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INDIA'S BORDER SECURITY, SOVEREIGNTY AND SURVEILLANCE: A COMPREHENSIVE ANALYSIS

Air Marshal Philip Thomas, AVSM, VM (retd)*

ABSTRACT

“The protection of sovereign borders is the first law of nature for any nation state.”

- Thomas Hobbes (5 Apr 1588 – 4 Dec 1679)

The focus of this article is to analyse India's border security framework, infringement of its sovereignty and efficacy of surveillance measures adopted over the years. In addition, the article would focus on evolving nature of cross border threats posing security challenges at various levels and the progress required in adoption and implementation of surveillance methods through advanced technology. Various dots need to connect to ensure a viable security set up protecting our sovereignty.

KEYWORDS: *Border Security, Sovereignty, Surveillance, Infringement, Advanced Technology.*

Introduction

India is the 7th largest country in the world sharing a vast, complex and mixed border with seven countries, covering over 15000 km and a coastline over 7500 km. The complexity of Indian borders ranges from thick vegetation with high altitude in the upper west and north, snow covered peaks in the north and east, thick jungles with hills in the east, riverine areas on the east to the vast desert in the west. Added by similarity in ethnicity, culture and DNA along some border areas, the transgression of communities has left the borders far from demarcation with the neighbouring countries.¹ Destabilising forces in the neighbourhood and from within have subjected India to constant pressure and need to be vigilant. This has resulted in military incursions, loss of territory, cross border infiltration, insurgency, terrorism, illegal migration, smuggling of weapons, narcotics and human trafficking etc.²

Aim

Aim of this article is to analyse the security challenges to our borders with specifics of terrain, topography and cross border influence on the sovereignty of India along with the existing surveillance mechanisms and propose certain recommendations to ensure security and sovereignty.

Borders and Neighbours

In this section, assessment of Indian Borders through geographical challenges, ethnic/racial similarities and disputed areas posing sector specific threat to security framework is brought out.

* Doctoral Research Scholar, University of Petroleum and Energy Sciences, PhD (Management) (School of Business).

¹ Sanjeev Joshi, "Ethnic Linkages and Border Fluidity in South Asia," *Journal of South Asian Studies* 14, no. 2 (2024): 75–78

² Nandita Menon, "Border Crimes in India: Trends and Threats," *Indian Journal of Internal Security* 11, no. 4 (2025): 56–60.

Pakistan

India and Pakistan share border of approx. 3300 km. The states are J&K in the north to Gujarat in the south and Punjab and Rajasthan in between (see Fig 1). The terrain bordering Gujarat, Rajasthan and Punjab is generally flat except along Sir Creek and river front border areas of Punjab. India has a smart security fencing with borderoutpost's setup at regular intervals. The patrols along border areas are regular. Due to sparse population along border areas especially along Rajasthan and Gujarat border, the instances of security breach through physical means are limited apart from Sir Creek and riverine areas along Punjab border. In disputed areas like Sir Creek taking advantage of tidal motions of water, infiltration is a common activity and mostly facilitated by the Pakistani security forces.¹ There are incidents of infiltration in desert/flat sector as well as it is not easy to keep constant surveillance during night and poor weather conditions especially in winter months. The third dimension, using Drones, is now being used for smuggling weapons and narcotics.²

Terrain complexity starts from Jammu area in the west till Kashmir in the north. The terrain is undulating with ranges 7000m and above as we move northwards with flow of multiple rivers and thick jungles. Certain places are far off and remote with hardly any connectivity and backup from the mainland. In such areas, military operates with challenges of reliability of information, backup of forces and mercy of weather Gods. Punjab and certain areas of J&K have common ethnicity and cultural similarities across the borders making it difficult to delineate the racial sentiments across the borders.

Border security is largely stable in the Punjab region except smuggling from across the border pushing in drugs to target our demographic dividend- the youth and weapons to ensure support to local separatist movements (e.g. Khalistani movement).³ The areas along Punjab border are well connected through transportation network hence making it easier to have multiple security outposts and backup.

In the Kashmir area of J&K, the sentiment and extreme ideology of religion has been capitalised by Pakistan's military and intelligence agencies.⁴ Coupled with terrain and ethnic sentiments, security forces find it extremely challenging to maintain this sensitive and volatile border area. The setup of surveillance assets in these areas remains limited to security installations/ border outposts on ridges thus making the borders volatile and porous.⁵



(Fig – 1)⁶

PoK (Afghanistan Border). The total border distance is 106 km and it stays under the illegal occupation of Pakistan.

¹ C. Raja Mohan, "Sir Creek and the Limits of Force in India-Pakistan Relations," *The Indian Express*, August 24, 2022.

