

## CLIMATE VULNERABILITY AND GEOPOLITICS IN THE INDIAN OCEAN: PAKISTAN'S ROLE IN MARITIME SECURITY AND REGIONAL STABILITY

Dr. Muhammad Arslan Farooq<sup>1</sup>, Dr. Sapna Mumtaz<sup>\*2</sup>, Minahil Ilyas<sup>3</sup>

<sup>1</sup>Anchor Person, SUCH TV, Lahore, Punjab, Pakistan

<sup>2</sup>Senior Research Fellow, Lahore Institute for Research and Analysis (LIRA)-The University of Lahore, Punjab, Pakistan

<sup>3</sup>Deputy Director Projects, Foundation for Peace, Pakistan

<sup>1</sup>arslanfarooq.ch@gmail.com, <sup>2</sup>sapna.mumtaz@lira.uol.edu.pk, <sup>3</sup>minahil\_awan@outlook.com

DOI: <https://doi.org/10.5281/zenodo.19453301>

### Keywords

Indian Ocean Region, climate vulnerability, geopolitics, maritime security, Pakistan, regional stability, blue economy

### Article History

Received: 11 February 2026

Accepted: 21 March 2026

Published: 07 April 2026

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Corresponding Author: \*

Dr. Sapna Mumtaz

### Abstract

The Indian Ocean Region (IOR) has emerged as a critical geopolitical and environmental arena where climate vulnerability and strategic competition intersect, shaping maritime security and regional stability. This study examines Pakistan's role in this evolving context by analyzing how climate change and geopolitical dynamics influence maritime governance. The research highlights that rising sea levels, extreme weather events, and environmental degradation are intensifying non-traditional security threats such as illegal fishing, piracy, and climate-induced migration. Concurrently, geopolitical competition among major powers, including China, India, and the United States, has transformed the IOR into a strategic space of influence, particularly through initiatives such as the Belt and Road Initiative (BRI) and Indo-Pacific strategies. Using qualitative analysis of secondary sources, this study evaluates Pakistan's geostrategic significance, its maritime security contributions, and the challenges it faces. The findings suggest that Pakistan's effectiveness in ensuring maritime security depends on integrating climate resilience with strategic policymaking, enhancing naval capacity, and strengthening regional cooperation.

### INTRODUCTION

The Indian Ocean Region (IOR) has gained immense strategic importance in contemporary global politics due to its central role in international trade, energy transportation, and global connectivity. A significant proportion of global oil shipments, accounting for nearly 40% of maritime oil trade, passes through the Indian Ocean, particularly via critical chokepoints such as the Strait of Hormuz, the Strait of Malacca, and the Bab el-Mandeb (Kaplan, 2010; Brewster, 2014). These sea lanes are essential not only for energy transportation but also for the movement of goods, natural resources, and manufactured products linking Asia, Africa, and the Middle

East. The region's strategic corridors have consequently become a hub for global commerce and a focal point for geostrategic competition, attracting the attention of regional powers like India and extra-regional powers including the United States and China, each seeking to secure economic influence, military presence, and strategic advantage.

At the same time, the Indian Ocean is increasingly affected by climate change, which acts as a threat multiplier for maritime and human security challenges. Rising sea levels, increasing ocean temperatures, and coastal erosion significantly threaten the sustainability

of coastal infrastructure, port operations, and urban settlements (IPCC, 2022). Extreme weather events such as cyclones, storm surges, and flooding have become more frequent and severe, disrupting trade, fisheries, and local economies. For developing countries like Pakistan, these environmental risks amplify existing socio-economic vulnerabilities, including poverty, urban congestion, and limited adaptive capacity. The combined effects of environmental stress and resource scarcity increase the likelihood of maritime insecurity, displacement of coastal communities, and disruptions to regional trade flows, highlighting the need for integrated climate adaptation and strategic planning.

