—and dependent human socioeconomic activities—at heightened risk. Small island developing states and other developing nations who have historically contributed the least to current climate change are disproportionately affected and especially vulnerable due to a combination of high levels of exposure and relatively low adaptive capacity.

Beyond the direct, physical impacts of climate change, second and third-order cascading risks add to the challenge. Climate change has led to widespread adverse impacts on food and water security, human health (both physical and mental), critical infrastructure, natural ecosystems, and national economies, and is driving involuntary displacement and migration. As climate change intensifies and these effects are amplified, they have the potential to result in significant social and political instability. This is especially likely in states where 1) large proportions of the population depend upon climate-sensitive activities, such as agriculture and fishing, for their livelihoods; 2) there is recent or ongoing instability and conflict; and 3) governance is weak and/or divisive.

Cascading risks associated with climate change furthermore present potential opportunities that malign state and non-state actors may seek to exploit in various ways, including exploitation of vulnerable communities, disinformation campaigns, efforts to provoke civil unrest, competition over scarce resources, and varying efforts to gain political and geostrategic advantage. As climate change worsens, it is expected that cascading risks will also grow.

Although militaries, security services, and first responders will not be in the lead on climate change, they will nevertheless have an important role to play. Besides being directly impacted themselves, e.g. in terms of physical risks to infrastructure, platforms, equipment and personnel, as well as increasing demand for humanitarian assistance and disaster response, they must also be prepared to respond to potential cascading risks, including various threats to social and political stability.

Looking ahead, global greenhouse gas emissions continue to rise and it is now expected that global surface temperatures will surpass the internationally agreed target of 1.5°C above pre-industrial levels sometime in the 2030s, and the effects of climate change will continue to intensify in the coming decades, with alarming consequences. For example, the IPCC has projected that "Extreme sea level events that used to occur once a century will strike every year on many coasts by 2050, no matter whether climate heating emissions are curbed or not."

According to the World Economic Forum Global Risks report, there is mounting research to suggest there is increasing risk of breaching climatic 'tipping points' at regional or global levels within the next decade, which could result in "long-term, potentially irreversible and self-perpetuating changes to critical planetary systems." These include, but are not limited to: dying off of low latitude coral reefs, rapid sea level rise from collapsing ice sheets; massive carbon release from thawing permafrost; and disruption of ocean or atmospheric currents. Such critical changes to the Earth's systems could result in "abrupt and severe impacts on planet health or human welfare," further accelerating climate change and outpacing adaptive capacity in many places, particularly developing states. Indeed, current climate adaptation financing is already falling far below what is needed, and this gap is only expected to grow.

While it is impossible to predict the future with certainty, practicing strategic foresight—the systematic exploration of multiple plausible future developments—can help to inform present risk-assessments and associated decision-making, plans and preparations aimed at mitigating or avoiding undesirable outcomes while positioning for success. Accordingly, forecasting has been identified as a component of adaptive capacity to climate change.

Design

Participants were assigned to one of three working groups in which they were asked to consider one of three possible future scenarios (Figure 1) involving differing rates of climate change and levels of adaptive capacity in the Indian Ocean Region in 2040.

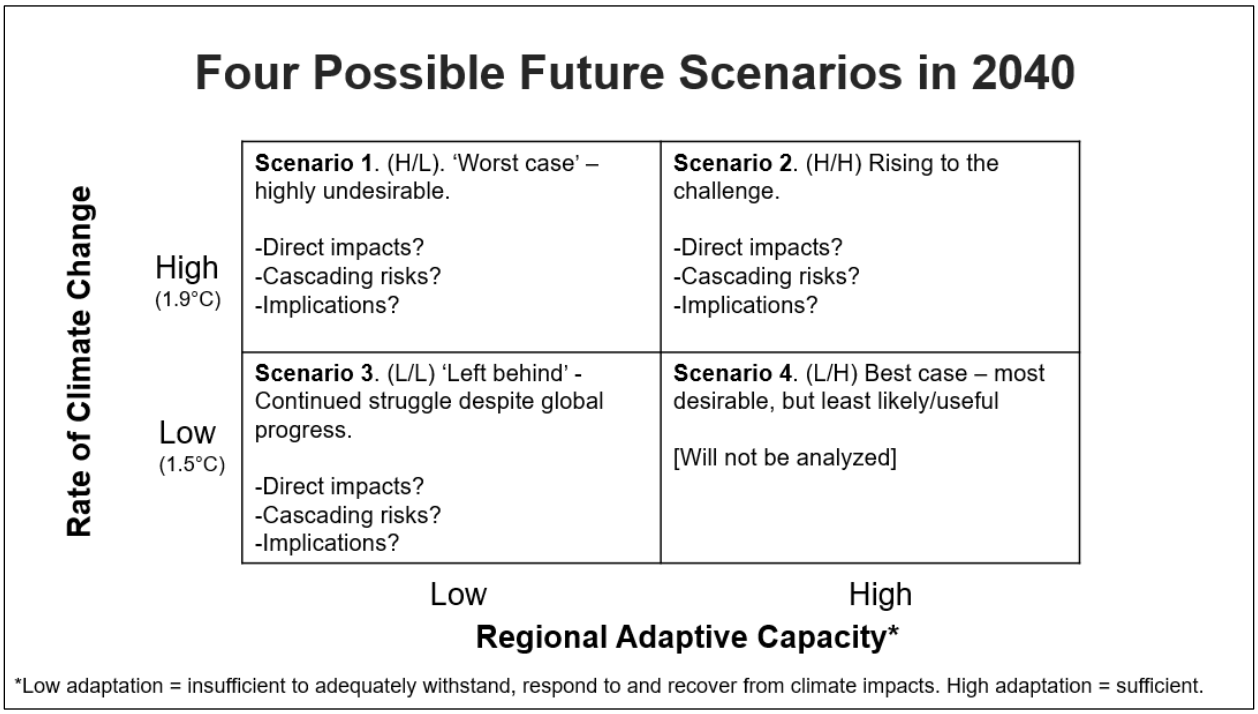

Figure 1. Four possible future scenarios for climate change vs. adaptive capacity in 2040.

In each scenario, the levels of climate change (1.5°C vs. 1.9°C) are based upon the range of possible global temperatures in 2040 depicted in the IPCC's Shared Socioeconomic Pathways (SSPs) greenhouse gas emissions scenarios. The 'high' rate of climate change scenario involves a continued, heavy reliance on fossil fuels at the global level and a failure to reduce emissions, while the 'low' scenario involves significant global progress in reducing emissions and transitioning to renewable energies.[1]

While the difference in temperature may seem relatively small (0.4°C), as U.N. Secretary-General António Guterres has observed, "The difference between 1.5 and 2 degrees could be the difference between extinction and survival for some small island states and coastal communities. The difference between minimizing climate chaos or crossing dangerous tipping points."

Although there is no universally agreed definition of adaptive capacity (ACAP), it involves the ability to adjust to climate change by moderating damages, taking advantage of opportunities and coping with consequences. It is also closely associated with building resilience, which involves the ability "to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions."

[1] For the purposes of the exercise, the full details of the SSP scenario narratives were not incorporated so as to avoid constraining participants' thinking, while maintaining a focus on regional and local (vs. global) conditions. More information about the SSPs can be found here.