² Sameer Patil, "Drone Threats on India's Borders: A New Security Challenge," *Observer Research Foundation*, October 2021.

³ "Khalistani Militants, Gangsters, Narcotic Smugglers Have Pooled Resources under ISI Game Plan: Punjab Police," *The Indian Express*, October 16, 2023.

⁴ "Pakistan ISI Tapping into J&K Terror Network to Fuel Pro-Khalistan Sentiments," *The Hindu Business Line*, March 3, 2023.

⁵ "Bleed India with a Thousand Cuts," *Wikipedia*, last modified May 12, 2025.

⁶ "Disputed Territories of India" *drishtias.com*, December 26, 2019.

China

India shares a border of 3488 km along the region of Ladakh and states of Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh. The primary contention of security challenges remain along disputed area of Aksai Chin and proclaimed area of Arunachal Pradesh by China. The terrain in the North and east in Ladakh region remains largely inhospitable due to high altitude mountain ranges and extreme climatic conditions. This poses security challenges for both countries; however, this fact favours China due to their technological superiority and better investment in infrastructure across the border. The racial incursion is less effective along border areas in the north except along Bhutan and Nepal border. India faces major challenges in setting up fence, border posts and building up of infrastructure and border roads in the Ladakh sector. China with its communist ideology and expansionist policy has taken advantage of open borders and grabbed entire area of Aksai Chin (38000 Sq Km).¹ The security challenges still remain along China border including locations in the Far East.

Myanmar

India shares a border of 1643 km along the states of Arunachal Pradesh, Nagaland, Manipur and Mizoram. Thick jungles and hills in the east with limited border posts and no clear delineation of border at some places make it easy for any incursion by any country/group intended for insurgency/smuggling through Myanmar.² The sentiments and ideology of local populace, less connected with the mainland and influenced by traditional and age old interactions with the various tribes and ethnicity remain a major security challenge for the forces along with inhospitable jungles, support from locals and lack of infrastructure.³

Nepal and Bhutan

The border with Nepal is landlocked with a length of approximately 1750 km along states, from west to east, of Uttarakhand, UP, Bihar, West Bengal and Sikkim. And a distance of approximately 700 km with Arunachal, Assam, WB and Sikkim. The border along Nepal remains open under the Indo-Nepal treaty of 1950 thus being vulnerable to any incursion/infiltration.⁴ Additionally, the challenges of undulating terrain with thick vegetation along both countries pose border security threats.⁵

Bangladesh

India shares world's fifth longest border with Bangladesh spanning 4096 km along states of West Bengal, Assam, Meghalaya, Tripura and Mizoram. The borders are porous along riverine areas posing surveillance challenges and risks of influx of population.⁶ The ethnic similarity along bordering states of both countries compound the risk and challenge to border management and security.

Maritime Boundaries

The geographical challenges remain least, however, the sheer magnitude of maritime boundary of over 7500 km leaves gap for security intrusions despite exercising best surveillance measures.⁷ The proximity of Pakistan and Bangladesh on either side facilitates transgression of people and easy medium for smuggling⁸ and activities inimical to our border security and sovereignty. Certain definitions and their explanations with respect to Maritime boundaries are listed below:-

¹ "Differing Perceptions of the Line of Actual Control," *Wikipedia*, last modified May 12, 2025.

² "Arunachal Pradesh," *Wikipedia*, last modified May 12, 2025.

³ "India's Border Issues with China and Myanmar," *The Hindu*, August 5, 2023.

⁴ Anand Singh Bhat, "A Study on Challenges of Border Management System along the Indo-Nepal Border," *The Journal of Nuwakot Adarsha Multiple Campus* 5, no. 1 (2024): 84–99

⁵ Nisheeth Basnet, "India-Nepal Open Border: Impacts, Threats, and Challenges to Border Management," *Academia.edu*, accessed May 13, 2025.

⁶ "Operation Illegals: How Porous Border with Bangladesh Threatens India's Security," *India Today*, December 12, 2024

⁷ "India's Maritime Security Strategy," *Indian Navy*, 2015.

⁸ Abhijit Singh, "Maritime Security in the Indian Ocean: The Challenges of Coastal Policing," *Observer Research Foundation*, October 2020.

- **Territorial Water.** It extends upto 12 nautical miles. This zone is our sovereign territory and other countries have to take permission to enter this area.
- **Contiguous Zone.** This zone in continuation with Territorial water is upto 24 nautical miles. Forces (Navy and Coast Guard) can seize vessels of suspicion or those found violating rule and regulations of the sea. Even in the contiguous zone, violation of immigration, customs, sanitation and any form of financial / smuggling / regulations can lead to punitive action from the coastal authorities or respective coastal states.
- **Exclusive Economic Zone (EEZ).** This zone stretches out till 200 nautical miles for each country. Here the right to natural and economic resources such as fishing, oil exploration, and other natural resources lies with the coastal country. Sea lines of communication may pass through the EEZ without any restriction, provided they do not pose a threat to sovereignty.

