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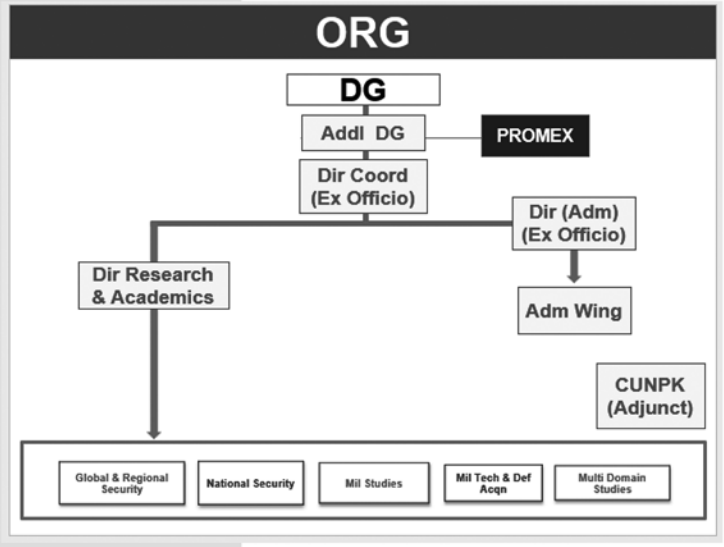

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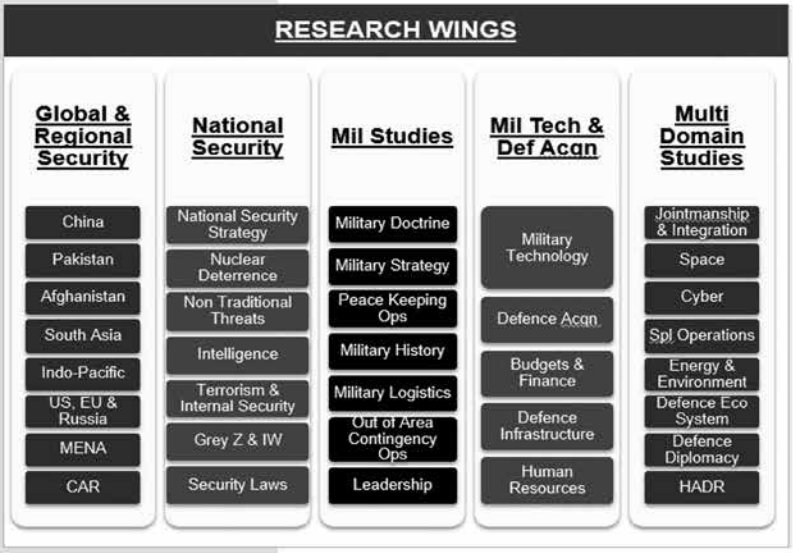

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CLAWS and MAHE have jointly signed a Memorandum of Understanding (MoU) to initiate PhD programme for Officers in broad subjects that include Geopolitics, National Security, Strategic Studies and International Relations. MAHE, Manipal, is one of the few universities in India that has a separate department of 'Geopolitics and International Relations'. As mentioned on the MAHE website, The Department of Geopolitics and International Relations focuses research on almost all the geopolitical regions with a greater focus on East Asia and South Asia, Strategic Technologies for National Security with a Focus on Outer Space, Nuclear Strategy of Major Powers, Delivery systems of China and Pakistan, Global Security Challenges, Dimensions of National Security, India's Foreign Policy Challenges, Cyber Warfare and Critical Infrastructure Security, Maritime Security, Indo-Pacific Security Architecture, Counter terrorism, Insurgency and asymmetric Conflict. In addition to above, certain additional subjects have also been proposed to MAHE for inclusion and consideration.

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Note from Managing Editor

Countries across the world are facing unique challenges to their security and future development. While the rigours of terrorism, conflict, and war have been closely studied and strategies formulated, little is available concerning the most serious threat humanity has yet faced—the spectre of climate change. Rising sea levels, increasing loss of natural and diverse habitats, and already apparent threats to human health are some of the prominent issues. At its core, climate change exacerbates existing vulnerabilities. Countries already struggling with resource scarcity, large populations, and economic challenges are hit hardest, while aspiring giants may find their ambitions frustrated by entirely unexpected disasters. Droughts, floods, and storms destroy crops, displace communities, and lead to intra-state or inter-state conflicts. In cases of severe water scarcity, for instance, this can escalate into full-blown conflicts between countries, while in the others, climate disasters may lead to large population movements and disease. All of this lay places enormous stress on governments and institutions, reducing their capacity to respond effectively. In terms of security, there is the threat to critical infrastructure, including security installations, thereby impacting their ability to deliver in times of threat.

As Managing Editor of CLAWS, it thus gives me immense pride to announce the publication of today's latest issue of Scholar Warrior. This issue focuses on the most pressing issue of our times, consisting of works written by authors on the impact of a rapidly changing natural environment on the security and development of India.

The First Section of the Scholar Warrior consists of contributions made by researchers and officers, both serving and veteran. With articles authored by military professionals and the civilian research staff of CLAWS, this section showcases not only the expertise of the research staff and external contributors, but also demonstrates the multi-faceted nature, and the multi-domain applicability of the research published by CLAWS.

From the contributions of Lt Gen S Ravi Shankar, who expounds on the impact of climate change on military logistics, to an article by Mr Ashu Maan, that takes a closer look at China's hydropower projects on the Brahmaputra River,

each article highlighting specific areas for the Indian strategic community to focus on. Through these essays, readers gain an in-depth understanding of how a rapidly changing natural climate and ecosystem impact India's developmental and strategic ambitions, as well as the long road ahead in terms of adaptation.

The second section of the Scholar Warrior, consists of two book reviews that highlights the varied literature perused by the research staff at CLAWS and the interpretations of the author's thoughts. The first review, written by Dr Shushant V C Parashar, focuses on the diplomatic aspects of the fight against climate change through a study of the work of Dr Dhanashree Jayaram, a noted expert in the domain of climate change studies, particularly from a geopolitical and international relations perspective. The second book review, written by Mr Govind Nelika, delves into traditional security concerns with the fascinating history of the Mossad, from its founding days to the present tumultuous times. The author, examining the written work of Mr Prem Mahadevan, brings to light the history of one of the world's most proficient and secretive intelligence organisations, and the choices they have had to make in securing their nation from internal and external threats.

Through this edition of the Scholar Warrior, CLAWS aims to highlight the very real dangers of climate change and the impact that decisions at all levels can have on fragile ecosystems. Our objective is to rapidly increase awareness of the immediate dangers rather than merely framing this, as a future threat, as nations often do.

I thank all authors for their invaluable contributions to this issue of the Scholar Warrior, and I also thank our readers for taking the time to engage with these pertinent topics. This is only a beginning. It is up to our readers to advance these discussions in their own work and thinking.

Thank you all once again!

Dr. **Tara Kartha**
Director—Research and Academics, CLAWS
Managing Editor, Scholar Warrior

SCHOLAR WARRIOR

SECTION I

ARTICLES

CENTRE FOR LAND WARFARE STUDIES

Resilient and Timely Response to Logistic Bottlenecks in Border Areas

S RAVI SHANKAR

Abstract

Resilient and timely response to bottlenecks caused due to weak bridges on National Highways (NHs) in disaster prone border areas is essential to utilise the highways to their full capacity and minimise disruption in logistic chains. It helps maintain the pace of development in border areas and to sustain military logistics, both of which contribute to national security. A study of a typical disaster situation in Irang Manipur, shows how logistics get disrupted for unacceptably long periods for want of a more resilient and timely response to replacing weak bridges. Underutilisation of just one NH for long periods, due to a weak bridge acting as bottleneck, results in losses to the State amounting to as much as 1,000 Cr annually—a reality that is simply ignored. How it impacts logistics, the economy and national security must be recognised and acted upon by logistic and financial experts.

Along with new infrastructure, a concept for a resilient and timely response to restore these bridges to full capacity post-disasters must evolve. Such a response needs dedicated planning, manpower, and equipment, which is lacking today. The solution is simple and well within reach and

requires someone to take the initiative, to speed up the development of border areas, improve military logistics and make them more resilient during operations.

Introduction

With the increase in extreme weather situations, the disaster prone Northern and Northeastern Borders see regular disruption of important logistic arteries, with bridges being washed away. It is not sufficient to build new roads and bridges; these must be kept operational to full capacity on a mission mode to reduce logistic costs. It will enhance the pace of development in border areas and enable sustained military logistics, which together contribute to national security. In disaster-prone areas, this is a challenge for which the nation is ill-prepared. While many agencies construct new infrastructure, during disruptions, they expect others to be the first responders. The first response when a critical bridge collapses is often left to the Army, followed by the aid provided by the civilian authorities. A recent example of this was when Wayanad was devastated by unprecedented landslides followed by floods in end-Jul 2024. Connectivity became critical for rescue operations as the existing 27 m span permanent concrete bridge between Chooranmala and Mundakkai was washed away without a trace. A 190 ft Bailey bridge was launched in record time by the Madras Sappers on August 1, 2024.

This caught the attention of the nation for more than one reason. The equipment, comprising 80 tons of Steel, with more than 300 major parts and innumerable bracing parts, connecting pins, and fasteners, was moved from MEG Centre, in Bangalore to the Chooramal site by trucks, a challenging logistics exercise carried out with military precision. The bridge was designed after a spot reconnaissance by the team and launched as a continuous span of 57 m, improvising for the tight 'back space' by using an intermediate pier at (15 m) from one end. Work was carried out tirelessly around the clock by the taskforce, to complete the bridge in 30 hrs. What grabbed special attention was Major Sita Ashok Shelke's, working with the task force, the only female in a 150-strong team of Madras Sappers.

What went relatively unnoticed was that the capacity of the bridge was reduced from double lane, 100-ton capacity to a single lane, 24 Tons after incorporating an improvised support in the riverbed at 15 m from one end. While it allows relief material, stores, machinery, and manpower to cross, limited by the maximum load, the bridge was still vulnerable to increases in water-levels

following heavy rains in the catchment area, necessitating protective works using gabions with the help of local authorities to protect the pier and bank seats. Fortunately, this vulnerability was not tested. The response by the Army was commendable, improvising as best as they could and quite effectively too, using the available vintage equipment. The Bailey bridge is very versatile, but being of a Second World War design, it is not best suited to today's axle loads, resulting in a weak structure. It is a first-generation Modular Steel Panel Bridge (MSPB) that we still use in emergencies, while the world has moved on to better-performing third generation MSPBs, which are wider, can accommodate present-day axle loads and can be constructed quickly. The impact on logistics along our borders due to the use of this vintage equipment in emergencies is crippling and needs urgent address.

On a National Highway (NH) with heavy civilian traffic, deploying a Bailey bridge is unsafe and drastically limits the capacity of the highway. This results in gross underutilisation of the NH, which can continue for years. There are numerous such examples, one of which is discussed here in detail to highlight the inadequate and ill prepared response in such situations, the significant losses incurred by the State because of it, and its effect on national security. A more resilient response requires forethought and planning.

The losses due to underutilisation of infrastructure are not easily quantifiable but are real. It requires an understanding of logistics and an economic evaluation of a NH. Economic Evaluation (Indian Roads Congress, 2019), outlines what you receive in return for the financial outlay, an exercise conducted when sanctioning funds for a highway but then forgotten by all. The benefits calculated during an economic evaluation accrue only if the NH or any road is used to capacity. If the capacity drops to 25 per cent for a few years, the loss to the State often goes unnoticed. And this is happening on numerous highways while the Government is concerned about logistics costs being 14 per cent of the gross domestic product (NITI Aayog, 2021, p. 19), compared to 7 to 8 per cent in developed countries and hopes to reduce it through better infrastructure. The adverse effect must be recognised, and measures taken to mitigate such losses.

Once the problem is fully comprehended the urgency for the solution and what to do follows more easily. The paper attempts to put this in perspective under the following heads:

- Disasters, Development of Border Areas and Military Logistics.
- Irang Bridge: A Case Study on Urgency for Resilient and Timely Response.

- Gearing up for a better response with Improved Technology.
- The Way Forward: On taking the Initiative.

Disasters, Development of Border Areas and Military Logistics

The development of border areas and military logistics are connected. Recurring disasters affect both. A recent report on Extreme Weather India: 2023, shows that the incidence of heavy rains, floods and landslides as well as the lives lost due to these events is highest along the Northern and Northeastern border areas (Sengupta and Pandey, 2023). While we continue to debate the reasons for this and its link with climate change, it is a reality that we must tackle. Monsoons hitting the still growing, unstable young fold mountains make the northern borders landslide-prone; the lower reaches are flood-prone and further northeast, during heavy rains large tracts of land tend to sink. Together these pose a continuous challenge to logistics. In assessing the impact on logistics and ways to mitigate these challenges we must take a holistic view of logistics in these areas.

A Holistic View of Logistics. Logistics means reaching men and material to the right place in minimum time and at the least cost. Improved road connectivity facilitates this process. Equally important in reducing time for replenishments the creation of logistic nodes closer to the destination, with assured availability of supplies. Well-stocked logistic bases must feed a logistic chain that reaches the destination; for military logistics, this means reaching the front lines, the forward trenches, and up to the gun end, ensuring operations are not held up for want of supplies, ammunition, fuel, and clothing. A first step is to develop the border states as strong support bases for the troops ahead.

The impact of development in border areas on security is significant. Economic development leads to better living conditions, a higher level of education, and a more stable society. It helps reduce unwanted external influences and also promotes better integration with the rest of the country, economically, culturally, and socially. This, in turn makes the region more secure. The efficiency of the forces along the borders is also enhanced by local support-motivated people, a thriving industry, and improved local resources. Ask anyone in the forces who has fought a war along the western borders, and he will tell you how local support acts as a force-multiplier.