Researchers have identified as many as 154 determinants of adaptive capacity. For the purposes of the exercise, participants were asked to consider the following foundational elements:

1. Awareness and knowledge
2. Funding
3. Resources, equipment and technology
4. Infrastructure
5. Legislation
6. Policies, plans and strategies
7. Cooperation and collaboration

For the purposes of the exercise, a 'low' level of regional adaptive capacity was simply defined as being *insufficient to be able to adequately withstand, respond to and recover from climate impacts*, while 'high' regional adaptive capacity was defined as being *sufficient to do so while maintaining the continued integrity and functioning of government and society*.

The tasks included the following:

Part 1: Each group created a narrative that described their future scenario, including anticipated direct impacts of climate change as well as related regional/local adaptive capacities.

Part 2: Each group discussed the cascading effects of climate change to include impacts on critical infrastructure and resources, economic impacts, social and political repercussions, and impacts on the military and security services.

Part 3: Each group performed a 'pre-mortem' or 'back-casting' where they worked backwards from the future world they imagined and derived policy recommendations aimed at reducing the risk of negative outcomes and strengthening climate adaptation and resilience measures, including implications for the military and security services.

Part 4: Each group prepared a presentation and briefed the participants and selected guests from the U.S. Embassy and Maldives Ministry of Defence.

Results: Step 1. Scenario Building (Direct Impacts of Climate Change and Regional Adaptive Capacity)

Participants began by discussing direct, physical impacts of climate change in the Indian Ocean Region, e.g. sea-level rise, floods, storms etc. and created a narrative that described their assigned scenario. The list of anticipated developments and accompanying narratives took into account material presented during workshop presentations and panels, as well as participant observations of what their countries had already experienced.

In the first part of the exercise, each group described the direct, physical impacts of climate change they anticipated in their assigned scenario in 2040 (see Appendix I for detailed narratives). All three groups–perhaps unsurprisingly, given the established trends–identified a very similar set of physical developments including rising temperatures, increased frequency of extreme weather events (floods, cyclones, heatwaves, droughts), rising sea levels, coastal erosion, damage to critical infrastructure, coral bleaching, negative impacts on fisheries and agriculture (on which many BOSS island states rely), as well as loss of biodiversity and spread of disease. However, as expected, the two groups that were assigned to the 'high' rate of climate change (1.9°C) both described impacts in stronger terms, e.g. referring to super typhoons "beyond the maximum of the current scale" and to near total collapse of coral reefs and traditional fisheries - the implications of which would be potentially devastating. These two groups still differed quite dramatically in terms of specific details (e.g. one group imagined sea-level rise at 20 cm above current levels, compared to 5 cm in the other), which is indicative of inherent uncertainty about the possible range of future outcomes, as well as the fact that groups were looking at a vast region and had limited time and resources at their disposal. Notably, however, even the 'low' rate of climate change group (1.5°C) described "severe physical impacts" on small islands in the Indian Ocean, given their scenario of 'low' adaptive capacity.

Differences between the groups became more apparent as they continued to build out their future scenarios with details of their respective adaptive capacity (see Appendix II for detailed narratives). This process was initiated with each participant sharing their country's current approach to climate adaptation, including their strengths, weaknesses, and challenges. Participants proceeded to think ahead to 2040 and the climate change scenario they had just described in their respective groups. While considering the seven foundational elements of adaptive capacity both between and within countries, participants proceeded to describe the future state of adaptive capacity, including discussion of hotspots of particular concern, as well as bright spots of resilience.

In the worst-case scenario group ('high' rate of climate change and 'low' adaptive capacity), failure to adapt was largely ascribed to shortfalls in knowledge and awareness and an "inability of people to contemplate or appreciate the severity, magnitude, frequency, and self-perpetuating nature of events". This was seen as contributing to and being compounded by insufficient funding, a persistent lack of trust, and deficient interagency cooperation and coordination within government, society, and with other states.

The 'low'/'low' scenario group similarly identified poor coordination between the security sector and civilian agencies as a contributing factor to insufficient adaptive capacity. However, the critical elements identified by this group were "[w]eak governance, a lack of political sovereignty, and pervasive corruption." Consequently, despite "leveraging great power rivalries to secure aid and resources", in this scenario, island states were still unable to turn external assistance into sustainable, long-term resilience.

In contrast to these negative futures, the 'high'/'high' group depicted a future where adaptive capacity had rapidly advanced to meet the challenges associated with a near-two degrees world.

Critical to this envisioned success–and in direct contrast with Scenario 1–were "extensive" climate change education and awareness programs for political leaders and general populations. Combined with effective engagement with the international community and the development of effective cooperation mechanisms between governments and the private sector in particular, this was seen as key to accessing and operationalizing climate finance. In turn, this enabled strategic hardening of critical infrastructure, acquisition of advanced early warning systems, diversification of economies, investment in key technologies, and adaptation measures including artificial reef building, deep-water upwelling, and expansion of marine protected areas to help mitigate some of the worst impacts of climate change. Central to this effort was "a whole-of-nation approach to climate resilience, with governments, private companies, NGOs, and 'citizen scientists' working together."

Results: Step 2. Assessment of Impact and Cascading Risks

At this stage in the exercise, participants conducted an impact assessment focused on potential cascading risks (i.e. second and third order effects) that could result in the scenario they had each constructed. Some of the categories of risk that were analyzed are depicted in Table 1.

Table 1: Possible cascading risks and insecurities associated with climate change

Critical infrastructure and resources	Economic impacts	Social and political repercussions	Impact on the military and other security services
• Water • Food • Energy • Health • Shelter • Biodiversity • Infrastructure • Resources	• Crisis response cost • Livelihood • Wellbeing • Employment • GDP • Investment • Remittances • Tourism • Natural resource exploitation	• Migration • Vulnerable populations • Civil disputes/unrest • Government legitimacy • National and cultural identity • Opportunities for malign state and non-state actors	• Installations • Infrastructure • Operational systems • Personnel • Operations • Training • Readiness • Demand to expand services

Participants considered interconnections and possible consequences that could arise from the direct impacts of climate change. They then constructed a detailed narrative to describe the cascading risks associated with each of the four categories depicted in Table 1 (see Appendix III).

In Scenario 1 (involving a high rate of climate change combined with low adaptive capacity), the cascading risks identified were extensive, including widespread damage to critical infrastructure;

severe impacts on agriculture, fishing, and tourism; and near economic collapse. Additionally, the group foresaw social tensions and political unrest in the Comoros, Mauritius, and Madagascar resulting from internal displacement, government mismanagement of crises, and inability to provide basic services. Corruption, fraud, theft, and land grabs were all seen to proliferate in the aftermath of disasters and displacement, further adding to the list of grievances. In this world, the military and first responders were exhausted by the constant demands placed on them, including having to perform "roles far beyond their traditional duties to manage the growing instability," at the same time as their own facilities, equipment, and personnel were compromised.