Pakistan's geostrategic position along the Arabian Sea further enhances its relevance in the Indian Ocean, offering both economic opportunities and security responsibilities. Its coastline, spanning approximately 1,046 kilometers, provides access to critical maritime routes, while proximity to the Strait of Hormuz positions the country near one of the most vital global energy corridors (Wolf, 2020). The development of Gwadar Port under the China-Pakistan Economic Corridor (CPEC) has elevated Pakistan's potential as a regional maritime hub, enabling it to link South Asia with Central Asia and the Middle East. Gwadar is not only a port of economic significance but also a strategic node that facilitates naval deployment, trade security, and energy transportation, providing Pakistan with a platform to influence regional maritime stability. In this evolving maritime and geopolitical landscape, Pakistan faces the dual challenge of addressing climate vulnerability while simultaneously navigating complex regional and extra-regional power dynamics. Geopolitical competition, particularly between India and China, combined with the presence of extra-regional actors such as the United States, creates a high-stakes environment where strategic miscalculations could impact regional stability (Pant, 2018; Small, 2020). At the same time, climate-induced threats such as coastal flooding, extreme weather events, and resource scarcity threaten infrastructure, livelihoods, and national security. Pakistan's ability to manage these intersecting challenges depends on the integration of environmental resilience,

maritime security planning, and multilateral cooperation.

Consequently, Pakistan's role in maritime security and regional stability is not limited to trade facilitation or naval presence; it encompasses environmental governance, economic strategy, and diplomatic engagement. Leveraging its strategic location, developing resilient infrastructure, enhancing naval and technological capabilities, and participating in regional cooperative frameworks are critical for Pakistan to contribute effectively to Indian Ocean security (Ahmed & Thompson, 2019; UNCTAD, 2022). This study, therefore, aims to explore how Pakistan can navigate the complex interplay of climate vulnerability and geopolitical dynamics to strengthen its maritime role and promote stability in the Indian Ocean Region, highlighting both challenges and opportunities for long-term regional cooperation.

### Literature Review

The literature on the Indian Ocean Region highlights its growing importance as a center of global geopolitics. Kaplan (2010) argues that the Indian Ocean is becoming the "center stage" of global power politics due to its strategic location and economic significance. Similarly, Brewster (2014) emphasizes India's efforts to establish itself as a dominant maritime power in the region, reflecting broader shifts in regional power dynamics. Pant (2018) further explores the Indo-Pacific concept, highlighting the increasing involvement of external powers such as the United States in maintaining a balance of power in the region.

China's expanding presence in the Indian Ocean has also been widely studied. Small (2020) examines the strategic partnership between China and Pakistan, particularly in the context of CPEC, while Wolf (2020) analyzes the economic and geopolitical implications of Gwadar Port. These studies suggest that China's investments are aimed at securing energy routes and enhancing its global influence. However, they also raise concerns about strategic competition and regional tensions.

In addition to geopolitical considerations, scholars have focused on the impact of climate change on maritime security. Busby (2018) highlights how climate change acts as a threat

multiplier, exacerbating existing vulnerabilities and conflicts. The IPCC (2022) provides comprehensive evidence of the increasing risks posed by climate change to coastal regions. Studies on the blue economy (Ahmed & Thompson, 2019) emphasize the importance of sustainable resource management, while Lee and Kim (2021) analyze the link between climate change and maritime security in the IOR. Rahman (2020) further examines how climate-induced disasters affect security in South Asia. Reports by UNDP (2020), World Bank (2021), FAO (2020), IEA (2021), and UNCTAD (2022) provide additional insights into the economic, environmental, and security dimensions of the region. Collectively, these studies highlight the interconnected nature of climate vulnerability and geopolitical competition in shaping maritime security.

### Research Gap

Although there is extensive research on the geopolitics of the Indian Ocean and on climate vulnerability, there is a significant gap in studies that integrate both factors to examine their combined impact on maritime security. Most existing literature tends to focus either on environmental risks such as rising sea levels, coastal degradation, and extreme weather events (IPCC, 2022; Rahman, 2020), or on geopolitical competition involving regional and extra-regional powers (Kaplan, 2010; Brewster, 2014; Pant, 2018). Few studies explicitly analyze how climate change amplifies security challenges such as piracy, illegal fishing, and resource competition, particularly in the context of Pakistan's strategic maritime role. Additionally, the literature often overlooks the potential of Pakistan's maritime infrastructure, such as Gwadar Port, to act as a hub for regional stability while simultaneously mitigating climate-related vulnerabilities (Wolf, 2020). Therefore, there is a clear need for a comprehensive examination that links climate vulnerability, geopolitics, and Pakistan's contribution to maritime security in the Indian Ocean Region.

