



16-18 JULY 2024
IATA AMERICAS OFFICE
703 WATERFORD WAY #600,
MIAMI, FL 33126, USA



SUPPORTERS







**AIRPORTS COUNCIL
INTERNATIONAL**

LATIN AMERICA CARIBBEAN


AGENDA

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Julio Siu - ICAO

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Aviation Safety Campaign & Workshop Collaborating for Effective Disaster Response and Preparedness

Miami, United States, 16 – 18 July 2024



SAFE SKIES.
SUSTAINABLE FUTURE.

ICAO environmental activities and its implications on contingency and recovery actions

Mr. Julio Siu, ICAO NACC Deputy Regional Director

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Contents:

OVERVIEW

- Background and context;
- ICAO work on climate change, adaptation and resilience
- Observed Impacts, Effects and Menu of Adaptation Options
- CAEP work
- RASG-PA – Safety contingency and recovery actions

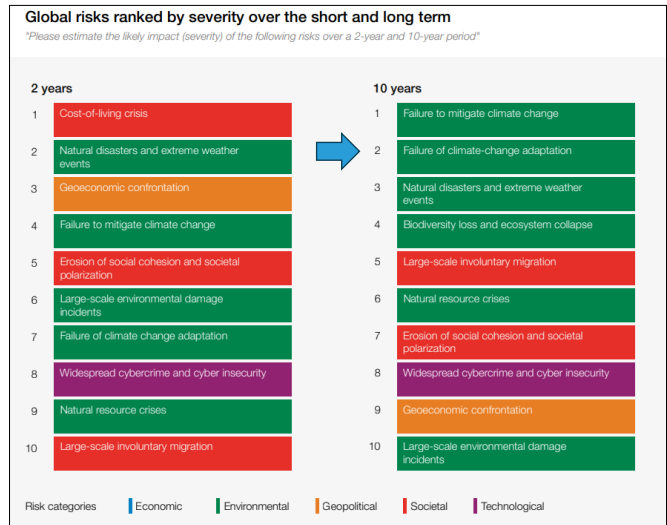
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Background and Context: Climate Adaptation and Resilience

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- **The Global Risks Report 2023** published by the World Economic Forum (WEF)

- Highlights that climate and environmental risks will take center stage in global risk perception over the next decade;
- Top 10 risks over the short term and long term, clearly indicates that **climate change adaptation** will rank as the **second most crucial risk in the next 10 years**.



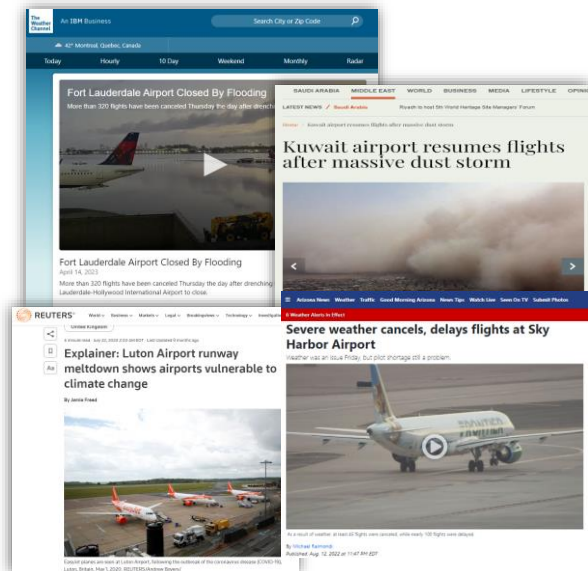
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Background and Context: Climate Adaptation and Resilience

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- Extreme weather events caused by the climate change pose a real and increasing **risk to the global aviation industry**;
- Aviation stakeholders already experiencing its impacts in the form of:

- increased intensity of storms;
- higher average and extreme temperatures;
- sea level rises;
- changes in rain, snow, wind, and storm patterns;
- desertification, sand and dust storms;
- more frequent and persistent droughts and wildfires.



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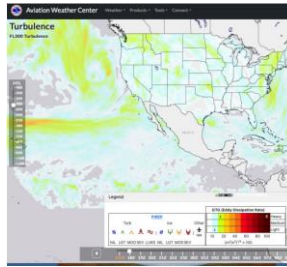
Background and Context: Enhancing ICAO Annex 3 for Climate Resilience

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Meteorological Service for International Air Navigation



<https://wmo.int/topics/weather>



World Area Forecast Center – Washington

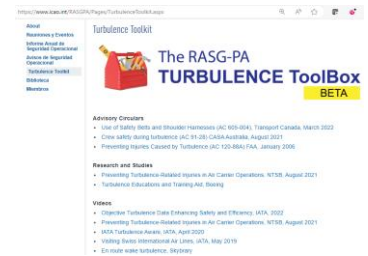
GTG Turbulence Forecasts:

Available through United States NWS Aviation Weather Center

<https://aviationweather.gov/gfa/#turb>

Regional Aviation Safety Group – Pan America (RASG-PA)

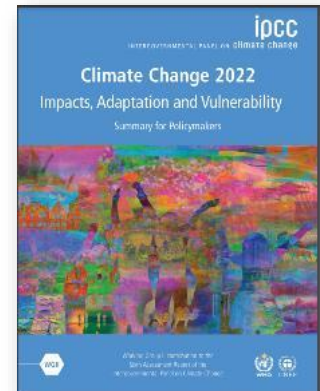
[Turbulence Toolkit \(icao.int\)](https://www.icao.int/TurbulenceToolkit)



Background and Context: Climate Adaptation and Resilience (IPCC WG2)

IPCC Working Group II contribution to the Sixth Assessment Report:

- ✓ assesses the impacts of climate change, looking at ecosystems, biodiversity, and human communities at global and regional level
- ✓ reviews vulnerabilities and the capacities and limits of the natural world and human societies to adapt to climate change
- ✓ reveals that global action on adaptation and mitigation needed now to secure a liveable and sustainable future for all



- Many airports are in the low elevation coastal zone, vulnerable to flooding and sea level rise.
- Under a 2°C scenario, the number of airports at risk of storm surge flooding increases from 269 to 338 or as many as 572 in the highest emissions no-policy baseline scenario, these airports are disproportionately busy and account for up to 20% of the world's passenger routes (Yesudian and Dawson, 2021)

Source: <https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/>

ICAO Assembly Resolutions on Climate Change

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Resolution A38-18 (2013) Paragraph 33. Requested Council:

- 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;

Resolution A39-2 (2016) Paragraph 19. Requested Council:

- 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;

Resolution A40-18 (2019) Paragraph 26. Requested Council:

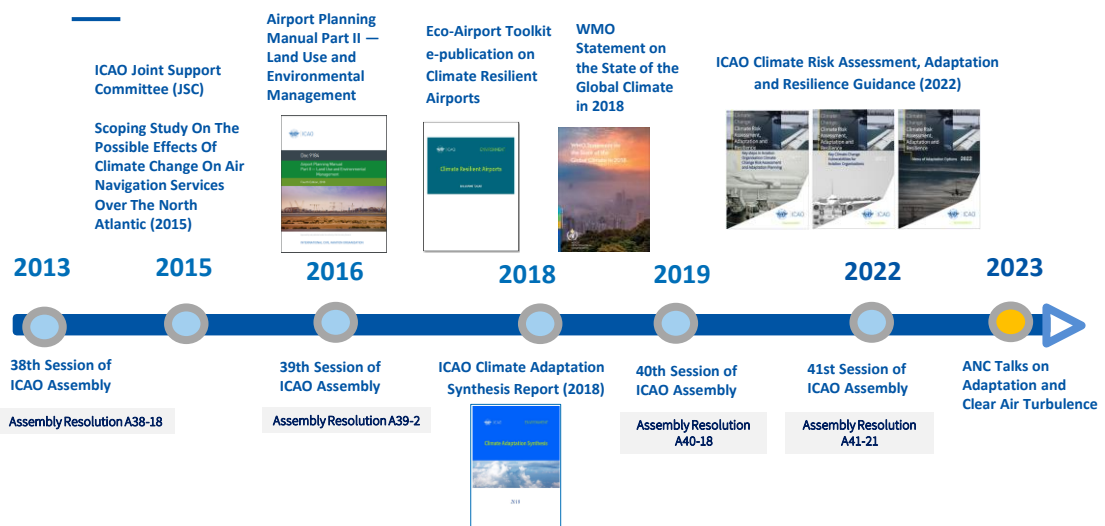
- to identify the potential impacts of climate change on international aviation operations and related infrastructure, identify adaptation measures to address the potential climate change impacts **and develop guidance on climate change risk assessment for international aviation**, in cooperation with other relevant international organizations and the industry