Framework of Border Security

The principle of “One Border, One Border Guarding Force” is the basis of Origin and Deployment of our Security Forces along the borders to secure them

- **Border Security Force (BSF).** Post the two wars of 1965 and 1971 with Pakistan, India raised a dedicated paramilitary force, the BSF and entrusted it the responsibility of guarding the borders with Pakistan in 1965 and later post 1971 war, with Bangladesh.

Prevailing Security Issues with Pakistan. (See Fig-2)

Long standing claim by Pakistan on PoK, frequent ceasefire violations, Infiltration of insurgent groups/terrorists, smuggling of drugs/weapons/fake currency using drones {The Golden Crescent of drugs (Afghanistan-Iran-Pakistan)}¹, instability along border areas influenced in the name of religion, Spying activities, cross border transgression facilitated by locals is the prevailing reality.²

The recent incidents which have taken place due to security breach in the past include Kargil war in 1999, Uri attack in 2016, Pulwama attack in 2019 and the recent horrifying Pahalgam attack on 22 Apr 2025.

Prevailing Security Issues with Bangladesh.

Illegal migration, especially Rohingyas, Narcotics and arms trafficking, Cattle smuggling, ethnic unrest affecting local population along borders incited by Pakistan and possibly by China.

The fencing along border with focus on regional connectivity and coordinated patrols have largely ensured prevention of major incidents erupting on the border. However, the situation may develop, especially after the ongoing political turmoil in Bangladesh with the ousting of former President Sheikh Haseena in 2024, targeting of the minorities and inclination of the interim Bangladeshi political regime towards China and Pakistan.³

- **Indo Tibetan Border Police (ITBP).** This para military force was raised in 1962 after the war with China in the same year. The areas of responsibility lay to guard the borders with China along the Himalayas in Ladakh and Arunachal. ITBP is under the Ministry of Home Affairs with specialisation in high altitude mountain warfare.
- **Prevailing Security Issues with China.** Long standing border dispute along the LAC, technology driven infrastructure build-up on the Chinese side along the disputed areas pose a

¹ “Golden Crescent and Its Impact on Border Security,” *The Hindu*, February 25, 2025.

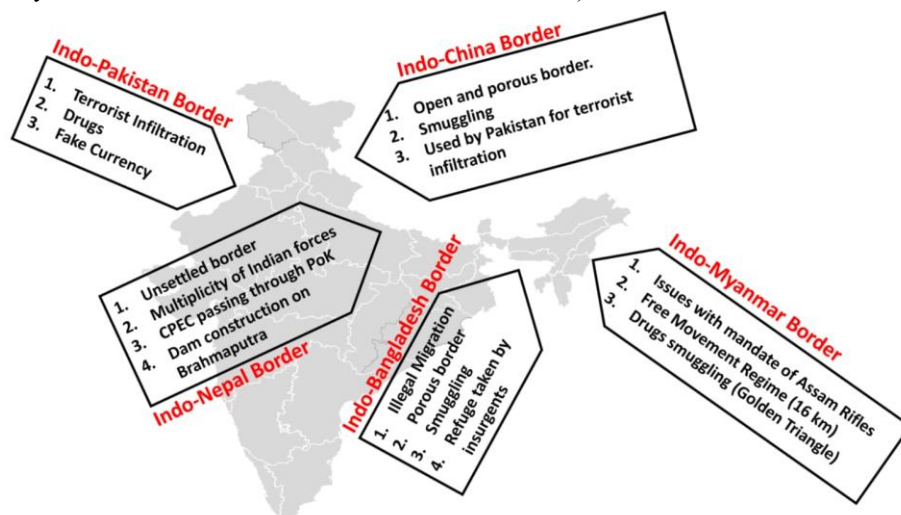
² “ISI’s Role in Border Security Challenges,” *The Economic Times*, January 30, 2025.

³ “Bangladesh’s Interim Government Strips Former Ruling Party of Registration,” *Associated Press*, May 12, 2025.

major challenge with heightened tensions.¹ Chinese influence on border areas with Nepal and Bhutan directly affect India's strategic concerns.²

The recent incidents escalating tensions between the two countries (Doklam Standoff in 2017 and Galwan Valley clash in 2020) highlight the security concerns.