### Research Questions

1. How does climate vulnerability affect maritime security in the Indian Ocean Region?

2. What role can Pakistan play in promoting regional stability amid geopolitical competition?

### Research Objectives

1. To analyze the impact of climate change on maritime security in the Indian Ocean Region.
2. To evaluate Pakistan's strategic role in enhancing maritime security and regional stability.

### Research Methodology

This study employs a qualitative research methodology, relying exclusively on secondary sources, including peer-reviewed journal articles, books, and reports from international organizations such as the IPCC, UNDP, FAO, and World Bank. A descriptive and analytical approach has been used to synthesize existing literature on climate vulnerability, geopolitical competition, and maritime security in the Indian Ocean Region. Data were collected through a systematic review of published scholarly work, focusing on both thematic analysis and comparative evaluation. This approach allows for a detailed understanding of Pakistan's strategic role, the environmental risks affecting its maritime domain, and the broader geopolitical dynamics shaping regional stability. By critically analyzing and integrating insights from multiple authoritative sources, the study provides a comprehensive perspective on the interplay between climate change, maritime security, and geopolitics.

### Findings

#### 1. Climate Change Increases Risks to Maritime Infrastructure and Coastal Populations

- Rising sea levels, cyclones, and coastal erosion pose serious threats to Pakistan's maritime infrastructure, including ports, naval facilities, and urban settlements along the Arabian Sea (IPCC, 2022). Areas such as Karachi and Gwadar are particularly vulnerable, where floods and erosion can disrupt trade, energy transportation, and port operations. These environmental risks also threaten local communities' livelihoods, particularly those dependent on fisheries and coastal economies. Pakistan must therefore prioritize the development of resilient infrastructure and

disaster preparedness plans to ensure that climate change does not undermine maritime security objectives.

## **2. Geopolitical Competition Shapes Regional Security Dynamics**

- The Indian Ocean has become a major arena for geopolitical rivalry, with India, China, and the United States actively pursuing strategic interests (Pant, 2018; Kaplan, 2010). Pakistan's strategic position along key sea lanes, combined with its alliance with China through CPEC and Gwadar Port, enhances its geopolitical significance (Wolf, 2020). However, this also exposes Pakistan to regional tensions and strategic pressures, requiring it to carefully navigate competing interests while maintaining sovereignty and ensuring regional stability.

## **3. Gwadar Port Enhances Pakistan's Strategic Maritime Role**

- Gwadar Port represents a transformative development for Pakistan's maritime strategy. As a hub for regional trade and energy transportation, it connects South Asia, Central Asia, and the Middle East (Wolf, 2020). Beyond economic benefits, Gwadar strengthens Pakistan's strategic leverage, allowing it to influence regional maritime security and logistics. The port's success depends on integrating security measures, infrastructure resilience, and environmental adaptation to withstand climate and geopolitical challenges.

## **4. Climate-Induced Resource Scarcity Exacerbates Maritime Insecurity**

- Environmental changes such as rising ocean temperatures, depletion of fisheries, and extreme weather events increase competition over marine resources (Busby, 2018). Illegal fishing, smuggling, and localized maritime conflicts are heightened in areas where communities face resource scarcity. Pakistan's maritime governance must address these threats by enforcing regulations, monitoring activities, and engaging in regional cooperation to mitigate tensions arising from climate-induced scarcity.

## **5. Sustainable Blue Economy Practices Are Essential for Long-Term Stability**

- Pakistan's potential in the blue economy provides an opportunity to link

economic development with environmental sustainability (Ahmed & Thompson, 2019). Investments in sustainable fisheries, maritime renewable energy, and responsible port management can generate revenue, reduce environmental degradation, and enhance regional cooperation. A strong blue economy strategy strengthens Pakistan's resilience to climate change and ensures that maritime infrastructure contributes to both national and regional security objectives.

## **6. Strategic Location Near Critical Sea Lanes Strengthens Pakistan's Role**

- Pakistan's proximity to the Strait of Hormuz and major Indian Ocean trade routes positions it as a key player in ensuring the security of international shipping and energy flows (Kaplan, 2010; Brewster, 2014). This strategic advantage provides opportunities for Pakistan to engage in regional security collaborations and monitoring efforts. However, it also requires the country to invest in naval capabilities and surveillance systems to secure its maritime domain effectively.

