# Air Power and HADR

## Defining the Role of the Indian Air Force in Disaster Management in India

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*The versatility, speed and strategic reach of air power makes it an indispensable component of Humanitarian Assistance and Disaster Relief (HADR) efforts, contributing significantly to the effectiveness and efficiency of disaster response operations. This article provides an in-depth exploration of the intricate dynamics between air power and HADR, offering valuable insights into the evolving and indispensable role of the Indian Air Force (IAF) in disaster management within the Indian context. The article will also provide insights into how several Indian civil agencies collaborating with the IAF makes for a robust disaster management system in India. Furthermore, the article conducts a comprehensive analysis of the transformation in the IAF's role within HADR over the past two decades. Finally, the article offers policy recommendations pertaining to the interplay of air power, the armed forces and civil administration.*

**Keywords**: *Air Power, Indian Air Force (IAF), Humanitarian Assistance and Disaster Relief (HADR), Disaster Management, Civil administration*

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## Introduction

The importance of air power has been proven beyond doubt and has withstood the test of time. Outside of its military use, the Indian Air Force (IAF) has made remarkable efforts in disaster management (DM). India has faced natural disasters throughout time which has rendered its citizens homeless and helpless. In such situations, the IAF has contributed by launching air operations to locate and rescue stranded people from disaster-affected areas. Several operations have seen active involvement of IAF which has been 'the first to enter and the last to leave' during relief operations. A comprehensive examination of the complex interplay between air power and Humanitarian Assistance and Disaster Relief (HADR) would provide valuable perspectives on the evolving and indispensable contribution of the IAF and Indian civil agencies in DM within the specific context of India.

## HADR in Indian Context

Humanitarian Assistance (HA) endeavours encompass actions undertaken with the primary objectives of preserving human life, alleviating distress and upholding human dignity. This form of assistance is typically mobilised in response to disasters of human origin, such as nuclear accidents and chemical releases, as well as, enduring natural calamities, such as droughts and famines. The focus of this article is to examine the latter aspect of HA, namely, the involvement of Armed Forces (AF) in disaster relief operations. Furthermore, Disaster Relief (DR) activities pertain to actions implemented during and immediately after a catastrophic event, with the aim of mitigating the repercussions of a natural disaster and furnishing prompt relief and support to the affected populace. According to Claudia Meier and C.S.R. Murthy, the Indian government employs the terms 'humanitarian assistance' or 'disaster relief' to denote activities geared towards alleviating human suffering stemming from natural disasters such as cyclones, droughts, earthquakes or floods.[1]

The notion of HA in India is rooted in the enduring cultural and spiritual values that have been transmitted across successive generations. The overarching aspiration is to foster the creation of a secure and disaster-resistant India by formulating a comprehensive, forward-thinking, multi-faceted, technology-driven approach, grounded in an ethos of response. Moreover, the National Policy on Disaster Management (NPDM) outlines comprehensive objectives with a primary aim of cultivating a society that is both resilient and

well-prepared to handle disasters. To begin with, the NPDM incorporates an ethos centered on prevention, preparedness and resilience, harnessing knowledge, innovation and educational initiatives across all strata of the Indian society. Secondly, the policy places significant emphasis on promotion of mitigation strategies, which draw from advancements in technology and traditional wisdom, all the while maintaining a steadfast commitment to environmental sustainability. Furthermore, the NPDM aims for the seamless integration of DM within the wider framework of developmental planning, necessitating a harmonious alignment between these two spheres.

Moreover, the policy underscores the importance of effective mechanisms for evaluating and monitoring disaster risks. The NPDM also underscores the crucial need for a compassionate and efficient response and relief mechanism, with particular consideration for the requirements of vulnerable segments of society. Lastly, the policy's overarching commitment to proactively involve the media in DM reflects its dedication to mobilising a diverse range of resources for the protection of communities during times of crisis.

## LEGAL AND INSTITUTIONAL FRAMEWORK

The Disaster Management Act, 2005, establishes a comprehensive framework encompassing institutional, legal, financial and coordination mechanisms at various administrative levels, including the national, state, district and local tiers. Importantly, these institutions are designed to function in a closely coordinated manner rather than as separate entities. Building upon the provisions of this Act, India's Disaster Management Policy was formulated in 2009, marking a significant shift from a relief-centric approach to incorporating a holistic paradigm. This new approach integrates a range of scientific, engineering, social and financial processes, covering prevention, mitigation, preparedness, response, relief and rehabilitation aspects of DM.