- **Sashastra Seema Bal (SSB).** The SSB guards Nepal and Bhutan borders. The primary aim of SSB is to collect human intelligence and focus on community cooperation.
- **Prevailing Security Issues with Nepal.** Fake currency, narcotics and weapon smuggling are the main issues here. Intelligence and over ground operatives working for many countries having easy access to Indian borders, easy access for fugitives and terrorists to flee India³, increasing Chinese influence along Nepal border areas are a reality. Recent incidents of rising tensions with Nepal include territorial disputes such as **Kalapani-Lipulekh**.⁴
- **Assam Rifles.** The force guards border areas along Myanmar border and also assists in Counter insurgency ops in the NE states.
- **Prevailing Security Issues with Myanmar.** Cross border insurgency involving groups like National Socialist Council of Nagaland, United Liberation Front of Assam etc, loosely controlled **free movement regime** (the FMR was established in **2018** as part of [India's Act East policy](#), promoting cross-border movement up to **16 km** without a visa) leading to mis-utilisation by radical groups⁵, Drug trafficking from the Golden Triangle (north-eastern Myanmar, north-western Thailand and northern Laos).⁶



(Fig – 2)⁷

- **Indian Army.** The Army is deployed along LoC with Pakistan and along LAC with China. During wartime and standoffs, the Indian army is the frontline force for safeguarding the Indian borders.
- **Indian Coast Guard, Indian Navy and Maritime police** together undertake maritime security along maritime boundaries and border areas with large water bodies like PangongTso.

¹ "China's Infrastructure Development on the LAC," *The Hindu*, April 10, 2025.

² "China's Strategic Influence on Nepal and Bhutan," *The Diplomat*, May 1, 2025.

³ "Narcotics and Weapon Smuggling on the Nepal-India Border," *The Hindu*, March 12, 2025.

⁴ "China's Growing Influence along Nepal Border," *The Diplomat*, January 20, 2025.

⁵ "India-Myanmar Free Movement Regime: Loopholes and Security Risks," *Observer Research Foundation*, January 2025.

⁶ "Golden Triangle and Its Impact on Northeast India," *Times of India*, February 15, 2025.

⁷ "Indian Borders and its Management" *drishtias.com*, June 21, 2024.

- **Prevailing Security Issues along Maritime Boundaries.** Smuggling of weapons, drugs and human trafficking, transgression of people, infiltration.¹

Major incidents executed via coastal vulnerabilities include 26/11 Mumbai attacks.²

Sovereignty

We are not just a nation but a nation state with existential legal entity and a robust and comprehensive written constitution

- **Traditional and Modern Concepts of Sovereignty.** The traditional concept of sovereignty refers to the absolute and supreme authority of a state to govern itself without interference from outside sources or other states. This idea emerged strongly in early modern Europe after the Peace of Westphalia (1648) symbolising and enforcing a state's control, independence and right to self-determination.³ When applied to border security, it defines a state's exclusive and absolute right to control and defend its borders. The modern concept of sovereignty emerged post WW II and during globalisation era. Under the modern concept, the authority is shared, limited or conditional in some cases. The States' control is influenced by the international laws and organisations like UN, ICC etc. Under the modern concept, the borders have become more porous and states have become interdependent economically and for security arrangements also.⁴ Seen as mutually exclusive traditionally, the modern states pool sovereignty for mutual benefit, for example the European Union.

Infringement of India's Sovereignty, Outcome of Strategic, Political and Operational challenges.

- **Territorial Integrity (Border Disputes, Diplomatic Tensions).** The border security ensures that there are no unauthorised encroachments whether through military aggression or cross border terrorism. The territorial integrity of India was compromised right after Independence with Pakistan occupying PoK in 1947. The occupation of 38000 Sq km of Aksai Chin area in 1962 is another such example where our sovereignty was infringed.⁵ The attempts in Kargil in 1999 and Galwan valley clash were effectively thwarted thus ensuring territorial integrity and sovereign status of the country.⁶
- **Social and Economic Stability (Terrorism, Insurgency Narcotics).** The border areas like Kashmir, Ladakh, NE states etc. are primarily dependent on tourism. The cross-border terrorism with the latest attack on tourists in Pahalgam is a prime example and biggest setback to social and economic stability in the region. First, the attack was carried out in the name of religion and second, the incident has affected tourism adversely⁷, thus impacting the social fibre of the country and also affecting mental and economic well-being of the local populace.⁸ Likewise, military confrontation and standoff in the NE sectors of Ladakh lead to disconnect and disenchant the people in high altitude regions who primarily survive on tourism. The growing drug menace also damages the development of society and the productivity of the nation. On the other hand, despite three wars with Pakistan, India has respected others' sovereignty by sharing natural resources like river waters and exporting basic needs of food and medicine thus providing stability in the region.

¹ "Coastal Security: Challenges and the Way Forward," *IDSA (Manohar Parrikar Institute for Defence Studies and Analyses)*, 2024.