Optimising Transportation Costs. It is common to see movement in smaller 6-wheel trucks (Load Class 18) in border areas, which is primarily because of weak bridges. Few realise how much transportation costs increase by using

smaller trucks. Figure 1 shows a comparison of costs using different sizes of trucks (Lt Gen Shankar, 2022).[1] When a carriage is limited to 6-wheel trucks the transportation costs can go up by nearly 70 per cent compared to using larger 4-axle, 12-wheel trucks. Slow traffic due to bottlenecks further add to costs. Together, they can lead to a 100 per cent increase in logistic costs. Such weak bridges are plenty in border areas, and with each disaster, the numbers increase. Disasters in Border Areas, weak bridges, and logistics costs are linked. How and why, will be examined in the following case study.

Fig 1: Transportation Cost Vs Truck Size

	Type of Truck	Gross (tonnes)	Carrying Capacity (tonnes)	Rate Rs/Ton for 10 Km lead	% Increase wrt 12 Wheel trucks	Remarks
Rates as per SSR Bihar State wef 01 Apr 22 for Tpt of Aggregate	6 Wheel	18.5	10	137	71.3%	
	10 Wheel	28	18	99	23.8%	
	12 Wheel	35	25	80	0.0%	Taken as Standard
	14 Wheel	42	32	70	-12.5%	

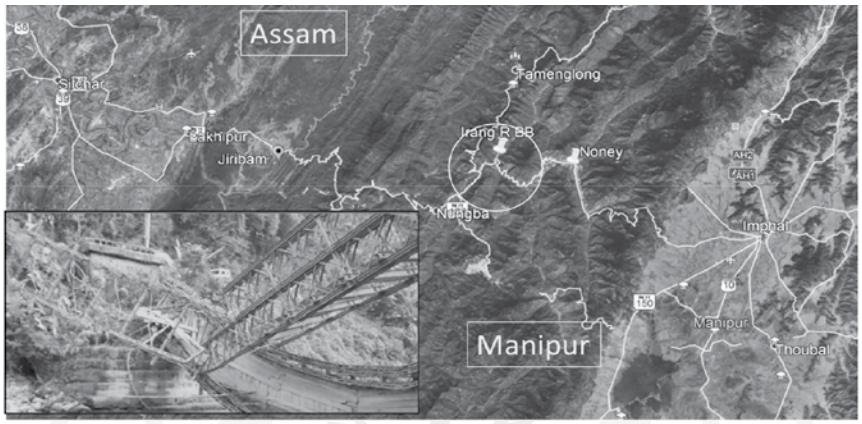
Irang Bridge—A Case Study on Urgency for Resilient and Timely Response

The case study on the Irang Bridge is one example selected to illustrate out how disasters, weak bridges, and logistics costs are linked and the urgency to address such situations more effectively.

NH 37 (Imphal-Jiribham-Silchar), was handed over to the National Highways and Infrastructure Development Corporation Limited (NHIDCL) in November 2017 by the BRO. It is a lifeline for Manipur. On November 1, 2020, the Bailey bridge at Irang collapsed when an overloaded vehicle carrying sand was crossing. The army was requisitioned, and repairs on the Irang Bridge started after uninstalling a similar Bailey bridge constructed at Tengnoupal along the Imphal-Moreh road. However, this old bridge collapsed during the launch. The Border Roads Organisation provided another Bailey bridge which

was then successfully launched on November 27. As always, the Army's effort was commended (EastMojo News Bureau, 2020). The bridge was completed but built with borrowed equipment; it remained 52 m span, Load Class 18, single-lane and a weak, unsafe structure.

Fig 2: Irang Bridge: NH37 Imphal-Jiribham-Silchar-Km 98.75

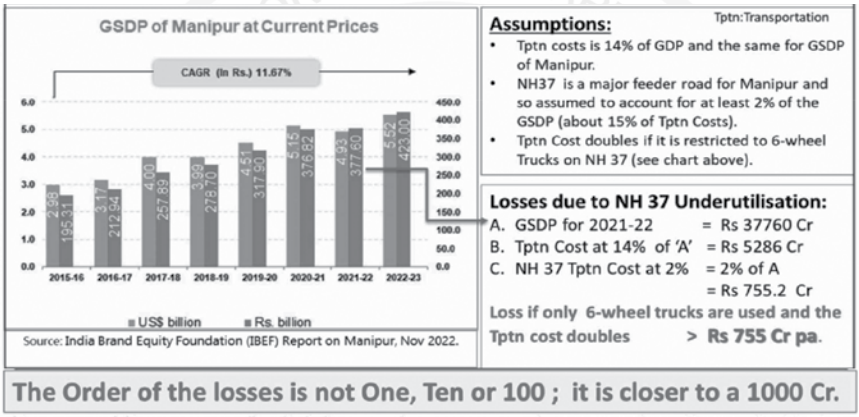


On May 2, 2022 the Irang bridge collapsed again (Vangmala, 2022). It was replaced by yet another Bailey bridge, this time procured from Garden Reach, Kolkata, but it had the same specifications, which is a limitation of the Bailey bridge design. This took three months to construct. In June 2024, the Irang crossing saw one more Bailey bridge collapse (Akoijam, 2024). Fortunately, the permanent bridge was nearing completion and was opened to traffic, effectively ending the saga of collapsing bailey bridges regularly and a weak bridge bottleneck at Irang for over four years.

Financial Impact of a Weak Bridge on NH 37. NH 37 is designed for Load Class 70, two-lane traffic accommodating wheel-trains up to 100 tons over bridges. By installing a Load Class 18, single-lane, Bailey bridge, the capacity of the NH was reduced to 25 per cent. Such a bridge on the NH restricts the load carried by vehicles on the entire highway limiting it to 6-wheel trucks (see Figure 1). Additionally, traffic movement is slower with a single lane bridge on a two-lane highway. Slow traffic, which has further cost implications. The Bailey bridge is also a temporary structure with a life of only 25 years and needs early replacement. And most important, the bridge is unsafe, leading to the loss of material and invaluable lives with each collapse.

Figure 3 shows the financial losses to Manipur State, due to the weak bridge, after making reasonable assumptions (India Brand Equity Foundation, n.d.). The accumulated losses amount to Rs 1,000 Cr per annum. This figure is for just one highway. When considering all the highways along our borders that are similarly affected by weak bridges and the losses to the nation accumulate to staggering numbers, over the years, resulting from the underutilisation of NHs on which huge amounts have been spent.

Fig 3: Analysis of Losses to the State of Manipur when NH 37 is Under-utilised (by restricting loads to 6-Wheel Trucks)



The Irang Bridge response clearly brings out how unprepared we are for the collapse of critical bridges in border areas. Every time a permanent bridge collapses it is replaced by a temporary weak bridge, a sub-optimal, unsafe solution resulting in mounting losses to the State. This does not affect any of the construction agencies and so no one takes responsibility for this, for such a events are often categorised as 'an act of God'.

The net result is a critical gap in the Nation's capability that directly affects both development and logistics in border areas. Development is impacted because weak bridges result in additional transportation costs. They also do not allow heavy plant and machinery to reach sites, slowing down projects, a dual setback. A poor response to restore such bridges increases the number of weak bridges with each disaster. It negates the very purpose for which the roads were built and must be addressed urgently.

Gearing-up for a More Resilient Response to Restore Bridges

To gear up for a better response, there must be clarity on the concept of an improved response, what we wish to achieve. From this will flow what kind of equipment must be used, who will be responsible for responding under various situations and how it should be stocked for ready availability. Let us see this one-by-one.

Concept of Improved Response. Presently, no timeframe for effective response by construction agencies in such emergencies exists. Practical guidelines on this need to be formulated so that the concerned agencies can gear themselves accordingly. To have quicker response in an emergency, better MSPB should be stocked and deployed to the site within a reasonable timeframe of three to four days of a mishap so that the highway is restored to at least 75 per cent of its capacity within 2 weeks. Full capacity must be targeted within a year, if not earlier, to mitigate economic losses from a damaged bridge. Provision of detours capable of handling full NH loads is also possible with the improved MSPB. Therefore, equipment must be stocked for both permanent and temporary bridges and in hilly terrain, it must allow for carriage to sites with restricted approaches and sharp bends. The stocked bridges should include 7 m wide double lane bridges for permanent bridges, where full NH capacity is desired and intermediate lane bridges of 5.5 m width for constrained sites and temporary detours. Both should allow Class 70 loads (up to 100 ton wheel-trains) (Indian Roads Congress, 2017), allowing all traffic on the highway to pass.

Selection of Modular Steel Panel Bridges. MSPB, like the Bailey bridge, can be assembled quickly, with no welding or riveting required on site. MSPBs are best suited for disaster mitigation and quick response to distressed bridges for spans up to 70 m. While the Bailey bridge has more than proved itself in the World War II, it has become woefully inadequate for the heavier axle-loads needed today (Ministry of Road Transport and Highways, 2018). Modular bridges have evolved from the first-generation Bailey bridge to improved 3rd Generation modular panel bridges (Structure Design and Rehabilitation, Inc., 2005). These allow for longer spans, and heavier loads (see Figure 4). They have more options of road widths and can be used as a temporary bridge or be deployed as a permanent bridge with a life of 75 to 100 years.

Fig 4: Development of MSPBs

	Span (meters)	Load (Tons)	Life (Years)
1st Gen (1940)	42m >42m	40 T 18-24 T	25 yrs
2nd Gen (1970)	60m	2x 30 T	50 yrs
3rd Gen (1990)	70m	2x50 T	100 yrs

Repeated appeals for a better modular bridge over the last 10-12 years have seen Garden Reach, Kolkata, a PSU, design modular panel bridges for heavier loads, but the span is limited to 42 m and a lifespan of 25 years. There is a need to transform to third generation bridge specifications early. These bridges are available off-the-shelf in the international market, and can easily be manufactured in India when there is sufficient demand. With more awareness of the problem and the implications, demand can peak in less than a year to 50 to 100 bridges annually. Guidelines on use of Modular Steel Bridges have recently been prepared by the Indian Roads Congress.[2] They cover designs safeguards for propriety design, which have often been a hurdle in introducing new technology. This will help in exploring more options for improved MSPBs.

Responsibility for Quick-Resilient Response. The responsibility for the maintenance of NHs is clearly defined and depending on the location, may be with any of the national construction agencies—National Highway Authority of India (NHAI), NHIDCL, BRO or a State Public Works Department, if nominated to maintain a NH. For important district roads responsibility lies with the respective State PWDs. The responsibility for effective emergency response, especially when bridges are damaged, should also lie with them. The agencies must be guided by Standard Operating Procedures (SOPs) in this regard, that outlines the individual responsibilities within the agencies, earmarks resources, including the location of stores. The procedure for requisitioning and collecting stores, and mustering skilled manpower in an acceptable time frame, must also be laid out. The stores could be drawn from 'store-parks' created for this, by all construction agencies in such emergencies.

Stocking of Modular Bridges for Quick Response. Quick response is possible only if the bridge parts reach the site in a short time. Store-parks must be created and dispersed strategically to cover specific areas. Modular bridges can be stocked as standard modules to allow for, say, 300 m of bridge length. In emergencies, a bridge of the required span, load, and width can be designed, within hours. The store-parks must be organised to house the stores, design the bridge, load, and despatch by trucks to any required bridge site and thereafter guide the launch on-site if required. A trained crew for the launch will also be required. All this needs a SOP to manage resources and operate such modular bridge store-parks. Such store-parks must service all construction agencies with simple guidelines on requisition, payment, and restocking the stores. In the US and Europe modular panel bridges are readily available on lease from vendors for use for short periods, or purchase as a permanent bridge. With demand increasing, manning such store-parks could become a viable business proposition.

But who takes responsibility for initiating these actions is yet another question.

The Way Forward—On Taking the Initiative

The Irang Bridge case-study clearly shows the knee-jerk response and lack of policy for restoring logistics in areas that directly affect national security. This is not a stray example, there are a few such incidents each year, and the number of distressed bridges continues to increase as existing infrastructure ages or the frequency of extreme weather increases. 3rd Gen MSPBs need to be stocked in these areas urgently.

Figure 5 shows one such 3rd Gen MSPB launched in India in 2016. This was after the permanent bridge was washed away during the devastating floods in the Kedarnath Valley in June 2013. The bailey bridge launched in its place was again washed away in 2015. The launch of a permanent modular bridge in record time in March 2016 was a bold step taken by the Uttarakhand Government on advice from their project consultants (Lt Gen Shankar, 2022).

Procuring such bridges has faced many roadblocks. Having been involved in the launch of the first such bridge in the country, one has participate in discussions on this. NHAI and NHIDCL agree on the urgency but state that they are not equipped to stock such bridges. The State PWDs and the BRO believe this should be provided for by Ministry of Road Transport and Highways (MORTH).

The National Disaster Management Authority (NDMA) was unwilling to take on a role in this. The Northeast Council was very clear that their role was to provide infrastructure; repair and rehabilitation was out of their preview. However, all agree that there is an urgency for it.

Fig 5: The 60m, double lane, permanent ACROW bridge launched in record time at Sonprayag, en-route to the Kedarnath Shrine (March 2016)

Logistic bridges that can be deployed quickly are also required by the Army. NATO specifies two-way Class 24 bridges require a minimum 5.5 m width (North Atlantic Treaty Organisation, 2017). This width can accommodate single lane Class 70 traffic too, which is the military requirement for heavier loads as projected by them to MORTH. It is the minimum that the Army should plan for to establish a more resilient logistics chain, during operations along the northern borders. The ability to respond appropriately to disruptions must also be included in of any operational plan.

It is high time for a coordinated initiative at the national level to address this gap in resilient responses to distressed bridges. The industry will gear up for this only if there is sufficient demand and clarity in what is required. The technology and design skill are not lacking, what is missing is someone to take the lead. Too many agencies need it, each waiting for someone else to take the initiative.

