# Silent Wings of Crime

## The growing menace of drones along the India-Pakistan border

Bulbul Prakash*

In recent years, the skies above the India-Pakistan border have become an unlikely battleground for a new wave of crime: the illicit use of drones for smuggling composite consignments [weapons+drugs+counterfeit currency notes]. These small, Unmanned Aerial systems (UASs), commonly known as drones, have captured the attention of law enforcement agencies, as criminals leverage technology to carry out their nefarious activities. The rising trend of drone-based smuggling operations create challenges of border security, and of counter-measures from security agencies.

Drones are defined as "aircraft of varying size that do not have a pilot on board and are instead controlled by someone on the ground".[1] They are used extensively in various sectors and industries, such as media companies utilising them to capture entertainment and news events; law enforcement agencies employing them for surveillance and monitoring purposes;

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* Bulbul Prakash is currently working towards her PhD in Politics at the University of Manchester in the United Kingdom. She was a research assistant at the Institute for Conflict Management (ICM) in New Delhi.

1 Michael J. Boyle, *The Drone Age: How Drone Technology Will Change War and Peace,* Oxford University Press, 2020, pp. 2-45.

airports using them for maintenance and inspection activities; agricultural companies employing them for monitoring crops and livestock; among an augmenting array of others. Their potential for expediting emergency healthcare interventions has garnered attention, owing to their exceptional manoeuvrability. Additionally, the implementation of drone-based food delivery systems has commenced in countries such as New Zealand and the United States,[2] driven by promotional objectives and cost-effectiveness. Furthermore, the deployment of drones exhibits promising prospects in investigating untapped energy reservoirs located in remote regions, and contributing to scientific endeavours by gathering invaluable data in domains such as meteorology and environmental sciences. Drones also offer distinct advantages in archaeological explorations, urban cartography, traffic monitoring, and geological surveys.

The advancement of drones has led to their increasing compactness, speed, and durability, making them harder to detect. With the ability to cover long distances and carry heavy loads, coupled with their ease of operation, drones pose safety and security concerns in almost every kind of environment. The misuse of this emerging technology poses a significant contemporary challenge.

## Types of drone threats

The threats posed by drones encompass various categories that can be distinguished based on their nature and potential implications. First, drones can be exploited as attack vehicles, capable of transporting and delivering explosives, biological agents, or chemical weapons. Such deployments constitute severe risks, as they can lead to substantial harm and cause extensive damage to targeted areas. Secondly, collision threats

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2   DJI Enterprise, "What you need to know about drone delivery", December 8, 2022, https://enterprise-insights.dji.com/blog/drone-delivery.

arise when drones enter the flight paths of aircraft, endangering the lives of passengers on board and creating a hazard for individuals and property on the ground. Poorly piloted or malfunctioning drones can result in accidents and potentially lead to fatalities.

Furthermore, the utilisation of drones for transport of contraband has become increasingly prevalent. Drones have emerged as a preferred tool for smuggling contraband items due to their ability to bypass ground-based security measures for the transportation of drugs, weapons, or other illicit substances.

Another significant category of drone threats pertains to espionage activities. Drones equipped with advanced imaging systems, including high-resolution cameras and sophisticated sensors, provide unparalleled surveillance capabilities. They enable covert monitoring of targeted individuals, specific locations, and sensitive sites. Their ability to hover, manoeuvre, and collect data in real-time, offer distinct advantages over traditional surveillance methods. This raises concerns regarding privacy, security breaches, and the potential compromise of sensitive information.

In recent years, there has been a spike in reported incidents of aerial smuggling. The illicit trafficking by drones carrying narcotics has been reported in various regions of Mexico, Colombia, and the United States, and has become a major concern.[3] The authorities have identified initial employment of hand-made drones for surveillance purposes in sensitive locations such as harbours and prisons, subsequently followed by the utilization of more advanced drones for the

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3    Tim Wright, "How Many Drones Are Smuggling Drugs Across the U.S. Southern Border?", *Smithsonian Magazine,* June 2020, https://www. smithsonianmag.com/air-space-magazine/narcodrones-180974934/.

transportation of narcotics. The substances primarily smuggled include methamphetamine, heroin, cannabis, and cocaine. These recurring incidents underscore the pressing need for a comprehensive legal frameworks and effective measures to combat the misuse of drones in illicit activities.

## HISTORY

Drug traffickers continuously adapt their strategies to evade law enforcement and maintain the flow of illicit drugs. Alongside traditional methods such as cars and high-speed boats, traffickers have embraced technological advancements, including app-based ride-sharing programs and darknet purchases.[4] The emergence of drones as a new avenue for drug distribution has opened unparalleled possibilities for traffickers.

Since approximately 2010, Mexican drug cartels started exploring the potential of drones for transporting drugs across borders.[5] To counter border surveillance, smugglers employ technology to spoof and jam the Global Positioning System (GPS) signals used by drones, effectively concealing their illicit cargo during transportation.

On August 12, 2015, Jonathan Elias and Brayan Valle, residents of El Centro, California, pleaded guilty to charges of using drones to smuggle 28 pounds of heroin into the United States. This is marked as the first international narcotics recovery involving the use of drones by Mexican drug traffickers, as

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4    Carole Cadwalladr, "How I bought drugs from 'dark net' – it's just like Amazon run by cartels", *The Guardian,* October 6, 2013, https://www.theguardian.com/society/2013/oct/06/dark-net-drugs.

5    Brenda Fiegel, "Narco-Drones: A New Way to Transport Drugs", *Small Wars Journal,* May 7, 2017, https://smallwarsjournal.com/jrnl/art/narco-drones-a-new-way-to-transport-drugs.

documented by the US Homeland Security Investigations.[6] As drone technology became more accessible and cost-effective globally, the next logical progression for cartels in Mexico was to commission the creation of custom-made drones.[7] By investing in larger and more specialised Unmanned Aerial Vehicles (UAVs), the cartels aim to increase their smuggling capacity, allowing them to transport larger quantities of drugs or contraband across borders, more efficiently and discreetly.