The second group (given the scenario of a high rate of climate change matched by high adaptive capacity), discussed many of these same potential outcomes including strain on critical infrastructure such as ports, airports, and transportation networks; threats to food, health, economic, and human security; as well as increased migration and opportunistic criminality. Likewise, militaries were seen coming under increasing strain due to "continual demands for disaster relief and missions to maintain or restore civil order" while performing "roles they have not traditionally been trained or equipped for." However, cascading risks in this world were described in somewhat more manageable terms as a result of the high level of adaptation, including efforts to harden critical infrastructure, preserve critical ecosystems, diversify economies, and invest in climate-resilient crops and shrimp farming. Crucially, this group identified proactive security adaptation measures, including planned migration, conflict mediation, and investments in training and equipment for security forces as an integral part of climate adaptation.

The third group (focused on a low rate of climate change but with a correspondingly low adaptive capacity), also saw that a "significant" strain on governance would take place in 2040 for many of the same reasons - notably food, water, and health insecurity, combined with rising unemployment and displacement. They similarly identified an increased demand and operational tempo for the military and security services in terms of disaster response operations. Surprisingly, however, this group imagined that this resulted in a forced, rapid evolution of the security sector to acquire new skills and become ever more capable at handling crises, and, as a result, emerging as a key player in national stability and climate response and attracting more resources and recruits to fulfill their expanded mission. Adding to this scenario, the group furthermore came to view geopolitical tensions between major powers as a potential opportunity for small island states to acquire aid for development and crisis response.

Results: Step 3: Back-casting/Pre-Mortem and Policy Recommendations

In the final phase of the exercise, participants consolidated their findings to identify policy recommendations aimed at 'de-risking' (i.e. avoiding undesirable, negative impacts) and achieving desirable outcomes. The pre-mortem analysis involved working backwards from imagined points of failure to identify potential vulnerabilities, risks or threats and then identifying ways to mitigate or prevent them from happening. Back-casting mirrors this process but is focused on achieving imagined successes.

In conducting this analysis, participants were asked to focus on specific policy recommendations that would enable BOSS islands in the Indian Ocean region to adapt in ways that would strengthen their resilience to both direct and cascading effects of climate change.

Participants were asked to consider the following questions as they formulated their policy recommendations:

- What can be done in the present/near future to avoid or reduce the impact of the direct, physical impacts of climate change?
- What can be done to overcome weaknesses and strengthen adaptive capacity?
- What specific steps could be taken to avoid the four types of cascading risk (to critical infrastructure and resources; economy; society and politics; and to military and security services) or make them more manageable?
- How can the military and security services of BOSS islands of the Indian Ocean Region better work together to strengthen adaptive capacity and resilience?
- Besides providing climate finance (which is likely to remain insufficient), how else can developed countries and multilateral institutions support the policy recommendations?

Collectively, the three groups came up with a total of 34 overlapping policy recommendations (see Appendix IV). Together, the suggested policy recommendations provide clear actions and strategies that policymakers can implement to enhance climate resilience across various adaptive capacities and resource availabilities.

Six core themes emerged from the groups' collective ideas, which were emphasized by each group to different degrees.

1. **Whole-of-Society Capacity Building**. There is a need to build climate literacy throughout society, including political leadership, government ministries and agencies, and among the private sector and civil society as a whole, including vulnerable communities. This was seen as a foundational element for building resilience. Recommended lines of effort ranged from incorporating climate change within national educational curricula to specialized training in disaster preparedness in order to increase societal resilience in times of crisis and reduce the burden on military and first responders.
2. **Risk-Assessments, Strategies and Plans**. A second foundational set of recommendations involved conducting detailed climate risk assessments to anticipate both direct impacts of climate change as well as cascading risks, and to develop associated national strategies and action plans to mitigate and manage these challenges.
3. **Military and Security Sector Reforms**. Although the military and security services were not singled out in the 'low/low' group, both of the 'high' rate of climate change groups made recommendations specific to the military. These included the development of climate adaptation plans for militaries and the establishment of climate change resilience departments within military and security services, which would serve as the focal point for

climate change resiliency and also collaborate with and deploy to neighbor/partner countries on assignments. Additionally, these groups identified the need for increased investment in HADR capabilities and equipment, as well as efforts to ensure that security forces can manage displacement of large populations and protect communities during crises.

4. **International Cooperation**. All three groups called for stronger international cooperation. The 'high/low' group recommended establishing a regional climate organization with shared disaster response resources, and also suggested that the South Asian Association for Regional Cooperation (SAARC) might play a role in the Indian Ocean region. Stronger partnerships with regional players such as France, regional organizations such as IORA, and with other developed countries, were similarly identified as critical opportunities. Group 2 (the 'high/high' scenario) recommended that BOSS island states in the Indian Ocean and beyond strengthen their collective alliance to amplify their collective voice in global forums. And group 3 ('low/'low') called for multilateral and bilateral partnerships to support long-term resilience projects and infrastructure investments.
5. **Resilient Infrastructure**. All three groups recognized the need for resilience critical infrastructure. Specific recommendations included the development of associated plans, policies and legislation to guide infrastructure standards; investments in climate-resilient infrastructure, such as improved drainage and expanded desalination plants; relocation of key infrastructure to higher elevations; building of storm shelters; and use of innovative technologies including floating infrastructure (such as floating levees to combat sea-level rise, and use of floating jetties) where appropriate. Natural resilient infrastructure, such as planting of mangroves, was also recognized as important in this context.
6. **Climate Financing**. The need for additional climate financing was universally recognized. Specific ideas to address this need included renewed effort to work through multilateral and bilateral partnerships; increased effort to build a BOSS islands alliance in order to raise their concerns in global fora and coordinate between member states; creation of a shared database of funding mechanisms; efforts to engage the private sector and NGOs for resilience financing; and development of blended funding mechanisms, combining government, NGO, and private sector resources.

While there were many similarities between the scenarios at every stage of the exercise, differences in policy recommendations emerged in alignment with the imagined severity and urgency of the respective scenarios, and the corresponding levels of adaptive capacity and resources, which together dictated the scope of each set of policy prescriptions. Table 2 teases out the primary focus areas and common themes that emerged from the respective narratives and policy recommendations between the different groups across multiple domains. Scenario 1 ('high/low') was defined by urgent, practical responses aimed at immediate impact mitigation; Scenario 2 ('high/high') adopted a broad, strategic, and technologically advanced approach to resilience; and Scenario 3 ('low/low') took a more measured, foundational approach, emphasizing gradual capacity building and reliance on external support due to significant resource constraints. No single approach by itself offers all of the

answers, however in combination they provide an extensive, if not fully comprehensive, set of policy considerations that, if successfully applied, have the potential to significantly strengthen resilience to the potential negative impacts of climate change.

Table 2: Distinctive elements and common themes in narratives and policy recommendations derived from three different future scenarios featuring low or high climate change and low or high adaptive capacity, through nine different lenses.

Aspect	**Scenario 1 (High/Low)**	**Scenario 2 (High/High)**	**Scenario 3 (Low/Low)**	**Common Themes**
Adaptive Capacity	Low capacity; reactive measures focused on immediate needs.	High capacity; proactive, strategic, and comprehensive approach.	Minimal capacity; slow, foundational steps toward resilience.	All scenarios focus on improving adaptive capacity, though at different levels and with different approaches.
Approach to Resilience	Urgent, practical actions like floating levees and basic training.	Sophisticated, integrated resilience with strategic planning and advanced tech.	Focus on basic governance, gradual capacity building, and reliance on aid.	Emphasis on resilience-building through community engagement, governance improvements, and infrastructure development.
Scope of Recommendations	Narrow, focused on immediate adaptation to severe impacts.	Broad, covering all sectors with detailed, future-oriented policies.	Basic, incremental improvements reflecting limited resources and capacity.	All scenarios advocate for policies to enhance infrastructure, training, and disaster response.
Role of Community vs. State vs. International Actors	Community-focused with small-scale partnerships and urgent local action.	Whole-of-society approach involving government, private sector, and international cooperation.	Reliant on international support and aid due to weak governance and internal capacity.	Engagement of communities and partnerships with state and international actors emphasized across all scenarios.

