

**61st CONFERENCE OF
DIRECTORS GENERAL OF CIVIL AVIATION
ASIA AND PACIFIC REGION**

*Kuala Lumpur, Malaysia
07 – 11 September 2026*

AGENDA ITEM 3: AVIATION SAFETY

**MANAGEMENT AND COORDINATION OF RESCUE OPERATIONS
IN THE MOUNTAINOUS TERRAIN OF NEPAL**

(Presented by Nepal)

INFORMATION PAPER

SUMMARY

The backbone of tourism in Nepal is mountain tourism, especially high-altitude adventure treks and expeditions. With the surge of such missions in recent years, the demand for helicopter rescue operations, for example, emergency medical airlifts and long-line rescues, has also increased significantly as they serve as the lifelines of not only the adventure seekers but also the locals of the mountain region. However, such medical rescue operations should operate in unpredictable, severe weather phenomena, creating aerodynamic limitations that necessitate quick decision-making under operational and institutional challenges.

Management of this specialized, tough yet indispensable operation demands technical readiness, highly skilled professionals, and multi-layered coordination mechanisms with all concerned entities, including aviation and tourism regulators, local governments, and medical institutions.

This paper outlines the operational challenges of mountain rescue operations, details the key stakeholders involved, and shares the regulatory and management framework adopted by Nepal, along with associated challenges to carry out search and rescue missions and maintain safety in the world's highest aviation corridors.

MANAGEMENT AND COORDINATION OF RESCUE OPERATIONS IN THE MOUNTAINOUS TERRAIN OF NEPAL

1. INTRODUCTION

A country with a landscape ranging from 60 m AMSL in the plains of the Terai Region to 8848.86 m AMSL at the summit of Mount Everest, Nepal faces capricious weather and mountainous terrain that beckon adventure-seekers to these challenging landscapes.

Nepal issued 236,587 trekking permits and over 3,000 mountaineering/expedition permits in 2025 (Nepal Tourism Board) for destinations in the mountainous region, above 3,300 m. These tourists are heavily concentrated, amongst other places, in narrow corridors of the Sagarmatha (Everest), and Annapurna regions. This concentration of people seeking adventure in a low-pressure, oxygen-deficient area leads to emergency helicopter rescue operations, such as medical airlifts and long-line rescue missions, as life-saving measures. Consequently, the number of such helicopter flights reached approximately 2,000, with 550 flights at or above the base camp of mountains above 6,400 m, in the year 2025.

Currently, there are twelve helicopter companies in Nepal with 34 helicopters in active operation. Out of all these, 29 are AS350 helicopters from Airbus. Flights by these helicopters to high altitudes are the critical lifelines for tourism, high-altitude mountain rescues, cargo logistics, and emergency medical evacuation, aiming to save lives.

2. DISCUSSION

2.1 Challenges of mountain rescue operations

The low atmospheric pressure in mountainous areas affects lift generation on the main rotor blades of helicopters, reducing engine performance. As a result, helicopters must keep shedding weight to accommodate the needy passengers. Consequently, at Camp 2 of the famous Mount Everest (6400 m), only one person can be rescued at a time. Similarly, the almost unpredictable and highly capricious weather patterns of this region also pose a challenge for safer operations. Clear skies and flight paths can abruptly transition into white-outs, severe downdrafts, and instant wind shear. Avalanches can be expected at any time of the day. All of these factors have the potential to expose any flight operation to the risk of Controlled Flight into Terrain (CFIT). Moreover, the lack of flat ground forces pilots to execute calculated maneuvers, including "Hover Loading" (holding a low hover inches above unstable snow to pull in a casualty). For the extraction of casualties from ridges or deep crevasses, rescue teams must deploy the Long-Line / Human Cargo Sling technique, in which the helicopter hovers in mid-air, suspending a rescue guide on a 50-to-100-meter static synthetic rope.

2.2 Involved Entities and their Roles

Mountain rescue remains an operation exclusively meant to save lives in the region. It is highly specialized, full of challenges, and requires the collective efforts of multiple stakeholders, each involved in their own distinct way as required.

Helicopter Companies: Helicopter Companies are entities that execute the rescue missions and manage logistics and emergency dispatch. These Companies have maintained specialized light helicopter fleets, such as Eurocopter AS350, engineered for high-altitude starts and hovers, prepositioning fuel depots at strategic helipads.

Civil Aviation Authority of Nepal (CAAN): CAAN is the safety and security regulator of flight operations in Nepal. It is responsible for issuing Air Operator Certificates and Certificates of Airworthiness, as well as the licensing of Pilots and Maintenance personnel. It is also responsible for issuing flight permissions to all types of flights. CAAN certifies specialized pilot ratings for high-altitude and long-line rescue operations. It also specifies conditions, such as the number of landings, additional crew rest requirements, and training requirements, under which helicopter rescue missions are carried out.

The rescue permits are issued after a request is received from a helicopter company, including details as required and evidence that all regulatory requirements have been met. The permits are issued in accordance with the 'Standard Operating Procedures for Flight Permission', which is based on the Civil Aviation Regulations, 2002.

Department of Tourism, Ministry of Culture, Tourism and Civil Aviation: The Department of Tourism oversees commercial trekking agencies and mountaineering expeditions. The Department deploys liaison officers to the base camp with each mountaineering team aiming to summit peaks above 6,400 m. Such officers are responsible, besides route approvals and rule enforcement, for coordination and assistance during emergencies and for facilitating rescue coordination in the event of an accident or severe weather.

Provincial Governments: Provincial Governments are responsible for issuing licenses and permits to travel agencies, overseeing their activities, and working alongside the Federal Government to facilitate and coordinate rescue missions.

Private Rescue Associations: These Associations play a foundational role in high-altitude medical safety, working in close coordination with the Government Entities and mountain communities.

Medical Entities and field health posts operate high-altitude remote clinics to verify medical emergencies and provide official clearance to ensure airlifts and other services are genuinely required.

Air Traffic Services and Flight Prioritization: CAAN air traffic controllers grant absolute, immediate priority to active Search and Rescue and Helicopter Emergency Medical Services flights. They manage other traffic so that active rescue flights are conducted without hindrance regarding flight paths and sequences for arrivals and departures.

During events—such as sudden high-altitude blizzards or severe avalanches—a joint emergency command is triggered, and the *Nepal Army* also deploys its helicopters, integrating private civilian helicopters under a centralized military command to maximize rescue efficiency.

2.3 Regulatory Challenges:

CAAN, as the regulator, faces operational, systemic, and coordination-related challenges in regulating helicopter search and rescue operations. Balancing immediate lifesaving demands with rigorous aviation oversight has given rise to several regulatory challenges, such as:

- Coordination with multiple entities involved simultaneously makes the procedure lengthy and complex.
- Ensuring the availability of technical capability, including medical supplies and rescue equipment, human resources, and effective procedures needed in the overall rescue operations, poses a great challenge in bringing rescue missions to fruition.
- Monitoring and oversight of such flights remain challenging because of remote-area operations in difficult mountainous areas.

2.4 Conclusion

The management of high-altitude rescue operations requires a meticulous balance between extreme piloting skills, stringent aircraft weight management, specialized professionals, effective regulation, and efficient administrative coordination and communication.

3 ACTION BY THE CONFERENCE

3.1 The Conference is invited to:

- a) note the information contained in this Paper, and
- b) encourage the Member States having mountainous terrain to review the multi-agency frameworks utilized by Nepal to ensure that high-altitude medical airlifts remain safe, verified, and structurally secure to save lives in the region.

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