The use of drones carrying weapons has raised threat levels in various parts of the world. On October 20, 2017, near Salamanca, Guanajuato, Mexican authorities made a significant discovery when they apprehended four individuals with a stolen vehicle that contained a small commercial drone, equipped with an explosive device and a radiofrequency detonator.[8] This incident marked a pivotal moment, as it was the first time that authorities had intercepted an armed drone operated by a criminal organisation. It is worth noting that, while civilian drones have been commonly employed for smuggling substantial amounts of illegal substances into the United States, the emergence of armed drones is an even more alarming threat.

Aerial drones are increasingly becoming integral to modern irregular warfare, attracting terrorist groups, insurgents, guerrillas, and Criminal Armed Groups (CAGs). Various violent non-state actors (VNSAs), including Hamas,

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6    "International Smuggling by Drones Nets 28 Pounds of Heroin", U.S. Attorney's Office, Southern District of California, August 12, 2015, https://www.justice.gov/usao-sdca/pr/international-smuggling-drones-nets-28-pounds-heroin.

7    Brenda Fiegel, op. cit.

8    Kathleen Joyce, "IED attached to drone in Mexico could show evolution of drug cartel tactics", *Fox News,* October 25, 2017, http://www.phoenixgroup panama.com/pdf/article-drone-mexico-cartel-arrest.pdf.

Hezbollah, Houthi rebels and the Islamic State (IS) have utilised drones. They have also been used for assassinations, such as the attempts on Venezuela's President Nicolas Maduro in 2018,[9] and Haiti's President Jovenel Moise in July 2021.[10] Learning from past experience, Ukrainian forces have successfully exploited drones since 2022, in combat operations against the Russian invasion.

## Drones as Delivery Vehicles in India

India, following its independence on August 15, 1947, effectively adapted and restructured its military at both the organisational and operational levels, drawing valuable lessons from past experiences. Among the notable transformations in the recent past has been the integration of drone technology into various military functions, encompassing offensive and defensive applications.

India's adversaries have also adapted this rapidly developing technology and, on June 27, 2021, India encountered its first drone attack, when two UAVs released Improvised Explosive Devices (IEDs) targeting an Indian Air Force (IAF) station situated in the Jammu region of Jammu and Kashmir (J&K), injuring two Security Force (SF) personnel.[11] Furthermore, in a subsequent occurrence during the night of June 27-28, two drones were observed hovering above the military stations

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9    "Venezuela's Nicolás Maduro survives apparent assassination attempt", *The Guardian,* August 5, 2018, https://www.theguardian.com/world/2018/aug/04/nicolas-maduros-speech-cut-short-while-soldiers-scatter.

10   Jim Wyss and Walter Brandimarte, "Haiti President Jovenel Moise Assassinated at Home, AP Reports," *Bloomberg,* July 7, 2021, https://www.bloomberg.com/news/articles/2021-07-07/haiti-president-moise-assassinated-at-home-ap-reports#xj4y7vzkg.

11   Kamaljit Kaur Sandhu, "In a first, drones used to drop explosives on Jammu air base", *India Today,* June 27, 2021, https://www.indiatoday.in/india/story/air-force-station-jammu-blast-drone-attack-suspected-1819895-2021-06-27.

in Ratnuchak and Kaluchak, both located within the Jammu region.[12] Situated approximately 12 to 15 kilometres from the India-Pakistan International Border (IB), the Indian Air Force installation in Jammu faces significant security risks arising from the potential infiltration of low-altitude drones, which also menace military facilities positioned near border areas.

In addition to their offensive potential, drones have been increasingly used for smuggling drugs, weapons, as well as composite consignments into India. Since 2018-2019, Pakistan has been employing drones, to clandestinely transport arms, ammunition, narcotics, and Fake Indian Currency Note (FICN) across the IB and Line of Control (LoC) into India. It has been reported that Pakistan's Inter-Services Intelligence (ISI) has established six drone centres along the border, strategically coordinating anti-India activities through aerial routes.[13] As technology continues to advance, the utilisation of drones would constitute a significant and escalating threat. Despite occasional reports by the Border Security Force (BSF) successfully intercepting and disabling a limited number of drones, most of these drones effectively penetrate the permeable airspace along the IB and LoC.

According to partial data compiled by Institute for Conflict Management (ICM), a significant increase in drone activity along the India-Pakistan border has been recorded across four states/Union Territories:  Punjab, Jammu and Kashmir,

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12   Ravi Krishnan Khajuria, "2 more drones spotted over Kaluchak military station in Jammu; searches launched", *Hindustan Times,* June 28, 2021, https://www.hindustantimes.com/india-news/2-more-drones-spotted-over-kaluchak-military-station-in-jammu-searches-launched-101624863251849.html.

13   Colonel US Rathore, "Drone: The Winning Edge", *Indian Defence Review,* July 29, 2022, http://www.indiandefencereview.com/news/drone-the-winning-edge/.

Rajasthan, and Gujarat. Punjab emerges as the frontrunner, with the highest proportion of incidents, approximately 77.35 per cent of reported cases. This is particularly notable in the Amritsar, Gurdaspur and Ferozepur districts. There was a total of 228 recorded incidents in these states in 2022, 104 in 2021, 77 in 2020 and 167 in 2019 – a total of 637 incidents since 2019, when the first incident was reported.[14] 61 such incidents had been recorded in 2023, by May 31.[15]

## DRONE INCIDENTS: 2019 – 2023

| Year | Punjab | Jammu and Kashmir (J&K) | Rajasthan | Gujarat | Total |
|---|---|---|---|---|---|
| 2023 | 53 | 5 | 2 | 1 | 61 |
| 2022 | 186 | 20 | 18 | 4 | 228 |
| 2021 | 64 | 31 | 7 | 2 | 104 |
| 2020 | 47 | 19 | 10 | 1 | 77 |
| 2019 | 142 | 25 | 0 | 0 | 167 |
| Total* | 492 | 100 | 37 | 7 | 637 |

*Data till May 31, 2023;
Source: ICM

The state of Punjab, situated in close proximity to the Golden Crescent region, comprising Afghanistan, Iran, and Pakistan, faces a significant drug menace. The Golden

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14  Harpreet Bajwa, "Arms-dropping drones, recovered near Pakistan border, manufactured in China", *The New Indian Express,* September 29, 2019, https://www.newindianexpress.com/nation/2019/sep/29/arms-dropping-drones-recovered-near-pakistan-border-manufactured-in-china-2040828.html.