Technology and Innovation	Practical, immediate-use technologies like floating jetties and early adaptation measures.	Cutting-edge technologies such as renewable energy, heat adaptation, and advanced warning systems.	Basic technological upgrades with limited access to advanced systems and financing.	All scenarios support the integration of technology to improve resilience, though at varying sophistication levels.
Economic Diversification and Strategic Planning	Limited focus on diversification, mainly reactive to prevent immediate collapse.	Emphasizes proactive economic diversification and detailed strategic planning to address future risks.	Basic steps toward diversification with limited strategic foresight due to resource constraints.	Recognition of the need for economic resilience and planning across all scenarios.
Military and Security Forces	Emphasizes immediate adaptation, training for basic disaster response roles.	Detailed climate adaptation plans with expanded roles in HADR and conflict mediation.	Gradual, experiential adaptation, driven by rising demand for crisis response.	All scenarios involve military and security forces adapting to new roles in disaster response and climate resilience.
Governance and Coordination	Calls for building trust and creating regional climate organizations.	Focus on enhancing inter-ministerial coordination and integrated governance for climate adaptation.	Prioritizes basic governance improvements and inter-ministerial platforms.	Strengthening governance and coordination is a key theme across all scenarios.
International Cooperation and Financing	Emphasizes partnerships and regional cooperation to enhance adaptation capacity.	Strong emphasis on leveraging international forums and climate financing for strategic adaptation.	Relies heavily on international support and blended funding mechanisms.	All scenarios seek increased international cooperation and access to climate financing.

Towards A Climate Resilience Toolkit for BOSS Islands

Further building upon the policy recommendations produced by participants in this exercise, the set of options for responding to climate change can be usefully reorganized into a 'Climate Resilience Toolkit' that can aid decision-makers in small island nations and elsewhere as they prepare for an uncertain future. The toolkit comprises a range of proactive and reactive policies and strategies designed to enhance resilience and address the formidable challenges posed by climate change (Table 3).

Table 3: The Climate Resilience Toolkit for small island nations recommends a broad selection of proactive and reactive policy options within seven categories.

Category	Type	Options
Governance, Policy, and Strategic Planning	Proactive	Conduct detailed risk assessments to better understand the likely direct and cascading effects of climate change at national and local levels.
		Develop and enforce policies and laws that integrate climate adaptation and mitigation to improve resilience.
		Build climate literacy among political leaders. Establish climate change task forces or inter-ministerial bodies to streamline adaptation efforts.
		Develop proactive migration plans, including conflict or dispute mediation mechanisms to manage displaced populations.
		Engage in regional and global forums to advocate for small island interests.
	Reactive	Activate national crisis response protocols, mobilizing emergency services during extreme events.
		Implement temporary regulatory measures, such as price controls, during climate-induced disruptions.
Financial Mechanisms and Economic Diversification	Proactive	Secure funding through climate funds, grants, and loans for adaptation and resilience projects. Develop a shared database of funding opportunities and share expertise in this area.
		Encourage public-private partnerships that invest in climate-resilient infrastructure and sustainable tourism.

		Develop alternative income sources, such as aquaculture and ecotourism.
	Reactive	Establish emergency relief contingency funds for immediate disaster response and recovery efforts.
		Expand access to climate risk insurance for financial protection against losses from extreme weather events.
Infrastructure and Technology Adaptation	Proactive	Construct resilient buildings, roads, and public facilities to withstand extreme weather, sea level rise, and flooding.
		Expand desalination plants, rainwater harvesting systems, and improve water storage facilities.
		Invest in solar, wind, hydro, and wave energy to reduce dependency on imported fossil fuels.
		Enforce updated building codes that require new developments to be energy-efficient and resilient.
	Reactive	Use floating jetties, mobile shelters, and emergency evacuation centers during extreme weather events.
		Rapidly deploy resources to repair damaged infrastructure and reopen critical facilities.
Community Engagement and Capacity Building	Proactive	Educate communities about climate impacts and best practices for preparedness and adaptation.
		Train communities in disaster response, including securing food and water supplies. Conduct disaster response drills to ensure community readiness.
		Incorporate traditional knowledge and practices into adaptation strategies.
	Reactive	Provide emergency food, water, medical aid, and temporary shelter during and after climate-related disasters.
Ecosystem-Based Adaptation and Natural	Proactive	Restore and protect natural coastal buffers like mangroves, coral reefs, and seagrasses.
		Promote climate-resilient crops and sustainable fishing practices.

Resource Management		Establish Marine Protected Areas (MPAs) to conserve critical habitats and protect biodiversity.
	Reactive	Rehabilitate damaged ecosystems, such as replanting mangroves or coral restoration.
		Restrict access to resources to prevent overuse during times of scarcity.
Early Warning Systems and Emergency Preparedness	Proactive	Develop advanced early warning systems that provide timely alerts for extreme weather and other climate threats.
		Ensure communities are prepared and equipped with emergency kits and evacuation plans.
	Reactive	Deploy trained crisis response personnel to provide immediate assistance during and after emergencies.
		Use social media and mobile alerts to keep the population informed in real-time during crises.
Military and Security Sector Capacity Building and Reforms	Proactive	Develop climate adaptation plans for the military and security sector.
		Establish climate change resilience departments within military and security services.
		Conduct risk assessments of military installations and infrastructure and take appropriate measures to strengthen critical assets.
		Invest in additional humanitarian assistance and disaster relief (HADR) resources and capabilities including specialized training and equipment.
		Conduct whole-of-society disaster relief training exercises in order to strengthen civ-mil cooperation, build trust, and also enhance the self-reliance of the civilian population in times of crisis.
	Reactive	Deploy military forces in support of civil authorities to assist with HADR.

Conclusion

The primary aims of this exercise were to build climate literacy and facilitate critical thinking among partner security forces about the potential direct and cascading risks associated with climate change. The scenarios that each group came up with were thus not intended to *predict* what will happen in the future, but to encourage consideration of *potential* negative and positive outcomes, and how those outcomes might be either avoided or achieved. By forcing different groups to consider a range of possible futures, the problem was explored from multiple different angles, and although the scenarios converged in many respects, the differences between them produced a nuanced and varied set of insights and ideas. When viewed together, the recommendations that groups came up with were usefully combined to give a wide-ranging list of policy options for climate adaptation and resilience that can be adjusted to suit unique circumstances.