## **7. Regional Cooperation Remains Limited Despite Shared Challenges**

- Although Indian Ocean states share common threats from climate change and maritime insecurity, political rivalries often hinder collaborative action (UNCTAD, 2022). Pakistan has the potential to play a proactive role in regional coordination through multilateral platforms, information sharing, and joint maritime initiatives. Strengthening regional cooperation is critical to addressing shared environmental and security threats effectively.

## **8. Naval Capabilities Are Central to Maritime Security**

- The Pakistan Navy plays a critical role in monitoring territorial waters, safeguarding economic zones, and participating in joint security operations with regional and international partners (Brewster, 2014). Effective naval deployment ensures protection of trade routes, energy infrastructure, and maritime assets. Continuous investment in personnel, technology, and strategic capacity is essential to maintain maritime security in a highly

competitive and environmentally vulnerable region.

### **9. Non-Traditional Security Threats Are Intensified by Climate Change**

- Piracy, smuggling, and illegal fishing are amplified by environmental degradation and resource scarcity (Busby, 2018). These threats pose both economic and security risks for Pakistan and neighboring states. Addressing non-traditional security challenges requires a combination of maritime surveillance, law enforcement, and cooperative governance measures with regional partners to maintain stability.

### **10. Climate-Induced Migration Affects Coastal Security**

- Coastal flooding, cyclones, and erosion can displace populations, creating humanitarian crises and increasing pressure on urban and port areas (Rahman, 2020). These migrations impact social stability, resource allocation, and law enforcement efforts, intersecting with broader maritime security concerns. Pakistan must incorporate human security and climate adaptation strategies into its maritime planning to address these emerging challenges effectively.

### **11. Technological Development Enhances Maritime Surveillance and Resilience**

- Advanced monitoring systems, satellite surveillance, and early warning technologies enable Pakistan to detect and respond to both environmental and security threats efficiently (Lee & Kim, 2021). Technology not only strengthens operational capabilities but also facilitates collaboration with regional partners, improving overall maritime security. Investing in modern technological solutions is critical for long-term resilience.

### **12. Economic Development and Strategic Planning Are Interlinked**

- Pakistan's economic growth through ports, trade, and maritime infrastructure is closely linked to its security capabilities (Wolf, 2020). Sustainable economic planning that incorporates environmental adaptation, naval preparedness, and multilateral cooperation enhances Pakistan's strategic leverage in the

IOR. Neglecting either economic or security dimensions could compromise its maritime role.

### **13. Energy Security is Closely Tied to Maritime Stability**

- The Indian Ocean hosts critical energy transportation routes, making maritime security vital for both regional and global energy supplies (IEA, 2021). Pakistan's capacity to protect energy shipments and maintain secure sea lanes reinforces its strategic relevance while contributing to global energy stability. Securing energy routes requires coordination with regional powers and technological investments.

### **14. Governance and Policy Integration Are Key to Resilience**

- Overfishing, pollution, and habitat destruction threaten marine ecosystems and human livelihoods, creating conditions for conflict (FAO, 2020). Integrating environmental governance with maritime security policies ensures that Pakistan can address both ecological and strategic challenges. Effective policy frameworks are essential to achieve sustainable and resilient outcomes.

### **15. Pakistan's Role in Regional Stability Depends on Strategic Foresight**

- Pakistan's strategic position in the IOR, combined with climate adaptation and maritime governance, allows it to contribute significantly to regional security (World Bank, 2021; IPCC, 2022). Proactive planning, investment in infrastructure and technology, and multilateral engagement are essential to navigate complex geopolitical and environmental challenges. Pakistan's ability to balance these dimensions will determine its effectiveness in promoting long-term maritime stability.

### **Discussion and Analysis**

The Indian Ocean Region (IOR) has increasingly become a geostrategic and environmental hotspot due to its role in global trade, energy transportation, and security dynamics. Strategic chokepoints such as the Strait of Hormuz and the Strait of Malacca make the region vital for international commerce and energy flows (Kaplan, 2010). Pakistan's location along the Arabian Sea positions it at a critical juncture, providing both opportunities and

responsibilities in shaping maritime security and ensuring regional stability. Its strategic position allows it to serve as a bridge between South Asia, the Middle East, and East Africa, making its maritime policies highly consequential for regional actors.