15  The data is extracted from Institute for Conflict Management (ICM) that research on terrorism, low intensity warfare, sectarian and other conflict.

Crescent serves as the entry point for heroin and opium from Afghanistan into India, specifically through the Punjab border with Pakistan. The price discrepancy between Pakistan and India has incentivised drug traffickers to smuggle heroin (narcotics) across the border, resulting in the proliferation of trafficking networks operating on both sides of the border.[16]

In the past, smugglers employed a range of techniques to transport drugs, such as concealing them in cavities within water campers, agricultural tools, shovels, plastic pipes, and utilising hollow spaces within the vacuum brake cylinders of goods trains from Pakistan.[17] They even resorted to throwing drugs across the border to Indian couriers waiting near the fenced border. However, these methods were effectively countered by BSF troops, resulting in the recovery of substantial quantities of narcotics.

To circumvent heightened security measures, smugglers have increasingly turned to Remotely Piloted Aircraft (RPA) or drones, recognising their potential as "ideal drug mules."[18] Pakistan and China, in particular, have capitalised on the use of drones for drug trafficking. Pakistan's increasing use of drones to smuggle contraband across the IB since August 2019 has raised major concerns for the BSF. On August 13, 2019, the first Pakistani 'Hexacopter Drone' designed and manufactured

16   David R. Winston, "The Convergence of the Narcotics Underworld and Extremists in Afghanistan and Pakistan and Its Global Proliferation", *DEEP,* 2022, https://deepportal.hq.nato.int/eacademy/wp-content/uploads/2022/05/Narco-Insecurity-Inc..pdf.

17   Aseem Bassi, "Heroin flows from across border; Pak still in denial", *Hindustan Times,* May 20, 2013*,* https://www.hindustantimes.com/punjab/heroin-flows-from-across-border-pak-still-in-denial/story-EzgfW0VORFdnyn1563rnKO.html.

18   Jochen Kleinschmidt and Luca Trenta. "Scanning the Horizon: Drones and Counter- narcotics in Latin America", 2022, https://edoc.ku.de/id/eprint/29582/.

by T Motors, a Chinese company, with a 21-kilogram payload capacity, was recovered in Mohawa village in the Amritsar district of Punjab.[19]

Among the drones recovered along the IB and LoC, the Matrice 300 RTK, manufactured by the Chinese Da-Jiang Innovations (DJI) company, has emerged as a preferred choice for smugglers. This drone offers superior reliability compared to assembled counterparts, ensuring precise delivery at predetermined locations.[20] Equipped with high-definition cameras capable of live recording and photography, the drone's flight time extends up to 55 minutes, allowing for the mounting of up to three payloads simultaneously. Additionally, these drones can be operated using dual remote controls featuring High-Definition (HD) screens.

The Matrice 300 RTK possesses an advanced feature that enables operators to remotely erase all data from the device in the event of its destruction or seizure, making it challenging to trace its previous flight paths. This further complicates efforts to track and monitor smuggling activities associated with the drone.

19  "Punjab police probe into Pakistan drones raises questions on its claims", *The Times of India,* September 28, 2019, https://timesofindia.indiatimes. com/city/chandigarh/punjab-police-probe-into-pakistan-drones-raises-questions-on-its-claims/articleshow/71344857.cms.

20  Anil Sharma, "High-end Chinese drone catches fancy of Pak smugglers", *Hindustan Times,* May 3, 2023, https://www.hindustantimes.com/cities/chandigarh-news/chinese-ai-drone-becomes-favourite-tool-of-pakistani-smugglers-dropping-drugs-and-arms-in-amritsar-india-101683135386675. html.
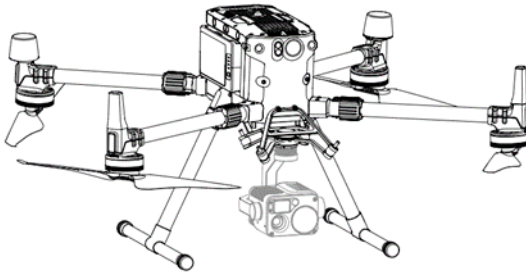
Figure 1. Matrice 300 RTK[21]

Narco-drones equipped with advanced, multi-axis cameras can also provide tactical information from a bird's-eye view, superior to that provided by human lookouts. This capability is advantageous for monitoring troop movements and border security.

## Drone activity across the India-Pakistan border

### Punjab

Punjab, a state in northern India, comprises 23 districts and shares its borders with Jammu and Kashmir (J&K), Himachal Pradesh, Haryana, and Rajasthan, as well as with Pakistan. The border between Indian Punjab and Pakistan spans approximately 553 kilometres and is a critical frontier, under strict surveillance and security measures. Over the past few years, drone activity in Punjab has increased significantly, with at least 492 incidents of drone sightings/entry into India along the India-Pakistan border detected between 2019-2023 (data till May 31, 2023) in the Punjab Frontier.[22]

The geographical features of the region do not pose

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21  "Matrice 300 RTK User Manual", *DJI,* May 29, 2022, https://dl.djicdn.com/downloads/matrice-300/20200507/M300_RTK_User_Manual_EN.pdf.

22  Institute for Conflict Management (ICM), New Delhi, data.

significant obstacles for individuals interested in using drones to cross the border from Pakistan. The flat terrain allows for unobstructed line-of-sight communication, making it easier for drone operators to maintain control. Additionally, the proximity of villages and houses to the border fence provides convenient landing options, allowing for precise placement of the drone in courtyards or other suitable locations.