In this way, the exercise helped to highlight the urgent need for essential policies that can enable BOSS islands to avoid the worst impacts of climate change while striving for the best possible outcomes amidst rising temperatures and sea-levels and varying adaptive capacities. The policy recommendations and the derived Climate Resilience Toolkit provide a strategic roadmap for policymakers in small island nations as they navigate toward an uncertain future. By working on both proactive and reactive measures designed to address both direct, as well as cascading risks (including military and security sector capacity building and reforms as part of a comprehensive effort), BOSS islands can improve their ability to address current vulnerabilities and future challenges. Implementing these policies now is crucial for enhancing resilience, protecting communities, and ensuring sustainable development, helping these nations navigate the complex landscape of climate adaptation and to secure their future in the face of ongoing environmental challenges.

Appendix I. Working Group Narratives on the Direct, Physical Impacts of Climate Change

Scenario 1: High rate of climate change (1.9°C) and low adaptive capacity

Narrative: It is 2040 and global warming has reached 1.9°C. Sea level rise in the Indian Ocean has risen on average 20 cm compared to 2024. 80% of land affected in Maldives, disappearance of beaches in most coastal areas. Contamination and inundation of sea water into coastal areas, degrading arable land by 10% up to 100%. Cyclones, with some measuring beyond the maximum of the current scale, occur twice as often per year, with one quarter being extremely severe super cyclones; the season for cyclones expands significantly. Heavy flooding, interspersed with severe droughts, affects all regions, doubling in frequency. Heat waves of 40°C happen up to 50-60 days per year. Projections indicate that heatwaves are not only increasing in frequency but also extending in duration, with profound implications for human health. Research by Amengual et al. (2014) suggests that high-stress heatwave events could last up to 40 days in certain regions, with some areas experiencing even longer periods, ranging from 50 to 60 days. This rise in prolonged heatwaves is driven by climate change, which alters seasonal patterns, causing heatwaves to start earlier in the year and continue into autumn. Parente et al. (2018) also emphasize the significant increase in the number of hot days, with some regions experiencing over 110 days per year with temperatures exceeding 25°C. The intensity and duration of these extreme heat events are expected to have severe effects on public health and contribute to challenges such as increased mortality, strained healthcare systems, and higher risks of wildfires.

Coral bleaching has progressed to near total coral extinction in the Indian Ocean. Near total collapse of traditional fisheries. Incidents of erosion and mudslides have doubled. Vector-borne and waterborne diseases spread significantly.

Scenario 2: High rate of climate change (1.9°C) and high adaptive capacity

Narrative: By 2040, the Indian Ocean Region has become much hotter, with temperatures regularly surpassing safe thresholds. More frequent and intense heatwaves also contribute to worsening droughts. Rainfall patterns have become less predictable, with periods of extreme dryness punctuated by major flooding across urban and rural areas. Coastal communities, who depend on ocean resources for their livelihoods, now face the collapse of tropical reef ecosystems due to coral bleaching. Warming oceans, coupled with pollution and overfishing, have forced fish stocks and seabirds to migrate elsewhere, leaving local economies and ecosystems severely strained. Meanwhile, rising sea levels—though only around 5 centimeters—have resulted in more powerful storm surges, worsening coastal erosion, and the contamination of freshwater supplies. Some of the smaller, low-lying islands have become uninhabitable. Moreover, Arctic ice sheets have reached a tipping point, meaning that more rapid sea-level rise is expected in coming years.

Mangroves, coral reefs, and fish species (important to both resources and cultural identity) are increasingly endangered, and biodiversity is under threat. Natural disasters like cyclones and wildfires are more frequent and destructive, impacting communities and damaging critical infrastructure. Recovery efforts are perpetually behind. Infectious diseases are spreading more easily. People and ecosystems must constantly adapt.

Scenario 3: Low rate of climate change (1.5°C) and low adaptive capacity

Narrative: By 2040, small island nations in the Indian Ocean face a daunting reality as the global temperature reaches a 1.5°C increase over the 20th Century average, sustained for nearly two decades. The low rate of climate change combines with insufficient adaptive capacity, resulting in severe physical impacts on these islands. Rising sea levels encroach upon land, contaminate freshwater sources, and disrupt coastal ecosystems, leading to the displacement of communities and critical infrastructure damage. Storm surges and extreme precipitation events trigger deadly floods and landslides, further eroding already fragile coastlines and agricultural lands. This, coupled with frequent heatwaves, exacerbates health issues among humans, animals, and plants; reduces crop yields; and threatens biodiversity through coral bleaching and ocean acidification. The combined effects strain food security and damage vital economic sectors such as tourism and fisheries, while communities grapple with forced migrations, reduced economic productivity, and increasingly unpredictable weather patterns. Environmental degradation and loss of biodiversity make it increasingly challenging to sustain livelihoods.

Future State of Direct Impacts

Similarities

- All scenarios describe significant climate change effects, including rising temperatures, sea level rise, and increased frequency of extreme weather events (floods, cyclones, and heatwaves).
- All scenarios highlight ecosystem deterioration, including decline of fisheries and biodiversity, coral bleaching, and coastal erosion, all of which threaten local communities.
- All scenarios emphasize the strain on local economies, particularly those dependent on fisheries and tourism, and broader social impacts from heatwaves, diseases, and food insecurity.
- There was a common thread of increased vulnerability including displacement, loss of livelihood, and a greater incidence of diseases due to changing environmental conditions.

Differences

Scenario 1 (High/Low): In this scenario, a high rate of climate change combined with low adaptive capacity resulted in the most severe consequences. The region faced extreme weather, including frequent super cyclones and extended droughts, leading to significant land degradation, nearly total coral extinction, and the collapse of traditional fisheries. Inadequate adaptive responses exacerbated these impacts, resulting in severe social, economic, and health challenges, with communities unable to effectively cope with rising diseases, food insecurity, and environmental collapse.

Scenario 2 (High/High): Here, a high rate of climate change was matched by a high level of adaptive capacity, which helped buffer some of the worst impacts but still resulted in profound challenges. The region contended with extreme heat, erratic weather patterns, and ecosystem degradation, including coral bleaching and the migration of fish stocks. While adaptation efforts were ongoing and partially successful, the scale of change strained infrastructure and societal resilience, leading to persistent economic and humanitarian challenges, cultural erosion, and constant adaptation needs.

Scenario 3 (Low/Low): This scenario featured a lower rate of climate change (1.5°C) but with insufficient adaptive capacity, leading to significant though less extreme impacts. Rising sea levels, flooding, and coastal erosion disrupted communities and economies, with moderate but persistent damage to ecosystems like coral reefs and fisheries. The lack of adaptive capacity meant that even these moderate changes created continuous hardship, including health issues, forced migrations, and economic decline, as communities struggled to manage the mounting environmental and social pressures.

Appendix II. Working Group Narratives on Regional Adaptive Capacity

Scenario 1: High rate of climate change (1.9°C) and low adaptive capacity

Narrative: Due to the enormous challenges, local adaptive capacity has not been sufficient. Key elements of adaptive capacity that were overwhelmed by events were knowledge and awareness, in that there was a widespread and persistent inability of people to contemplate or appreciate the severity, magnitude, frequency, and self-perpetuating nature of events. This lack of knowledge and awareness contributed to insufficient policies, plans, and strategies. Funding and infrastructure were overwhelmed from constant degradation and response, and competing priorities that could not all be met. Cooperation was deficient, with low levels of trust between different communities and interests–urban, rural, coastal, upland, farming, herding, fishing, tourism–as well as inadequate interagency cooperation, a lack of whole-of-government synergy, and insufficient collaboration between different island states.