Furthermore, the Disaster Management Act serves as the foundational framework for the establishment of the National Disaster Management Authority (NDMA) and provides explicit delineation of the roles and responsibilities of the central, state and district authorities in the realm of DM. The NDMA, functioning as the apex body for DM, operates under the leadership of the Prime Minister and bears the responsibility for the formulation of policies, plans and guidelines pertaining to DM. Furthermore, it coordinates the enforcement and execution of these measures to ensure that responses to disasters are both timely and effective. These guidelines serve as a point of reference for central ministries, departments and states in the

development of their respective DM plans. In situations where impending disasters are on the horizon, the NDMA possesses the authority to undertake additional measures focused on prevention, mitigation, preparedness and capacity building as deemed necessary.

The legislation also grants the NDMA the authority to grant permission to relevant departments or entities for emergency procurement of essential provisions or materials required for rescue and relief efforts in the face of imminent disaster situations or disasters. Moreover, the NDMA exercises overarching supervision, guidance and command over the National Disaster Response Force (NDRF). NDRF is presently composed of 10 battalions, each equipped with 144 specialised teams extensively trained to effectively manage wide range of disaster scenarios. Specifically, four of these battalions receive specialised training to address radiological, nuclear, biological and chemical disasters (RNBC).[2] The National Institute of Disaster Management (NIDM) also operates within the framework of the broad policies and guidelines established by the NDMA. In addition, resources available with the DM authorities at all levels - the National Executive Committee (NEC), State Disaster Management Authority (SDMA), District Disaster Management Authority (DDMA) and local authorities - are to be made accessible to the nodal ministries/agencies responsible for managing emergencies in times of impending disasters.[3] However, it is worth noting that the capability of civil administration in dealing with such emergencies remains limited. Consequently, during significant emergencies, they often rely on the AF for substantial assistance efforts.

## ROLE OF ARMED FORCES IN HADR

With the overarching national military objective of HADR, the Indian AF bears a pivotal responsibility in the domain of DM. This duty encompasses the provision of assistance to affected populace and restoration of essential infrastructural elements, including but not limited to sustenance provisioning, potable water dispensation and the re-establishment of communication conduits. Their swift and effective responsiveness, as well as their proficiency in handling such circumstances, establish the AF as the preferred 'front-line' responders.

In the event of a disaster in India, the AF takes on a supporting position, leveraging their equipment, training and professional expertise to tackle any situation. Their capabilities, including airlift and transportation of large volumes of personnel and material across the country, are

noteworthy. Furthermore, their unparalleled proficiency in search and rescue operations is commendable. Preparing for military operations other than war (MOOTW), in which DM is a key aspect, is an integral aspect of AF training. The Air Force, in particular, assumes a lead role in DM, providing aircraft and helicopters for transportation of personnel, supplies and equipment, as well as air-dropping critical supplies and conducting aerial damage assessments. The role of the Air Force in managing disasters is well documented.

In addition to the existing and well-structured DM institutions, the involvement of the AF is solicited by civil authorities when they confront situations that surpass their capacity. In such instances, the AF, operating under the purview of the Ministry of Defence (MoD), are deployed to provide assistance to civil authorities. This deployment aligns with the AF's inherent responsibility, as outlined in the Instructions on Aid to the Civil Authorities by the AF, 1970, referred to as 'Aid to Civil Authorities' (ACA), wherein they are mandated to participate in disaster response efforts.[4] The key provisions[5] that govern the AF participation in DM are:

1. Instructions on Aid to Civil Authorities by the Armed Forces 1970;
2. Manual of Indian Military Law, Chapter VII; and
3. Defence Services Regulations—Regulations for the Army, Chapter VII, Paragraphs 301 to 327.

The operational structure facilitating the engagement of the AF in DM is the Defence Crisis Management Group (DCMG), which operates within the confines of the Integrated Defence Staff (IDS) Operations Room. The IDS Operations Room maintains continuous communication with the Operations Rooms of the Army, Navy, Air Force and Coast Guard. This central hub serves as the command center from which all disaster response efforts, ranging from the management of events like tsunamis and floods to recent earthquake incidents, are orchestrated and coordinated.[6]

The AF constitute a pivotal component of the government's response capabilities and function as swift responders in instances of severe disasters. Their substantial potential to confront any adverse challenge, expeditious operational response and possession of abundant resources and capabilities have consistently positioned the AF as significant contributors to emergency support functions. These functions encompass vital areas such as communication, search and rescue operations, healthcare and medical facilities, and transportation, particularly in the immediate aftermath of a disaster.