A pilot project of establishing one store-park of 3rd Gen MSPBs is needed to demonstrate the feasibility and utility. It will start a flood of demand. More such bridges will speed up development and improve logistics in border areas. The first store-park could be planned in Uttarakhand, where the first 3rd Gen MSPB in India was launched. The State experiences disasters in every monsoon. Even as

I write in mid-July, the state is reeling under extremely heavy floods. Better still would be a Central Government initiative by the MORTH or NDMA, involving all the Border States and Construction Agencies, with improved national Security and significant economic savings as the goal.

Lt Gen **S Ravi Shankar**, PVSM, VSM (Retd.) an Alumnus of the National Defence Academy, was commissioned into the Madras Sappers (Corps of Engineers) in March 1972. He retired as the Director General Border Roads, with wide experience in planning and execution of infrastructure Projects,in challenging terrain; working under extreme conditions such as on the Siachen Glacier; operating in hostile conditions including the UN Mission in Somalia; and rehabilitation after major disasters such as the earthquake in Sikkim in 2011, where roads were opened in record time. He was awarded the PVSM during his tenure with the Border Roads and has the distinction of being awarded the Gen Harkirat Singh Medal for innovation in the field, while supporting operations on Siachen Glacier.

He has been an instructor in the Indian Military Academy, DSSC Wellington and the College of Military Engineering, training junior and middle level leaders. Later as Commandant of the Selection Centre at Allahabad he oversaw selection of candidates into the three services.

Post retirement, for over 10 years, he was with an Infra consultancy company with an international footprint, overseeing various Infra projects as also facilitating new technologies such as 3rd Generation Modular Steel Panel Bridges, Geo-spatial applications and more, to be introduced."

Notes

1. Figure 1 based on the data taken from SSR of the State of Bihar PWD wef. 01 April 2022 for transport of aggregate for construction. Image obtained from: Lt Gen Shankar, S Ravi (Retd) (2022, 29 November). National Highway: Highways of Connectivity. Organiser. Accessed 18/08/2024. https://organiser.org/2022/11/29/100152/bharat/national-highway-highways-of-connectivity/.
2. Guidelines on Modular Steel Bridges were prepared by the IRC Sub-committee 5.1 constituted for this. This has since been approved by the IRC Council and should be published by November 2024. The author was a member of this sub-committee along with other experts in the field.

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Climate Security: The Military Dimension, in the Indian Context

G SUNIL KUMAR

Abstract

This article discusses the impact of climate change on national security, focusing on the military implications for India. It emphasizes how climate-related events—such as rising temperatures, extreme weather, and sea level rise—pose risks to infrastructure, human security, and military operations. Natural disasters, which are occurring more frequently, demand greater military involvement in disaster relief, creating challenges for balancing defense responsibilities. India's operational environment, particularly in high-altitude and coastal areas where the military is deployed are at particular risk. The rising sea levels threaten major naval bases, while the accelerated melting of glaciers and extreme weather increase risks for soldiers in northern border areas. The changing climate also exacerbates water scarcity, which has strategic implications for conflicts, particularly with Pakistan over the Indus River system. Additionally, climate-induced migration presents internal security threats, leading to demographic shifts and social unrest, particularly in urban areas where displaced populations settle.

The article suggests that while India has avoided discussing climate security at the UN Security Council, it is imperative to integrate climate considerations into its national security strategy, by calling for

greater military involvement in addressing climate security, advocating for "greening" the armed forces and creating comprehensive climate protection plans to safeguard both national security and operational readiness in the face of climate change.

"Climate security looks at the impacts of climate on security. Climate security often refers to the national and international security risks induced, directly or indirectly, by changes in climate patterns. It is a concept that encompasses the idea that climate-related change amplifies existing risks in society that endanger the security of humans, ecosystems, economy, infrastructure, and societies" (Barnett & Dabelko, 2019) (Ide, January 2, 2023).

Climate change can increase the likelihood of violent conflict by impacting resource availability and job security, and by causing forced migration. It can also affect the conduct of operations and military strategy. With more and more countries incorporating climate security into their national policies, securitisation of climate change is inevitable, and India would do well to give serious thought in this regard.

Natural Disasters

As per a recent article by Rajit Sengupta, India is experiencing extreme weather events with greater frequency. "Traditionally, extreme weather events were believed to be one-in-a-lifetime events. But this has changed. It is not about the single event but about the increased frequency of the events—an extreme event that occurred once every 100 years has now begun to occur every five years or less. Worse, it is now all coming together—each month is breaking a new record. This, in turn, is breaking the backs of the poorest, who are most impacted and are rapidly losing their capacities to cope with these recurring and frequent events" (Sengupta, 2023).

These events are thus necessitating increased deployments of armed forces for disaster relief operations, for which they invariably tend to be among the first responders. While these operations tend to enhance the image of the security forces in the eyes of the local populace, frequent deployments may tend to downplay their relative importance. These increased civil-military interactions may in turn result in minor frictions or misunderstandings, which can then be exploited by inimical elements to undercut public goodwill, as the armed forces are generally equated with national prestige and an important, fail-safe instrument of the government itself. A balanced approach, in the deployment

of armed forces along with National Disaster Response Force and State Disaster Response Force is thus essential to prevent over employment of Armed forces in their secondary role at the cost of adversely impacting their primary duties.

Effect on Operational Environment

According to a Clingendael, Netherlands, report from January 2023 "climate change, and in particular rising temperatures, rising sea levels, and extreme weather events, also affect the working environment of the armed forces. This applies both to military infrastructure and capabilities, as well as to the environment in which the armed forces have to operate" (Zandee, 2023).

According to an analysis by the renowned Geographic Information System (GIS) solution firm RMSI, some critical properties and road networks in Mumbai, Kochi, Mangalore, Chennai, Visakhapatnam, and Thiruvananthapuram will be submerged by 2050 because of the rise in sea level. The military implications include the likely flooding of major naval bases such as Kochi and Visakhapatnam, which necessitate the identification and development of alternate infrastructure and the creation of adequate redundancies, well in advance. The change in the salinity of seawater will have attendant effects on submarine and anti-submarine operations. High temperatures affect load carriage for aircraft and also impact sensitive avionics. Frequent thunderstorms could lead to mission re-routing more often, affecting operations and fuel consumption. Climate change will increase jet streams and also increase clear air turbulence. Climate change will impact space launch stations which are typically located close to the shore. The effects of these factors needs to be considered while planning air operations, especially from forward airfields located at higher altitudes.

A large portion of our armed forces is deployed along un-demarcated borders with Pakistan and China, in high-altitude areas, in an environment of almost perpetual military strife. This induces mental stress on soldiers, which gets exacerbated by additional losses due to extreme climatic conditions and mishaps such as avalanches, flash floods, and landslides. The accelerated melting of Himalayan glaciers and increased atmospheric warming are triggering lethal avalanches and flash floods with greater frequencies. Cloudbursts and unprecedented landslides tend to wash away entire camps, as well as sever lines of communication for long durations. The same troops may then be exposed to extremely high temperatures (in the high 40s and even 50s°C) in Rajasthan and other northern and western Indian states, during their subsequent deployments. With climate change, this range is expanding at both extremes, with colder

minimums and hotter maximums. The physiological stress induced by these variations has a direct adverse impact on the operational efficiency and mental health of troops, besides significantly degrading equipment performance and increasing wear and tear. It thus necessitates a review of the entire operational logistics plan, inducing greater costs, reducing reliability, and creating larger operational contingencies.

While lesser snowfall and higher snowlines may offer more reliable lines of communication and increased days of connectivity with remote military locations, it would also mean longer windows of operation for our adversaries on the northern borders. This, in turn would entail forward deployments for extended durations, with higher probabilities of weather- and stress-induced casualties. Reduced snowfall will also will also provide a greater and extended window for infiltration by insurgents along the Line of Control, resulting in more counterinsurgeny and counterterrorism engagements and disruptions of public peace. Conduct of conventional operations at the tactical level itself will need to be reevaluated in light of the effects of extreme climate on equipment and troops.

Efficacy and suitability of extreme cold climate clothing and equipment for high-altitude operations, increased terrain friction due to sudden and severe climate events such as cloud bursts, landslides, avalanches, and flash floods (the recent loss of an armoured vehicle due to flash floods in Leh is a grim example), the psychological effects of difficult climatic conditions(especially while facing losses due to natural disasters) on the morale of troops, etc are only some of the climate-induced factors that need to be incorporated into operational and tactical planning at all levels.

Pakistan depends on water from the Indus River to ensure the effectiveness of its canal and DCB network as a viable obstacle system, 'especially in defending its economic hub in Punjab and Sindh regions'. This is also a major consideration for India while planning its operations in the Western theatre. Control of water in the Indus River system and the implications of reduced water availability, impacting obstacle potential and terrain friction (as discussed in the following paragraphs) are major factors affecting planning at the operational and tactical levels of warfighting. Climate change is likely to play a major role in influencing this aspect.

Indus River and Climate Change

The importance of the Indus River for Pakistan can be assessed from the fact that approximately 65 per cent of agricultural land in Pakistan is irrigated by

water from the Indus, which accounts for approximately 90 per cent of the country's food and fiber production (Pappas, 2011). The Indus plays a critical role in the energy security of Pakistan as well. "Pakistan currently generates approximately one-third of its electricity using hydropower, with approximately 7,100 MW of installed capacity in 2021. Pakistan is considered to have declining energy security, due in part to its reliance on imported energy sources for thermal power generation. Hydropower development potential in Pakistan is vast and is estimated to be between 26,000 MW and 60,000 MW, representing significant opportunities for increased energy security. Realising this potential relies in part on the construction of large new dams such as the Daimer-Basha and Dasu dams on the Upper Indus as well as other proposed projects such as the Kalabagh Dam on the Lower Indus. These dams may also impact the seasonal water supply security of the Indus Basin Irrigation System, which is one of the largest irrigation systems in the world and the food basket of Pakistan" (Stewart, 2024).

Glaciers are an important source of water for the Himalayan rivers, especially the Indus. "For the upper Indus basin, glacier melt may contribute up to 41 per cent of the total runoff; in the upper Ganga basin, it is 13 per cent; and in the upper Brahmaputra, it is 16 per cent. These rates are higher in the critical dry spring months, when other sources of runoff are scarce, and in the headwater catchments, indicating the significant role of seasonal melt runoff in the discharge. Shifts in precipitation and runoff in the upstream glaciers sub-catchments during such critical moments are expected to strongly affect people's livelihoods that are dependent on the river flows" (Nepal, 2012). Climate change-induced reduction in Himalayan glaciers is capable of causing up to a 50 per cent depletion of waterflow in Indus, in the long run, exacerbating historical and strategic conflict factors between India and Pakistan.

Climate Change and Internal Security

The flooding of the Fukushima nuclear plant in Japan, due to the Tsunami, in 2011, is a real example of how climate change presents grim security challenges. Increased frequencies and strength of earthquakes, volcanic eruptions, storms, and wildfires pose added difficulties in ensuring the safety of critical military (missile and ammunition storage, naval and air bases, border roads and important bridges, etc.) and civil infrastructure (nuclear power plants, rail and road infrastructure, communication network, etc.). Any major and prolonged disruptions in these areas are likely to cause huge economic and security

problems which may even spill over as domestic unrest. Climate change thus has grave implications for internal security as well. India is still a predominantly agrarian society with almost 47 per cent of its population dependent on agriculture for its livelihood. A prolonged drought or even an erratic monsoon can cause severe economic stress due to extensive crop loss. With most of these farmers belonging to poor and weaker strata of society, these events could lead to significant social unrest causing major disruptions in the nation's economic development (a glimpse of these was sen during the recent farmer protests, which were on a much smaller scale than what would unfold in case of a major agrarian crisis). Climate change-induced cross-border migrations are the next major security threat facing India.

Climate Change and Migration

The Internal Displacement Monitoring Centre in India reports that around 14 million individuals have been forced to leave their homes due to climate change. A 2021 research paper, 'Climate-Induced Displacement and Migration in India,' revealed that individuals are moving to avoid poverty, as their traditional ways of making a living have collapsed and the infrastructure is deteriorating due to climate change. In the mountainous regions of Uttarakhand, unpredictable rainfall and a falling water table have compelled people to leave their residences and agricultural lands for the plains. In the northern state of Bihar's Saharsa district, a community that was relocated continues to face constant flooding. "The occurrence of inter-state and intra-state (rural-urban) migration due to droughts, floods, and other extreme weather events has been ongoing in the country for a long time, and it is recognised that the nature of this migration has shifted due to the increasing frequency of climate-related extremes." These migrations are likely to exert greater pressure on the urban infrastructure and widen the economic disparity gap, leading to more law-and-order issues. The poor migrants invariably end up being part of the urban slum colonies, which are easy targets of inimical elements to recruit criminals and anti-national elements. Thus climate-induced migrations play a role in influencing internal security adversely (Krishnan, 2023). The importance of programs like Mahatma Gandhi National Rural Employment Guarantee Act and similar initiatives lies in their focus on building natural support systems that enhance the way of life for people and the strength of communities, which is vital in the time of climate change. Unless these programs are strengthened further and the migrations

reversed, our nation's security and its development journey will continue to be hindered by such phenomena.

One of the most prominent security implications of climate change is the conflict arising due to the cross-border migration caused by it. According to a report released in December 2020, by Climate Action Network South Asia and Action Aid, even if the world fulfills its commitments and targets for reducing greenhouse gas emissions, an estimated 37.5 million people will remain displaced by 2030 and 62.9 million by 2050 in five South Asian countries: Bangladesh, India, Nepal, Pakistan, and Sri Lanka (Kishtwari, 2024). The matter of concern for India is that all the other nations on this list are its immediate neighbours. If we add the Maldives, which is likely to face unsustainable flooding due to rising sea levels, this problem is exacerbated further.

Unchecked migration is capable of causing major demographic changes in border cities, leading to significant cultural, socioeconomic, and religious conflicts. The Rohingya migration into India and Bangladesh, and the mass migration of Bangladeshis into Northeastern states of India (especially from the Sundarbans, due to ecological degradation and loss of livelihood) are only a few examples of this phenomenon. As stated earlier, this is only going to increase further as climate change induces even greater hardships on the already poor populations of these regions.