² "2008 Mumbai Attacks: Timeline and Security Lapses," *BBC News*, November 26, 2023.

³ Benno Teschke, *The Myth of 1648: Class, Geopolitics and the Making of Modern International Relations* (London: Verso, 2003).

⁴ Saskia Sassen, *Losing Control? Sovereignty in an Age of Globalization* (New York: Columbia University Press, 1996).

⁵ Neville Maxwell, *India's China War* (Vintage Books, 1970), pp. 305–310.

⁶ "India-China Galwan Clash: Timeline and Repercussions," *The Hindu*, June 2020.

⁷ *Hotel Management Network*, "Hotel Bookings Plummet as Terror Strikes Hit Kashmir's Tourism," April 26, 2025.

⁸ *The Times*, "How the Kashmir Massacre Unfolded, According to Those Who Witnessed It," April 25, 2025.

- **Cultural Integrity (Migration, Smuggling).** The influx of people from Pakistan, Nepal, Myanmar and Bangladesh has led to social and political concerns in the country.¹ In case of Rohingya settled in India, over time from Bangladesh and other countries have affected jobs, intermingling through marriage with Indians and illegally activities including criminal often leading to unrest and concerns in the society.²Over the years, the illegal immigrants have got Aadhar and voter IDs. They have been utilised for political gains and being promoted and protected by political parties especially in the eastern states of India. Often the smuggling of narcotics intended to deteriorate DNA and cultural values of a country have been undertaken by illegal migrants. This has disrupted the social fabric of the country and affected demographic and cultural character of the country thus compromising India's sovereignty.³

Table 1: represents last ten years statistics on the various ways resorted to by our neighbours to infringe upon India's sovereignty.

Country	Year	Military Incursions	Cross-border Insurgency	Infiltration	Weapon Smuggling	Narcotics Smuggling	Fake Currency Smuggling
Pakistan	(2015-2025)	107	307	594	178	171	121
China		15	66	60	4	52	12
Bangladesh		0	60	88	2	56	21
Myanmar		7	66	90	43	113	36
Bhutan		0	19	66	0	36	8
Nepal		0	60	88	2	56	21

Table-1: Infringement of Indian Sovereign Status by Neighbouring Countries: Incidents from 2015–2025(Data collated online from open source)

Surveillance

Challenges of Border Security on the sovereignty amply highlight the need for and Technical efficacy of modern surveillance systems deployed under the border security framework

Technologically driven systems have been fused with physical manning of border posts to ensure enhanced security of landlocked and maritime borders of India post recommendations of Kargil review committee and lessons learnt overtime through various incursions. Let's do a comprehensive analysis on their efficacy: -

- **Smart Border fencing.** India has largely adopted smart border fencing along its border areas wherever terrain and topography permits especially along Pakistan and Bangladesh border. The comprehensive Integrated Border Management is one of the key initiatives which aims to improve BSF's capability in detecting and managing cross border activities. The system uses a combination of infrared cameras, motion sensors, radar drones, laser detectors and remote surveillance with minimal human intervention. The non-availability of CIBM (Comprehensive Integrated Border Management) in inhospitable and inaccessible areas still pose a void in the security setup.⁴
- **Use of Drones and UAVs.** The deployment of drones and UAVs help in surveillance of high altitude/inaccessible remote areas like Siachen glacier, thick jungles and deserts along the border. However, the selective launch of these is not fool proof method for continuous surveillance.⁵

¹ Sandeep Kumar, *Illegal Immigration in India: A Threat to National Security*, Journal of Strategic and Security Studies 14, no. 2 (2024): 22–24.

² RealShePower, "The Rohingya Crisis and Its Impact on India: A Deep Dive," accessed May 14, 2025.

³ Aadil Rasheed, "Humanitarian Crisis to Security Threat: Understanding the Rohingya Migrants Issue and Its Pertinence to Jammu and Kashmir's Stability," *Journal of Asian Security*, April 2024.

⁴ "Smart Border Fencing: A Step Toward Securing Indian Borders," *India Today*, last modified May 12, 2025.

⁵ Shyam Sundar, "Drone Technology for Border Surveillance: An Indian Perspective," *Journal of Defense Technology* 12, no. 4 (2024): 55-56.