Resolution A41-21 (2022) Paragraph 29. Requested Council:

- 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

ICAO Work on Climate Change Adaptation (timeline)

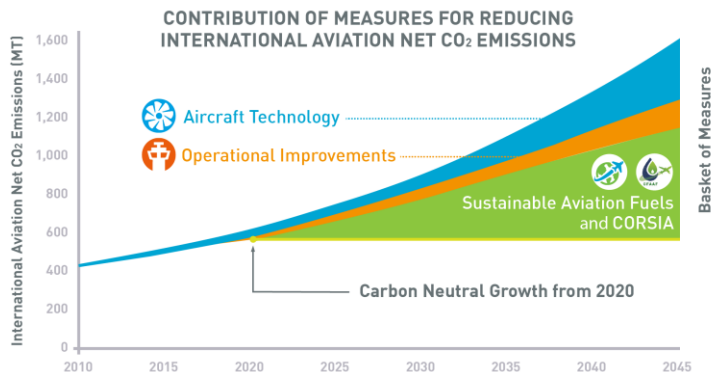
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The ICAO Assembly at its 41st Session in 2022 adopted Resolution A41-21 Consolidated statement of continuing ICAO policies and practices related to environmental protection — Climate change. Through this Resolution, the ICAO Assembly adopted the collective long-term global aspirational goal for international aviation (LTAG) of net-zero carbon emissions by 2050, in support of the Paris Agreement's temperature goal. To achieve the global aspirational goals and to promote sustainable growth of international aviation, ICAO is pursuing a basket of measures including aircraft technology improvements, operational improvements, sustainable aviation fuels, and market-based measures (CORSIA).

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- Long-term global aspirational goal (LTAG) for international aviation
- Environmental Trends – Emissions that affect global climate
- Technology Goals
- Technology Standards
- CORSIA
- Sustainable Aviation Fuels
- Operational measures
- State Action Plans
- Adaptation
- Financing
- Climate Neutral Initiative



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ICAO Work on Climate Change Adaptation

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In response to A38-18 (2013):

- ICAO began investigating the effects of climate adaption
- The Secretariat supported the initiative by the ICAO Joint Support Committee to examine potential impacts of climate change on aviation navigation services over the North Atlantic
- The Secretariat worked with Member States to develop the scoping study report
- Impact and Science Group (ISG) of Committee on Aviation Environmental Protection (CAEP) reviewed the scoping study report
- In 2016, it was decided to CAEP would conduct the necessary research and get an understanding of the environmental impacts of climate adaptation



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ICAO Work on Climate Change Adaptation

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Update to the Airport Planning Manual, Part 2 (ICAO DOC 9184):

- During the CAEP/9 cycle (2010-2013), Committee on Aviation Environmental Protection (CAEP) updated the Airport Planning Manual, Part 2
- The update included elements on eco-friendly airport planning and best practices in land-use planning and management
- During the CAEP/10 cycle (2013-2016) the group tasked to conduct the full review of the document
- Three new Chapters added:
 - Chapter 4 on "Infrastructure for Environmental Management"
 - Chapter 8 on "Heritage Considerations" and
 - Chapter 9 on "Climate Change Resilience and Adaptation"
- In addition to new Chapters, the manual was updated to include revisions throughout the document, in particular
 - Appendix 2 "Cases of Effective Land Use Management Around Airports" and
 - Appendix 3 "Fact Sheets on land-use planning measures related to airports"



ICAO Climate Adaptation Synthesis Report (2018)

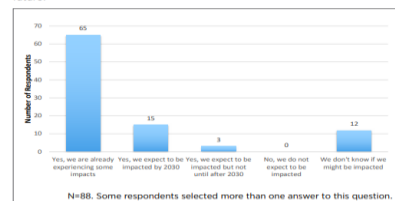
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In response to A39-2 (2016):

- ICAO Climate Adaptation Synthesis Report, developed by CAEP, synthesizing existing information on the range of projected climate impacts on the aviation sector to better understand risks for:
 - **airports, air navigation service providers (ANSPs), airlines, and other aviation infrastructure**
- Survey conducted to gather input from States and aviation organizations (**65 out of 88 responses survey respondents are already experiencing climate change**)
- The impacts which most respondents expect to be the biggest challenges were:
 - **increased intensity of storms (42 respondents),**
 - **changing precipitation (38 respondents), and**
 - **higher average and extreme temperatures (35 respondents)**



FIGURE 1: Q1 - Do you expect to be impacted by climate change now or in the future?



Climate Resilient Airports (2018) – Eco Airport Toolkit

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Contents include:

- Industry Recommendations;
- Resilience Planning;
- Reporting and Communications;
- Stakeholder Engagement;
- Combining Mitigation with Adaptation; and
- Some Available Resources Examples of Action



ECO AIRPORT TOOLKIT E-COLLECTION

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International airports are the backbone of international civil aviation. In the context of air traffic growth, airports are key players in ensuring that the sector's growth is environmentally-friendly.

The objective of the **Eco-Airport Toolkit e-collection** is to provide practical and ready-to-use information to support the development of airport infrastructure projects. The themes of the publications are chosen based on immediate operational needs of States. Each publication focuses on a specific aspect of environmental planning at airports.

With this e-collection, ICAO wishes to equip States with practical information on key aspects of airport planning and design and to present concrete options they may choose to use. The "**Eco-Airport Toolkit e-collection**" is a new tool for States to take informed decisions when financing a new airport infrastructure project or environmental management enhancement programmes.



[Addressing Single-Use Plastics: an Overview for Aviation](#)

[Unmanned Aircraft Operations](#)

[Innovation and Technology in Airport Sustainability 2023](#)

[GHG Management and Mitigation at Airports](#)

[Sustainable Considerations for Airport Surface Areas](#)

[Air Quality Management at Airports](#)

[Climate Resilient Airports](#)

[Water Management at Airports](#)

ICAO Environmental Reports (2016, 2019, 2022)

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- Dedicated chapter on Climate Change Adaptation & Resilience

- ICAO Work on climate adaptation
- Articles, good practices, lessons learned from aviation stakeholders



ICAO

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ICAO Guidance on Climate Risk Assessment, Adaptation and Resilience (2022)

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In response to A40-18 (2019):

- ICAO Guidance on Climate Risk Assessment, Adaptation and Resilience developed by CAEP
- Three interconnected but standalone documents
- Guidance material on risk assessment and adaptation and resilience planning:
 - Includes step-by-step process to carry out a climate change risk assessment and develop and implement a climate change adaptation plan
 - Includes key climate change vulnerabilities for aviation organizations, and
 - Provides menu of adaptation options
- Free of charge on ICAO web-site



ICAO

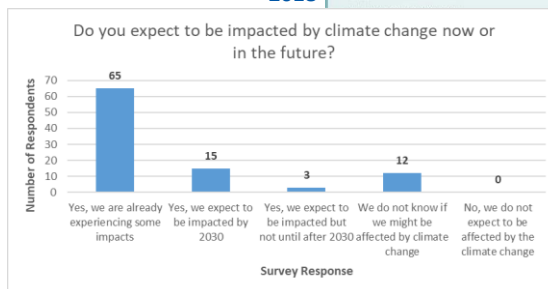
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Examples of climate impacts and effects on airports:

The table adapted from ICAO Guidance on Climate Risk Assessment, Adaptation and Resilience

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- CAEP WG2 on Airport and Operations
 - Updating the Climate Adaptation Synthesis Report (2018) including re-running the Stakeholder survey
- Preliminary Results Preview
 - Over 250 responses to online survey