Despite security measures such as fortified fences, floodlights, and round-the-clock patrolling by BSF personnel, the limited range of drones due to weight restrictions suggests that they may land at predetermined coordinates in remote areas. Communication between Indian and Pakistani smugglers often occur through encrypted *WhatsApp* calls, taking advantage of the fair data connectivity in border areas.[23] However, it remains unclear why certain areas experience higher drone activities while adjacent regions remain unaffected.

The use of civilian-grade drones and the growing reliance on them by terrorist groups like Lashkar-e-Taiba (LeT) and Khalistani factions supported by the ISI, indicate an inevitable utilisation of drones for launching attacks on security forces, political leaders, and crucial military and non-military installations.[24] This emerging threat persists despite efforts to fortify security infrastructure.

The state is battling a severe drug menace, with more than 20 per cent of the total heroin recoveries in the country attributed

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23 Harpreet Bajwa and Bala Chauhan, "Drug, drones and death: Inside Punjab's tragic stories of addiction", *The Indian Express,* October 30, 2022*,* https://www.newindianexpress.com/magazine/2022/oct/30/drug-drones-and-death-inside-punjabs-tragic-stories-of-addiction-2512309.html.

24 Bulbul Prakash, "India-Pakistan: Drone Intrusions – Analysis", *South Asia Terrorism Portal*, May 22, 2023, https://www.satp.org/south-asia-intelligence-review-Volume-21-No-48.

to Punjab alone.[25] The crisis has also resulted in a high number of addicts in the state, leading to devastating consequences for individuals, families, and communities, including increased crime rates, overdose deaths, and the destruction of lives and livelihoods. The Punjab Police, along with other agencies, is engaged in a challenging battle against drug smugglers, but corruption and limited resources significantly inhibit their efforts.

Another emerging concern for Punjab Police is the transportation of ammunition to gangsters and militants via drones. Though the smuggled narcotics are sold in multiple regions across the world, the illicit arms brought in through drones often remain within Punjab, fuelling criminal activities and creating potentials for terrorism, and destabilising the region.

Investigations into the RPG attack on Punjab Police's intelligence headquarters in May 2022 revealed that the key accused received an AK-47 rifle through a drone from Pakistan.[26] Furthermore, the supplier of the IED used in the December 23, 2021 Ludhiana court blast admitted to receiving the IED used from a drone sent from Pakistan, and to supplying it to the perpetrators of the blast.[27]

On February 18, 2023, the BSF recovered 20 packets wrapped in yellow tape, suspected to contain approximately

25  Harpreet Bajwa and Bala Chauhan, op. cit.
26  Nikhil Sharma, "Mohali RPG attack: Punjab Police recover AK-47 from field in Ropar", *Hindustan Times,* October 21, 2022, https://www. hindustantimes.com/cities/chandigarh-news/mohali-rpg-attack-punjab-police-recover-ak-47-from-field-in-ropar-101666333003525.html.
27  PK Jaiswar, "Ludhiana court blast case: Five, including juvenile, arrested", *Tribune India,* May 20, 2023, https://www.tribuneindia.com/news/punjab/ stf-cracks-ludhiana-bomb-blast-case-arrests-4-for-providing-technical-support-to-traffickers-396499.

22 kilograms of heroin, along the International Border (IB) in Gurdaspur district, Punjab. During this operation, they also seized two pistols, one of Turkish origin and the other made in China, along with six magazines, 242 rounds of ammunition, and a 12-foot-long plastic pipe.[28]

2023 marked a notable period in Punjab, with a series of composite seizures reflecting the persistent challenges posed by the illegal drug trade and the proliferation of firearms.

**COMPOSITE SEIZURES IN PUNJAB 2023[29]**

| Date | No. of Incidents | Items |
|---|---|---|
| 20 January 23 | 1 | 1.100 kg of heroin, .32 bore pistol |
| 21 January 23 | 1 | 2 kg of heroin and a pistol |
| 27 January 23 | 1 | 100 gm of heroin, four pistol of 0.32 bore, 18 live cartridges of 0.32 bore, four magazines and INR 770,000 in drug money |
| 3 February 23 | 3 | 2.2 kg of heroin, 14 kg of other narcotics, two rifles, three pistol, live ammunition |
| 10 February 23 | 1 | 3 kg of heroin, one china-made pistol. cartridge, and a magazine |
| 18 February 23 | 1 | 22 kg heroin, two pistol, six magazine, and 242 rounds |
| 26 March 23 | 1 | 4 kg heroin, 2 pistols, 18 live cartridges |

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28 "BSF seizes 20 packets of contraband close to India-Pak border", *Greater Kashmir*, February 19, 2023, https://www.greaterkashmir.com/national-2/bsf-seizes-20-packets-of-contraband-close-to-india-pak-border

29 Data extracted from "Khalistan Extremism Monitor", a web portal which intends to be a one stop resource centre for research on the Khalistan separatist movement in Punjab. Data till May 31, 2023.

| Date | No. of Incidents | Items |
|---|---|---|
| 28 March 23 | 1 | 2 kg heroin, 1 chinese-made pistol, 1 magazine, and eight bullets |
| 4 May 23 | 1 | One .32 bore, two Glocks, and three 30 bore Pistols, 7 magazines, 77 live rounds, 4.5 kg heroin. |
| 16 May 23 | 1 | Chinese-made drone, 1.6 kg of heroin, a pistol, and rifle |
| 18 May 23 | 2 | Narcotics weighing 2.1 kg, one pistol; 150 gm of heroin, a country-made pistol, and live bullets. |
| 23 May 23 | 1 | Chinese-made drone, 1.6 kg of heroin, a pistol, and rifle |
| 31 May 23 | 1 | 1.8 kg heroin, 82 kg poppy husk, 1 kg opium, four weapons. |
| Total | 16 | 41.35 kg heroin, 82 kg poppy husk, 1 kg opium, 2 kg intoxicating powder, 16.1 kg other narcotics, 9 pistols, 11 magazines, 139 live cartridges, 7 other weapons |