- **Satellite Surveillance.** Currently, India operates 55 satellites for comprehensive security of its borders and vast coastline. Satellites that may provide actionable surveillance are few in numbers. The plan to launch close to 100 plus satellites in coming months and year ahead should aid in this requirement. These satellites provide high satellite imagery which assists in strategic surveillance; however, state sponsored terrorists use the satellite blind periods, hidden routes in valleys under shadow of thick vegetation for their movement. Hence, in the current scenario, real time monitoring of borders remains an issue.¹
- **The Integrated Coastal Surveillance System (ICSS-2010).** India's coastal surveillance setup, primarily the ICSS utilises a multi-layered approach involving ground-based radar stations, optical and electro-optical sensors and other technologies to detect and track maritime activities. Underwater sensors and sonar systems have been setup for coastal and riverine areas. Maritime domain awareness has ensured automatic identification of all types of boats/ships transiting through maritime waters and coastal areas. Despite availability of all measures, the human intervention in the chain can lead to possible security leak/void as capitalised during 26/11 Mumbai attacks.²
- **Multi Agency Coordination and Data Analysis.** The sharing and digital processing of data on intelligence inputs provided by various security and intelligence agencies has been undertaken regularly. However, the prediction is purely on the data fed through sensors and human input which can wrongly be infused and deceived by the neighbouring states.³
- **Border Roads Organization (BRO).** The BRO constructs and maintains roads, often the lifelines, along the border, ensuring strategic military access to remote areas, especially in regions bordering China.
- **Integrated Check Posts (ICPs).** Regulation of trade and to keep migration under check ICPs at critical juncture along the border are in place.

Need of the Hour

Having examined and analysed the importance of Border Security on Sovereignty of the country, it is important to examine solutions. This is crucial in the prevailing circumstances where our country is surrounded on all fronts by forces inimical to our sovereignty. The need of the hour is to have state of the art and fail-safe mechanisms / systems with multiple redundancy ensuring the following:-

- Gap Free Surveillance
- Ability to monitor 24x7 365 days.
- Timely and Punitive Deterrent to security breaches

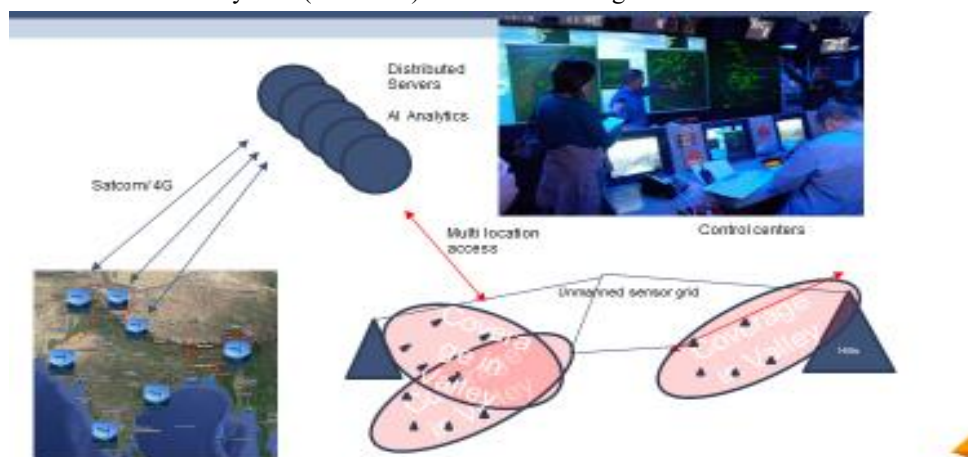
It is pertinent to emphasise that mere fencing, fortifying or physical guarding is inadequate as can be seen from the manner drugs, fake currency, weapons and humans continue to be trafficked unabated and with impunity. Also, what happened on 22 April 2025 at Pahalgam brings in the argument for Border crossings to be allowed only at designated points. Any crossing other than these points must be considered as security breach to sovereignty and dealt with hard kill options. Similarly, in the maritime domain there should be restriction on beaches along the sea coast. Further, the designated beaches must have limits beyond which no boats or humans should be seen and allowed. Violations to the limits must be dealt with hard kill. To ensure that such measures are actionable, solutions must ensure the following:

¹ Amit Kumar, "India's Satellite Surveillance: Enhancing Border Security in the 21st Century," *Strategic Defense Review* 9, no. 3 (2025): 98-100.

² Rajeev Pandey, "Integrated Coastal Surveillance: Enhancing Maritime Security," *Indian Journal of Defense Studies* 14, no. 1 (2025): 45-47.

³ Sanjay Kumar, "The Role of Multi-Agency Coordination in National Security," *Journal of Strategic Studies* 10, no. 2 (2024): 112-114.