Military as a Contributor/Mitigator of Climate Change

As per experts from the Conflict and Environment Observatory Report of 2022, Among the world's biggest fuel consumers, militaries around the world account for 5.5 per cent of global greenhouse gas emissions. 'Greening' of military forces is thus an inescapable prerogative in the present circumstances. In India, the Cantonments invariably serve as the lungs of the city or town they are located in. Concerted efforts to further increase the green cover through extensive tree plantation, the establishment of solar power projects through the Military Engineering Service for green energy generation, and the utilisation of feasible military land resources for establishing and running EV charging stations are some of the means to increase the contribution of Armed forces in combating climate change. Thus, the diversion of military land in cantonments for other purposes should be avoided or kept to a bare minimum. The recent induction of electric buses in Delhi, for troop movements, is a welcome start to the 'greening' initiative. However, the transition from fossil fuel vehicles to electric vehicles

needs to be scaled up substantially throughout the Armed Forces, in a phased manner, to bring about effective contributions in the renewable energy push to combat climate change.

India's Stand on Climate Change and Security

India, unlike the Western nations, has chosen not to discuss climate security at the United Nations (UN) Security Council. Its stance has been that when it comes to climate justice and action, India is unmatched. However, discussing either subject before the UN Security Council is not appropriate. It seems that the attempt to do so by the industrialised nations is driven by a desire to avoid accountability in the right arena and deflect attention away from their failure to perform when it matters most. Access to affordable climate funding and technologies is now essential for making significant progress, especially for developing nations like India. Developed nations need to provide USD 1 trillion in climate funding as soon as possible. Tracking climate finance requires the same attention to detail as tracking climate mitigation. And the truth is that industrialised nations have not lived up to the expectations placed upon them.

In addition to highlighting the need for 'a broader approach, anchored in development, adaptive capacity, risk assessment, and institutional build-up', India argues that the United Nations Framework Convention on Climate Change (UNFCCC) and other representative UN agencies should handle climate change. This is in contrast to a securitised or militarised approach. Currently, this stance seems to be best suited for India to achieve its developmental goals. However, considering climate change and security as mutually unrelated entities may lead to glaring deficiencies while formulating a national security strategy and it will be in India's best interest to guard against such an oversight.

Conclusion

As seen, climate change is capable of having profound effects on the security environment of India. Increased natural disasters, climate change-induced migrations changed dynamics of water flow in important rivers, and significant impact on the operational environment and military tactics are only some of the major security imperatives of climate change. Climate security has emerged as an unavoidable aspect in formulating our national security Strategy. The long time offset, required for climate protection initiatives to bear fruit, means that we need to start thinking about Climate security at the earliest and create a

clear roadmap for achieving our intended goals. Involving the armed forces in this planning, at all levels, will result in a more coherent and comprehensive climate protection initiative. While India's stand on discussing climate issues without interlinking security with it, maybe suitable currently, periodic reviews and necessary changes to address changed Geopolitical factors are strongly recommended.

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Power Play on the Brahmaputra: Hydropower, Geopolitics, and Environmental Concerns

ASHU MAAN

Abstract

The Brahmaputra River, originating in Tibet and flowing through China, India, and Bangladesh, is a crucial transboundary water resource supporting agriculture, hydropower, and biodiversity. China's recent initiatives to harness the river's hydropower potential, including the construction of several dams and proposed water diversion projects, have significant implications for downstream countries. These projects, aimed at addressing China's internal water scarcity and energy demands, could alter river flows, impacting water availability, agriculture, and ecological balance in northeastern India and Bangladesh. The absence of a comprehensive water-sharing agreement exacerbates tensions and highlights the need for improved regional cooperation and dialogue. This paper examines China's hydropower developments on the Brahmaputra, their potential environmental and economic impacts, and the geopolitical challenges they pose. It underscores the necessity for enhanced diplomatic engagement, domestic resilience, and regional collaboration to ensure sustainable and equitable management of this vital transboundary resource.

Introduction

The Brahmaputra River, known as the Yarlung Tsangpo in the Tibet Autonomous Region, is one of Asia's most significant transboundary rivers. Originating from the Angsi Glacier in Tibet, it flows through China, India, and Bangladesh, supporting the livelihoods of millions of people along its course. The river is crucial for agriculture, hydropower, and biodiversity, and its vast flow and steep gradient make it an attractive resource for hydropower development. In recent years, China's initiatives to exploit the hydropower potential of the Brahmaputra have garnered significant attention due to their potential impacts on downstream water availability, ecological balance, and regional geopolitics.

China's development activities on the Brahmaputra include a series of dam constructions and proposed water diversion projects aimed at addressing its growing energy demands and internal water scarcity issues (Haoyang Lyu, 2023). While these projects offer substantial economic benefits for China, they pose significant challenges for downstream countries like India and Bangladesh, which rely heavily on the Brahmaputra for their water security and economic stability. These developments have raised concerns about the potential environmental, hydrological, and geopolitical consequences, emphasising the need for cooperative water management and dialogue among riparian nations.

This paper explores the multifaceted implications of China's activities on the Brahmaputra River, providing a comprehensive overview of the current and planned infrastructure projects, their capacities, and potential impacts on downstream regions. Through an examination of hydrological data, environmental assessments, and geopolitical considerations, this study aims to shed light on the challenges and opportunities presented by China's river management strategies and the importance of regional cooperation in ensuring sustainable and equitable water resource management.

China's Diversion Activities on the Brahmaputra in Tibet

China's river management strategy on the Brahmaputra in Tibet involves constructing several dams and proposing water diversion projects to optimise hydropower generation and address water scarcity in northern China. These projects are part of a broader plan to develop a cascade of dams along the Yarlung Tsangpo, maximising its energy potential (Davis, 2023). The key hydropower projects on the Yarlung Tsangpo in Tibet include:

- **Zangmu Dam**: Completed in 2015, the Zangmu Dam is the first hydropower project on the mainstream of the Yarlung Tsangpo. Located in the Gyaca

County, Tibet, this gravity dam has an installed capacity of 510 megawatts (MW). The dam plays a crucial role in harnessing the river's hydropower potential, marking a significant step in China's efforts to develop its renewable energy resources.

- **Gyatsa Dam**: Part of a series of planned dams on the Yarlung Tsangpo, the Gyatsa Dam is designed to contribute to the overall hydropower capacity of the region. The specific capacity details of the Gyatsa Dam are not publicly available, but it is part of China's strategy to create a cascade of hydropower facilities along the river.
- **Dagu Dam**: Located upstream of the Zangmu Dam, the Dagu Dam is currently under construction. It is expected to have a capacity of around 640 MW, adding to the hydropower output of the cascade and contributing to China's renewable energy targets.
- **Jiexu Dam**: Situated between the Zangmu and Dagu Dams, the Jiexu Dam is part of the series of hydropower projects planned along the Yarlung Tsangpo. With an anticipated capacity of 560 MW, the Jiexu Dam is expected to play a significant role in the region's energy production.
- **Langzhen Dam**: The Langzhen Dam is a proposed project that, once completed, will further enhance the hydropower capacity of the Yarlung Tsangpo. It is designed to fit into the broader cascade development strategy, contributing to the overall energy output of the river.

These projects represent a significant investment in hydropower infrastructure, with the potential to generate substantial renewable energy to meet China's growing demands. However, they also pose challenges for downstream regions, including altered river flows, reduced water availability during dry seasons, and changes in sediment transport. These hydrological changes could have far-reaching consequences for agriculture, fisheries, and livelihoods in northeastern India and Bangladesh. The absence of a formal water-sharing agreement between China and its downstream neighbours exacerbates these concerns.

China's Leverage as an Upstream Country

China leverages its position as an upstream country on the Brahmaputra River by employing a strategic approach to water management and infrastructure development. As the upper riparian state, China wields significant influence over the river's flow and has capitalised on this by undertaking extensive hydro-

engineering projects. This includes the construction of large-scale dams such as the Zangmu, Dagu, Jiexu, and Jiacha dams, as well as ambitious plans for even larger projects like the proposed mega-dam at Metog. These dams are designed to harness the river's water for energy production and potential diversion projects.

China's control over the Brahmaputra allows it to impact the river's flow significantly, both in terms of volume and timing. By implementing the South-North Water Diversion Project and the Great Western Water Diversion Plan, China seeks to redirect water from the Brahmaputra and other trans-boundary rivers to its arid northern regions. This potential diversion raises concerns about its effects on the downstream countries, particularly India and Bangladesh. China's approach is driven by its need to address water scarcity in its northern and western regions, and its activities reflect a broader strategy to secure vital natural resources and enhance its geopolitical leverage (Mahapatra, 2015).

The impact of China's actions is profound for the lower riparian states. The construction of dams and potential diversion of water can alter flood patterns, affect agriculture, and disrupt ecosystems in downstream regions. Furthermore, the lack of a comprehensive water-sharing treaty exacerbates tensions and uncertainties. China's emphasis on self-reliance and its reluctance to engage in transparent dialogue about its water management practices contribute to regional apprehensions and highlight the need for collaborative strategies to address the complex dynamics of trans-boundary water resources.

Challenges for India

Geopolitical Tensions and Distrust

The relationship between India and China is marked by complex geopolitical tensions, historical disputes, and mutual distrust, which significantly complicate transboundary water management (Biba, 2020). The unresolved border disputes, particularly in the Ladakh region and Arunachal Pradesh, contribute to the lack of trust between the two nations. These territorial disputes extend into the water domain, as the rivers originating in Tibet flow into regions that are geopolitically sensitive for India. The ongoing military standoffs, in the Western sector of Line of Actual Control, have further strained relations, making cooperative agreements on water management more challenging to negotiate (Verma, 2023).

The strategic importance of the Brahmaputra River for India adds another layer of complexity. The river is crucial for the northeastern states, providing

water for agriculture, drinking, and hydropower. Any potential reduction in water flow due to China's diversion projects is perceived as a threat to India's water security and regional stability (Tanushree Baruah, 2022). This perception is exacerbated by the lack of transparency and limited data sharing from China regarding its water management activities.

Lack of Binding Agreements

One of the most significant challenges India faces is the absence of binding bilateral agreements with China on water sharing and management. The existing memorandum of understanding on hydrological data sharing is limited in scope and duration, covering only the monsoon season. This agreement does not address water diversion or broader transboundary water management issues. Without comprehensive legal frameworks, India has little leverage to ensure that its concerns about water security are adequately addressed.

The lack of binding agreements also hampers India's ability to engage in meaningful dialogue with China on water-related issues. This is particularly concerning given the potential for China's river diversion projects to exacerbate water scarcity and alter the natural flow regimes of the Brahmaputra. The absence of a formal mechanism for dispute resolution further complicates the situation, increasing the risk of unilateral actions by China that could have adverse impacts on India's water resources (Mohan, 2022).

Environmental and Economic Implication

The potential environmental and economic implications of China's river diversion projects for India are profound. The Brahmaputra River is critical for the northeastern states' agriculture, which is predominantly dependent on river-fed irrigation. Any reduction in water flow could lead to decreased agricultural productivity, threatening food security and livelihoods in the region. This is particularly concerning given the socio-economic vulnerabilities of the northeastern states, which are still developing their infrastructure and economic capabilities.

Changes in the river's flow could also impact hydropower generation, a key energy source for the region. The northeastern states have significant untapped hydropower potential, and any alteration in river flow could affect future projects and energy security. The potential for increased sedimentation and changes in water quality could further exacerbate these challenges, impacting infrastructure, agriculture, and the overall economy of the region.

Potential for Increased Conflict

The transboundary nature of the Brahmaputra and other rivers originating in Tibet creates a high potential for increased conflict between India and China. Water is an essential resource, and any perceived threat to its availability can escalate tensions. The absence of effective communication channels and cooperative mechanisms increases the risk of misunderstandings and miscalculations, which could lead to diplomatic standoffs or even conflict.

The potential for China to use water as a strategic tool in its relations with India is a significant concern. In times of heightened tension, there is a fear that China could leverage its control over the upstream water resources as a form of geopolitical pressure (Sahu, 2020). This possibility underscores the need for robust diplomatic engagement and the establishment of mechanisms that can facilitate dialogue and cooperation on water management.

Recommendations for India

Given these challenges, India must adopt a multi-pronged strategy to safeguard its water security and manage the risks associated with China's river diversion projects.

Strengthening Diplomatic Efforts

India should prioritise diplomatic engagement with China to enhance transparency and build trust. This includes advocating for expanded data-sharing agreements that provide year-round information on river flows and potential diversion activities. Establishing regular communication channels can help reduce misunderstandings and foster a cooperative approach to transboundary water management.

Building Domestic Resilience

Enhancing India's domestic water management capabilities is crucial to mitigate the impacts of potential changes in transboundary river flows. Investing in water-use efficiency, developing alternative water sources, and improving infrastructure for water storage and distribution can help ensure water security for the northeastern states. Additionally, promoting sustainable agricultural practices and investing in irrigation technology can enhance resilience to water scarcity.

Regional Cooperation and Advocacy

India should strengthen regional cooperation with other South Asian countries affected by transboundary water issues, such as Bangladesh and Nepal. Forming a coalition of concerned countries can help present a united front in advocating for equitable water-sharing practices and sustainable management of shared resources. Regional forums, such as the South Asian Association for Regional Cooperation, can serve as platforms for dialogue and collaboration.

Leveraging International Support

India can leverage international platforms to highlight the challenges posed by China's river diversion projects and advocate for cooperative water governance. Engaging with international organisations, such as the United Nations and the World Bank, can help raise awareness of the importance of sustainable and equitable management of transboundary water resources. India can also seek technical and financial support for initiatives aimed at enhancing water management and resilience.