The 21ˢᵗ century has witnessed many natural disasters in India, including the 2001 Gujarat earthquake, the 2004 tsunami, the 2005 Kashmir earthquake, the 2006 Mumbai floods, the 2008 Bihar Kosi river flood, the 2010 cloudburst in Leh, the 2011 Sikkim earthquake,[7] and the 2012 Assam floods. In all these disasters, the AF have been actively involved in relief operations.

In conjunction with the Army, the Air Force successfully rescued over 1,000 individuals during the Gujarat floods. Additionally, during 'Cyclone Vardah'[8], the IAF was mobilised to provide relief operations in Chennai. It transported critical supplies to Chennai, including air-dropping food packets to those affected, and airlifting stranded and injured individuals. In 'over 200 sorties, the air force airlifted 1,200 people in its transport helicopters'.[9] Consequently, in the context of air power, the IAF has played a stellar role in HADR missions.

## AIR POWER IN THE INDIAN CONTEXT

The IAF's core doctrine has emphasised the significance of air power since 1995. In the IAF's doctrine document spanning the years 2000–2012, there are two pivotal factors delineated to define the concept of air power. Firstly, it underscores that 'air power entails the capability to project military force either from or through a platform situated in the third dimension above the Earth's surface'.[10] This statement is accompanied by an important elaboration highlighting that the aerial medium, as the 'third dimension', serves not merely as a transit medium akin to a bullet or an artillery shell, but also as a means for executing strategic maneuvers, facilitating surprise tactics, enabling concealment and supporting tactical deployments.[11] Regrettably, this nuanced aspect has been overlooked in certain discussions, leading to a loose comparison of the Air Force with artillery in certain contexts.

Secondly, it delineates air power as the capability to 'transport cargo, individuals, munitions and military capabilities via aerial means to a specified destination, with the intent of achieving a defined objective'.[12] The current foundational doctrine of the IAF articulates this concept as follows: 'Airpower, in its classical sense, is defined as a nation's comprehensive ability to assert its influence through the utilization of the airspace'.[13] An examination of the doctrines employed by well-established Air Forces globally reveals a striking commonality in their perspectives, opinions and comprehension of air power. These viewpoints exhibit a remarkable consistency, with few disparities arising

primarily in response to the rapid evolution of technological advancements in the field.

Moreover, the IAF's doctrine, which defines air power as a nation's capacity to assert its influence through airspace, underscores the importance of discerning the origins or components of air power. Frequently, a misconception equates the air force with the entirety of a nation's air power. This misinterpretation often engenders confusion among both land-based and aerial military personnel. The contemporary IAF doctrine takes a more comprehensive approach by encompassing the logistical, infrastructural and human resources aspects of aviation within the purview of air power. Specifically, it stipulates that 'air power encompasses a nation's aviation assets, conventionally identified as air forces, air arms and civil aviation, along with their affiliated organizations, infrastructure, logistical support, and personnel'.[14]

## Air Power and HADR

Air power is the ability to swiftly deploy personnel, equipment and supplies to disaster-stricken areas. Unlike ground transportation, which can be hampered by damaged infrastructure or difficult terrain, an aircraft can quickly reach remote or inaccessible regions. This speed is crucial in the early stages of disaster response when every minute counts in saving lives and mitigating suffering. For instance, the 2015 earthquake in Nepal, which was one of the most devastating disasters in the country's history, prompted a substantial humanitarian response from the global community. This response took the shape of financial donations, material assistance and search and rescue missions. India, notably swift in its reaction, initiated 'Operation Maitri' by mobilising the Indian Army, Air Force and specialised task forces for immediate deployment and assistance. During operation, 9,509 individuals were airlifted to safety.[15] Similarly, in 1987, during the intensification of the Sri Lankan civil conflict, India's response involved the deployment of its Coast Guard and Air Force. Their mission was to airdrop multiple metric tons of relief material to assist the Tamil minority community.

