

Taking Flight Towards Climate Resilience

ICAO's work towards building adaptation strategies for aviation

By ICAO Secretariat

Introduction

Climate change is reshaping the aviation sector in profound ways. Recent climate events, such as wildfires, flooding and extreme weather, have increased the concerns and urgency of addressing the impacts of climate change on aviation, and the importance for ICAO to take the lead in further assessing the climate change risks to aviation

operations and infrastructure, and identifying targeted actions to assist aviation stakeholders in taking practical steps in their operations.

Recognizing the urgency of the matter, ICAO has been actively working in supporting Member States, including Small Island Developing States, to enhance climate adaptation and resilience across global aviation infrastructure. This article explores the background, milestones, and ongoing initiatives within ICAO to support Member States, airports, aircraft operators and air navigation service providers (ANSP) across the global aviation network in facing the impacts of a changing climate.

Global risks ranked by severity over the short and long term

"Please estimate the likely impact (severity) of the following risks over a 2-year and 10-year period."

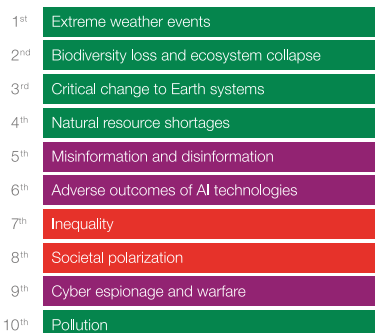
2 years



Risk categories



10 years



Source
World Economic Forum Global Risks
Perception Survey 2024-2025.

The Growing Need for Adaptation and Resilience

According to the World Economic Forum's "Global Risks Report 2025"¹, extreme weather events are perceived as the second most crucial risk over the next two years and the most crucial risk over the next decade.

These risks are not abstract future threats and rather they are already manifesting across sectors today, with aviation being particularly vulnerable given its reliance on stable weather conditions and extensive infrastructure networks. As climate impacts intensify, airports and aviation systems around the world are experiencing increasingly severe disruptions, requiring urgent attention and adaptation efforts.

1 https://reports.weforum.org/docs/WEF_Global_Risks_Report_2025.pdf



Some examples of these effects of a changing climate already impacting aviation are:

- **Increased intensity of storms**
- **Higher average and extreme temperatures**
- **Sea level rise**
- **Shifting patterns in rain, snow, wind, and storms**
- **Desertification and sand/dust storms**
- **Frequent and persistent droughts and wildfires**

According to the Adaptation Gap Report (AGR) 2024² by the United Nations Environment Programme (UNEP), the quality of adaptation planning is improving, but reaching global coverage of national adaptation planning instruments will be difficult. It also states that better capacity-building and technology transfer could accelerate adaptation planning and implementation.

Some countries explicitly included and recognized the importance of airport infrastructures in their National Adaptation Plans (NAPs)³, which aims to (1) reduce vulnerability to the impacts of climate change, by building adaptive capacity and resilience and (2) to facilitate the integration of climate change adaptation, in a coherent manner, into relevant new and existing policies, programmes and activities, in particular development planning processes and strategies, within all relevant sectors and at different levels, as appropriate.

ICAO's Efforts on Climate Adaptation and Resilience: A Timeline

ICAO continues to expand its efforts on climate adaptation with the delivery of timely and comprehensive guidance materials. Facing the growing need for adaptation and resilience of the aviation network, over the past decade, ICAO has systematically expanded its work on climate adaptation through a series of Assembly Resolutions, technical studies, and practical guidance tools. Building on the 2018 ICAO Climate Adaptation Synthesis Report, the Organization has updated this crucial document over the last three years. The 2024 edition of the Climate Adaptation Synthesis Report highlights the growing concerns of States and aviation stakeholders, underscoring that the number of States and stakeholders experiencing the impacts of climate change has tripled since 2018. This work also emphasizes the increasing challenges of climate adaptation, reinforcing the need for adaptation and resilience measures that complement ongoing mitigation efforts. Detailed information about this important piece of work will be provided in a separate article. The table below summarizes the key milestones and initiatives that illustrate ICAO's growing commitment to building resilience in the aviation sector.