Conclusion

The transboundary nature of the Brahmaputra River and the ambitious river diversion activities undertaken by China highlight the complex interplay between national interests, environmental sustainability, and regional stability. While China pursues its developmental objectives, it must also recognise the broader implications of its actions on downstream nations like India and Bangladesh. The absence of comprehensive water-sharing agreements exacerbates tensions and underscores the urgent need for cooperative management and transparent dialogue among riparian countries.

As this paper has illustrated, China's hydropower projects and potential water diversion initiatives on the Yarlung Tsangpo present a multifaceted challenge that encompasses environmental, economic, and geopolitical dimensions. The altered flow regimes, potential reduction in water availability, and ecological consequences could have profound impacts on agriculture, hydropower, and the livelihoods of millions in downstream regions. These challenges are compounded by historical disputes and a lack of trust between China and India, making diplomatic engagement and collaboration all the more crucial.

For India, addressing the challenges posed by China's activities on the Brahmaputra requires a comprehensive strategy that encompasses strengthening diplomatic efforts, enhancing domestic water management, and fostering regional cooperation. Building domestic resilience through investments in water-use efficiency and sustainable agricultural practices is essential to mitigate potential impacts. Additionally, leveraging international support and engaging with regional partners can bolster India's position in advocating for equitable water-sharing and sustainable management of transboundary resources.

Ultimately, the long-term stability and prosperity of the Brahmaputra basin depend on the ability of riparian countries to navigate their differences and work towards shared goals. By fostering a cooperative framework for water management, embracing scientific research, and prioritising environmental conservation, the nations involved can turn potential conflicts into opportunities for mutual benefit and regional development. In a rapidly changing world, where water resources are increasingly under pressure, collaborative efforts are imperative to ensure the sustainable and equitable use of this vital river for generations to come.

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Sea-Level Rise and National Security: Strategic Concerns for India's Coastal Regions

DANISH YOUSUF

Abstract

Extreme storms are causing severe flooding worldwide, with climate change posing an increasingly dire threat. Rising sea levels significantly endanger coastal communities globally. Military installations along coastlines are particularly vulnerable. As rising sea levels affect infrastructure through flooding and storm surges, they undermine operations and readiness. If a base cannot perform its duties, it threatens national security. Higher sea levels amplify the impact of normal storms. If another crisis occurs simultaneously with such a storm, the ability to respond becomes more challenging. In India, sea level rise could displace millions, destabilise communities, and lead to increased conflict, necessitating urgent intervention. This paper examines the escalating threat of rising sea levels to India's national security, particularly focusing on its extensive coastline and the consequential risks to critical infrastructure and economic activities.

Introduction

Over the decades, the Indian armed forces have addressed numerous national security challenges, from border conflicts and insurgencies to terrorism and extremism. However, global climate change presents a new and profoundly different type of national security challenge for India. Climate change and national security issues are continually growing. One significant aspect of these issues is rising sea levels.

Unlike traditional threats that are often geopolitical and human in origin, climate change is a pervasive and evolving environmental phenomenon that impacts national stability in many ways. Its consequences, including rising sea levels, extreme weather events, and resource scarcity, have the potential to exacerbate existing conflicts, displace populations, and strain military operations and infrastructure. Unlike conventional security threats that involve specific actions by a single entity at particular points in time, climate change can cause numerous chronic conditions to manifest simultaneously on a global scale.

Global sea level increased to a new high in 2023

In India, with its extensive coastline, diverse ecosystems, and vast population, the concern of rising sea levels is particularly acute. The World Meteorological Organisation reported that between 2013 and 2022, sea levels rose by an average of 4.5 mm per year (Down To Earth, 2023). In contrast, three times higher than the period between 1901 and 1971 (Business Standard, 2023). Mumbai, the financial hub of India, with a population of approximately 22 million, faces significant risk as rising sea levels threaten coastal agriculture, water supplies, infrastructure, and the lives and livelihoods of its residents.

While the rate of sea level rise has been increasing since the early 20th century, the past decade has seen the most rapid rise (National Oceanic and Atmospheric Administration, 2022). From 1971 to 2018, various factors contributed to this increase, but ice losses in 2010-2019 were four times greater than those from 1992 to 1999 (Hindustan Times, 2023). Human activity is highly likely to be the primary cause of this rise since 1971 (Geophysical Fluid Dynamics Laboratory, 2024). The global ocean has warmed more rapidly in the past century than it has since the last glacial period.

The continued rise in sea levels poses severe risks to small islands, coastal ecosystems, populations, and infrastructure, and is expected to persist beyond 2100. Significant and ongoing reductions in greenhouse gas emissions are

necessary to slow this acceleration and mitigate long-term sea level rise. According to the Intergovernmental Panel on Climate Change, the Earth's current temperature is 1.1 degrees Celsius higher than it was in the late 1800s (Intergovernmental Panel on Climate Change (2023). In addition to Mumbai, numerous other densely populated cities across the globe are also at risk due to rising sea levels.

Consequences of Rising Sea Levels

Each successive report on climate change tends to highlight increasingly imminent dangers, painting a more alarming picture than previous assessments. A recent global study by Climate Central, published in Nature Communications, predicts that by 2050, areas currently inhabited by 36 million Indians will be at risk of chronic flooding, a significant increase from the previously estimated five million (Climate Central, 2019). This projection includes several key landmarks in Mumbai, such as the municipal corporation headquarters, the Reserve Bank of India, Oval Maidan, the Chhatrapati Shivaji Maharaj Terminus, and Brabourne Stadium.

The impacts of rising sea levels extend beyond flooding, affecting economic activities such as agriculture, industry, and tourism. Vital infrastructure, including ports and freshwater resources are also at risk amid growing water scarcity. India's extensive coastline, spanning over 7,517 kilometres across nine states, two Union territories, and two island territories, supports 171 million people in 70 coastal districts (Ganeshan et al., 2021). Four of India's ten most populated cities are located on or near the coast, with millions dependent on fishing. Rising sea levels pose significant threats to these coastal populations and economic activities. Adapting to this long-term and irreversible trend will be both costly and challenging. The expansion of seawater exacerbates coastal erosion, contaminates soil and groundwater, and inundates wetlands, which serve as essential protective barriers against storms and floods.

In 2021, the European Space Agency (ESA) issued a warning regarding climate change, emphasising that rising sea levels, based on satellite data, pose a significant threat to millions of people living in coastal regions (ESA, 2021). According to the ESA, since 1993, the global mean sea level has risen by just over three millimetres annually, on average. This rise in sea levels threatens millions of people living in coastal areas. The effects of global warming can also be observed in irregular rainfall, erratic weather patterns, and the melting of polar ice caps, all of which contribute significantly to sea level rise.

Supply Chain Disruptions and Threat to Critical Infrastructure

Supply chain disruptions caused by rising sea levels are significantly affecting the global economy. Rising sea levels could inundate ports and other coastal infrastructure, causing widespread disruptions. Approximately 90 percent of the world's freight moves by ship, and inundations will threaten the world's coastal ports (PBS NewsHour, 2022).

Rising sea levels are a significant part of this threat, jeopardising coastal communities across the globe, including in India. India's coastline is home to critical national infrastructure, including ports, container terminals, oil refineries, and defence installations, all vital to the country's economy and security.

The western coast, particularly Gujarat's Special Economic Zone, hosts several refineries that process crude oil, while offshore sites like ONGC's Bombay High are crucial energy assets (Ministry of Petroleum and Natural Gas, Government of India, 2014). The Indian shipbuilding industry, with 30 shipyards—eight government-owned and 22 private—has contributed significantly to both defence and the economy (Ministry of Ports, Shipping and Waterways, Government of India, 2020). These shipyards produced India's first indigenously designed nuclear submarine, INS Arihant, and the indigenous aircraft carrier INS Vikrant, positioning India among the few nations with such capabilities.

India's Ports

Source: Ministry of Ports, Shipping, and Waterways.

India's coastal regions also house key defence and research facilities, including missile testing ranges like Abdul Kalam Island, radar facilities, and space launch assets. These locations are essential for testing and validating defence technologies, far from populated areas. For instance, India's status as a missile power relies heavily on these coastal sites. Additionally, nuclear power plants, such as the Kundankulam plant in Tamil Nadu, are situated along the coast, highlighting the strategic importance of these areas. The Fukushima disaster in 2011 serves as a reminder of the potential risks to such coastal installations.

One of the most critical naval installations in India is the Western Naval Command in Mumbai, which houses millions of dollars in assets (Kesnur, 2024). Sea levels in Mumbai are projected to rise significantly by 2100, increasing the number of hours each day that access to the base is hindered due to flooded roads. This not only impacts daily operations but also long-term preparedness.

When sea levels rise, even normal storms can have more significant impacts. Rising sea levels can affect infrastructure through flooding or storm surges, which impacts operational readiness and national security. In India, several naval bases along the coast are at risk. If a naval base cannot perform its functions, it poses a significant threat to national security.

Coastal Vulnerability Assessment and Mitigation

The Indian National Centre for Ocean Information Services, part of the Ministry of Earth Sciences (MoES), has conducted a Coastal Vulnerability Index mapping to assess the impact of sea-level rise along India's coastline. Using seven parameters—shoreline change rate, sea-level change rate, coastal elevation, coastal slope, coastal geomorphology, significant wave height, and tidal range—maps were developed. The report, titled 'National Assessment of Shoreline Changes along Indian Coast', was shared with central and state government agencies and stakeholders to support shoreline protection efforts (Kankara, et al., 2018). Also, the Ministry of Earth Sciences provides technical solutions and guidance to State Governments and Union Territories to combat coastal erosion.

The National Centre for Coastal Research (NCCR) in Chennai, which operates under the MoES, has been monitoring shoreline erosion since 1990 using remote sensing data and Geographic Information System (GIS) mapping techniques (NCCR, 2018). An analysis of the 6,907.18 km mainland coastline

from 1990 to 2018 revealed that 33.6 per cent of the coastline is experiencing erosion, 26.9 per cent is accreting, and 39.5 per cent remains stable. The table below details coastal erosion on a state-by-state basis (Kankara, et al., 2018).

Sr. No.	State		Coast Length (in km)	Coast length (in Km)					
				Erosion		Stable		Accretion	
				Km	%	Km	%	Km	%
1	West Coast	Gujarat	1945.6	537.5	27.6	1030.9	53.0	377.2	19.4
2		Daman & Diu	31.83	11.02	34.6	17.09	53.7	3.72	11.7
3		Maharashtra	739.57	188.26	25.5	477.69	64.6	73.62	10.0
4		Goa	139.64	26.82	19.2	93.72	67.1	19.1	13.7
5		Karnataka	313.02	74.34	23.7	156.78	50.1	81.9	26.2
6		Kerala	592.96	275.33	46.4	182.64	30.8	134.99	22.8
7	East Coast	Tamil Nadu	991.47	422.94	42.7	332.69	33.6	235.85	23.8
8		Puducherry	41.66	23.42	56.2	13.82	33.2	4.42	10.6
9		Andhra Pradesh	1027.58	294.89	28.7	223.36	21.7	509.33	49.6
10		Odisha	549.5	140.72	25.6	128.77	23.4	280.02	51.0
11		West Bengal	534.35	323.07	60.5	76.4	14.3	134.88	25.2
Total			6907.18	2318.31		2733.86		1855.03	
%				33.6		39.5		26.9	

Source: Ministry of Earth Sciences, Government of India in Parliament (06 April 2023)

Root Causes of Rising Sea Levels

The melting of polar ice caps is a significant factor leading to rising sea levels (Swapna, et al., 2020). However, the Arabian Sea level has been rising at a higher rate than expected, posing a serious threat (Madaan, 2023). While this is a matter of decades, it is certainly a cause for concern. For example, one of the major factors contributing to global warming is the burning of coal.

The West often accuses India, China, and Russia of being the countries that burn the most coal (Economic Times, 2020). While they may not always be accurate, in this case, the data shows that India and China are major contributors to coal burning (Wang & Song, 2021). In India, coal remains the main energy source; it contributes around 73 per cent to the energy mix, and approximately 75 per cent of the country's electricity is generated by coal

(Ministry of Coal, Government of India, 2024). According to the figures for 2023, coal demand increased by 6 per cent and 10 per cent in China and India, respectively (International Energy Agency, 2023). While the current Indian government is encouraging the use of electric vehicles at a rapid pace, they are powered by electricity generated from coal.

Additionally, with the rising temperatures of the Arabian Sea, it has been observed for the first time since reliable satellite data became available in 1980 that a super cyclonic storm hit the west coast of India (Economic Times, 2021). Cyclone Nisarga, which struck in June 2020, was unprecedented in the past 40 years of recorded data (India Meteorological Department, 2020). The rapid warming of the Arabian Sea is a critical factor in the formation of such severe cyclonic storms. While the sea has a vast capacity to absorb heat, it is warming much more rapidly now, particularly the Arabian Sea (Nandi, 2023). This warming trend poses a significant threat to coastal regions, especially south of Mumbai, which narrowly escaped severe damage during Nisarga. More super cyclonic storms are expected to hit the west coast in the coming years, potentially causing significant damage.

Both the temperature and sea level rise on the west coast have exceeded previous expectations. India is at greater risk from global warming than many other countries due to its fragile environment and economy. Despite aspirations of becoming an economic superpower, India's current state of economic inequality and environmental degradation makes it particularly susceptible to the adverse effects of climate change. Growing economic inequalities (PIB, 2023) force more people to live near rivers and coasts, increasing population densities in these vulnerable areas. The dependence on monsoon rains for agricultural production further amplifies India's vulnerability, with fluctuating rainfall patterns likely to cause significant disruptions.

In response to the United Nations' warning about the irreversible effects of climate change, immediate actions are necessary to control further damage. The most crucial step is to limit the usage of fossil fuels. Evidence suggests that solar power is now cheaper (Dvorak, 2020) than coal power and can be made available consistently throughout the year. Adani Energy Ltd. promises (Fortune India, 2020) to supply solar power at a lower rate than coal power on a 24/7 basis. The persistence of coal power is often driven by corrupt practices, as highlighted by recent legal actions (India Today, 2017) against former ministers involved in coal scams. To combat climate change effectively, India must eliminate these corrupt practices and transition away from coal.