In addition, air power provides a unique vantage point for assessing the extent of damage and identifying critical areas of need. Aerial surveys and reconnaissance missions enable disaster response teams to gather essential information, such as the severity of destruction, accessibility of affected areas, and potential hazards like flooding or landslides. Armed with this data, relief efforts can be coordinated more effectively. It also facilitates the rapid

transport of essential supplies, including food, water, medical equipment and personnel, to disaster-affected regions. In addition to cargo transport, aircraft are indispensable for medical evacuation (medevac) operations, where injured individuals can be swiftly airlifted to medical facilities, often far beyond the reach of ground transportation (see Table 1).

Table 1. India's HADR in the Neighbourhood

| Year | Affected Country | Disaster Type | Relief Provided | Air Assets Deployed |
|---|---|---|---|---|
| 2003 | Sri Lanka | Floods | 5,000 food packets, 2,500 blankets, 16 truckloads of medical supplies | 2 IL 76 aircraft, 1 An-32 aircraft |
| 2004–2005 | Maldives | Tsunami | Medical camps on ships, drinking water, rescue and relief, transportation of relief material, repairing and restoring generators and communication | 4 aircraft, 4 helicopters |
| 2008 | Myanmar | Cyclone | 125.5 tonnes of relief material—medicines, clothing, utensils, water tanks, tents, tarpaulins worth INR 5.4 Crore (US$ 1.24m) | 6 IL-76 aircraft, 2 AN-32 aircraft |
| 2015 | Nepal | Earthquake | 10,000 blankets, 1,000 tents and 1,000 tarpaulin sheets, food, medical supplies, water, and other relief material | 13 military aircraft including C-17, IL-76, and C-130, 18 medical teams, 5 Advanced Light Helicopters, a total 1636 Indian Air Force sorties, amounting to a total flying effort of 863 hours, 546 Army aviation sorties |

*Source*: Brookings Institution, India Center.[16]

The versatility, speed and strategic reach of air power makes it an indispensable component of HADR efforts, contributing significantly to the effectiveness and efficiency of disaster response operations. Table 1 shows the competence of the IAF's rapid response capabilities, allowing for the swift deployment of resources, personnel and relief supplies to disaster-stricken areas.

## HADR AND IAF

In recent years, HADR operations have garnered the attention of the global community. Policymakers in India are increasingly recognising the importance of developing capabilities, interoperability and a conceptual framework for participating in these operations. The IAF has extensive experience in disaster relief operations, both domestically and internationally, where they have played a central role in relief efforts. The IAF has a distinct role in such operations due to its ability to respond quickly, as well as its range, mobility and flexibility. In addition to numerous rescue missions within India, other nations have benefited from the IAF's capabilities in HADR and 'Non-Combatant Evacuation (NCE)' missions.

As a part of HA, the IAF provides relief measures without interruption. In 'Operation Sanjeevani', the IAF airlifted critical medical supplies to Maldives and Nepal with a large number of wide-bodied aircraft and helicopters as a part of its operation. The IAF has conducted hundreds of sorties and transported medicine, rations and other essential supplies to various parts of the country. Further, in the context of DR, the IAF authorities have the duty of administrative and medical arrangements in coordination with the local civil administration. The former includes identifying buildings, providing security, ensuring the supply of food, water and transportation. The latter includes providing daily medical examination, lab testing, guidance on disinfection and biomedical waste management, public health measures, management of symptomatic patients, surveillance, and creation and referral to isolation wards at the nearest hospital. In light of the widespread outbreak of the COVID-19 pandemic across the globe, the IAF facilitated the evacuation of Indian nationals from countries such as China and Iran on two separate occasions. During the second operation, a group of 57 individuals from Ladakh region who had undertaken a pilgrimage to Quom, Iran, were transported to the Hindon Air Force station via a C-17 aircraft on 10 March 2020. This group consisted of 33 women, 2 children and 22 men.[17] A quarantine center

was also established at Hindon Air Force station for the aforementioned pilgrims. The center was fully equipped with necessary amenities for the pilgrims' rest and recovery. These instances showcase the IAF's potential to augment measures to build confidence in the country and worldwide, particularly in the neighbouring countries.

The IAF has demonstrated its proficiency in disaster response through various relief and rescue operations carried out within the country. The IAF collaborated with the Indian Army in rescue missions during the 2013 cloudburst in Uttarakhand and the 2014 floods in Jammu & Kashmir. Notably, during the 2013 Uttarakhand floods, the IAF successfully undertook an evacuation operation, resulting in the safe transportation of 23,892 individuals, alongside 798 tonnes of relief supplies. This was achieved through the completion of 3,536 missions over a course of 65 days.[18] Despite losing one helicopter and its entire crew during the operation, the IAF's success in developing and implementing HADR capabilities over the past two decades is evident.