ICAO Cooperation with Other Organizations

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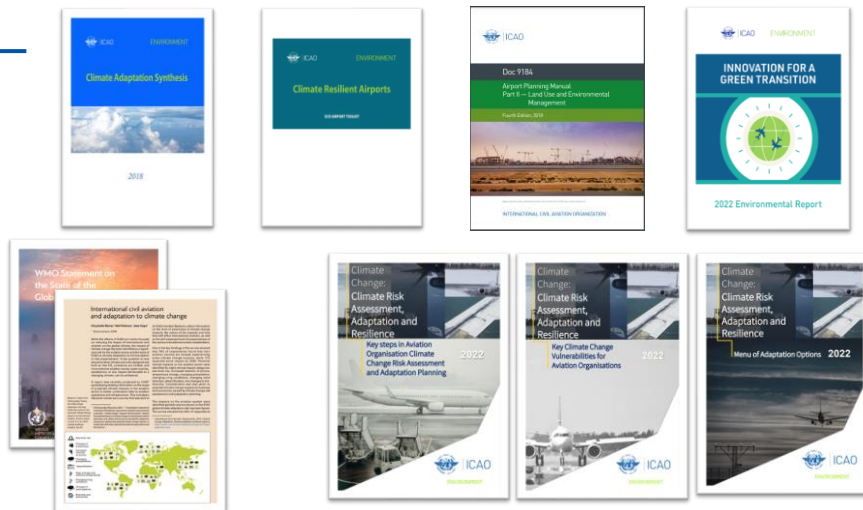
Sand and Dust Storms

- United Nations Convention to Combat Desertification (UNCCD)
 - working in a coalition of 19 Members
 - provide and build the knowledge pool and expertise on the topic
- UN Sand and Dust Storm (SDS) Coalition
 - established in response to the United Nations General Assembly resolution in 2017
 - goal of improving monitoring and response to these storms
 - joint research and monitoring, capacity building, policy development, disaster planning, and sustainable land management measures



ICAO Work on Climate Change Adaptation

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ICAO Climate Change Adaptation WEBSITE

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

Mrs. Deniz Kaymak - Associate Environment Officer, ICAO

The Regional Aviation Safety Group – Pan America (RASG-PA) was established in November 2008 to use the framework provided by the ICAO Global Aviation Safety Plan (GASP) and the Global Aviation Safety Roadmap (GASR) to support the establishment and operation of a performance based aviation safety system in the Pan American Region.

RASG-PA supports implementation of the ICAO GASP and complies with ICAO Council approval of Regional Aviation Safety Groups (RASGs) with the objective to address global aviation safety matters from a regional perspective. Further, the RASG-PA supports the NACC and SAM Regions in establishing objectives, priorities, indicators and the setting of measurable targets to address safety-related deficiencies in each region while ensuring consistency of action and coordination of efforts.

RASG-PA serves as regional cooperative for integrating global, regional, national, and industry efforts in continuing to enhance aviation safety in the Region. RASG-PA eliminates duplication of effort through the establishment of cooperative regional safety initiatives and activities. This coordinated approach significantly reduces both financial and human resource burdens on States and allows for the delivery of measurable safety improvements.



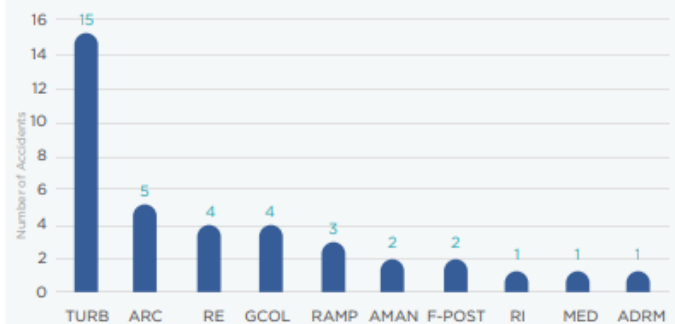
Severe weather In 2022, for the 5th consecutive year, the most common category of accidents in the region was Turbulence. In the last year, this type of event represented 43% of all registered accidents. Although there have not yet been fatalities under this category, in all the 15 turbulence-related accidents that occurred in 2022, serious injuries were recorded among the occupants. There is preliminary evidence to suggest that severe weather events have increased in frequency and intensity over time.



Accidents by Category

Turbulence continues to be the main accident category for the fifth consecutive year, however there have been no fatalities under this category.

AMAN Abrupt maneuver
ARC Abnormal runway contact
ARDM Aerodrome
F-POST Fire/smoke (post-impact)
GCOL Ground collision
MED Medical
RAMP Ground handling
RE Runway excursion
RI Runway incursion
TURB Turbulence encounter



Turbulence is caused by the relative movement of disturbed air through which an aircraft is flying. Its origin may be thermal or mechanical and it may occur either within or clear of cloud.

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In-flight turbulence is the leading cause of in-flight injuries to passengers and crew members. There have been accidents and incidents over the years involving clear air turbulence that resulted in serious injuries and fatalities to passengers and crew members.

Support on establishing procedures regarding turbulence management includes crew coordination and communication, as well as the performance of safety and service-related duties by crew during turbulence or when turbulence is expected.

Turbulence types and intensities -> awareness, prevention and preparedness



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International Civil Aviation Organization
Regional Aviation Safety Group – Pan America

RASG-PA/13 Plenary Meeting

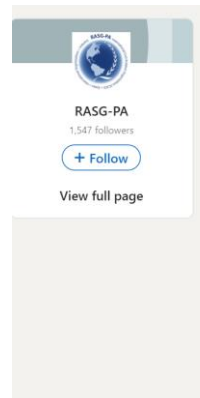
13 & 14 November 2023 – Santo Domingo, Dominican Republic

Day 1 – Monday, 13 November 2023

RASG-PA Safety Day – Turbulence

A Day of Discovery: One Day, Eight Minds, Infinite Learning!

Time	Presentation	Organization
08:00 – 08:30	Registration	
08:30 – 08:45	Opening remarks	ICAO
08:45 – 09:15	What does the data tell us about turbulence?	Gerardo Hueto IATA
09:15 – 09:45	Turbulence case study	Cap. German Diaz Barriga Aeromexico
09:45 – 10:15	How can Collaborative Safety Teams foster turbulence data sharing	Cap. Renan Frota AZUL/BCAST
Coffee Break		
10:45 – 11:15	Navigating turbulence safely	Cap. John DeLeeuw American Airlines
11:15 – 11:45	Turbulence Trend Analysis with Robotic Process Automation	Capt. Kang Won Bae Korean Air
11:45 – 12:15	Effects of climate change in turbulence	Paul D. Williams University of Reading
Lunch Break		
13:30 – 14:00	Preventing Turbulence-Related Injuries	TBD NTSB
14:00 – 14:30	Contributing factors to turbulence related accidents	Julian Echeverry DIACC Colombia
14:30 – 15:00	Panel Discussion	All presenters
15:00 – 15:15	Closing remarks	RASG-PA – Cochairs



RASG-PA
1,547 followers
1mo •

Be careful with turbulence! Our priority is to work together to strengthen aviation safety in the region. RASG-PA has available a Turbulence Toolbox that contains a collection of tools that can help you develop your own mitigation mechanisms. Whether you are a Civil Aviation Authority, Airline or Air Navigation Service Provider, follow this link to access the toolbox: <https://lnkd.in/e66rx3ev>

Sections **WSJ**

NIKKEI -1.17% ▼ STOX EURO 600 -0.42% ▼ S&P 500 FUTURES



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Rhea Hanrahan- HMMH

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AGENDA

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Aviation Safety Campaign & Workshop Collaborating for Effective Disaster Response and Preparedness

Session 2: Planning for and Assessing the Risks of Environmental Changes

Rhea Hanrahan, HMMH

July 16, 2024



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Presentation Overview



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About HMMH

- HMMH is an international leader in environmental and transportation planning including:
 - Sustainability and renewable energy
 - Air quality analysis
 - Airport and airspace planning
 - Noise and vibration control
- Founded in 1981, Women-Owned Business
- Aviation, Surface Transportation and Governmental clients
- Over 200 airports served