Scenario 2: High rate of climate change (1.9°C) and high adaptive capacity

Narrative: By 2040, the island nations in the Indian Ocean Region have managed to bolster their resilience against the high rate of climate change, overcoming seemingly insurmountable challenges. Critical infrastructure has been fortified, with enhanced drainage systems designed to handle the increased flooding. Political leaders, along with the general population, have undergone extensive climate change education and awareness programs, allowing them to engage actively in resilience-building efforts. The acquisition of technical and scientific expertise has empowered governments to implement effective solutions, while crucial funding from the IMF, developed countries, and private sector investments—particularly from the tourism industry—has enabled widespread climate adaptation projects.

With advanced early warning systems in place, nations can now anticipate and respond to natural disasters far more efficiently. Governments have also created alternative livelihoods for previously marginalized populations, transitioning them from unsustainable practices like overfishing and deforestation to resilience-focused work such as mangrove restoration. Although many coral reefs have been lost, innovative approaches like deep-water upwelling have saved critical reef systems. Artificial reefs, meanwhile, bolster coastal defenses and support marine biodiversity. With renewable energy sources like solar and hydro becoming widespread, populations are able to endure the intense heat. The region has adopted a whole-of-nation approach to climate resilience, with governments, private companies, NGOs, and citizen scientists working together to monitor ecosystems and expand protected marine zones, ensuring the sustainability of fish stocks and other marine life. Despite the high climate stress, the region has proven its capacity to adapt and thrive.

Scenario 3: Low rate of climate change (1.5°C) and low adaptive capacity

Narrative: The region's low adaptive capacity compounds these challenges, creating a fragile social and economic landscape. Weak governance, a lack of political sovereignty, and pervasive corruption hinder effective responses, while economic instability and declining workforce capabilities reduce resilience. Political systems struggle with weak regulations, inadequate enforcement, and a heavy dependence on foreign aid, eroding trust and fueling civil unrest. Infrastructure is outdated and poorly maintained, with insufficient capacity to withstand climate impacts, leading to frequent service disruptions that jeopardize food, water, and human security. Social vulnerabilities are amplified, particularly for women, children, and indigenous communities, who face higher rates of displacement, loss of cultural heritage, and deteriorating mental and physical health. Although the security sector shows relative strength, with trained personnel, resources, and rapid response capabilities, their efforts are often hindered by poor coordination with civilian agencies and a lack of strategic vision.

Amidst this backdrop of vulnerability, these island nations find themselves navigating a complex geopolitical environment, leveraging great power rivalries to secure aid and resources but struggling to turn external assistance into sustainable, long-term resilience.

Future State of Adaptive Capacity

Similarities

All scenarios depicted challenges in adaptive capacity, whether due to overwhelmed systems (Scenario 1), the need for coordinated resilience-building efforts (Scenario 2), or weak governance and social vulnerabilities (Scenario 3).

Each scenario highlighted strain on infrastructure and the economy due to climate impacts, although the degree varied, with outdated or overwhelmed systems in Scenarios 1 and 3 (low adaptive), and fortified but pressured systems in Scenario 2.

All scenarios emphasized the critical role of governance, political will, and social dynamics, affecting the region's ability to cope with climate change. Poor governance and corruption were central in Scenario 3, while strong leadership and a whole-of-society approach are highlighted in Scenario 2.

Across all scenarios, there were efforts to improve resilience through various means, such as nature-based solutions, community resilience programs, and the development of alternative livelihoods, albeit with varying levels of success.

Differences

Scenario 1 (High/Low): This scenario illustrated the severe limitations of adaptive capacity in the face of high climate change. Critical elements like knowledge, funding, and infrastructure were overwhelmed, with people unable to fully grasp the magnitude of the challenges. Competing priorities and insufficient resources led to a reactive rather than proactive approach, leaving communities highly vulnerable and struggling to keep up with ongoing climate impacts. There was a

persistent lack of trust, with deficient cooperation and collaboration within government, within society, and with other states.

Scenario 2 (High/High): A high rate of climate change was matched by strong adaptive capacity, characterized by a well-coordinated, whole-of-society approach. Enhanced infrastructure, increased funding, and effective governance enabled the region to implement advanced resilience measures, such as fortified critical systems, alternative livelihoods, and expanded protected zones. Climate education and awareness were widespread, empowering communities and leaders to actively participate in adaptive strategies, allowing the region to not only cope but also thrive amidst high climate stress.

Scenario 3 (Low/Low): This scenario featured a lower rate of climate change but significant weaknesses in adaptive capacity. Challenges were compounded by weak governance, corruption, and a reliance on foreign aid, which undermined long-term resilience. Outdated infrastructure, poor regulatory enforcement, and social vulnerabilities left communities exposed to climate impacts. Although some improvements were made, such as nature-based solutions and increasing renewable energy, these efforts were often hampered by poor coordination, weak institutions, and the lack of a strategic vision, leading to ongoing instability and limited progress in resilience-building.

Appendix III. Working Group Narratives on Cascading Risks

Scenario 1. High rate of climate change (1.9°C) and low adaptive capacity

Narrative: In 2040, the escalating impacts of climate change have severely disrupted critical infrastructure and resources across the Indian Ocean region, triggering a cascade of social, economic, and security challenges. Cyclones, soil erosion, and flooding have become commonplace, leading to widespread soil loosening and the formation of sinkholes, causing severe damage to essential infrastructure such as roads, power lines, schools, hospitals, seaports, airports, jetties, submarine data cables, and telephone networks. Frequent power cuts have become the norm, contributing to the loss of tourism, on which many states heavily rely. Arable land is severely impacted by saltwater intrusion and contamination, directly impacting agriculture and aquaculture, and resulting in food shortages and increased disease outbreaks. Displacement of communities and loss of life are now routine, forcing mass migrations that put immense pressure on transport systems, disrupt supply chains, and heighten the vulnerability of drinking water reservoirs and sewage systems.

Economic repercussions are dire. Governments are straining under the immense financial burden of response and recovery efforts, often allocating large portions of their budgets to address immediate crises while seeing no replenishment of funds. Industries come to a standstill during recovery periods, further draining national resources. The collapse of the fishing industry, both as a source of profit and subsistence, has led to an estimated $6 billion loss in annual revenue, crippling coastal economies. Tourism, once a cornerstone of economic stability, has disintegrated as damaged infrastructure prevents the influx of visitors. The cumulative loss of workforce and halting of the green economy has resulted in a sharp drop in GDP, and the breakdown of importation due to compromised ports, airports, and transport networks exacerbates the economic collapse.

Social and political tensions are escalating as communities are forced to migrate internally, often leading to conflict, as seen in Comoros where the strain of relocating populations has sparked civil unrest. Housing is hastily erected in flood-prone areas, leaving vulnerable populations repeatedly displaced and relying on evacuation shelters. Corruption and fraud flourish, with some individuals exploiting government assistance programs during recovery efforts, further eroding trust and straining already limited government budgets. In Mauritius, protests and strikes have become more frequent as citizens react to government mismanagement. Displaced groups, such as the 18 ethnic communities in Madagascar, face heightened friction as they are relocated to unfamiliar areas, leading to increased crime, theft, and land grabs during the reconstruction phase. Squatters seize state land, further complicating recovery and redevelopment efforts.