The deployment of Chinese autonomous civilian drones for delivering weapons in Indian Punjab by Pakistan adds a new dimension to India's security challenges, although it has largely refrained from directly targeting Army posts along the Line of Control (LoC) with armed drones. There wase, however, a drone attack at the Air Force Station in Jammu on June 27, 2021. The global implications of this evolving threat are exemplified by events abroad, such as the 2016 incident in northern Iraq, where Kurdish forces intercepted and accidentally triggered

a small drone laden with explosives deployed by the Islamic State, illustrating the use of weaponized drones in combat. The proliferation of drone-dropped weapons and narcotics in Punjab highlight an urgent need for robust border surveillance and international cooperation to counter an amplifying danger.[30]

In May 2023, the Director General of Police (DGP), Punjab, announced a proactive step, offering a reward of INR 100,000 for information on drone movements that leads to the recovery of weapons or narcotics.[31]

Interestingly, recent arrests in May 2023, have highlighted reverse cross-border drone operations, with smugglers orchestrating the smuggling of narcotics from Pakistan using drones operated from Indian soil.[32] The availability and affordability of drones, coupled with the support and bases provided by the Pakistani spy agency ISI, reinforce the need for stringent measures to counter this emerging threat in the region.

### Jammu and Kashmir

Jammu and Kashmir (J&K) is a region situated in the north western part of the Indian subcontinent. To the east lies the Indian union territory of Ladakh, while to the south are the Indian states of Himachal Pradesh and Punjab. On the

30  Vinay Kaura, "War on Drugs: Challenges for the Punjab Government", *ORF,* 2017, https://www.orfonline.org/wp-content/uploads/2017/05/ORF_IssueBrief_176_DrugsPunjab.pdf.

31  Tarun Gandhi, "Punjab DGP declares Rs 1 Lakh reward for information about drone movement", *The Daily Guardian,* May 18, 2023, https://thedailyguardian.com/punjab-dgp-declares-rs-1-lakh-reward-for-information-about-drone-movement-2/.

32  Yudhvir Rana, "Reverse drone smuggling unearthed by STF in Punjab", *The Times of India,* May 23, 2023, https://timesofindia.indiatimes.com/city/amritsar/reverse-drone-smuggling-unearthed-by-stf-in-punjab/articleshow/100452109.cms?from=mdr.

southwest side, it is bounded by Pakistan, and to the northwest is Pakistan occupied Kashmir (PoK).

The terrain of the region is widely diverse, including high mountains, valleys, and plain areas, with ample hiding spots and cover for illicit activities. The rugged and inaccessible areas, and the proximity to neighbouring countries which are known for drug production and arms smuggling, such as Pakistan and Afghanistan, create opportunities for illegal cross-border activities, making imposing a necessity for security forces to maintain constant surveillance.

The Union Territory (UT) has become a transit route for narcotics, as Pakistan and Afghanistan utilise the region for transporting drugs to states such as Punjab and Delhi. The highway connecting Punjab and J&K plays a pivotal role in facilitating this drug trade, often involving the use of drones.[33] Areas such as Kathua, Samba, and Doda districts frequently witness trans-border drone activities. This infiltration of drugs through drones not only contributes to the rise of drug addiction, particularly opioid dependence, but also serves as part of a deliberate narco-terrorism strategy targeting Kashmir's youth. The growing prevalence of drug abuse in the region has led to an increase in addiction rates, accompanied by various socio-cultural problems and a rise in criminal behaviour.

The convergence of drug-peddling syndicates with terrorist groups like LeT, The Resistance Front (TRF), and Hizb-ul-Mujahideen (HM), has led to the prominence of heroin as a cross-border covert currency. This shift towards drug trafficking is a consequence of the diminished financial

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33    Ankur Sharma, "Drugs Dropped by Drones in Punjab, Moved to J&K Via Road: The New High-Way Headache for Agencies", *News 18*, December 9, 2022, https://www.news18.com/news/india/drugs-dropped-by-drones-in-punjab-moved-to-jk-via-road-the-new-high-way-headache-for-agencies-6576655.html.

resources available to terrorist groups, which has resulted in an engagement with drug-peddling activities.[34]

Besides, drones have also been used to drop weapons in the region. Between 2019 and 2023, Jammu and Kashmir has recorded 16 documented instances of arms recovery from drones.[35] Defence analysts have claimed the potential utilisation of Kamikaze drones for the recent terrorist attack in Poonch District of J&K on April 20, 2023, further amplify the security challenges associated with drone activity in the region.[36]

The transition from Kalashnikovs to pistols for targeted killings in J&K has also been observed. Despite interception efforts, security officials acknowledge the possibility of magnetic IEDs, sticky bombs, and smaller weapons successfully entering the region. The infiltration of drugs and weapons through drone activity, coupled with the corresponding problem of narco-terrorism, constitute a significant threat to the stability and security of Jammu and Kashmir.

### Rajasthan

Rajasthan, located in the north-western part of India, is the country's largest state characterised by its predominantly arid and semi-arid landscapes. The vast expanses of deserts and sparsely populated areas in Rajasthan pose challenges to authorities in effectively monitoring the increasing occurrences of drone intrusions in the region.

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34  United Nations Office on Drugs and Crime, "Drug trafficking and the financing of terrorism", *UNODC*, https://www.unodc.org/unodc/en/frontpage/drug-trafficking-and-the-financing-of-terrorism.html

35  ICM data.

36  Abhishek Das, "Poonch militant attack: Use of drone, foreign weapons can't be ruled out", *Kashmirwalla,* April 21, 2023, https://thekashmirwalla.com/poonch-militant-attack-use-of-drone-foreign-weapons-cant-be-ruled-out/.

Historically, criminal syndicates and terrorist groups based in Pakistan utilised camel-back smuggling routes across the vast Thar Desert in Rajasthan and relied on well-trained foot couriers. However, there has been a shift in their modus operandi, with drones emerging as their preferred mode of transportation.