Moreover, in response to the disastrous tsunami of 2004, India launched operation 'Sea Wave' to provide relief, rescue and evacuation services. This operation was targeted at not only affected areas within India, but also Sri Lanka, Maldives and Indonesia, which were severely impacted. The IAF was mobilised immediately after the first reports of the crisis were received. As 'Search and Rescue (SAR)' operations are a critical component of HADR efforts, particularly in the aftermath of natural disasters, air forces often deploy specialised SAR teams and equipment, such as helicopters and pararescue units, to locate and extract survivors from hazardous conditions. Air power's reach and mobility make it an invaluable asset in such life-saving missions. A separate operation, 'Rainbow', was launched for providing assistance to Sri Lanka, which involved rescuing around 882 people and delivering 329 tonnes of relief material. Another operation, 'Castor', was initiated to aid the Maldives, where the IAF 'delivered 170 tonnes of relief materials and rescued 885 people'.[19] The Indian government also extended its help to Indonesia for a limited period of 90 days.

In September 2014, 'Operation Neer' was launched to address a major drinking water crisis in the Maldives caused by the breakdown of its main RO plant. The IAF deployed 'three C-17 and three IL-76 flights to airlift 374 tonnes of drinking water over the next two days'.[20] These operations highlight the IAF's ability to provide confidence-building measures across the world, particularly in the neighbouring countries. The successful execution of HADR operations, both at the global and

regional level, necessitates the involvement of multiple agencies, including civil authorities, which are expected to aid in facilitating effective communication and cooperation.

## Limitations of HADR

Disaster Management is a complex and all-encompassing endeavour that requires the collaboration of multiple stakeholders in order to prevent, mitigate, prepare for, respond to and rebuild after a disaster. It is widely recognised that no single organisation can tackle a disaster of any scale on its own. Rather, it is the shared responsibility of diverse entities, including government ministries, departments, and boards at the national, state and local levels, private sector, civil society, non-governmental organisations, AF, central armed police forces, NDRF and international institutions, among others, each fulfilling distinct roles in the process. While some stakeholders have primary responsibility for disaster management, others provide auxiliary support. The AF are a crucial stakeholder among this group.

Within the framework of National Military Objectives (NMOs), the AF extend support during exigencies, both domestically and internationally, encompassing endeavours such as HADR, aiding civil authorities, participating in International Peacekeeping operations and responding to any unforeseen circumstances as and when required.[21] The AF may be called upon to assist civil authorities in responding to unforeseen events. It is widely recognised that in the aftermath of natural or man-made disasters, AF are often called upon to contribute to disaster management efforts in various parts of the world.

Due to their specialised training and dedication to serving society, AF are often the preferred choice of state civil authorities in the event of disasters. The government and civil society hold a high level of trust and confidence in the AF, considering them capable of effectively managing all emergencies and crises. Samuel Huntington, in one of his essays, highlights 'the armed forces' discipline, organizational skills, and expertise in technical matters make them attractive temporary substitutes for underperforming civilian agencies'.[22] The significant contribution of AF in disaster management has been acknowledged worldwide owing to their well-structured organisation, training and human resources.[23]

India is susceptible to a wide range of natural and human-made disasters due to its unique geographic, climatic and socioeconomic conditions. 'About 58.6 per cent of the landmass is vulnerable to moderate to very high-intensity

earthquakes. Additionally, over 40 million hectares (12 per cent of its land) is susceptible to floods and river erosion. Almost 5,700 kilometres of India's 7,516 kilometres long coastline is at risk of cyclones and tsunamis, while 68 per cent of the cultivable area is prone to drought. Hilly regions face the danger of landslides and avalanches'.[24] India exhibits a notable discrepancy in the degree of preparedness for diaster management between the central and state governments, indicating a pressing need for substantial improvement. The notion of disaster management, encompassing prevention, mitigation, preparedness, response, relief and recovery, is still a relatively new concept. The recurrence of the Himalayan flash floods in Uttarakhand and portions of Himachal Pradesh have revived discussions regarding whether it is a natural calamity or a human-made catastrophe. Regardless of the answer, it is evident from the responses to the disasters over time that neither the central, nor the state governments, are adequately equipped to handle the situation.