- Accurate and real time intelligence
- Shorten the Sensor to Shooter loop
- Minimise the decision dilemma
- Ability to delegate to the soldier on the ground with freedom to operate.
- **Border Surveillance Solution.** With the above arguments as the need of the hour, surveillance solution must be an Integrated Sensor Grid comprising of Optical, Acoustic, Radio and Tracking & Location Radar based surveillance system. Further, the Sensor Grid should be unmanned using the capabilities of Solar / Wind Power and an integrated communication system. For the boots on the ground, as an end user, it is paramount that the end product of surveillance can be easily monitored. This could be through a Web Based Graphical User Interface that enables them to operate from different devices and OS without any software installation. Field of view of Sensors need to have the ability to overlap with secured and layered access ensuring gap free surveillance. The system architecture would require Satcom (minimum 4G), Distributed Servers, Unmanned Sensor grids (especially for coverage in hilly regions) and control centres. This is represented in Fig 3 below. Further, Table 2 represents the ideal surveillance system (area wise) with the technological features and the end state.



(Fig – 3)

Table 2: Surveillance Systems for Border and Coastal Security
(Data collated online from open source)

Area of Concern	Surveillance System	Technological Features	Purpose/Need	Targeted Borders/Countries
Land Borders (Pakistan)	- Smart Fencing with Sensors - Satellite-based Monitoring	- Integrated fencing with seismic and motion sensors - Automated alarm systems	- Prevent infiltration attempts - Monitor cross-border movement and smuggling	- Jammu & Kashmir - Punjab - Rajasthan - Gujarat
Land Borders (China)	- Satellite-based Monitoring	- High-resolution Earth observation satellites - Real-time data processing	- Detect military movements - Monitor infrastructure development along the LAC	- Arunachal Pradesh - Ladakh - Sikkim

Coastal Areas (Pakistan)	- Coastal Surveillance System (CSS)	- Automated sensors - Drones and UAVs - Radar and camera systems	- Monitor illegal maritime activities - Prevent infiltration and smuggling through the sea	- Gujarat - Maharashtra - Karachi Coastline
Coastal Areas (Bangladesh)	- Coastal Radar Systems and UAVs	- High-frequency radar systems - Drones for monitoring vulnerable areas	- Counter human trafficking - Monitor smuggling and infiltration across the sea border	- West Bengal - Assam - Sundarbans region
Land Borders (Bangladesh)	- Smart Border Monitoring Systems (SBMS)	- Smart cameras - AI-powered data analytics - Motion detectors	- Prevent border-crossing activities - Monitor cross-border insurgency and smuggling	- West Bengal - Assam - Meghalaya
Land Borders (Nepal)	- Biometric and Smart Border Checkpoints	- Biometric verification systems - Automatic vehicle number plate recognition	- Monitor illegal migration - Prevent human trafficking and cross-border insurgency	- Uttar Pradesh - Bihar - Uttarakhand
Coastal Areas (Myanmar)	- Integrated Coastal Monitoring Network	- Real-time video surveillance - Coastal radar and sensors	- Monitor illegal migration - Prevent insurgency and cross-border criminal activity	- Mizoram - Nagaland - Manipur - Tripura
Land Borders (Myanmar)	- Automated Surveillance Towers (ASTs)	- AI-enhanced visual detection - Integrated communication systems	- Monitor insurgent activities - Detect unauthorized crossings in remote areas	- Arunachal Pradesh - Nagaland - Manipur
Coastal Areas (China)	- Advanced Coastal Surveillance Network (ACSN)	- Underwater sensors - Real-time drone and satellite integration	- Monitor China's naval movements - Prevent illegal fishing and smuggling activities	- Tamil Nadu - Andaman and Nicobar Islands
Coastal Areas (All Neighbours)	- Integrated Coastal Surveillance Network (ICSN)	- Automated drones - Satellite monitoring - Underwater acoustic sensors	- Improve response times for threats in coastal waters - Enhance coastal border security	- Kerala - Goa - Odisha - All coastal regions

Conclusion

The Indian borders are a symbol of country's sovereignty, territorial integrity and security. The India's border security system needs to evolve ahead of potential threat curve which hinges on strategic

unpredictability, asymmetric threats and technological acceleration. Development of infrastructure connecting border areas and across border coupled with strong operational capabilities, integration of modern AI driven systems in multi layered security framework and multi-pronged flexible diplomacy would greatly aid in ensuring India's security and sovereignty across in years to come. Certain recommendations that emerge from the analysis are: -