The strain on military and security services is equally profound. Facilities are compromised, and personnel often commit desertion (permanently abandoning their military or security service duties) or unauthorized, temporary absences from their official duties as they prioritize helping their families in crisis. Responders are stretched thin, frequently deployed on lengthy, difficult missions that sap their resources and morale. The demands of constant response efforts are exhausting security forces,

leaving them less effective in maintaining order and supporting recovery. As the fabric of society frays, the military and security services are forced to adapt, often filling roles far beyond their traditional duties to manage the growing instability and safeguard what remains of national resilience.

Scenario 2. High rate of climate change (1.9°C) and high adaptive capacity

Narrative: Unless proactively addressed as an integral component of climate adaptation, the cascading effects of climate change have the potential to create a range of infrastructure, resource, economic, social, political, and security crises for island states in the Indian Ocean Region. Challenges to agriculture, fishing and food production have intensified, threatening food security in coastal and rural communities in particular. Tourism is also threatened as a result of damage to natural attractions such as reefs, beaches, and biodiversity. The combined loss of agriculture, fishing, and tourism has resulted in a significant loss in GDP, rising unemployment, loss of cultural identity, and increasing migration. Internal migration (typically away from coastal areas), is fueling social tensions.

The strain on critical infrastructure is also significant. Water security is at risk due to salinization of freshwater sources and damage to coastal infrastructure. Hydroelectric plants face disruptions due to water variability. At the same time, there are increased energy demands to combat the extreme heat. Ports, airports, and transportation networks, crucial for trade and relief efforts, are frequently damaged by storms and flooding, further compounding economic losses. Health crises have grown, with diseases spreading in the wake of natural disasters, while biodiversity continues to suffer. The rising inequality between those who can access critical services and those left behind threatens to destabilize communities further, leading to protests and civil unrest. Criminal elements have also exploited the situation, engaging in fraud, looting, and land grabs as displaced populations are forced to abandon their homes.

The military and security services are under continued pressure. Damaged infrastructure, coupled with continual demands for disaster relief and missions to maintain or restore civil order, places additional strain on personnel and resources. Soldiers are increasingly called to act in roles they have not traditionally been trained or equipped for, from managing refugee flows to mediating ethnic disputes fueled by migration. Their equipment, already stretched thin, suffers from overuse, while morale also suffers as troops become burnt out. Simultaneously, law enforcement is stretched by the increased criminal activity associated with natural disasters and displacement. The constant demands on the military have degraded its readiness, leaving both the forces and the region vulnerable to further crises.

These impacts have been mitigated, but not entirely eliminated, by the climate adaptation measures described in part 1. Additional, specific adaptation measures that have helped to reduce the cascading risks of climate change are wide ranging. Investments in climate-resilient crops and shrimp farming have contributed to a more resilient economy and food security, while planned migration

and proactive conflict mediation efforts have helped reduce the challenges associated with mass displacement. Meanwhile, strengthening of the military and security forces has helped them adapt. Fundamentally, this has been achieved through development of climate adaptation strategies and plans, and better training and equipment to deal with the rising demand for HADR and related operations. Broader investments in disaster preparedness have also played an important role, particularly the provision of training for civilian populations to be more self-sufficient in times of crisis.

Scenario 3. Low rate of climate change (1.5°C) and low adaptive capacity

Narrative: In the 2040 scenario, small island nations in the Indian Ocean are actively confronting escalating risks from climate change, marked by a 1.5°C increase above 20th-century temperatures and hampered by low adaptive capacity. Sea level rise, coastal erosion, and extreme heatwaves have led to significant land loss, degraded fisheries, and declining agricultural yields, intensifying food and water scarcity across the region. Communities are grappling with malnutrition, waterborne diseases, and worsening mental health issues driven by displacement and the loss of traditional livelihoods. Economic instability is evident as critical sectors like tourism and fisheries falter, driving unemployment, shrinking GDP, and deepening poverty. The strain on governance is significant, with social unrest and over-reliance on foreign aid complicating national responses to ongoing climate challenges.

Amidst these challenges, the security sector is evolving rapidly, responding to the increased demand for its services with a heightened profile and operational tempo. Despite concerns about reduced personnel availability, recruitment difficulties, and challenges in maintaining equipment, security forces are experiencing a surge in new recruits drawn by the sector's growing prominence. The constant need for crisis response provides security personnel with invaluable real-world experience, often seen as more effective than conventional training. As a result, security forces are accelerating their force projection capabilities, enhancing their ability to manage internal and regional threats. With increased resources flowing in, there is a renewed focus on improving logistics, sustainment, and operational resilience, making the security sector a cornerstone of national stability and response to climate-induced crises.

Meanwhile, these nations are strengthening regional cooperation, pooling resources, and enhancing joint climate adaptation initiatives to better manage shared threats. Limited investments in renewable energy and sustainable agriculture are reducing dependency on imported resources in a small way, while more affordable nature-based solutions like mangrove restoration and coral reef rehabilitation are actively protecting coastlines and supporting local economies. Leveraging geopolitical competition, these nations are skillfully attracting aid and investment from diverse sources, ensuring that no single external power dominates their strategic decisions. Governance reforms are underway, bolstering public-private partnerships and building stronger institutions that

increase transparency and ensure effective use of resources. Indigenous knowledge is being integrated into community resilience efforts, empowering local populations to take a direct role in climate adaptation. Across these islands, security forces, now better trained and equipped by foreign partners, are not just responding to crises but are actively shaping the broader climate resilience landscape. Their enhanced capabilities enable them to safeguard communities, manage complex emergencies, and support national development efforts, turning cascading climate risks into catalysts for growth, stability, and a more secure future for the region.

Future State of Cascading Impacts

Similarities

- All scenarios highlighted significant damage to critical infrastructure, including roads, telecommunications, and utilities, leading to widespread service disruptions and compromised essential services such as water, energy, and healthcare.
- Each scenario described severe economic impacts, including reduced GDP, increased unemployment, and financial strain on governments. Key industries like agriculture, fishing, and tourism were heavily affected, contributing to broader economic decline.
- Social instability, increased migration, displacement, and internal tensions were common across all scenarios. There were heightened social vulnerabilities, particularly among marginalized groups, leading to protests, civil unrest, and increased criminal activity.
- The military and security forces in all scenarios were under immense pressure due to increased demand for disaster response, peacekeeping, and maintaining civil order. Resources and personnel are stretched thin, impacting readiness and morale.

Differences

Scenario 1 (High/Low): This scenario showed the severe cascading effects of high climate impacts paired with low adaptive capacity. Infrastructure was frequently damaged, leading to power cuts, transport breakdowns, and contaminated resources. Economic repercussions were severe, with significant budget depletion from continuous response and recovery efforts, leading to industry collapse and high unemployment. Social tensions escalated, driven by internal migration, land grabs, and increased crime. The military faced intense strain with repeated deployments and fatigue, further reducing its effectiveness.

Scenario 2 (High/High): Although faced with a high rate of climate change, this scenario benefited from strong adaptive capacity, allowing for significant resilience-building efforts. Infrastructure was better managed, with fortified systems and enhanced early warning mechanisms. Economic impacts, while severe, were mitigated by diversified economies and external funding. Social and political systems, bolstered by educated and climate-aware populations, actively worked towards adaptation, though tensions from displacement and rising inequality persisted. The military was continually

engaged but was supported by better equipment and training. All security sector agencies struggled with overextension and reduced readiness.