Given the inadequate readiness of civil administration for large-scale disasters, the AF has emerged as the primary option for managing such situations. The IAF is renowned for its commitment, professionalism and modernity. There is a necessity to harness the collaboration between armed forces and civil authorities, including disaster response forces, to become self-sufficient and reduce their dependence on the AF. To improve civil–military relations, efforts should be made to enhance risk reduction capabilities in both urban and rural areas through appropriate legislative and regulatory mechanisms.

In times of disaster, the AF are often called upon to provide assistance despite the responsibility of coordinating disaster response and relief lying with the home ministry. The AF have conventionally functioned as a last resort, but in reality, they have frequently been among the initial responders and the final to leave in numerous post-disaster operations. An example of this was evident when the Indian coastline was struck by a tsunami on 26 December 2004, wherein the AF, overseen by the IDS, competently managed relief, rescue and evacuation operations. The AF have contributed to disaster management during various calamities, such as the 2005 Kashmir earthquake, the 2007 Bangladesh tropical cyclone and the 2010 flash floods in Leh. It is essential to note that as part of the civil–military relations programme, enhancing civil authorities' capabilities in handling disasters and reducing their dependence on the AF should be promoted.[25]

One of the peacetime functions of the IAF is to aid the civil administration in managing natural disasters that necessitate immediate rescue and relief efforts. 'History shows that HADR is a capability that the IAF has been

displaying for about 20 years now, starting largely with the Tsunami disaster in 2004', according to Air Vice Marshal Manmohan Bahadur (Retd).[26] Despite challenging terrains and unfavourable weather conditions, transport and helicopter fleets have consistently accomplished their assigned tasks with commendable performance. Some of the achievements are highlighted below:[27]

1.  **Earthquake in Sikkim:** Shortly after the earthquake in Sikkim on 18 September 2011, two C-130J aircraft departed from Delhi carrying 13 tonnes of relief supplies and 220 NDRF personnel. Over the course of sustained operations until 11 October 2011, a total of 527 sorties were flown, consisting of 294 hours on various aircraft and helicopters, which transported 1,714 individuals and 252 tonnes of relief supplies. IAF helicopters were also utilised for rescue operations, evacuating 525 individuals from inaccessible areas to safer locations.

2.  **Power Supply in Jammu and Kashmir (J&K) Valley Restored by IAF:** In January 2012, a severe snowfall hit Jammu and Kashmir, leading to a power outage in the Srinagar valley. At the request of the Government of Jammu and Kashmir, the IAF undertook the responsibility of aiding the Power Grid Corporation of India in the restoration of electrical power to the valley. Employing an aerial survey spanning the geographical expanse from Ramban to Banihal, the IAF discerned a compromised transmission tower in proximity to Ramsu village as the principal catalyst behind the prevailing power outage.

3.  **IAF deploys Mi-17 helicopter to fight forest fires in Goa:** According to an official statement from the IAF, on 10 March 2023, a Mi-17 helicopter was dispatched to combat a severe forest fire in the state of Goa.[28] The IAF employed a specialised firefighting apparatus, known as the Bambi Bucket, to target the blaze in the affected regions of Goa.

The above instances underscore the formidable capabilities and resolute commitment of India's transport and helicopter fleets in executing their designated roles amidst challenging topographies and adverse climatic conditions. These achievements reflect the resounding success of the IAF in deploying its resources with exceptional efficacy. Noteworthy among these accomplishments is the IAF's unwavering dedication to HADR operations, exemplified by its swift response to emergencies such as the Howrah–Kalka train accident and the earthquake in Sikkim. These operations demonstrate the IAF's adeptness in swiftly mobilising resources, facilitating rescue and relief and significantly mitigating the impact of disasters.

Furthermore, the IAF's engagement in addressing the aftermath of natural calamities, as seen in the Bhubaneshwar flood relief and restoration of power supply in Jammu and Kashmir, reflect its versatile and adaptable approach. The IAF's ability to respond promptly and efficiently to diverse challenges, including the forest fires in Goa, through innovative tools like the Bambi Bucket, speaks volumes of its proactive stance in safeguarding lives and ecosystems. Consequently, the IAF have made praiseworthy contributions towards aiding civil administration in HADR operations and have played crucial roles in these operations both, domestically and globally. Notable examples include 'Operation Rahat' in 2015, and relief operations conducted in Sri Lanka, Nepal, Indonesia and Maldives.[29]