The districts of Sriganganagar and Barmer in Rajasthan have emerged as focal points for drone-based smuggling operations, primarily involving the transportation of narcotics.[37] These districts share a border with Pakistan, which adds to their appeal as strategic locations for smugglers.

Currently, local-level small-scale smugglers entice farmers who own agricultural farms near the border with financial incentives, actively engaging them in illicit activities. The Bharatmala highway, which traverses through Jaisalmer and Barmer in Rajasthan and connects with Punjab, serves as a key route for their operations. Moreover, reports indicate the establishment of criminal gangs in Punjab, as well as the presence of pro-Khalistan movement supporters, who are consolidating their base in Hanumangarh district and Sriganganagar.[38]

Law enforcement efforts have resulted in noteworthy arrests and seizures. On April 13, 2023, the Rajasthan Police apprehended three individuals and successfully recovered narcotics valued at INR 700 million that were dropped from a Pakistani drone in the Sriganganagar District.[39] Similarly, on

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37 Jaykrishnan Sharma, "Sri Ganganagar new target of Pak agencies to smuggle arms, drugs to India", *India Today,* August 1, 2022, https://www.indiatoday.in/india/story/sri-ganganagar-district-new-target-pak-agencies-isi-drugs-arms-smuggling-1982567-2022-08-01.

38 Ibid.

39 "Rajasthan: Police seize Heroin worth over Rs 70 crore 3 held", *India Today,* April 13, 2023, https://theprint.in/india/rajasthan-police-seize-heroin-worth-over-rs-70-crore-3-held/1516710/.

April 10, 2023, four individuals were arrested in the Jaisalmer District, and heroin worth INR 350 million was seized. It was revealed that these local smugglers had intended to distribute the narcotics across various districts in Rajasthan, as well as in Punjab, Himachal Pradesh, and Delhi.[40]

### Gujarat

Gujarat, a state situated in western India, has witnessed a series of incidents involving the use of drones for smuggling narcotics in recent years. Between 2019 and 2023, a total of seven reported incidents of drone sightings/entry into India have been documented.[41] The prominence of Gujarat's seaports as major gateways for drug trafficking exacerbates concerns regarding the proliferation of drone-based delivery methods for narcotics. Notably, between 2022 and 2023, the state has experienced a significant surge in drug and liquor recoveries, amounting to a staggering value of INR 42.69 billion, across 25 districts. Additionally, on March 8, 2023, law enforcement agencies recovered 61 kilograms of heroin valued at INR 4.25 billion from an Iranian boat in Gujarat's Kutch district, a development that has once again underscored the issue of drug smuggling through the state's ports.[42] Earlier, on September 13, 2021, a gigantic consignment weighing 2,988 kilograms of heroin, had been seized at Mundra Port in the Kutch District of Gujarat.

40  Ashish Mehta, "9kg of heroin worth Rs 35 crore seized in Rajasthan, four smugglers arrested", *The Times of India,* April 10, 2023, https://timesofindia.indiatimes.com/city/jaipur/9-kg-of-heroin-worth-rs-35-crore-seized-in-rajasthan-four-smugglers-arrested/articleshow/99379600.cms?from=mdr.

41  ICM data.

42  "Drugs worth Rs 425 crore seized from Iranian boat off Gujarat coast", *The Economic Times,* March 7, 2023, https://economictimes.indiatimes.com/news/india/drugs-worth-rs-425-crore-seized-from-iranian-boat-off-gujarat-coast/videoshow/98464541.cms.

While the number of reported incidents involving drone-facilitated drug smuggling in Gujarat may appear relatively few when compared to other regions, the risks are substantial, since the coastal areas and ports in the state are already major transit routes for drugs.

### Strengthening Border Security Against UAS

To address diverse drone threats effectively, it is crucial that comprehensive countermeasures be developed and security measures be enhanced. This would include the implementation of robust systems for detection, interception, and neutralisation of rogue drones. Additionally, regulations and guidelines need to be established to govern the ownership, operation, and usage of drones, taking into account potential security risks. Collaboration among relevant stakeholders, including security agencies, technology developers, and policymakers, is essential to devise strategies that mitigate the threats posed by drones while upholding safety, privacy, and the overall security of the affected areas.

### Rights, Security, and Implications

Drone incursions represent a severe infringement of the fundamental rights of civilians, encompassing privacy, safety, and security. These violations occur not only within the domestic territory but also at the borders, impacting individuals on both sides. Consequently, such actions can be deemed as morally reprehensible due to their inherent disregard for ethical principles.

The utilisation of low-cost unmanned drones by extremist and terrorist organisations has proven to be an effective tool for mass destruction. This phenomenon has prompted numerous countries to engage in the race for drone production, leading to increased affordability and a growing market for these devices. Such proliferation of drones is expected to alter

rules governing surveillance, and also to increase the risk of conflict escalation.[43] As of 2020, approximately 90 countries possessed military drones, with the majority of production concentrated in the hands of the United States, Russia, and Israel. The emergence of China as a major drone producer further exacerbates concerns surrounding this issue. In India, the prevalence of class-I and class-II Unmanned Aerial Vehicles (UAVs) primarily serves surveillance and tactical purposes.[44] Prominent laboratories such as the Aeronautical Development Establishment Laboratory and the National Aerospace Laboratory have made significant strides in developing indigenous military drones.[45] However, domestic endeavours have yet to be fully implemented, resulting in India's continued reliance on imports from the United States and Israel.

Boyle explores the implications of drone usage in conflict zones and highlights the potential for increased competition and tension between states, leading to new risks of escalation.[46] Drawing upon the example of drone use in Kashmir by both Indian and Pakistani forces, Boyle thus, cautions:

> "…as drones are used in more conflict zones around the world, they will begin to quietly reorder the risk calculations behind deterrence and coercion and produce greater chances of miscalculation, error and accident…"[47]

43   Michael J. Boyle, Michael C. Horowitz, Sarah E. Kreps, Matthew Fuhrmann, "Debating Drone Proliferation", *International Security,* Volume 42, Issue 3, 2018, pp.178-182.