Sustainable Tourism and Coastal Preservation

Rising sea levels also threaten popular coastal tourist destinations such as Goa and Kerala, as well as emerging ones like Odisha and Andhra Pradesh. The government is investing in the development of coastal tourist hubs, but these plans must consider the impact of climate change and promote sustainable tourism. For example, following the 2018 floods in Kerala, new resorts are being constructed on stilts (Philip, 2020), and the state has proposed relocating households within 50 metres of the sea. In addition to tourism and industry, rising sea levels increase salinity in freshwater resources (Intergovernmental Panel on Climate Change, 2019), complicating farming in low-lying coastal areas. In India, this could result in a significant decline in the yields of irrigated paddy and maize in coastal districts by 2030.

Local administrations in coastal cities and towns must prepare for the effects of climate change. Constructing barriers to combat rising sea levels is expensive, and alternatives such as growing mangroves along the coasts should be considered. While India has had a National Action Plan on Climate Change since 2009, state plans require legal backing similar to disaster management plans.

Another critical area of focus should be the preservation of the west coast's natural landscapes. The expansion of highways along the coast has led to the deforestation of valuable trees, particularly in Goa. These developments not only destroy beautiful landscapes but also remove natural barriers that protect against environmental hazards. It is now up to individuals and policymakers alike to take concerted action to reduce emissions and protect the environment, ensuring a sustainable future for the country.

Conclusion

In conclusion, rising sea levels pose a serious threat to national security in India. The impact on naval installations and coastal infrastructure is profound, requiring immediate and sustained efforts to enhance resilience and preparedness. Addressing these challenges is crucial for maintaining the operational readiness and security of the nation. With this assessment, it is clear that India must prioritise climate adaptation strategies to safeguard its military assets and ensure national security in the face of rising sea levels.

Climate change is affecting the national security of every country. The increased severity and frequency of storms, low-lying coastal areas sinking underwater, and damage to native aquatic species all threaten the health and safety of people around the globe. Sea-level rise has caused the loss of several

low-lying Pacific islands and atolls. Once a home is deemed uninhabitable, it becomes a threat to human security and forces residents to migrate. Coastal aquifers are facing decreased water quality from salinisation due to both sea-level rise and increased flooding from coastal storms, resulting in water insecurity. Increased flooding has compromised the soil and decreased crop yields, leading to food insecurity.

Without intervention, rising sea levels will engulf islands and coastal areas, submerging them underwater. Cooperation is key in tackling the impact of rising sea levels in terms of security and defence. Climate change is a global phenomenon, and we need to cooperate to address it. There are various methods of cooperation and different avenues. First, data sharing is essential. There is a need for better data sharing between countries, whether it be for climate science or marine sciences, to better understand the environment in which armed forces will have to operate in. Data sharing is a key asset for maritime safety and maritime surveillance.

The second pillar of cooperation is capacity building in terms of maritime domain awareness, port state control, and surveillance and control of exclusive economic zones. Various methods can facilitate capacity building, including strengthening the Regional Maritime Information Fusion Centre in Madagascar and facilitating its exchange with those in New Delhi. Lastly, military cooperation is vital. Military preparation for humanitarian assistance and disaster relief is key. There is a need to strengthen the interoperability of different armies for post-disaster intervention.

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Climate Finance and Its Impact on Pakistan's Climate Change Goals

NAMITA BARTHWAL

Abstract

This paper explores the critical role of climate finance in supporting Pakistan's climate change goals amidst its challenging economic context and extreme vulnerability to climate events. In 2022, devastating floods in Pakistan underscored the urgent need for enhanced climate action and resilience, particularly in the agricultural and infrastructural sectors. The study examines the climate finance allocation within Pakistan, emphasising the impact of international financial aid, and the involvement of the private sector in achieving national climate objectives. It also assesses the policy frameworks that govern these financial flows. A significant focus is placed on the balance between adaptation and mitigation funding, investigating whether current financial strategies adequately address Pakistan's most immediate and severe climate risks. The analysis reveals substantial gaps in funding allocation, particularly in adaptation efforts, which are crucial for immediate resilience, highlighting the need for a recalibrated approach that ensure the sustainable and equitable management of resources to safeguard the future of vulnerable populations in Pakistan.

Introduction

Addressing climate change is crucial for Pakistan due to its vulnerability to extreme weather events, economic impacts, and the effects on public health and agriculture. The catastrophic floods of 2022, which displaced millions and caused an estimated economic loss of over USD 30 billion (World Bank, 2022), serve as a stark reminder of the urgent need for climate action. These floods, fuelled by unexpectedly heavy monsoon rains and accelerated glacial melting, highlight the dire consequences of climate inaction.

As a nation heavily reliant on agriculture and already grappling with infrastructural challenges, Pakistan must prioritise sustainable development and climate resilience to safeguard its future and ensure the well-being of its people. Effective climate financing is essential for this endeavour. This paper explores various aspects of climate finance concerning Pakistan's climate change goals, focusing on several compelling areas. These areas are:

- **Funding Gaps and Allocation Efficiency**. This section will research how effectively climate finance is being allocated and utilised in Pakistan. It will include an analysis of whether funds are reaching the most vulnerable sectors most impacted by climate change, such as agriculture and water management.
- **Impact of International Financial Aid**. In this section, the role and impact of international funds, such as those from the Green Climate Fund (GCF) or bilateral aid, on Pakistan's climate change mitigation and adaptation strategies will be examined. This section will consider how these funds are managed and whether they align with the national priorities outlined in Pakistan's Nationally Determined Contributions (NDCs).
- **Effectiveness of Policy Frameworks**. This section will evaluate the policy frameworks governing climate finance in Pakistan, focusing on how policies facilitate the flow of funds and the implementation of projects aimed at climate resilience and low-carbon development.

Trends of Climate Change in Pakistan

Pakistan faces alarming rates of warming, significantly above the global average, with projections indicating a potential temperature rise of 1.3°C to 4.9°C by the 2090s compared to the 1986–2005 baseline (World Bank Group, 2021). The annual maximum and minimum temperatures are expected to rise more sharply than

the average temperature, exacerbating pressures on human health, livelihoods, and ecosystems.

While changes to Pakistan's rainfall and water resources remain uncertain, the likelihood of increased drought conditions is high (Asian Development Bank & World Bank, 2021). Moreover, the frequency and intensity of extreme climate events are projected to escalate, heightening disaster risks, particularly for vulnerable poor and minority groups.

By 2035–2044, an estimated 5 million additional people in Pakistan could be exposed to extreme river floods, with another 1 million annually at risk from coastal flooding by 2070–2100 (United Nations Environment Programme/GRID Geneva, n.d.).

Agricultural yields for key crops such as cotton, wheat, sugarcane, maize, and rice are expected to decline in Pakistan, further straining food security (Akram et al., 2021).

Urban dwellers and outdoor labourers face heightened risks of heat-related illnesses and fatalities across all emissions scenarios. These climate impacts compound existing high levels of undernourishment and deprivation (Government of Pakistan, 2021).

The key to avoiding these trends is to efficiently and effectively utilise climate finance.

What is Climate Finance?

Climate finance refers to the financial resources dedicated to supporting climate change mitigation and adaptation efforts. This includes investments in renewable energy, energy efficiency, and other low-carbon technologies aimed at reducing greenhouse gas emissions.

Climate finance is essential for implementing international agreements such as the Kyoto Protocol or the Paris Agreement, which set targets for limiting the rise in the global temperature. It involves both national and international public and private sector funding, and it can take the form of grants, loans, guarantees, and equity investments (United Nations Framework Convention on Climate Change, n.d.). Key sources of climate finance include multilateral development banks, national governments, and private investors.

Climate finance is crucial for enabling countries, particularly developing nations and small island states, to build capacity and access the necessary technologies to combat climate change. It plays a significant role in supporting

infrastructure projects that are resilient to climate impacts and in promoting policies that foster green growth (World Bank, n.d.).

The mobilisation of climate finance also involves creating financial instruments like green bonds and developing financial regulations, and taxonomies that classify sustainable investments.

The effectiveness of climate finance is often evaluated on the basis of on its ability to leverage additional private sector investments and to achieve measurable outcomes in terms of emission reductions and climate resilience.

Pakistani leaders have been vocal about the urgent need for climate finance to address the impacts of climate change, especially in the wake of devastating events such as the 2022 floods. At international platforms such as the 27th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCC), Pakistan has asked for financial support from developed countries, emphasising that those most responsible for climate change should bear the financial burden. For instance, Sherry Rehman, Pakistan's Climate Change Minister, asked for funds dedicated to compensating countries that have faced climate-induced losses (Hussain & Naqvi, 2022). Similarly, at the 28th Conference of the Parties to the UNFCC, Caretaker Prime Minister Anwaarul Haq Kakar emphasised the urgent need for predictable and adequate climate finance from developed nations to support ground-based climate initiatives in developing countries like Pakistan (Iqbal, 2023). In international conferences, Pakistan's representatives have repeatedly pointed out the inadequacies in the current global financial systems, which often fail to support middle-income countries like Pakistan adequately. They have urged developed nations to fulfil their USD 100 billion yearly climate finance pledges (Sheikh, 2023), a commitment made to support climate mitigation and adaptation in developing countries.

Though not adequate, Pakistan does receive funds to take action to adapt and mitigate climate change. The paper delves into two important questions: first, how Pakistan's key authorities allocate funds, and, second, what are the gaps?

Funding Gaps and Allocation Efficiency

The climate finance allocation has two main categories: Adaptation Projects and Mitigation Projects.

- **Adaptation Projects**. Adaptation projects are designed to help communities and ecosystems adjust to the adverse effects of climate change. These

projects focus on enhancing resilience and reducing vulnerability to climate-related impacts.

Examples of Adaptation Projects. Building and upgrading infrastructure to withstand extreme weather events (e.g., flood-resistant housing, stormwater management systems); developing and implementing early warning systems for natural disasters; agricultural projects aimed at improving crop resilience to changing climate conditions; water resource management to ensure supply during droughts; and, Health initiatives to prevent climate-related diseases.

- **Mitigation Projects**. Mitigation projects aim to reduce or prevent the emission of greenhouse gases, thus addressing the root cause of climate change. These projects focus on transitioning to low-carbon technologies and improving energy efficiency.

  Examples of Mitigation Projects. Renewable energy projects such as solar, wind, and hydropower installations; Energy efficiency improvements in buildings, industry, and transportation; Reforestation and afforestation projects to absorb CO_2 from the atmosphere; Development of sustainable public transport systems; and, waste management projects that reduce methane emissions.

In 2021, a total of USD 4 billion was invested in climate-related initiatives in Pakistan, sourced from both domestic and international investors, including significant funds from the Green Climate Fund (GCF), the Global Environment Fund (GEF), and the Adaptation Fund (AF). Despite this, the investment levels were lower than those in similarly positioned countries like Bangladesh.

Private sector contributions made up about 31 per cent of the total investments, with the public sector accounting for the remaining 69 per cent. Of the total climate finance, domestic sources provided USD 650 million, or 16 per cent, which included USD 450 million (11 per cent) from domestic public and private sectors and USD 200 million (5 per cent) respectively. International sources contributed a substantial 84 per cent, amounting to USD 3,358 million, with Development Partners delivering 58 per cent of the total financing flows, or USD 2,310 million. International private sector investors and project developers also played a significant role by contributing another USD 1,048 million, or 26 per cent (Growth Gateway, 2023).

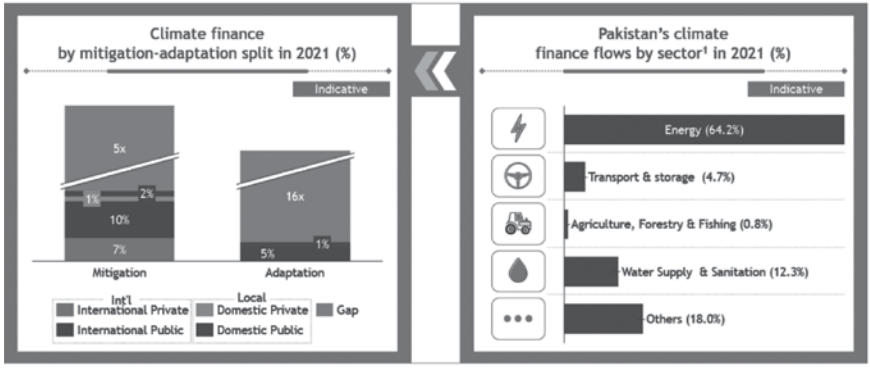
Climate finance in Pakistan was primarily directed towards mitigation activities, which accounted for 79 per cent of the funds due to their higher

profitability. The energy sector attracted the most investment, highlighting its significance within the climate finance landscape. Globally, mitigation projects, particularly in power generation, dominate climate financing, with more than 50 per cent of all funds allocated to this sector. This emphasis is mirrored in Pakistan, where the energy mix consists of 60 per cent thermal sources and 40 per cent renewable sources. Access to electricity in Pakistan is approximately 79 per cent of the population, lower than the South Asian median of 95 per cent, with rural areas notably lagging at 72 per cent access in 2020.

The transmission and distribution grid experiences losses of 17 per cent of generated output, which is 9 per cent higher than the global average, translating to approximately USD 1.8 billion in losses in 2022. Pakistan's power demand is projected to grow significantly, anticipated to reach 216 Terawatt-hours by 2030, marking a 38 per cent increase from the estimated consumption for 2023. This growth is largely fuelled by substantial investments in renewable energy, notably through initiatives like the State Bank of Pakistan's renewable energy financing scheme, totalling USD 2,020 billion.