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HMMH Sustainability & Resilience Capabilities



- Comprehensive Sustainability Planning
- Carbon Accounting, Reporting, & Net Zero Roadmaps
- Infrastructure Resilience
- Sustainability Rating Systems
- Social Sustainability, Quality of Life
- Stakeholder and Community Engagement
- Renewable Energy
- Waste Management
- Noise and Air Quality Measurement, Modeling and Analysis



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Climate Change Hazards Posing Risks to Airport Operations



- Rising temperatures
 - Degraded runways and equipment
 - Increased energy costs for cooling
 - Increased fire risk
 - Ground subsidence, instability of permafrost
- Extreme winter freezes
 - Increased or new de-icing needs, perhaps in areas not accustomed to snow and ice
 - Increased energy costs for heating
- Severe storms (rain, wind)
 - Damage or delays due to high winds, heavy rain
 - Increased or new flooding
- Rising sea levels
 - Flooding of airport roads and runways
 - Storm surge causing floods or damaging facilities
 - Liquefaction in areas built on landfill: ground subsidence and instability
- Desertification or drought
 - Degraded runways and roads due to soil erosion
 - Increased flood risk during rain
- Ecological changes
 - New wildlife hazards due to migration changes

*Diagram of climate change risks to airports is from "Climate risks and adaptation practices for the Canadian transportation sector 2016"



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Fundamentals of Risk Assessment and Resilience Planning



- Conduct risk and resilience analysis to mitigate impacts of environmental changes
 - Conduct vulnerability assessment to determine hazards potentially affecting airport operations
 - Conduct risk and resilience planning to prepare for severe events and long-term environmental changes
- Coordinate with stakeholders to prepare for acute hazards such as weather events
 - Work with local businesses to prepare for managing stranded passengers
 - Discuss peak energy needs for disaster response with utility providers
- Consider airport's potential role in community as emergency shelter
 - Impact on airport operations and resources



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Introduction to Envision

“The purpose of Envision is to foster the dramatic and necessary improvement in the sustainable performance and resiliency of physical infrastructure”



Energy

Distribution
Hydroelectric
Coal
Natural Gas
Wind
Solar
Biomass



Water

Treatment
Distribution
Capture / Storage
Stormwater
Flood Control
Nutrient Management



Waste

Solid waste
Recycling
Hazardous
Waste
Collection & Transfer



Transportation

Airports
Roads / Highways
Bikes / Pedestrians
Railways
Transit
Ports
Waterways



Landscape

Public Realm
Parks
Ecosystem Services
Natural Infrastructure
Environmental Remediation



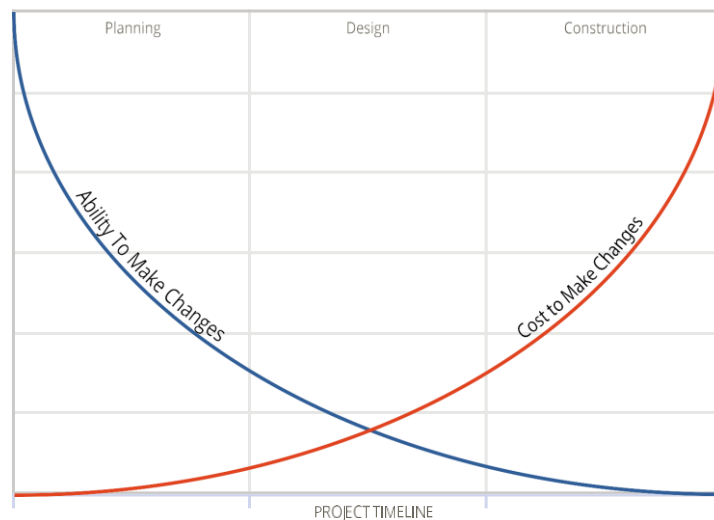
Information

Telecom
Cables
Internet
Phones
Data Centers
Sensors



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Envision to Enhance Resiliency Early in Planning Process



Source: ISI



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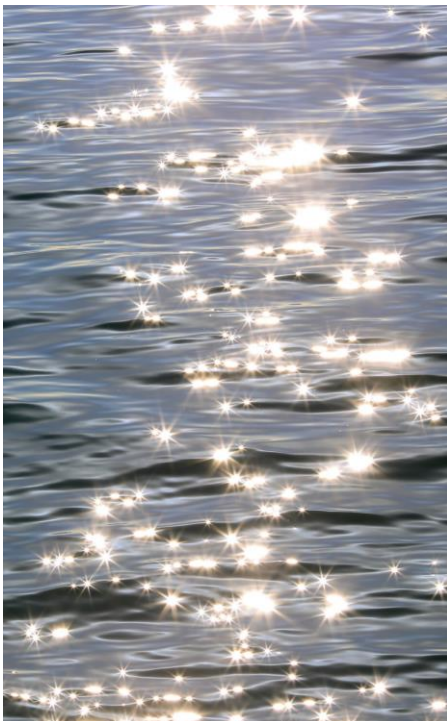


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Source: ISI



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Envision Climate and Resilience Category

- This category focuses on minimizing a project's contributions to climate change through emissions reductions, and ensuring projects are resilient to natural hazards and man-made threats
- Resilient infrastructure planning:
 - Reduces short- and long-term risks, vulnerabilities
 - Natural hazards, shifting climate patterns
 - Considers full project lifecycle and impacts
 - Enables reuse, upcycling of materials & equipment
 - Maximizes infrastructure durability and flexibility
 - Integrates infrastructure into surrounding systems
 - Anticipates long-term needs of community



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Envision Climate & Resilience Credits



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EMISSIONS

- CR 1.1 Reduce Net Embodied Carbon
- CR 1.2 Reduce Greenhouse Gas Emissions
- CR 1.3 Reduce Air Pollutant Emissions

RESILIENCE

- CR 2.1 Avoid Unsuitable Development
- CR 2.2 Assess Climate Change Vulnerability
- CR 2.3 Evaluate Risk & Resilience
- CR 2.4 Establish Resilience Goals & Strategies
- CR 2.5 Maximize Resilience
- CR 2.6 Improve Infrastructure Integration



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CLIMATE AND RESILIENCE: RESILIENCE

CR2.1 Avoid Unsuitable Development

16

POINTS

INTENT

Minimize or avoid development on sites prone to hazards.

METRIC

The degree to which the project is designed and/or sited to avoid or mitigate site-related risks.

LEVELS OF ACHIEVEMENT

IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
A + B	A + B + C	A + B + C + D	A + B + C + E	A + B + C + F
(3) Alternative Assessment	(6) Risk Mitigation	(8) Lowest Risk Alternative	(12) Unsuitable Development Avoided	(16) Strategic Retreat

- Credit assesses how project siting can reduce risk and improve resilience by:
 - Identifying hazards
 - Evaluating alternatives
 - Avoiding hazards
- Mitigating hazards, choose lowest risk alternative
- Removing existing infrastructure on unsuitable sites



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CLIMATE AND RESILIENCE: RESILIENCE

CR2.2 Assess Climate Change Vulnerability

20
POINTS

INTENT

Develop a comprehensive climate change vulnerability assessment.

METRIC

Scope and comprehensiveness of climate change vulnerability assessment.

LEVELS OF ACHIEVEMENT

IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
A + B	A + B + C	A + B + C + D	A + B + C + D + E	Not Available
(8) Project Vulnerability	(14) System Vulnerability	(18) Community Vulnerability	(20) Knowledge Sharing	

- Credit focuses on understanding of potential climate change impacts.
- Identify climate change threats and determine project vulnerabilities
- Assess threats to and vulnerabilities of the integrated system
- Assess threats to and vulnerabilities of the broader community
- Share findings with stakeholders
- This credit overlaps with CR 2.3



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CLIMATE AND RESILIENCE: RESILIENCE

CR2.3 Evaluate Risk and Resilience

26
POINTS

INTENT

Conduct a comprehensive, multihazard risk and resilience evaluation.

METRIC

Scope and comprehensiveness of the multihazard risk and resilience evaluation.