Climate change has emerged as a significant threat multiplier in the IOR, exacerbating vulnerabilities and influencing security challenges. Rising sea levels, coastal erosion, and increasing frequency of extreme weather events have particularly impacted Pakistan's coastline, including the areas surrounding Karachi and Gwadar Port (IPCC, 2022). These environmental stressors threaten both infrastructure and livelihoods, necessitating the integration of climate adaptation strategies into maritime planning. Without proactive measures, Pakistan risks undermining its capacity to secure its maritime domain effectively.

The geopolitical environment of the IOR adds further complexity to Pakistan's maritime role. India, China, and the United States, among other powers, have intensified their strategic presence to safeguard economic and security interests (Pant, 2018). Pakistan's alliance with China, particularly through the China-Pakistan Economic Corridor (CPEC) and the development of Gwadar Port, enhances its strategic leverage but simultaneously exposes the country to geopolitical pressures and regional tensions. Managing these dynamics requires careful diplomatic and strategic planning.

Gwadar Port represents a cornerstone of Pakistan's maritime strategy, providing both an economic gateway and a strategic hub in the region (Wolf, 2020). The port facilitates trade, energy shipments, and regional connectivity, enhancing Pakistan's potential role in the IOR. However, sustaining this strategic advantage requires robust climate-resilient infrastructure and comprehensive maritime security measures to mitigate environmental and geopolitical risks. Non-traditional security threats, such as piracy, illegal fishing, and smuggling, are amplified by climate-induced resource scarcity in the Indian Ocean (Busby, 2018). Rising ocean temperatures and declining marine resources contribute to conflict over fisheries and maritime zones, complicating security governance. Pakistan's maritime strategy must therefore include

preventive and adaptive approaches to ensure stability and protect its territorial waters.

The concept of the blue economy offers Pakistan an opportunity to integrate economic development with environmental sustainability (Ahmed & Thompson, 2019). Sustainable management of fisheries, port infrastructure, and maritime renewable energy can strengthen Pakistan's economic resilience while addressing climate vulnerabilities. Such an integrated approach can enhance regional cooperation and establish Pakistan as a proactive actor in maritime governance.

Regional cooperation remains an essential element of effective maritime security in the IOR. Despite shared environmental and security challenges, political rivalries often hinder collaborative initiatives (UNCTAD, 2022). Pakistan can utilize multilateral platforms, such as the Indian Ocean Rim Association (IORA), to enhance information sharing, joint security operations, and coordinated responses to climate-induced and geopolitical threats.

Energy security is deeply intertwined with maritime stability in the region. The IOR serves as a critical corridor for global oil and gas transport, making energy infrastructure highly sensitive to both environmental hazards and geopolitical tensions (IEA, 2021). Pakistan's role in protecting energy shipments and facilitating secure maritime routes strengthens its strategic importance but requires investment in naval capabilities and surveillance technologies.

Climate-induced migration represents another emerging challenge with implications for maritime security. Coastal flooding, cyclones, and erosion have displaced populations, creating humanitarian pressures and intensifying competition over resources (Rahman, 2020). Pakistan must integrate human security considerations into maritime planning, ensuring that climate adaptation policies also address social and economic vulnerabilities.

Naval capabilities are central to Pakistan's ability to maintain maritime security. The Pakistan Navy is responsible for monitoring sea lanes, safeguarding economic zones, and participating in cooperative exercises with regional and global partners (Brewster, 2014). Strengthening these capabilities through modern technology, personnel training, and strategic coordination is

crucial to ensure effective defense against both conventional and non-traditional threats.

Geopolitical tensions, particularly between India and China, have a direct impact on Pakistan's maritime strategy. While its strategic partnership with China provides economic and security benefits, it also places Pakistan in a complex position amid regional rivalries (Small, 2020). Pakistan must balance its strategic alliances carefully to avoid escalation while maintaining operational autonomy in maritime security initiatives.

Environmental management and effective maritime governance are critical to long-term stability. Overfishing, coastal pollution, and habitat degradation threaten both ecological balance and human livelihoods, creating conditions for conflict (FAO, 2020). Pakistan's ability to integrate environmental regulation with security measures will determine the sustainability of its maritime strategy and influence regional cooperation outcomes.