However, the issue of the AF involvement in responding to and providing relief during disasters is a significant matter in the context of civil–military relations. The IAF provides prompt aid to civil authorities in accordance with the 'Defence Service Regulations', which include maintaining law and order, essential services, aiding in natural calamities and other forms of assistance that may be required by civil authorities.[30] For instance, in the event of an emergency, the Chief Secretary or the Commissioner of Revenue Administration, serving as the State Emergency Manager (SEM), serves as the primary coordinator and controller of all activities. Their main duty is to establish contact with AF units to request support for rescue, evacuation and relief operations.[31] In disaster scenarios, the primary function of the AF is to provide manpower and technical equipment to assist the rescue and relief operations led by civil authorities. Nevertheless, due to the inadequate functionality of the civilian administration's DM system, it remains a dependent on the AF for disaster response. This reliance on the AF is partially due to the absence of a civil defense system, underscoring the significance of establishing a comprehensive and coordinated DM system in India.

Nonetheless, excessive reliance on the military by civil authorities has limited the initiative, responsibility, and accountability of civilian officials. In 'Operation Sadbhavana' in Jammu and Kashmir, the AF are filling the void in governance and service delivery. Flood and cyclone-prone areas require appropriate preparation by civil authorities. To address this issue, a disaster management centre of excellence is planned to be established in the upcoming Indian National Defence University (INDU).[32] Moreover, on 4 April 2023, Prime Minister Narendra Modi, in his address at the opening ceremony of the International Conference on Disaster Resilient Infrastructure,[33] outlined the government's approach for constructing infrastructure that can withstand natural disasters. He emphasised that disasters can have far-reaching effects

beyond their immediate geographic location in today's highly interconnected world. Therefore, a comprehensive and interconnected response is essential, rather than a fragmented and isolated one.

## ANALYTICAL FRAMEWORK

The utilisation of air power in HADR efforts has seen significant transformation over the years. Historically, military aviation primarily focused on combat operations, but as the world has witnessed a growing frequency of natural disasters and humanitarian crises, the need for a versatile and rapid response mechanism has become apparent. Consequently, air forces worldwide have adapted and expanded their roles to include disaster relief and humanitarian assistance. This transition highlights the versatility and adaptability of air power as a strategic tool.

Over the last two decades, the IAF has undergone a noticeable transformation in its role within the context of HADR. The IAF has significantly improved its state of readiness for HADR missions. This includes maintaining a higher level of readiness, improved coordination mechanisms and more robust disaster response plans. It has expanded its capacity for rapid deployment and response. This includes the acquisition of modern transport aircraft, helicopters and specialised equipment dedicated to HADR missions, for instance, the deployment of C-17 Globemaster, II-76 transport fleet, C-130Js and An-32s. The IAF has strategically stationed Rapid Aero Medical Teams (RAMT) at several key locations.[34]

The role of IAF is also expanding in India's humanitarian diplomacy efforts, by offering assistance to neighbouring countries in times of need and strengthening regional partnerships in disaster management. For instance, the IAF utilised C-17 Globemaster III aircraft to evacuate 2,000 Indian nationals from Yemen. The IAF also undertook operations in Nepal, which was impacted by earthquake in April 2015 and successfully rescued over 10,000 individuals from disaster-stricken areas.[35]

Additionally, the IAF has invested in specialised training and expertise related to disaster response, including the development of specialised HADR teams and units. Prime Minister Narendra Modi's initiative of Security and Growth for All in the Region (SAGAR) has facilitated India's cooperation with numerous partners to ensure economic development and security in the Indo-Pacific region. One noteworthy illustration of this collaboration is the HADR exercise 'Samanvay 2022'[36] held in Agra, Uttar Pradesh. This exercise evaluated the effectiveness of institutional disaster management

structures and contingency measures. The exercise featured a Disaster Management seminar, a 'Multi Agency Exercise' showcasing various HADR assets through static and flying displays and a 'Table Top Exercise'.[37] The aforementioned activity, an annual collaborative event on the subject of HADR, has a two-fold objective. Firstly, to evaluate the effectiveness of established disaster management frameworks and contingency plans within institutions and secondly, to facilitate the sharing of specialised knowledge, practical experience and exemplary approaches with the Association for South East Asian Nations (ASEAN) member states that participated in the exercise. The exercise fostered a synergistic approach towards HADR by bringing together various stakeholders involved in disaster management, including civil administration, AF, NDMA, NIDM, the NDRF, the Defence Research and Development Organisation (DRDO), the Border Roads Organisation (BRO), the India Meteorological Department (IMD) and Indian National Center for Ocean Information Services (INCOIS). Consequently, India has attained the status of a regional power in South Asia, owing to its expanding ability to provide HA and DR to its citizens and regional allies.