LEVELS OF ACHIEVEMENT

IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
A + B + C + D + E	A + B + C + D + E	A + B + C + D + E	A + B + C + D + E + F	NOT AVAILABLE
(11) Project Evaluation	(18) System Evaluation	(24) Community Evaluation	(26) Integrated and Inclusive Approach	

- Similar but expands on CR 2.2. In CR 2.3, project teams complete a comprehensive risk evaluation to understand potential hazards/threats and the project's vulnerability
- Examine acute (short-term/low predictability) shocks and chronic stressors (long-term / more predictable)
- Identify vulnerabilities and evaluate risk
- Include wide range of stakeholders



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CLIMATE AND RESILIENCE: RESILIENCE

CR2.4 Establish Resilience Goals and Strategies

20
POINTS

INTENT

To support increased project and community resilience through the establishment of clear objectives and goals.

METRIC

The degree to which resilience goals expand from initial commitments to quantifiable project objectives, long-term operating plans, and community-wide development plans.

LEVELS OF ACHIEVEMENT

IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
Not Available	A + B	A + B + C	A + B + C + D	Not Available

- Risk assessment is a prerequisite to identify appropriate goals and strategies
- Identify goals and risk tolerance
- Develop risk management strategies
- Include stakeholders in goal setting and strategy selection
- Consider broader community resilience goals and strategies in setting project



CLIMATE AND RESILIENCE: RESILIENCE

CR2.5 Maximize Resilience

26
POINTS

INTENT

Increase resilience, life-cycle system performance, and the ability to withstand hazards by maximizing durability.

METRIC

The degree to which the project incorporates elements that increase durability, the ability to withstand hazards, and extend useful life.

LEVELS OF ACHIEVEMENT

IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
A + B	A + B + C	A + B + C + D	A + B + C + D + E	Not Available
(11) Improved Resilience Performance	(15) Thorough Implementation	(20) Ongoing Resilience Monitoring	(26) Quantifying Improvement	

- This credit is focused on implementation of resilience and risk strategies
- A continuation of the prior Climate and Resilience credits
- Resilience strategies are effective to address project risks
- Project team reviews effectiveness of strategies throughout project delivery
- Strategies address risk throughout project life-span





CR2.6 Improve Infrastructure Integration

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POINTS

INTENT

Enhance the operational relationships and strengthen the functional integration of the project into connected, efficient, and diverse infrastructure systems.

METRIC

The degree to which the project is integrated into other connected systems, where beneficial and appropriate, in order to increase resilience and systems performance.

LEVELS OF ACHIEVEMENT

IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
A	A + B	A + B + C	A + B + C + D	A + B + C + D + E
(2) Internal Integration	(5) Risk Reduction	(9) Systems Integration	(13) Community/ Network Integration	(18) Information Integration

- This credit is all about connected nature of infrastructure and systems thinking
- Encourages project teams to address internal and external system integration
- Encourages use of data and monitoring systems to monitor and improve performance



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Detroit Metropolitan
Airport: Reconstruction
of 3L/21R and Taxiways –
2019 Envision Gold



Project description:

- \$180 million project
- Original facilities from 1950s
- Geometry updated to current design standards
- Decommissioned pavement was removed
- Improve safety and operational flow

Highlighted Sustainability Elements:

Safety:

- Earthen berm added as visual screen between taxiing and departing aircraft

Systems Design

- Sustainability charette held at onset of design with wide range of stakeholders with continued engagement throughout process
- Sustainable construction practices were incorporated into bid packages

Resiliency

- Underdrains installed beneath pavement base to reduce moisture accumulation as response to increased freeze/thaw cycles

Materials

- Excavated materials reused on site diverting 90% of waste from landfill
- 90% of materials came from local/regional area



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Tampa International Airport – Master Plan Update Phase 1*



TPA's Master Plan Incorporated Several Resiliency Elements

- Conducted a Vulnerability Assessment (CR 2.2 and 2.3)
 - Developed a Resilience Action Plan
 - Updated model for storm surge and flooding
 - Staff extreme heat assessment
 - Conducted Storm Surge Asset Vulnerability Assessment
 - CIP Planning: Storm Surge Protection
- Shared results of assessment and plans with broader community

**Project details from TPA Airport provided on Envision webinar 3/7/24*



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Penn Station Reconstruction: Pursuing Envision Gold



Penn Station Reconstruction Incorporating Envision Resiliency Elements

- Resilience and Risk Analysis (CR 2.1, 2.3, 2.4)
 - Plan will identify hazards, evaluate risk and resilience
- Sustainability Management Plan, Lifecycle Cost Analysis (CR 2.5)
 - Strategies to maximize resilience over the long-term
- GHG Reduction Analysis; Embodied Carbon Analysis (CR 1.1, 1.2)
 - Addresses complement of resilience: reduces contribution to climate change
- Stakeholder workshop between station, design team (CR 2.2, 2.3, 2.6)
 - Provides opportunities to share findings with stakeholders
 - Encourages system integration



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Massport Pursuing Envision Certification for Runway 15R-33L



Massport Runway 15R-33L is located in highly flood-prone area

- 2014: Conducted Disaster and Infrastructure Resiliency Planning Study
 - Climate hazard analyses (CR 2.2)
 - Vulnerability assessments for critical infrastructure (CR 2.2)
 - Resiliency recommendations for capital improvements, programming (CR 2.4)
- 2018: Developed Sustainability & Resiliency Design Standards & Guidelines
 - Sets minimum standards for all new construction and rehabilitation projects to ensure long-term sustainability (CR 2.5)
- Past resiliency planning work will enable Massport to apply for Envision credits for new runway rehabilitation project



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Opportunities to Use Envision for Resilience Planning



- Airports can use Envision guidance and receive credits for vulnerability assessments and climate resilience projects related to a wide range of hazards:
 - Power disruptions due to weather impacts on energy grid
 - Indianapolis building a solar-power, battery-storage energy system to provide backup power
 - Philadelphia installed microgrids to reduce dependence on the grid
 - Flooding due to sea level rise, storm surge, and extreme weather events
 - SFO's shoreline protection program will reinforce natural shoreline against erosion and flooding to a level sufficient to remove SFO from FEMA's mapped Special Flood Hazard Area



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Resources

- [Envision Resources](#)
- [Envision For Airports Brief](#)
- [Airport Cooperative Research Program Report 147: Climate Change Adaptation Planning](#)



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Thank you!

Rhea Hanrahan, Director, Aviation Environmental & Sustainability
HMMH

ghanrahan@hmmh.com



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Mitch Otey - FAA

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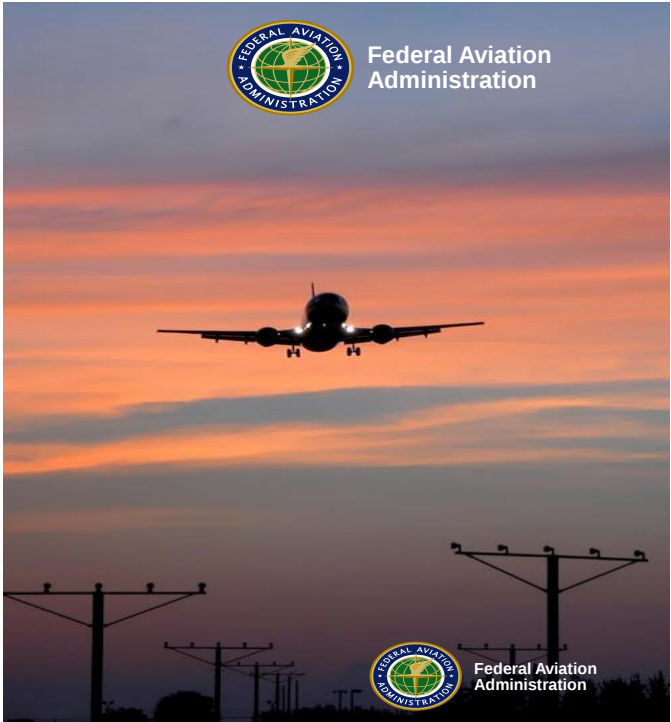
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INTERNATIONAL**
LATIN AMERICA CARIBBEAN