In contrast, adaptation projects received only 21 per cent of the funds, highlighting a considerable imbalance in the allocation of climate finance, especially given Pakistan's severe climate vulnerabilities. This skew towards mitigation over adaptation poses a significant challenge for the country (see Figure 1).

Figure 1: Climate Finance Allocation in Pakistan (2021)



Source: https://growthgateway.campaign.gov.uk/wp-content/uploads/sites/138/2023/11/231120_Accelerating_Green_Climate_Financing_Report_vFinal-003.pdf

Impact of International Financial Aid

The current landscape of climate finance in Pakistan is dominated by international public financiers. The GCF has played a significant role in supporting Pakistan's climate change mitigation and adaptation efforts. As of 2020, Pakistan has secured approximately USD 122 million through intermediary funding from organisations such as United Nations Development Program, Asian Development Bank, and Food and Agriculture Organisation for three projects approved by the GCF (ADB, 2023; GCF, n.d.; FAO, 2019). This funding is aimed at various projects, including those for enhancing water security, improving agricultural productivity, and building community resilience to climate change impacts.

Bilateral climate funds have been less accessible to Pakistan, with only one project from the Nationally Appropriate Mitigation Actions framework being funded. The limited access to these funds has been a barrier to scaling up climate mitigation and adaptation projects.

The Global Environment Facility has been another crucial source of international climate finance for Pakistan, with 19 projects approved (15 completed) aimed at various environmental and climate objectives.

Management of Climate Funds in Pakistan

Pakistan's management of international climate funds involves a structured process to ensure effective utilisation for climate mitigation and adaptation projects. This process begins with identifying and developing projects based on national priorities and climate vulnerability assessments, followed by collaboration with international donors and funding agencies. Projects require approval from relevant national authorities and accreditation by international funding bodies, such as the GCF.

The Ministry of Climate Change leads the implementation and continuous monitoring of approved projects, supported by provincial counterparts, ensuring compliance with both national and international standards.

Impact of International Climate Finance *on Climate Change Mitigation*

- **Renewable Energy Initiatives.** By 2030, Pakistan aims to generate 60 per cent of its energy from renewable sources, including hydropower. This transition is significantly supported by international climate finance, which helps cover the substantial investment needed for such a shift.

- **Electric Vehicles (EVs).** Pakistan plans to have 30 per cent of all new vehicles sold by 2030 be electric vehicles. This initiative is contingent on the availability of international financial and technical resources, highlighting the crucial role of international funds.
- **Forest Carbon Sink Projects.** Programs like the Ten Billion Tree Tsunami Programme have received recognition and support from international bodies, contributing to the sequestration of CO_2 and enhancing biodiversity.

Impact of International Climate Finance on Climate Change Adaptation

- **Project Recharge Pakistan**. This project, under review by the GCF, aims to reduce flood risks and enhance water recharge at various sites in the Indus Basin. The project will build resilience for approximately 10 million people and support vulnerable ecosystems.
- **Protected Areas Initiative**. By 2023, Pakistan aims to increase its protected areas from 12 per cent to 15 per cent, promoting eco-tourism and preserving rare fauna and flora. This initiative also provides green job opportunities and is partly supported by international funds.
- **Nature-Based Solutions (NbS)**. Pakistan has implemented various NbS projects that benefit from international climate finance. These projects include the Ten Billion Tree Tsunami Programme and other afforestation and reforestation initiatives.

While international funds have been instrumental, Pakistan faces challenges in accessing predictable and sufficient international climate finance, technology transfer, and capacity-building support. The lack of predictable and sufficient international finance has been a significant barrier. This unpredictability makes it challenging for Pakistan to plan and implement long-term climate projects effectively. There are considerable barriers to accessing the necessary technology for climate mitigation and adaptation. Technology transfer is critical for implementing advanced climate solutions; yet Pakistan faces difficulties in securing these technologies from international partners.

Effectiveness of Policy Frameworks

The updated NDCs of 2021 set ambitious targets to reduce greenhouse gas emissions by 50 per cent by 2030, employing a combination of NbS, technological

interventions, and major restoration efforts such as the Ten Billion Tree Tsunami Programme. However, 35 per cent of these targets depend on international financial support.

Complementing this, the National Adaptation Plan of 2023 outlines comprehensive strategies to tackle climate risks across sectors such as agriculture, water, urban resilience, and disaster risk management, fostering inclusivity and collaboration among stakeholders to build resilience.

Additionally, the resilient recovery, rehabilitation and reconstruction framework, formulated in response to the 2022 floods, emphasises governance, livelihood restoration, social inclusion, and the sustainable recovery of infrastructure.

To advance green finance, Pakistan is focusing on integrating Environmental, Social, and Governance (ESG) considerations within financial institutions, aiming to set sustainable lending targets, reduce carbon emissions, and enhance operational resilience.

Challenges

- **Disproportionate Focus on Mitigation**: A significant portion of climate finance in Pakistan is directed towards mitigation projects (around 80 per cent), particularly renewable energy, due to their higher bankability. Conversely, adaptation and resilience projects receive less funding despite the country's high vulnerability to climate change.
- **Private Sector Participation**: The private sector's contribution to climate finance in Pakistan is relatively low, especially from domestic investors. Enhancing private sector involvement is crucial to bridging the financing gap. Innovative mechanisms like blended finance, which combines concessional and commercial capital, can help attract private investments into priority adaptation and resilience projects.
- **Cost of Inaction**: Quantifying the cost of inaction is essential to prioritising climate interventions and secure concessional financing. This involves detailed climate risk modelling and developing evidence-based project pipelines.
- **International Support and Capacity Building**: Strengthening partnerships with international donors and enhancing local capacities are pivotal for mobilising the necessary climate finance. Engaging global reinsurers and exploring instruments like catastrophe bonds can help manage disaster risks and attract more funds.

- **Fragmented Governance**. The governance of climate finance in Pakistan is currently fragmented across multiple ministries, leading to significant coordination challenges. This situation necessitates the creation of a streamlined national climate finance governance framework to improve oversight and efficiency.
- **Development of a National Green Taxonomy**. The development of a national green taxonomy is essential for classifying climate initiatives and guiding investments, facilitating the identification and tracking of climate financing flows, and supporting the establishment of a robust green finance market.

Conclusion

Addressing climate change is of paramount importance for Pakistan due to its severe vulnerability to extreme weather events and their subsequent economic and social impacts. The 2022 floods, which displaced millions and caused substantial economic losses, underscore the urgent need for comprehensive climate action and effective climate finance strategies. Pakistan's reliance on agriculture and existing infrastructural challenges further complicates its path to resilience, making it imperative to prioritise sustainable development.

This paper has explored various facets of climate finance in relation to Pakistan's climate change goals. The findings highlight significant funding gaps and inefficiencies in allocation, with a disproportionate focus on mitigation over adaptation, despite the country's acute vulnerabilities. International financial aid, particularly from entities like the Green Climate Fund and the Global Environment Facility, has been crucial, yet Pakistan faces challenges in accessing predictable and adequate support. Additionally, the effectiveness of policy frameworks is hampered by fragmented governance and coordination issues.

To bridge these gaps, Pakistan must enhance private sector participation, employ innovative financing mechanisms, and strengthen international partnerships. The development of a national green taxonomy and the Environmental, Social, and Governance (ESG) considerations within financial institutions are critical steps forward. Furthermore, addressing barriers to technology transfer and capacity building will be essential for implementing advanced climate solutions.

Ultimately, a balanced approach that equally prioritises both mitigation and adaptation projects is necessary. By leveraging international support and ensuring the efficient allocation of climate finance, Pakistan can build resilience

against climate change, safeguard its economy, and improve the well-being of its people. Robust monitoring, reporting mechanisms, and a streamlined national climate finance governance framework will be key to achieving these objectives and ensuring a sustainable and resilient future for Pakistan.

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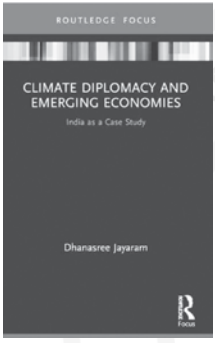

Climate Diplomacy and Emerging Economies: India as a Case Study

Dhanasree Jayaram
Routledge. 2022, August; INR 4,455/-, Paperback, pp. 154
ISBN 978-0-367-63402-5

Reviewed by Dr Shushant VC Parashar

Climate Diplomacy and Emerging Economies: India as a Case Study by Dhanasree Jayaram offers a comprehensive examination of the evolving role of emerging economies—Brazil, South Africa, India, and China (the BASIC countries)—in the international climate order. Jayaram's scholarly work is particularly notable for its multidimensional approach, combining conceptual and material factors to provide a nuanced analysis of climate diplomacy. This book, published by Routledge, stands out for its in-depth case study of India, presenting an insightful exploration of the country's climate diplomacy from 2009 to 2019.

Jayaram's work is situated within a growing body of literature that recognises emerging economies' pivotal role in global climate politics, a topic of increasing relevance in today's world. The BASIC countries have been instrumental in shaping climate negotiations, especially since the 2009 Copenhagen Summit. Jayaram's analysis is timely, capturing the dynamics over a decade marked by significant developments in international climate policy, culminating in the 2019 Madrid Summit. This period saw substantial shifts in the climate diplomacy

strategies of these countries, influenced by both domestic imperatives and international pressures.

One of the key strengths of Jayaram's book is its unique theoretical framework, which integrates constructivist and realist perspectives in a novel way. Jayaram moves beyond the simplistic dichotomy often found in International Relations literature by emphasising the interplay between ideational and material factors. The author adeptly demonstrates how ideas of equity, climate justice, and sovereignty intersect with material interests, such as economic growth and energy security, to shape the climate diplomacy of the BASIC countries.

The book provides detailed country-specific analyses, highlighting the unique trajectories of Brazil, South Africa, India, and China. For instance, China's ascent as a leader in renewable energy is framed within its broader geopolitical ambitions and domestic policy priorities. Brazil's climate diplomacy is examined through its dual focus on combating deforestation and promoting biofuels. South Africa's approach, characterised by a coal-dependent economy, balances its equity-based arguments with progressive domestic policies, like carbon taxation.

The most compelling section of the book is the case study on India, which Jayaram explores with remarkable depth. India's climate diplomacy is portrayed as evolving from a position of resistance to a more proactive and flexible stance under Prime Minister Narendra Modi. Jayaram meticulously traces India's journey from the Copenhagen Summit, where it strongly advocated for equity and climate justice, to the Paris Agreement and beyond, where it has taken on more ambitious climate action goals.

Jayaram's analysis reveals how India's climate diplomacy has been shaped by various factors, including its vulnerability to climate impacts, developmental aspirations, and desire for global leadership. Launch of the International Solar Alliance is a pivotal moment, symbolising India's shift towards leadership in promoting renewable energy. The author also delves into India's bilateral climate diplomacy, particularly with the EU, China, and the US, showcasing how these partnerships have bolstered India's capacity to address climate change.

Jayaram employs a robust methodological approach, combining qualitative and quantitative analyses. Narratives, policy documents, and interviews with critical stakeholders enrich the empirical foundation of the book. The author's background as a researcher and academic lends credibility to the work, evident

in the meticulous attention to detail and the rigorous analysis presented throughout the book.

The book makes several critical contributions to climate politics and international relations. Firstly, it underscores the importance of emerging economies in shaping the global climate agenda, challenging the traditional North-South divide. Jayaram's work illustrates how the BASIC countries, despite their diverse domestic contexts, have managed to assert themselves as critical players in the climate negotiations.

Secondly, the book highlights the role of ideas in influencing climate diplomacy. Jayaram provides a fresh perspective that complements the materialist explanations often emphasised in the literature by focusing on conceptual factors such as equity and justice. This approach enriches our understanding of the motivations behind climate policies and offers valuable insights into potential pathways for future climate cooperation.

Thirdly, India's in-depth case study offers a template for analysing the climate diplomacy of other emerging economies. Jayaram's nuanced portrayal of India's evolving stance provides a valuable resource for scholars and policymakers, illustrating the complex interplay between domestic and international factors in shaping climate diplomacy.

Climate Diplomacy and Emerging Economies: India as a Case Study is a significant scholarly contribution that enhances our understanding of the role of emerging economies in the global climate order. Dhanasree Jayaram's meticulous research and insightful analysis make this book a must-read for students, scholars, and policymakers interested in climate change, environmental policy, and international relations.

Jayaram's work not only fills a critical gap in the literature but also sets the stage for future research on the climate diplomacy of emerging economies. The book's blend of theoretical rigour, empirical richness, and practical relevance ensures its place as a foundational text in study of global climate politics. As the world continues to grapple with the challenges of climate change, the insights offered by Jayaram's book will undoubtedly prove invaluable in shaping more effective and equitable climate policies.

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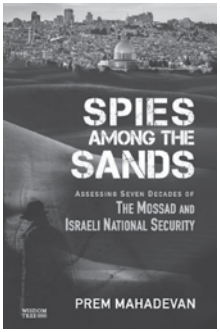

Spies Among The Sands: Assessing Seven Decades of the Mossad and Israeli National Security

Prem Mahadevan
Wisdom Tree Publishers, New Delhi. 2024, April
Hardcover, INR 629/-, pp. 360.
ISBN-13 978-8183286282

Reviewed by Govind Nelika

Introduction

The author describes the complexity of Israel as a state itself and proceeds to analyse what sets Israel apart from other countries, specifically Mossad, the Israeli intelligence agency. The author explores the 'Mossad Myth' and whether their legendary status is due to their expertise or ability to broadcast their achievements to others, or a mix of both. The chapter touches on historical factors, the Holocaust and perceived Western apathy, which were crucial in shaping Mossad's identity and fostering a culture of self-reliance and innovation. The chapter highlights Mossad's strategic alliances, operational risks, and adaptability, which led to its growth and modernisation, including a shift towards cyber espionage and increased reliance on the foreign Jewish diaspora and Western alliances.