44   Pintu Kumar Mahla, "Military Drones in India New Frontier of Warfare", *Journal of Defence Studies,* Volume 16, Issue 4, 2022, p.253-261, https://www.idsa.in/system/files/jds/jds-16-4_Pintu-Kumar-Mahla_15.pdf.

45   Ibid.

46   Boyle, 2020, op. cit, p. 45.

47   Ibid, p. 46.

Kintervater emphasises the significance of drone warfare in shaping modern warfare strategies, highlighting the increased reliance on Intelligence, Surveillance, and Reconnaissance (ISR) capabilities and dynamic targeting.[48] Through a study of archival sources on the history of warfare, Kintervater observes a historical pattern of "lethal surveillance" facilitated by drone technology, which has shaped current practices of security and control.

It is well-known that India intends to continue utilising armed drones equipped with precision munitions to counter cross-border terrorism. Pakistan has collaborated with China to develop its own drones for combating the Taliban.[49]

**Anti-Drone System**

The Anti-Drone System is a technological solution designed to detect and destroy the movement of UAVs. Advancements in technology have enabled the development of various methods for detecting, identifying, locating, and tracking drones. In military zones, where drones may be employed for espionage or malicious activities, the major countermeasures commonly employed involved:

- physically destroying the drone
- neutralising the drone
- taking control of the drone

Counter-drone technologies are applicable for both Hard Kill, involving a laser-based offensive to eliminate hostile drones, and Soft Kill, which involves disrupting the

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48 Katharine Hall Kindervater, "The emergence of lethal surveillance: Watching and killing in the history of drone technology", *Security Dialogue,* Volume 47, Issue 3, 2016, p. 223-238.

49 Micah Zenko and Sarah Kreps, "Limiting Armed Drone Proliferation", *Council Special Report No. 69,* June 2014, https://www.files.ethz.ch/isn/181065/Limiting_Armed_Drone_Proliferation_CSR69.pdf.

communication capabilities of enemy drones. While actually shooting down a drone is known as a Hard Kill solution, most countries adopt Soft Kill solutions[50] which encompass three distinct techniques: "jamming", which disrupts the GPS signal of the drone, causing it to lose orientation and either land or return to its point of origin; "spoofing", which involves providing the drone with false GPS signals to divert its intended path; and "protocol manipulation", where the drone is hacked and subsequently controlled by a different operator instead of the original one.

Drones can function as a mini-computer to detect other drones, even hack into their system and take control. In India, counter-drone technology employs radar, infrared, and radio frequency for detection and identification of drones. Interception is accomplished through methods such as kinetic kill or employing neutralisation techniques like jamming or using drone capture nets.[51] The Indian Air Force has played a crucial role in coordinating multiple departments involved in counter-strategies against drone attacks.

## CHALLENGES

As governments face mounting pressure to combat the growing threat of drones, border security agencies are tasked with finding effective solutions. However, addressing these challenges is no easy task, particularly due to the extensive length of borders, which can span mountains, shorelines, and densely populated urban areas.

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50  Charlie Campbell, "The Anti-Drone Arms Race: Inside the Fight to Protect the World's Skies", *Time,* March 23, 2023, https://time.com/6265108/drone-trd-singapore-unmanned-aerial-vehicle/.

51  "National Counter Rogue Drone Guidelines", *Ministry of Civil Aviation,* 2019, pp. 64-68, https://www.civilaviation.gov.in/sites/default/files/Counter_rogue_drone_guidelnes_NSCS.pdf.

Traditional methods employed by border security agencies to mitigate the drone threat have their limitations. One key limitation lies in differentiating between small drones and other objects, leading to false positives when relying solely on radar systems. This compromises the accuracy and effectiveness of detection efforts, potentially allowing rogue drones to go undetected.

The challenge of destruction lies in achieving a balance between the cost of kill and the cost of the attack. It is impractical to use expensive surface-to-air missiles (SAMs) costing millions of dollars to destroy inexpensive drones. Small arms, such as rifles and Medium Machine Gun (MMG) offer a cost-effective solution for neutralising visually detected drones.[52] Countermeasures like jamming can disrupt radio communications, impeding critical communication channels between military or special forces units. Furthermore, both jamming and kinetic solutions fail to provide clear insights into the types of drones deployed, to disrupt missions, or regarding the whereabouts of the drone operators.

Kinetic solutions, such as physically destroying drones, may cause collateral damage in urban border areas or to border facilities.[53] The jammer-based systems, while capable of disrupting drone control signals temporarily, can disrupt border communications as well, and may not offer a long-term solution. Additionally, counter-drone solutions, including jammers, can interfere with existing communication signals operating on specific frequency bands. This interference may

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52   V K Saxena, "Drone Threat – the big picture", July 14, 2021, *Vivekananda International Foundation,* https://www.vifindia.org/article/2021/july/14/drone-threat-the-big-picture.

53   D-fend solutions, "Difficult times at the borderlines", https://d-fendsolutions.com/by-sector/border-patrol/.

disrupt Wi-Fi and point-to-point communications, introducing additional complications.

To overcome these limitations, innovative counter-drone solutions are required, such as identifying and tracking the take-off positions and remote-control operators of rogue drones. This accurate identification and tracking capability would enable effective enforcement actions and better targeting of individuals controlling illegal drone activities. Terrain-independent detection capabilities are thus necessary to ensure effective drone detection, regardless of the challenging landscape.

### Anti-drone systems in India

Considering the geographical proximity of India to Pakistan and China, nations that have demonstrated persistent hostility to India, as well as substantial advancements in China (with advantages offered to Pakistan) in the integration of artificial intelligence (AI), in addition to the drone attack in Jammu in June 2021, the Indian government has prioritized the critical requirements for anti-drone technologies. Counter-unmanned aerial systems (Counter-UAS) are not only required by the Armed Forces and the BSF, but also by Police forces, to ensure they possess the necessary equipment for effective response and mitigation against unauthorised unmanned aerial systems.