AGENDA

FAA Recovery And Resilience Efforts

Mitchell Otey
Environmental Protection Specialist
Federal Aviation Administration
Office of Environment and Energy



Agenda

- **Introduction**
- **Key Regulatory and Policy Drivers**
- **Example Recovery/Resiliency Projects**
- **Vulnerability Assessments**
 - FAA Air Traffic Organization (Air Navigation Service Provider)
 - FAA Office of Airports - Airport Resiliency Analysis Framework
- **FAA Research**
- **International Collaboration**



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Introduction

- **FAA**
 - 5 Lines of Business
 - 9 Staff Offices
- **Office of Policy, International Affairs & Environment**
- **FAA's Office of Environment and Energy**
- **Environmental Policy Division**
 - Policy, Review & Outreach



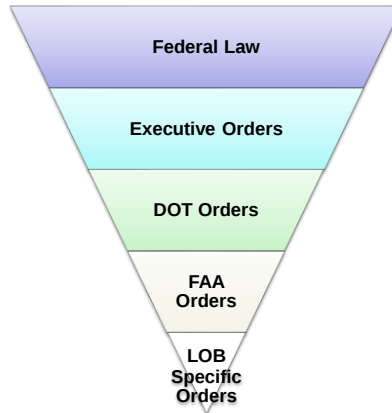
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AEE Functions and Example Internal Efforts

- **Policy**
 - “Energy Management at FAA Facilities”
- **Review**
 - Annual Energy Report
- **Outreach**
 - Monthly sustainability workgroup meetings
 - Awards



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Key Regulatory and Policy Drivers

- **Executive Order (EO) 14008:**
 - Signed by President Biden on 01/07/2021
 - Required all federal agencies to:
 - complete vulnerability assessments on critical infrastructure
 - Submit annual plans and progress reports on bolstering efforts
- **Energy Independence and Security Act**
 - Requires agencies to:
 - increase use of renewable energy systems
 - Audit facilities every four years to identify energy/water reduction opportunities and implement life cycle cost effective measures



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Recovery and Resilience Projects

- **Hurricane Damage (repair and bolster costs):**
 - Harvey: \$17 million
 - Maria: \$5.3 million
 - Ida: \$93.2 million
- **FAA's Air Traffic Operation**
 - Dedicated project managers
 - Rapid hurricane response

Damaged Remote Transmitter/Receiver (RTR) in Galliano, Louisiana. Over 250 navigational facilities were impacted by Hurricane Ida.



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Vulnerability Assessments

- **EO 14008 requires a proactive approach**
- **Vulnerability Assessment:**
 - Identify mission critical infrastructure (FAA facilities only)
 - Expected effects from climate change
 - How those effects will impact the facility
- **FAA uses the Comprehensive Hazard Evaluation and Risk (CHER) Assessment**
 - CHER uses the U.S. Global Change Research Program's *National Climate Assessment*
- **Updates on assessments and projects required to be captured in the DOT Climate Action Plan for Resilience, October 2021 (updated annually)**
- **FAA's Office of Airport is developing similar guidance and assessment for airports (discussed on slide 10)**



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CHER (Example)

Select Group name below:			Dependency on Focus Area				
Group	Operational Asset	Criticality to Agency Mission	Energy	Water	Transportation	IT/Communications	Other
ABC TRACON	Building	Medium Criticality	Very High Dependency	High Dependency	High Dependency	Very High Dependency	High Dependency

Facility Representative assigns dependency values on each infrastructure class.

		Vulnerability of Focus Area				
Group	Hazard	Energy	Water	Transportation	IT/Communications	Other
ABC TRACON	Drought	Low Vulnerability	Low Vulnerability	Low Vulnerability	Low Vulnerability	Medium Vulnerability

CHER populates vulnerability score for each class based on NCA/FEMA database.

Asset-Level Risk Scores		
Group	Operational Assets	Climate and Natural Hazard Risk
		Risk Value Risk Level
ABC TRACON	Building	30.7 Intermediate Risk

Aggregate vulnerability score calculated based on weighted average.

This slide demonstrates an example fictitious facility and does not provide data for real FAA assets.



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Results Used to Drive Projects



Drainage project completed at a facility along the gulf coast.



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FAA's Energy Efficiency Efforts

- The most resilient energy is the energy you don't use.
- Sustainable Tower Initiative
 - All-Electric
 - Thermally efficient façade
 - Recycled steel and metal products
 - Renewable mass timber
 - Ground source heating and cooling



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Airport Resiliency Analysis Framework (ARAF)

- Maintain operations during events
- Speed recovery efforts following disruptions
- Maximize capacity and prevent cancelations
- Reduce repair and replacement costs
- Increase infrastructure life
- Ensure energy flow to airports



Construction of a 3 million-gallon cistern at San Diego International Airport

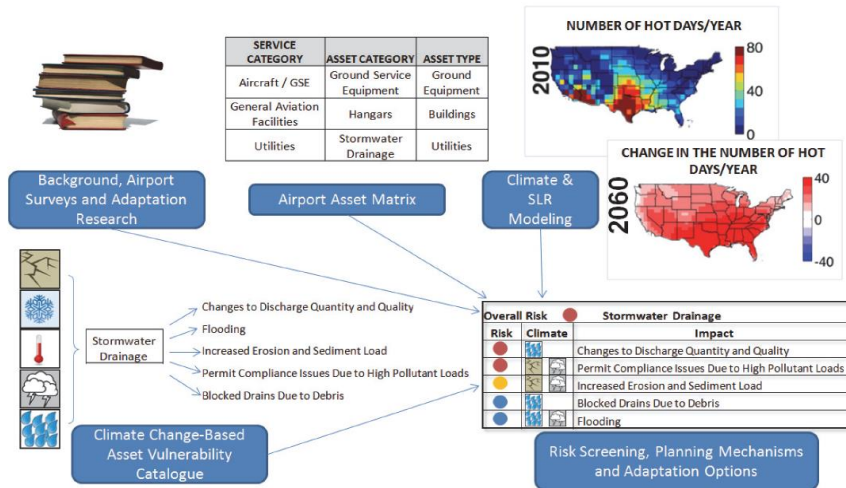


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ARAF cont.

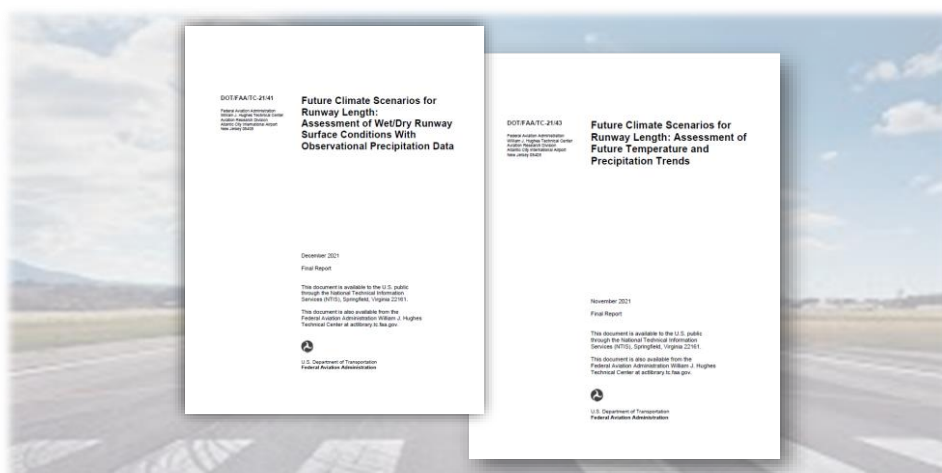


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FAA Research: FAA Climate Inputs for Runway Length



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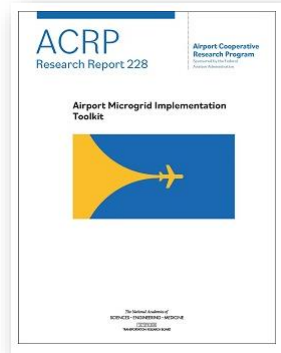
66