Technological development plays a pivotal role in strengthening maritime security and resilience. Advanced surveillance systems, satellite monitoring, and early warning mechanisms enhance the ability to detect threats, respond to emergencies, and manage environmental risks efficiently (Lee & Kim, 2021). Investments in technology not only improve operational effectiveness but also reinforce Pakistan's credibility as a proactive regional security actor.

International partnerships and alliances can further enhance Pakistan's influence in the IOR. Collaboration with regional powers and global institutions enables intelligence sharing, coordinated exercises, and collective responses to climate-induced disasters, improving overall maritime security (UNDP, 2020). Engagement in multilateral frameworks also strengthens Pakistan's diplomatic positioning and fosters trust among neighboring states.

In conclusion, Pakistan's maritime role in the Indian Ocean is shaped by the interplay of climate vulnerability, economic development, and geopolitical competition. By integrating climate adaptation strategies, enhancing naval and technological capabilities, and pursuing multilateral cooperation, Pakistan can address emerging challenges and contribute significantly to regional maritime security and stability

(World Bank, 2021; IPCC, 2022; Wolf, 2020). A proactive and comprehensive approach is essential to navigate the complex strategic environment of the IOR while ensuring long-term resilience and sustainable development.

### **Conclusion**

The Indian Ocean Region has emerged as a pivotal arena where climate vulnerability and geopolitical competition intersect, creating complex challenges for regional stability. Rising sea levels, frequent extreme weather events, and environmental degradation have compounded traditional security threats, affecting coastal states' infrastructure, livelihoods, and economic resilience. Pakistan, with its strategic location along the Arabian Sea and proximity to critical maritime chokepoints, faces both significant challenges and opportunities in this context. The country's maritime role is not only shaped by regional power dynamics but also by its ability to mitigate climate-related vulnerabilities through adaptive strategies.

Pakistan's geostrategic significance is further enhanced by the development of Gwadar Port under the China-Pakistan Economic Corridor (CPEC). This infrastructure positions Pakistan as a potential hub for regional connectivity, facilitating trade and energy transportation while providing a platform for regional cooperation. However, the effectiveness of such initiatives is contingent on integrating climate resilience into planning and operations. Without addressing environmental risks, the long-term sustainability of maritime infrastructure and security efforts may be undermined.

Moreover, Pakistan's role in maritime security extends beyond infrastructure development. Ensuring regional stability requires active participation in multilateral initiatives, maritime patrols, and cooperative mechanisms that address both traditional and non-traditional security threats. The interplay between climate change and resource scarcity has exacerbated challenges such as illegal fishing, piracy, and displacement, necessitating comprehensive policies that combine environmental stewardship with strategic security measures.

Finally, addressing the dual challenges of climate vulnerability and geopolitical competition requires Pakistan to adopt a forward-looking

maritime strategy that is flexible, collaborative, and resilient. By leveraging its strategic location, enhancing naval capacity, and engaging in regional cooperation, Pakistan can play a decisive role in promoting maritime security, facilitating economic growth, and contributing to the broader stability of the Indian Ocean Region. The integration of climate adaptation into security planning will be essential for achieving long-term resilience and sustainable development in the region.

### Way Forward

Pakistan must prioritize the development of climate-resilient maritime infrastructure and disaster preparedness frameworks to mitigate the impacts of rising sea levels, extreme weather events, and coastal erosion. Investments in adaptive technologies, early warning systems, and sustainable port management practices will enhance the country's capacity to respond effectively to environmental hazards. Simultaneously, policy frameworks must integrate environmental, economic, and security considerations to ensure that Pakistan's strategic maritime assets contribute to both national and regional stability.

In addition, Pakistan should actively strengthen regional cooperation through multilateral mechanisms, information sharing, and joint maritime exercises. Building partnerships with neighboring states, international organizations, and strategic allies can facilitate collective responses to climate-induced security threats and geopolitical challenges. By pursuing a coordinated approach that combines strategic foresight, environmental sustainability, and robust governance, Pakistan can enhance its maritime role while promoting the overall security and stability of the Indian Ocean Region.

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