The task of securing extensive borders using a limited number of anti-drone systems, which possess constraints in terms of direction, range, and detection capabilities, particularly with regard to smaller drones, is proving to be challenging for BSF troops. Should any suspicious activity be detected, the systems necessitate manual interventions. A senior BSF official stated,

We don't have a sufficient number of systems to cover even 10% of the area at one point in time. We have to change their placement at frequent intervals and install them again and again as there is an acute shortage of anti-drone systems. Another issue is with the limitations and flaws, which make them almost counterproductive. Our men, manually, day and night, keep a check, but it is not foolproof for such long border areas…[54]

India's focus on countering rogue drones and enhancing its anti-drone capabilities is evident through various initiatives and collaborations. The country requires anti-drone technology which can retrieve drone payloads being carried by rogue drones, identify and track the location of the drones' take-off positions and of their remote-control operators. India's security agencies are formulating methodologies to identify and intercept these unmanned aerial vehicles, encompassing the utilisation of counter-drone technology, augmenting surveillance efforts, and enhancing collaborative efforts among different agencies.

The BSF has made notable progress in implementing the Comprehensive Integrated Border Management System (CIBMS) after the Pathankot terrorist attack in 2016.[55] The CIBMS integrates new gadgets and technologies to bridge the gaps in the existing border security system. By seamlessly integrating human resources, weapons, and advanced

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54  Ankur Sharma, "Insufficient Anti-Drone Systems Giving Tough Time to BSF on Indo-Pak Border, Advantage to Enemy", *News 18,* June 24, 2022, https://www.news18.com/news/india/insufficient-faulty-anti-drone-systems-giving-tough-time-to-bsf-on-indo-pak-border-5427811.html.

55  Pushpita Das, "Comprehensive Integrated Border Management System: Issues and Challenges", *MP-IDSA,* October 4, 2017, https://www.idsa.in/issuebrief/comprehensive-integrated-border-management-system_pdas_041017.

surveillance equipment, the CIBMS aim to replace manual surveillance with electronic surveillance, thereby strengthening detection and interception capabilities. BSF established a drone repair laboratory in Delhi in 2022.[56] This facility enables analysis of drone behaviour and characteristics, leading to the development and implementation of remedial measures. By gaining insights into drone flight patterns, the BSF aims to strengthen its capabilities in countering drone-related threats and enhancing overall border security.

In a significant development, the Indian Navy has entered into a contract with Navratna Defence PSU Bharat Limited, to procure the first indigenous comprehensive Naval Anti-Drone System (NADS).[57] Equipped with both hard kill and soft kill capabilities, the NADS can detect, jam, and neutralise micro drones using laser-based technology.

India is also exploring various anti-drone systems developed both domestically and internationally. One such system is the Defence Research & Development Organisation's (DRDO's) D-4 drone system, a domestically developed solution that can identify and neutralise rogue drones through soft and hard kill mechanisms. Additionally, the evaluation of Israel's SMASH 2000 Plus systems by the Indian Navy, showcases India's determination to expedite the procurement of effective anti-drone technology.[58] The SMASH 2000 Plus system

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56 "BSF's drone forensic lab at border helps fight menace from Pakistan", *The Pioneer*, June 2, 2023, https://www.dailypioneer.com/2022/india/bsf---s-drone-forensic-lab-at-border-helps-fight-menace-from-pakistan.html.

57 "Indian Navy signs contract with BEL for supply of Naval Anti drone system", *Ministry of Defence,* August 31, 2021, https://pib.gov.in/PressReleasePage.aspx?PRID=1750830.

58 Sneha Alex Philip, "Navy orders Israeli SMASH 2000 Plus systems to tackle drones, more contracts in offing", *The Print,* December 8, 2020, https://theprint.in/defence/navy-orders-israeli-smash-2000-plus-systems-to-tackle-drones-more-contracts-in-offing/562955/.

utilises artificial intelligence, computer vision, and advanced algorithms to provide a lightweight, handheld fire control system capable of countering drones and small UAS.

Furthermore, India's own Indrajaal Drone Defense Dome system, developed by the Hyderabad Technology Research and Development Organization, offers extensive monitoring and protection over large areas.59 It can effectively detect and track multiple UAVs in real-time, providing continuous surveillance and incorporating a weapons infrastructure to enhance its functionality.

These initiatives and collaborations underline India's efforts to strengthen its defences against rogue drones and minimise their threats. By integrating advanced technologies, enhancing surveillance efforts, and leveraging indigenous and international anti-drone systems, India is actively working towards countering the evolving challenges posed by unmanned aerial devices.

## The Road Ahead

To strengthen defences against rogue drones and minimise their entry across India's borders, several key measures can be implemented. First, India should participate or even take lead in averting conflicting situations, promoting harmony on its borders and strengthening norms guiding drone proliferation and use. Secondly, documenting and conducting further research on drone activity, including effective detection and security responses, can inform future policy development and contribute to the advancement of indigenous drone technology design and manufacturing. The collaboration between the BSF

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59 Geethanath, "India's own Indrajaal drone defense dome system", *The Hindu,* July 9, 2021, https://www.thehindu.com/news/cities/Hyderabad/hyderabad-firm-develops-drone-defence-dome/article35227828.ece.

and local police, as well as community involvement, can be strengthened to improve anti-drone security responses.

It is essential to address the issue of underutilisation of high-tech surveillance devices deployed by the BSF by ensuring that the necessary technical expertise is uniformly available among personnel. Furthermore, the development of a national-level technology solution, such as a dedicated mobile application, can play a crucial role in capturing comprehensive data on drones and their operators. This solution should facilitate the identification, registration, licensing, enforcement, and compliance monitoring of drone operations. Establishing and strictly enforcing designated 'no-drone areas', which encompass Vulnerable Areas and Points (VAs/VPs) near border regions and critical national security locations, is paramount. Prioritizing the areas based on their level of criticality, involving subject-matter experts, and identifying the most suitable anti-drone solutions, including situational awareness (SA), Close-In Weapon Systems (CIWS), or a combination of multiple solutions, will significantly enhance India's defences against rogue drones and minimise their entry across the borders.