Civil authorities serve as the linchpin of HADR operations, leveraging their local knowledge, legal authority and coordination capabilities to facilitate effective disaster response and recovery, ultimately safeguarding the well-being of affected population. Especially, the significance of civil aviation authorities in HADR operations lies in their pivotal role in managing airspace, expediting relief efforts, ensuring safety compliance and facilitating cooperation, all of which are essential for effective disaster response and recovery. However, keeping the limitations in mind, HADR encounters several formidable challenges. For instance, effective coordination between AF and civil authorities is critical. Communication issues and varying levels of preparedness among different agencies can hinder it.

## WAY FORWARD

In order to strengthen the disaster management system and its coordination with the civil authorities, various measures need to be taken into account. Although the IAF has always been at the forefront of providing assistance to the civil administration and providing relief to affected individuals, there are still areas that the IAF, along with the civil administration, must focus on to better utilise its capabilities to alleviate the damage and destruction caused by natural calamities. Some of the measures to be implemented include: establishment of a well-planned procedure for exercises that focus

on HADR, which includes reaching remote islands in disaster-prone regions of the Indian Ocean through air transport and landing at different runways with simulated relief supplies or rescue teams; and conduct of joint surveys of the topography of vulnerable areas and joint drills with civil organisations involved in disaster relief. Such measures would enhance communication and execution, thereby reducing the critical factor of time wastage.[38] To enhance the efficiency of search and rescue operations, joint drills utilising IAF transport planes and other military elements, including the navy and army, should be conducted. These drills can be beneficial in situations like medical emergencies in the open ocean, rescuing crews from hijacked or capsized vessels and other contingencies. To maintain goodwill and ensure coordination with other forces, it is crucial that Indian defense forces operate on the same wavelength as other forces.

Moreover, by recognising the paramount importance of climate change repercussions in influencing the frequency and magnitude of catastrophic events, it becomes imperative to maintain a state of heightened readiness within the disaster management framework. In the year 2019, India ranked seventh among the nations significantly impacted by extreme weather events stemming from climate change. This impact manifested in terms of both human casualties, accounting for 2,267 lives, and economic ramifications, which translated to a monetary loss of US$ 66,182 million in terms of purchasing power parity (PPP).[39] The evolving climate patterns have been unequivocally linked to an escalation in the occurrence and severity of disasters, necessitating a proactive and agile approach in response strategies. As climatic shifts continue to exert their influence, the conventional paradigms of disaster management must be attuned to the dynamic nature of these challenges. Disaster relief operations can be greatly aided by advance planning and preparation, such as identifying travel routes, establishing helipads, obtaining accurate weather forecasts and ensuring adequate fuel supplies and efficient communication systems. The need to recalibrate disaster management mechanisms require robust collaboration and coordination between AF and civil authorities.

## Conclusion

Air power, traditionally associated with military operations, has evolved into a versatile tool for humanitarian assistance and disaster relief. Its ability to provide rapid deployment, aerial surveys, cargo transport, medical evacuation, search and rescue and communication and coordination support makes it an

indispensable asset in disaster response efforts. Air power continues to be one of the most efficient ways to evaluate and distribute aid in both natural and human-made disasters. In this context, the armed forces especially the IAF's accomplishments indicate its pivotal role as a pillar of resilience and support in times of crisis. By consistently delivering commendable performance, adapting to evolving challenges and employing advanced techniques, the IAF has demonstrated its dedication to serving the nation in times of need, thereby amplifying its stature as a vital component of India's disaster management and relief efforts. Moreover, its dedication to HADR has helped rescue numerous individuals and provided essential relief to affected communities. However, to maximise its effectiveness, governments and international organisations must address infrastructure, coordination, safety and resource allocation challenges. The adaptability of air power in HADR highlights its vital role in saving lives and mitigating suffering during times of crisis. In an increasingly interconnected world where natural disasters and humanitarian crises are on the rise, harnessing the full potential of air power is imperative for a more effective and efficient response to these challenges.

## Notes

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