Scenario 3 (Low/Low): With a lower rate of climate change but poor adaptive capacity, this scenario saw high infrastructure damage, low connectivity, and inadequate waste management. Economic impacts were characterized by low productivity, weak governance, and heavy reliance on foreign aid, exacerbating poverty and social inequity. Social repercussions included reduced quality of life, high migration rates, and increased health issues. The military faced operational challenges, but with increased resources and real-world experience, it emerged as a key player in national stability and climate response, despite ongoing struggles with recruitment and equipment maintenance. Geopolitical tensions were increasingly viewed as a potential means of acquiring aid for development and crisis response from all competing foreign countries.

Appendix IV. Working Groups' Policy Recommendations

Scenario 1. High rate of climate change (1.9°C) and low adaptive capacity

Scenario 1 (High/Low): The policy recommendations in this scenario are driven by an urgent need to address immediate climate impacts due to the high rate of change paired with low adaptive capacity. The focus is on practical, rapid-response measures, such as building floating levees, constructing resilient infrastructure at higher elevations, and developing evacuation and shelter areas. There is a heavy emphasis on community training for basic disaster response, self-sufficiency, and fostering small-scale partnerships to build trust and resilience within and between states. Recommendations are narrowly focused on mitigating severe impacts through direct action and immediate adaptation efforts, reflecting a reactive stance due to limited resources and institutional capacity.

Infrastructure and Community Resilience

1. Develop floating levees that can endure with sea-level rise and buffer against increasingly severe and frequent cyclones, while also building infrastructure at higher elevations.
2. Establish evacuation and shelter areas to enhance community safety during disasters.
3. Update building codes to address severe climate impacts and promote resilient construction.

Governance, Cooperation, and Capacity Building

4. Establish a regional climate organization with shared disaster response resources supported by developing states.
5. Reinvigorate the South Asian Association for Regional Cooperation ("SAARC") and integrate climate resilience into national strategic and training plans.
6. Enhance public-private partnerships to reduce reliance on first responders and foster trust between states and communities.
7. Within military and security services, create climate change resilience departments that receive education on climate change resiliency, that collaborate with and deploy to neighbor/partner countries on assignments, building the future leaders that will be the force in 2040. Include experts on seabed hydrography within these departments who can best understand and respond to storm surge events.

Community Engagement and Training

8. Train communities on basic disaster response and self-sufficiency until national forces can assist, to include providing communities equipment such as pumps and the training for its maintenance and use.
9. Educate the public on maintaining essential supplies and equipment during emergencies.

10. Encourage community involvement in climate adaptation activities, like mangrove planting, to foster a culture of resilience.

International Cooperation and Support

11. Strengthen partnerships, such as cooperation with Reunion Island, involving France as a resource and capability partner.
12. Seek support from developed countries, particularly in improving communication infrastructure, and avoid geopolitical exploitation of SIDS vulnerabilities.

Innovative Solutions and Technology

13. Explore new technologies, such as wave and tidal energy, floating jetties, and eco-friendly developments to bolster early adaptation efforts.
14. Promote the use of seaplanes and floating infrastructure to enhance mobility and resilience.

Scenario 2. High rate of climate change (1.9°C) and high adaptive capacity

Scenario 2 (High/High): This scenario's policy recommendations are characterized by a proactive, comprehensive, and forward-looking approach enabled by high adaptive capacity. There is a broad emphasis on strategic planning, detailed climate risk assessments, and advanced technological investments, such as renewable energy, heat adaptation systems, and sophisticated early warning networks. The recommendations encompass a whole-of-society approach, integrating government, private sector, and international cooperation to create a robust, coordinated response to climate challenges. This scenario emphasizes not just immediate needs but also long-term resilience, promoting economic diversification, ecosystem protection, and advanced infrastructure development, reflecting a well-resourced and strategically planned adaptation strategy.

Community Engagement and Education

1. Train and educate communities and leaders on climate impacts, incorporating local and indigenous knowledge with scientific insights.
2. Foster community resilience by integrating local input into adaptation planning and increasing public awareness through workshops and consultations.

Infrastructure and Technological Adaptation

3. Invest in climate-resilient infrastructure, such as improved drainage and expanded desalination plants.
4. Mandate climate resilience in all new infrastructure projects and share best practices among SIDS.

Climate Risk Assessments and Strategic Planning

5. Conduct detailed climate risk assessments to anticipate cascading risks and proactively address potential threats to critical sectors like tourism, agriculture, and fisheries.
6. Develop strategic plans for land use, irrigation, and marine protection to safeguard food and energy security.

International Cooperation and Climate Financing

7. Strengthen alliances among SIDS to amplify their collective voice in global forums and access climate funding.
8. Create shared databases of funding mechanisms and engage private sector and NGOs in resilience financing.

Renewable Energy and Ecosystem Management

9. Promote renewable energy investments and develop heat adaptation strategies to address extreme temperatures.
10. Invest in natural resilience measures, such as mangrove cultivation and climate-resilient crops, to protect coastlines and provide alternative livelihoods.

Emergency Preparedness and Military Adaptation

11. Improve early warning systems and strengthen joint disaster response capabilities across military, emergency, and civil sectors.
12. Develop climate adaptation plans for militaries, enhance HADR capabilities, and ensure security forces can manage displacement and protect communities during crises.

Scenario 3. Low rate of climate change (1.5°C) and low adaptive capacity

Scenario 3 (Low/Low): The policy recommendations in this scenario reflect a slower, more incremental approach to building resilience due to low adaptive capacity and limited resources. The focus is on foundational improvements, such as enhancing basic governance, building essential infrastructure, and gradually increasing community and institutional capacity. There is a heavy reliance on external support and international aid, with an emphasis on establishing basic coordination mechanisms, training programs, and blended funding approaches to support climate adaptation. This scenario prioritizes the most fundamental needs and governance improvements, advocating for gradual, step-by-step adaptation measures that aim to build resilience over time while managing immediate vulnerabilities.

Policy and Governance

1. Develop national policies focused on climate change preparedness, emphasizing coastal and inland infrastructure, water and food security, and energy transitions.

2. Create inter-ministerial platforms for coordination and implement rehabilitation plans for sustainable infrastructure and wetlands protection.

Training, Capacity Building, and Implementation

3. Establish training programs for communities, NGOs, and civil society to improve disaster response and climate adaptation.
4. Integrate climate literacy into national curricula and vocational training, and promote resilience planning in urban development.

Funding and Resource Mobilization

5. Develop blended funding mechanisms, combining government, NGO, and private sector resources to finance climate adaptation.
6. Encourage multilateral and bilateral partnerships to support long-term resilience projects and infrastructure investments.

Community Resilience and Social Equity

7. Prioritize the needs of vulnerable populations, such as women, youth, and indigenous communities, by enhancing access to resources and support systems.
8. Promote social and cultural knowledge exchanges to empower communities and integrate traditional practices into modern resilience efforts.

The views expressed in this article are the author's alone, and do not necessarily reflect the official position of the DKI APCSS or the United States Government.

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