66

FAA Supported Research: Microgrid Toolkit

Airport Cooperative Research Program (ACRP): Airport Microgrid Implementation Toolkit

- **Power disruptions lead to:**
 - Flight delays
 - Extended layovers
 - Cargo disruptions
 - Loss of revenue
 - Lack of emergency support
- **Toolkit provides:**
 - Reference materials
 - Online tool to analyze feasibility of microgrid



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International Collaboration

- ICAO CAEP: Climate Adaptation Synthesis
- First published in 2018
- Conducted survey of member States on climate threats to airports and aviation
- Findings from North America/Caribbean, 3 primary concerns:



- Increased intensity of storms
- Higher than average and extreme temps
- Sea level rise
- **Current CAEP cycle includes updating**
 - Initial results indicate a more balanced concern across categories including the 3 listed above and:
 - Changes in precipitation
 - Sea level rise
 - Changes in wind
 - Changes in biodiversity



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Resources

Airport Cooperative Research Program

Airport Microgrid Implementation Toolkit

<https://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4431>

ACRP Research Report 199: Climate Resilience and Benefit-Cost Analysis: A Handbook for Airports

<https://crp.trb.org/acrpwebresource2/climate-resilience-and-benefit-cost-analysis-a-handbook-for-airports/>

FAA

Airport Master Plans Advisory Circular

https://www.faa.gov/airports/resources/advisory_circulars/index.cfm/go/document.current/documentnumber/150_5070-6

Future Climate Scenarios for Runway Length: Assessment of Future Temperature and Precipitation Trends

<https://www.airporttech.tc.faa.gov/Products/Airport-Safety-Papers-Publications/Airport-Safety-Detail/future-climate-scenarios-for-runway-length-assessment-of-future-temperature-and-precipitation-trends>

Future Climate Scenarios for Runway Length: Assessment of Wet/Dry Runway Surface Conditions with Observational Precipitation Data

<https://www.airporttech.tc.faa.gov/Products/Airport-Safety-Papers-Publications/Airport-Safety-Detail/future-climate-scenarios-for-runway-length-assessment-of-wetdry-runway-surface-conditions-with-observational-precipitation-data>

Sustainable Tower Design Initiative

<https://www.faa.gov/tower-design>

International Civil Aviation Organization – Committee of Aviation Environmental Protection

Climate Adaptation Synthesis Report

<https://www.icao.int/environmental-protection/Pages/Climate-Adaptation.aspx>



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Questions?

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202-267-6581



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Mario Sibrian - WFP

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THE AFTER-ACTION REVIEW APPROACH





World Food
Programme

SAVING
LIVES
CHANGING
LIVES

Miami Safety Campaign & Workshop: "Collaborating for effective Disaster Response and Preparedness"

Miami, USA | 16-18 July 2024

Mario Sibrian Chief Aviation Safety Unit

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The United Nations World Food Programme (WFP)

- WFP is the largest humanitarian organization, saving and changing lives worldwide through its numerous activities. It has a presence in over 120 countries and territories.
- At the core of WFP's Ops is the WFP Supply Chain Division, where the WFP aviation sits.
- One of the services provided by the WFP Aviation Service is the UN Humanitarian Air Service – a common service not exclusive to WFP, but designed to benefit the entire aid community UN/NGO/Donor organizations.



World Food Programme

SAVING
LIVES
CHANGING
LIVES

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WFP Aviation

Vision and Objectives



Provide aviation services

Common services
(United Nations Humanitarian Air Service - UNHAS);

On-demand and Specialized services
for humanitarian and development organizations;



Act as a facilitator in humanitarian response

Promote collaboration between aviation and humanitarian stakeholders;

Ensure **systematic communication and coordination** among aviation and humanitarian actors.



Strengthen Aviation Systems and Capacity at the Regional and National Levels

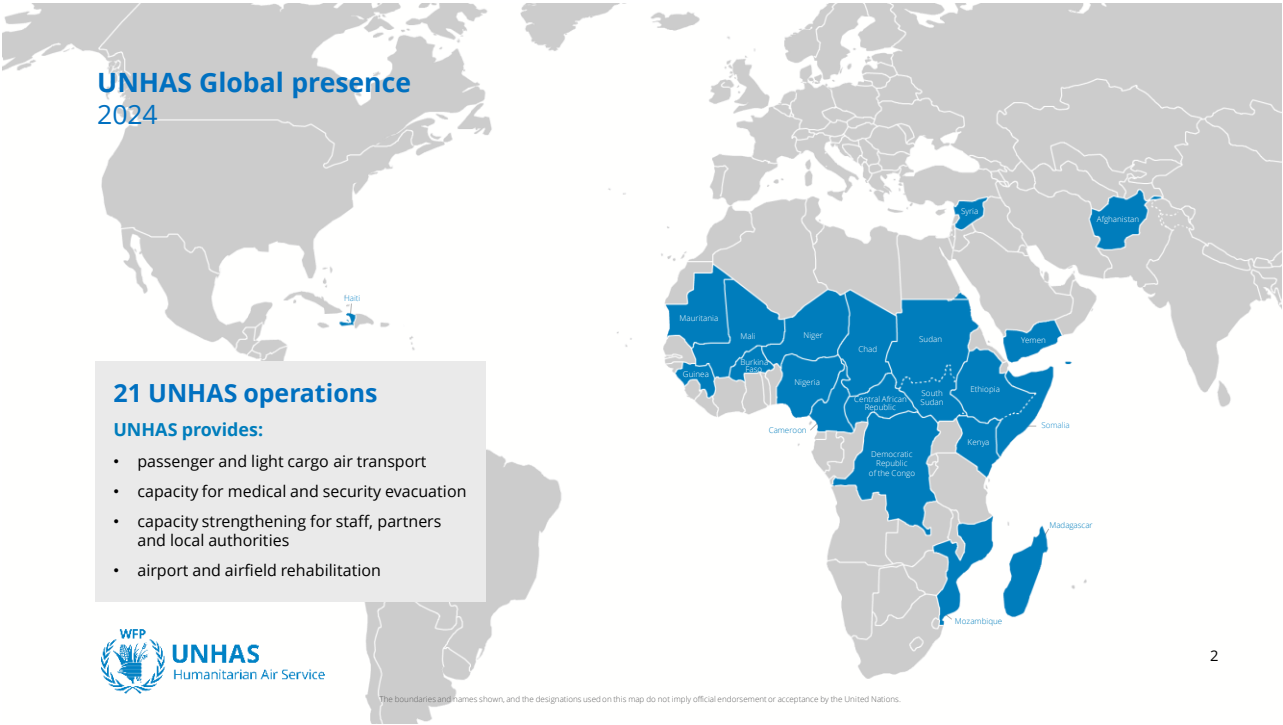
Collaborate with international aviation organizations and regulators;

Strengthen partnerships with humanitarian and development actors.

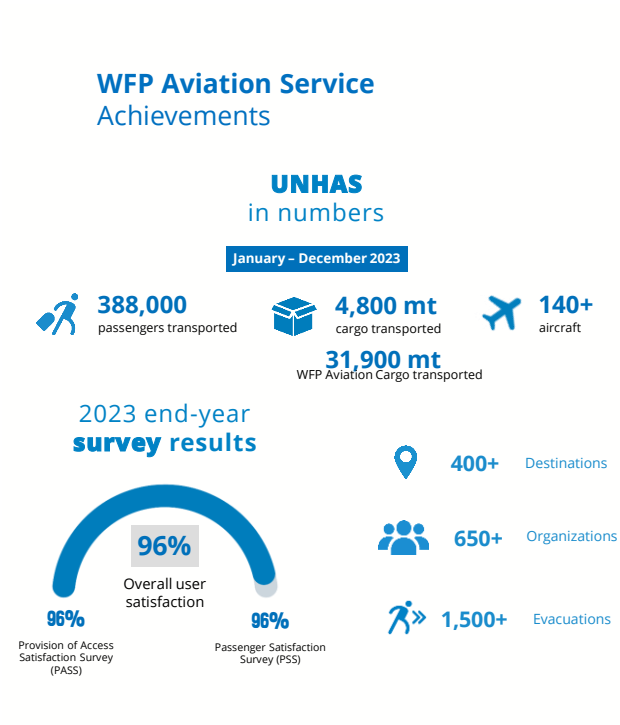


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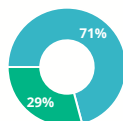
4