Chapter I: An Early Entry into covert action

The chapter notes how Israeli intelligence and its tactics predated the formation of the Jewish state. The author outlines the evolution of covert operations by Jewish militias against British rule in Palestine before Israel's statehood, highlighting key events. It emphasises the strategic cooperation of militias, i.e. Lehi, Irgun, and Haganah and their intelligence gathering and operations. The chapter addresses the escalating violence, including the Deir Yassin massacre, which contributed to territorial gains for Jewish forces amidst the backdrop of security concerns. The chapter illustrates how these early intelligence efforts laid the foundation for Israel's future clandestine operations and diplomatic strategies.

Chapter II: Through War Towards a Distance Peace

The chapter focuses on Israel's security strategies to counter surrounding hostility from Arab nations while detailing Israel's pre-emptive military actions and unconventional warfare tactics. It highlights key figures such as Charles Orde Wingate, whose influence shaped Israeli special forces strategies, and the "Iron Wall" theory, which describes Israel's determination to become an entity that discourages Arab resistance. The author notes the role of British forces in training and developing the Haganah's elite units and Israel's policy of retaliatory strikes against Arab states harbouring terrorists. It also speaks of the controversial Unit 101 and its implications on Israel's relations with the US and Europe, and briefly addresses the effectiveness of Israeli intelligence, including Mossad's successes, and the complex dynamics of international sympathy for Israel following the Holocaust, which influenced perceptions of Israel's responses to aggression. Ultimately, the chapter suggests that Israel's aggressive security measures were partly justified by its Western partners due to the empathetic stance of European governments. Overall, it provides a detailed glimpse of how the intelligence roots developed against British rule moulded Israel's post-1948 clandestine diplomacy.

Chapter III: Scouting for Operations or Collecting Policy Intelligence

The chapter briefly analyses the early days of Israel's intelligence apparatus, focusing on the Shabak (domestic intelligence) and Mossad (foreign intelligence) agencies. It highlights the collaborative efforts between intelligence organisations in Israel and their role in intelligence gathering, supported by the global Jewish diaspora through the Sayan network. The author discusses Mossad's recruitment strategies, including false flag operations and the leveraging and turning of key officers, with notable cases such as those of Jonathan Pollard and Eli Cohen. The brief covers Mossad's aggressive tactics, such as forging passports and conducting assassinations on foreign soil, and its operations following the Munich Olympics massacre, which garnered it further acclaim. It analyses the complex relationship between Mossad and other intelligence units like AMAN (Intelligence Directorate of the Israel Defense Forces [IDF]), emphasising Mossad's effectiveness in clandestine diplomacy and its specialised units like Kidon, and the IDF's Sayeret Matkal. It mentions Mossad's contributions to counterterrorism, sharing information with MI6 and training German units, which helped mitigate criticism from Western nations over its actions towards

Palestinians, while also addressing Mossad's controversies, such as the Yehuda Gil scandal. It concludes by highlighting Iran's emergence as Israel's primary adversary, reflecting the evolving geopolitical landscape and the ongoing challenges faced by Israel's intelligence services.

Chapter IV: A Pliant but Powerful Weapon

The chapter explores the evolution of the Israel-US relationship, beginning with intelligence sharing due to Israel's unique access beyond the Iron Curtain. It details the establishment of Unit 300, funded by the Central Intelligence Agency, and significant events such as the defection of the MiG-31 pilot. The narrative also covers the geopolitical dynamics leading to the Yom Kippur War and Israel's development of nuclear capabilities as a deterrent. The author outlines Israel's strategies to gain favour with the US, including joint efforts against Iran after it had pursued nuclear power. It concludes with examples of US support for Israel at the UN Security Council and the subsequent targeting of the US by Hezbollah due to its backing of Israel.

Chapter V: The Containment of Egypt

The author provides an in-depth examination of Israel's strengthening position following its wars with Egypt, particularly after the rise of Gamal Abdel Nasser. It discusses the geopolitical manoeuvring between British and American interests in the Middle East and the escalating tensions triggered by Israel's covert Operation Susannah, aimed at destabilising Nasser's rule. This operation, however, failed with the capture and execution of operatives, leading to retaliatory attacks by Arab gunmen and a subsequent IDF raid on Gaza. The chapter also covers Israel's activities in the Sinai Peninsula, Nasser's nationalisation of the Suez Canal, and the formation of the Trident Alliance. It concludes with Nasser's remilitarisation of Sinai and his defiance of the 1957 agreement, setting the stage for further conflict.

Chapter VI: The war of attrition and Yom Kippur Surprise

The analysis begins with an examination of the Six-Day War of 1967, during which Israel occupied the Golan Heights from Syria, the West Bank (including East Jerusalem) from Jordan, and both the Gaza Strip and the Sinai Peninsula from Egypt. The author summarises details of United Nations (UN) Security Council Resolution 242, which advocated for Israel's withdrawal from these territories in exchange for peace. Additionally, the chapter analyses the war of

attrition initiated by Egypt in 1969, Operation Boxer, and explores the geopolitical tensions between the US and Russia in the region. It provides insights into Operation Kavkaz, the preceding Yom Kippur War, and the subsequent Camp David Accords, offering a comprehensive overview of the complex dynamics shaping the Middle East during this period.

Chapter VII: Secret Diplomacy and a Secret War

The author comprehensively examines Israel's interactions with its neighbouring countries, focusing mainly on the evolving relationships with Jordan and Egypt. It details the historical alliances between Israel and these nations, highlighting key figures such as Abdullah, the Emir of Transjordan, and his grandson, King Hussein of Jordan. The chapter explores the strategic considerations behind these alliances, including Jordan's role in containing Egyptian aggression and the impact of Syrian military actions. A significant portion of the chapter discusses the strained relations between the Palestinian groups within Jordan and King Hussein, culminating in calls for the overthrow of the Hashemite monarchy. This tension reached a boiling point in 1970 when Palestinians proclaimed the city of Irbid a "free zone," leading to a series of escalating conflicts. King Hussein's unique position is highlighted as he maintained covert communications with Israel, even providing warnings about potential threats. This complex dynamic is set against the backdrop of Jordan's broader geopolitical challenges, including its dealings with Syria, internal Palestinian issues, and the rise of militant organisations like Hamas. The chapter concludes with an analysis of the military buildup by Egyptian forces in the Sinai Peninsula and the subsequent regional dynamics that unfolded. The account gives the reader insight into the intricate web of alliances, tensions, and strategic manoeuvres that have shaped Israel's relationships with its neighbours over the years.

Chapter VIII: The Periphery Doctrine

The chapter details David Ben-Gurion's Periphery Doctrine, emphasising Israel's strategy to forge alliances with non-Arab nations that could either openly or secretly support Israel. This policy, said to have been crafted within the Mossad under the leadership of its first and second directors, aimed to establish diplomatic ties with countries interested in Israel's resources but hesitant to engage through conventional diplomatic means. The chapter highlights Israel's growing influence in these regions and overall credibility, exemplified by operations like the Entebbe rescue mission and the subsequent deterioration of

Tehran post-regime change. The author explores the intricate dynamics between Sunni Arab states and Shia Iran, highlighting mutual suspicion and caution among them. Additionally, the chapter focuses on the evolution of the Periphery Doctrine, now considering demographic insecurities. It anticipates potential threats to Israel, including those from Turkey, indicating a broader perspective on national security beyond traditional geopolitical boundaries.

Chapter IX: Counterterrorism as a Strategic Instrument

The chapter details Israel's counterterrorism strategies, emphasising the complex dynamics among American entities, the Black September Organisation, and the Palestine Liberation Organisation. It scrutinises the diplomatic manoeuvres, including Henry Kissinger's role, alongside Mossad's operations against Palestinian militant leaders. The author also covers the emergence of Jewish settlements and Yasser Arafat's decision to acknowledge Israel, setting the stage for the Madrid Peace Conference in 1991 and the subsequent Oslo Accords. This period saw heightened tensions between Israel and militant groups like Hamas and the Palestinian Islamic Jihad, with Arafat navigating these conflicts. The chapter further explores the cooperation between the Palestinian National Authority and Israel, which led to peace negotiations and Israel relinquishing control over 80% of the West Bank. However, the failure of further peace talks and the resurgence of Fatah-led terrorist campaigns underscore the challenges faced in achieving lasting peace.

Chapter X: From Covert to Overt Killing

The author speaks of destabilised peace talks in 2002 as a result of Israeli civilians being targeted by a series of suicide bomb attacks and several more through a combination of terrorism attacks and urban street fighting. The chapter describes the instances of Non-state actor terrorism against Israel and its reappraisal in kind with Operation Defensive Shield along with various barriers and settlements set up by Israel in Palestine. The book details the 2003 agreements, where Sharon agreed to a final status agreement regarding the unilateral withdrawal of Israeli settlers from Gaza and its implications. The following Al Aqsa Intifada, saw Israel utilise more covert operations than the regular overt approach, focusing on key individuals within Egypt, Palestine and actors like Hizballah and Hamas. The chapter goes on to describe the dynamics Israel would have with the growing threat of Hizballah and the impending challenges posed by Hamas. The concluding section highlights how Mossad managed to inform its Western allies

about Palestinian terrorist activities, thereby legitimising the IDF's response to Palestinian terrorism.

Conclusion: The Advantages and Risks of Ideological Guidance

The concluding chapter begins with the author acknowledging Mossad's advantages and general proficiency, further explaining how Mossad's intelligence network and capabilities have aided Israel's steadfast success during military operations. The author also touches on the Mossad Myth and the intricacies of Israel's Intelligence agencies in conjunction with the IDF. The chapter also notes the "Iron Wall" and Israel's interceptive attack approach as well as the Periphery Doctrine. The chapter details a unique, tailored approach to each perceived threat while deliberating Mossad's celebrity status when compared to Israel's other intelligence agencies, noting, how collaboration between all these agencies is crucial in Israel's operation. Furthermore, addresses the complexities of the Arab minority in Israel and the threat of Jewish right-wing terrorism. The author concludes the chapter by analysing how Israel has remained steadfast in the Middle East despite the odds stacked against it. The selected quote by the author aptly highlights its acclaim and the losses incurred:

'Not every engagement can be an Entebbe or a rerun of the Six Day War, whatever the headline writers may believe'.

Analysis

The author, P Mahadevan, has beautifully encapsulated the formation, development and growth of Mossad, while detailing the dynamics leading up to the establishment of Israel and the development of its intelligence network. The book details the Jewish diaspora and how they have adapted to the hostility of Arab Nations and secured their position in the Middle East. The book touches on not only Mossad, but Israel's domestic agencies which are not well discussed and overshadowed by the reputation of Mossad. The book also details the interests of the UK, US, and Russia as well as their involvement in the geopolitics of the Middle East. The book serves as a comprehensive summary of events and their backdrops detailing the Intelligence network systems of countries and their roles in shaping the current scenario in the Middle East. The author also partially answers the initial questions he had posed in chapter one, about the Mossad Myth with his detailed analysis.

The note of suggestion would be that the book needs a volume II that could further detail the aftermath of each of events, in further details providing a comprehensive glimpse into the existing Israel-Palestine scenario and the challenges arising from events described by other authors. While detailing incidents like the Deir Yassin massacre committed by Jewish militias, the text overlooks the aftermath and reprisals endured by Jews. For instance, it neglects to mention the Arab ambush on a Jewish convoy headed to Hadassah Hospital shortly after Deir Yassin. Furthermore, there are conflicting accounts by Authors about Deir Yassin; one such account is by Thomas D. Ice[1] of there are differences in the narrative of the Deir Yassin massacre.

Govind Nelika is the Researcher/Web manager at the Centre for Land Warfare Studies (CLAWS). He is an alumnus of Pondicherry Central University and is a Political Science graduate, complemented by a certification in Data Sciences from IBM. With a multidisciplinary approach, his research areas focus on the emerging challenges and trends in the fields of Cybersecurity, OSINT, and the evolving landscape of Cybersecurity and Strategic Technology synergized with Generative AI & LLM.

Note

1. Ice, Thomas D., "A Mythical Massacre: Deir Yassin" (2009). Article Archives. 66. https://digitalcommons.liberty.edu/pretrib_arch/66

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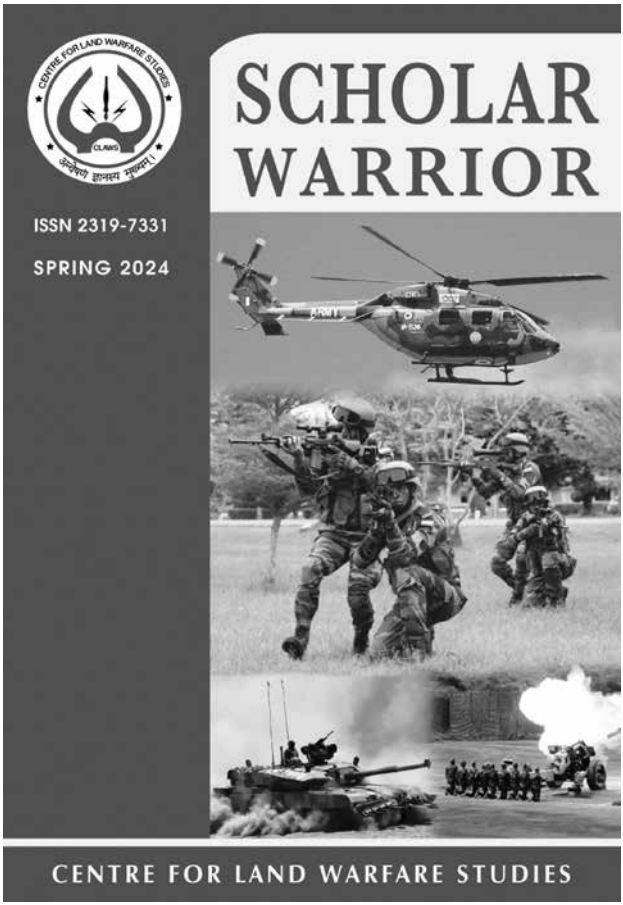

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