- **Infrastructure Setup.** A place well connected to the mainland can be better monitored and surveyed. India needs to connect Ladakh, Siachen and other remote and inhospitable areas through roads, railways and good transportation network. It should facilitate quick movement of forces for timely backup during peacetime and crisis situations. The construction of roads, railways and highways should cater to military deployments, monitoring of border security setup taking into consideration movement of large vehicles utilised for setting up radars and security monitoring systems.¹ Additionally, the settlements near border for security forces should cater to extreme climatic conditions of weather, temperature and rarity of atmosphere.²
- **Civil Military Connect.** There needs to be an independent civil military advisory body with a say in decision making at the national level and great financial powers to address security needs immediately. The infrastructure build up and setup in the country should mainly pass through this body. Under indigenisation drive, they should have the flexibility to advise public private partnerships in hiring MSMEs in finding technology driven cutting edge solutions towards smart security setup. The body should focus on formulating a National Border Security Doctrine that defines threats and sets guidelines for both military and civilian agencies across all borders.^{3,4,5}
- **Enhanced Diplomacy.** To settle border security issues especially along disputed areas, the diplomacy needs to be multi-pronged rather than keeping it to flag meetings and bilateral talks with the affected countries. The diplomatic methods even if challenged by international organisations needs to ensure sovereignty of the country. India needs a permanent solution along LoC and LAC.^{6,7,8}
- **Confidence Building Measures amongst Local Population and Neighbouring Countries.** The connectivity to remote places, terrorism hit areas and ensuring financial and social security among the people through confidence building measures would pave the way in ensuring strong social and cultural fibre of the country. It would curtail the feeling of isolation and left out in the border areas. The CBMs with neighbouring countries should be a continuous effort to maintain a strong regional influence.^{9,10,11}

¹ Ramesh Verma, "Infrastructure Development for Border Security: Challenges and Solutions," *Journal of Border Studies* 7, no. 3 (2025): 132-134.

² Ashok Yadav, "Border Infrastructure Challenges in Remote Indian Areas," *Strategic Infrastructure Review* 15, no. 1 (2024): 78-80.

³ Deepak Singh, "Strengthening Civil-Military Coordination for National Security," *Security Policy Journal* 11, no. 4 (2024): 78-80.

⁴ Manish Kumar, "Indigenisation and Public-Private Partnerships in Defense," *Indian Strategic Studies Review* 5, no. 2 (2025): 90-92.

⁵ Harish Gupta, "National Border Security Doctrine: A Comprehensive Framework," *Journal of Defense and Security Studies* 14, no. 1 (2025): 105-107.

⁶ Amit Kumar, "Diplomatic Strategies in Border Security: India's Approach," *International Relations and Security Journal* 12, no. 3 (2024): 45-48.

⁷ Rajeev Verma, "The Role of Diplomacy in Border Disputes," *Asian Security Review* 18, no. 2 (2025): 121-123.

⁸ Priya Sharma, "India's Sovereignty and the Global Diplomacy Framework," *Geopolitics and Diplomacy Studies* 9, no. 1 (2024): 35-37.

⁹ Anil Kumar, "The Role of Confidence Building Measures in Border Security," *Journal of Border Studies* 7, no. 4 (2023): 56-59.

¹⁰ Sunita Rani, "Regional Diplomacy and Confidence Building Measures in South Asia," *Asia Pacific Review* 15, no. 2 (2024): 112-115.

- **Settling of Habitation near Border Areas.** The people from mainland and strong cultural setup should be motivated with benefits of land and financial security to settle near border areas. Tourism at such places should be encouraged for sustenance especially if land is not fertile. This should come under the purview of civil military body if established.¹²
- **Multi Layered Fencing and Security System .**The CIBMS must be setup across all borders with specific modification to high altitude and riverine areas. India should construct more than two layers of fencing supported by tech driven surveillance systems with facility of biometrics and face recognition. There should be a biometric database with face recognition systems alarming an unauthorised entry especially at security check points and prominent places within towns and cities.³⁴
- **Security Layers in Depth.** The difficult areas esp. along Myanmar border, with thick vegetation should have a layered fencing/network of security posts in depth areas where challenges of thick vegetation reduce. In such areas, the security forces should have a biometric database.⁵⁶.



¹¹ Rajeev Patil, "Social and Economic Security through Confidence Building Measures," *Strategic Security Forum* 21, no. 3 (2024): 82-85.

¹ Neha Joshi, "Encouraging Settlement in Border Areas: A Strategic Move for National Security," *South Asian Policy Review* 11, no. 2 (2025): 90-93.

² Sunil Verma, "Tourism and Border Development: A Path to Economic Sustainability," *Journal of Regional Development* 8, no. 3 (2024): 101-104.

³ Sneha Tripathi, "Facial Recognition and Biometric Technologies in National Security," *Indian Journal of Cybersecurity and Technology* 7, no. 2 (2025): 44-47.

⁴ Manoj Bhatia, "Layered Fencing and Tech Integration in Border Management," *South Asia Security Review* 12, no. 3 (2024): 91-94.

⁵ A.K. Sharma, *Border Management in India's northeast: Strategic Imperatives*, Centre for Security Studies, 2024, pp. 88-91.

⁶ Priya Nair, "Biometric Surveillance in Remote Border Areas: Challenges and Opportunities," *Journal of Homeland Security and Technology* 10, no. 2 (2025): 52-54.