² <https://www.unep.org/resources/adaptation-gap-report-2024>

³ <https://www.napcentral.org/about-naps>

Year	Source	Description
2010	ICAO Environmental Report	Dedicated “Chapter 6 – Adaptation”. ⁴
2013	ICAO Environmental Report	Dedicated “Chapter 7 – Adaptation”. ⁵
2013	Resolution A38-18, Paragraph 33	Requested Council (...) <i>to monitor and disseminate relevant information on the potential impacts of climate change on international aviation operations and related infrastructure, in cooperation with other relevant international organizations and the industry.</i>
2015	Scoping Study	Examine effects of climate change on air navigation over the North Atlantic.
2016	ICAO Environmental Report	Dedicated “Chapter 7 - Climate Change Adaptation and Resilience”. ⁶
2016	Resolution A39-2, Paragraph 19	Requested Council (...) <i>to identify the potential impacts of climate change on international aviation operations and related infrastructure and identify adaptation measures to address the potential climate change impacts, in cooperation with other relevant international organizations and the industry.</i>
2017	ICAO Seminar on Green Airports	Dedicated “Session 5: Climate Adaptation and Resilience”. ⁷
2018	Update to Airport Planning Manual, Part 2 (ICAO Doc 9184)	Added new chapters including Chapter 9 on “Climate Change Resilience and Adaptation”.
2018	Climate Adaptation Synthesis Report	Synthesize projected climate impacts and stakeholder survey results.
2018	Eco-Airport Toolkit	Provide recommendations and strategies for resilience planning. ⁸
2019	ICAO Environmental Report	Dedicated “Chapter 7 Climate Change Adaptation”. ⁹
2019	ICAO Seminar on Green Airports in cooperation with ACI	Dedicated Session 5: Climate Adaptation and Resilience. ¹⁰
2019	Resolution A40-18, Paragraph 26	Requested Council (...) <i>to identify the potential impacts of climate change on international aviation operations and related infrastructure, identify adaptation measures to address the potential climate change impacts and develop guidance on climate change risk assessment for international aviation, in cooperation with other relevant international organizations and the industry.</i>
2022	Climate Risk Assessment Guidance	Step-by-step guide for conducting risk assessments and planning adaptation. ¹¹
2022	ICAO Environmental Report	Dedicated “Chapter 9 - Climate Change Adaptation & Resilience”. ¹²
2022	Resolution A41-21, Paragraph 29	Requested Council (...) <i>to identify adaptation measures to address the potential climate change impacts and maintain and enhance guidance on climate change risk assessment and adaptation measures for international aviation, in cooperation with other relevant international organizations and the industry.</i>
2024	ICAO Seminar on Green Airports	Dedicated Session 4: Taking Flight Towards Climate Resilience: Building Adaptation Strategies for Airports. ¹³ Highlighted the urgent need for climate adaptation efforts, complementing ongoing mitigation strategies, so that airports are better prepared to manage the evolving impacts of climate change. This holistic approach to both adaptation and mitigation is vital for building resilient, sustainable airports in the face of changing climate.

4 https://www.icao.int/environmental-protection/Documents/Publications/ENV_Report_2010.pdf

5 <https://www.icao.int/environmental-protection/Documents/EnvironmentalReports/2013/ICAOEnvReport2013.pdf>

6 <https://www.icao.int/environmental-protection/Documents/ICAO%20Environmental%20Report%202016.pdf>

7 <https://www.icao.int/Meetings/greenairports/Pages/Presentations.aspx>

8 <https://www.icao.int/environmental-protection/pages/ecoairports.aspx>

9 <https://www.icao.int/environmental-protection/Pages/envrep2019.aspx>

10 <https://www.icao.int/Meetings/GREENAIRPORTS2019/Pages/Presentations.aspx>

11 <https://www.icao.int/environmental-protection/Pages/Climate-Change-Climate-Risk-Assessment,-Adaptation-and-Resilience.aspx>

12 <https://www.icao.int/environmental-protection/Pages/envrep2022.aspx>

13 https://www.icao.int/Meetings/greenairports2024/Documents/ICAO2024GreenAirports_Programme_v12_presentations-final.pdf

Year	Source	Description
2025	Update of Climate Adaptation Synthesis Report	In February 2025, CAEP Working Group 2 (WG2) updated the Climate Adaptation Synthesis Report by compiling the latest information on the projected climate impacts on the aviation sector, and outlining possible adaptation and resilience measures. The updated report highlights the growing concerns of States and other stakeholders, emphasizing that the number experiencing climate change has tripled since 2018. It also underscores the need for adaptation and resilience measures to complement mitigation efforts. The Report will be soon available in ICAO's climate adaptation webpage. ¹⁴
2025	ICAO Environmental Report	Dedicated "Chapter 13 – Climate Adaptation & Resilience".

ICAO's Cooperation with Other Organizations

ICAO collaborates actively with organizations like the United Nations Convention to Combat Desertification (UNCCD) through initiatives such as the UN Sand and Dust Storm Coalition. This coalition improves monitoring, builds expertise, and advances sustainable land management practices to mitigate desertification's impacts on aviation.

Next steps

The evidence is clear: climate change will increasingly affect aviation infrastructure, operations, and economics. ICAO's leadership in supporting adaptation and resilience across the sector is crucial to ensuring that airports and aviation systems can continue to thrive.

Through a combination of outreach activities, guidance development, stakeholder engagement, and international collaboration, ICAO will continue its efforts in supporting aviation stakeholders worldwide to "take flight" towards a more climate-resilient future.

ICAO's further efforts in providing reports and guidance are crucial in supporting States and other stakeholders understand these climate risks and develop adaptation strategies. It is also essential for ICAO to continue encouraging States to incorporate climate adaptation and resilience measures into their long-term strategies and action plans, and to implement them to avoid interruptions and significant damage to infrastructure. This will ensure the sector is ready to manage and adapt to the challenges of changing climate while maintaining operations safe and efficient.

¹⁴ <https://www.icao.int/environmental-protection/Pages/adaptation.aspx>