Contracted aircraft

124 aircraft

72 aircraft on MGH

52 aircraft on Standby/Ad hoc



51 fixed wing



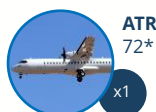
21 helicopters

STANDBY/AD-HOC AIRCRAFT LOCATION

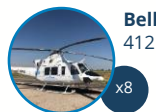
Kenya	29	B1900 / C-208B / DHC8 / DHC8-Q400 / Do228/ EMB120 / EMB135 / EMB145
South Africa	13	Bell 412 / Airbus AS332 / MBB-BK 117 / LET410 & 420 / B1900
Uganda	4	C208
Burkina Faso	2	DHC6
Germany	1	Bell 412
Mozambique	1	LET410
Mauritius	1	LET410
Canada	1	CRJ 200

as of 30 May 2024

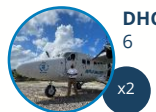
Currently, the WFP contracted fleet on long term agreements and standby / ad hoc is composed of **54% of aircraft powered by P&W engines**:



ATR
72*



Bell
412



DHC
6



Dornier
328



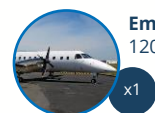
Beechcraft
1900



Cessna
C208 Caravan



DHC
8



Embraer
120

*ATR 42-500 will be permanently replaced by an ATR 72 in Afghanistan, pending WFP Aviation Safety Unit registration of ATR72. 5
ATR 42, ATR 72, AW139, B1900, Bell-412, Cessna 208 Caravan, Cessna Citation II Bravo, DHC-6, DHC-8, Do328, EMB-120 and Learjet-60 powered by Pratt & Whitney Canada engines are in the List of Registered Aircraft (LORA).

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WFP Aviation at the Frontline of Emergencies



**Public health
emergencies**

Ebola response in West Africa 2014 to 2016

UNHAS connected over 90 humanitarian organizations to 40 critical destinations from Dakar, Senegal to primarily affected countries (Guinea, Liberia and Sierra Leone).

COVID-19 response

As borders closed and commercial flights halted, aid organizations struggled to reach those in need. From May 2020 to May 2022, **UNHAS connected aid workers from 452 organizations and delivered 48.3 metric tons of relief items** to people in need across 68 countries.



**Climate related
disasters**

Haiti earthquake in 2010

In response, UNHAS launched a critical operation to transport humanitarian personnel, food, medicines and other relief items to areas cut off from ground access.



Indian Ocean earthquake and tsunami in 2004



**Conflict induced
crisis**

Ensuring access to vulnerable people who need life-saving assistance during an emergency can be challenging. Over the past years, an already complex situation as regards humanitarian access has become increasingly difficult.

Despite access constraints caused by conflict and insecurity, the **humanitarian and development communities were able to continue delivering assistance thanks to the air transport services** provided by WFP in **Burkina Faso, Democratic Republic of the Congo, Sudan, South Sudan and Yemen.**

3

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THE AFTER-ACTION REVIEW APPROACH

- Areas of review
- Review (5 review areas)
 - Staffing
 - Air Assets / Operations
 - Logistics Operations
 - Coordination
 - Systems, Tools and Equipment

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After Action Review Approach



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Review Areas

1. Staffing: Org. structure, deployment and Admin

2. Air Assets Selection

3. Aviation Ground Support

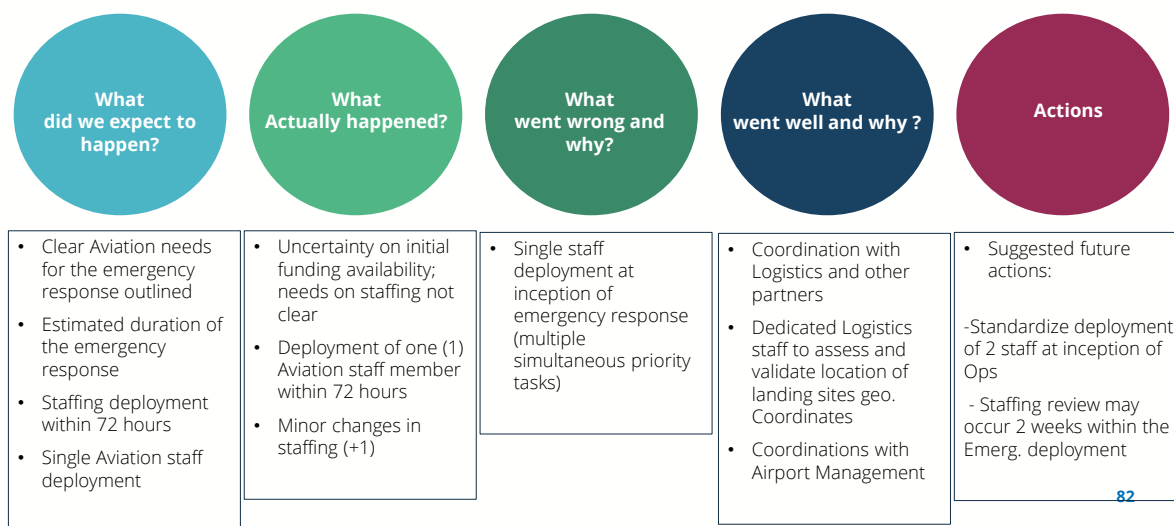
4. Coordination with: WFP, Govt., Partners

5. Systems, Tools and Equipment

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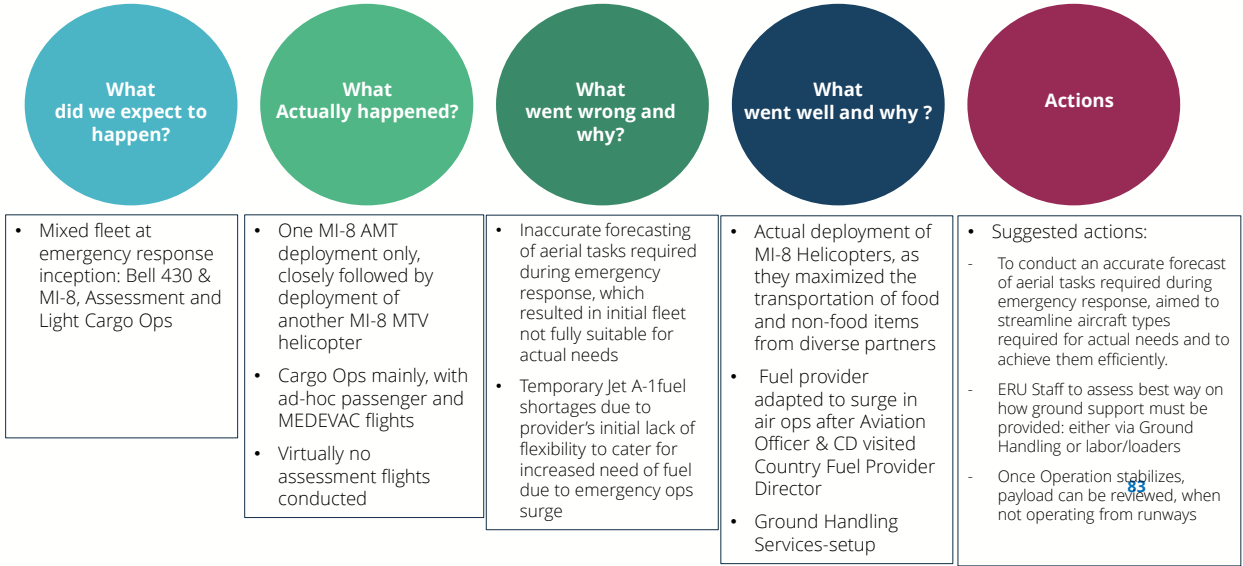
STAFFING



82

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AIR ASSETS SELECTION

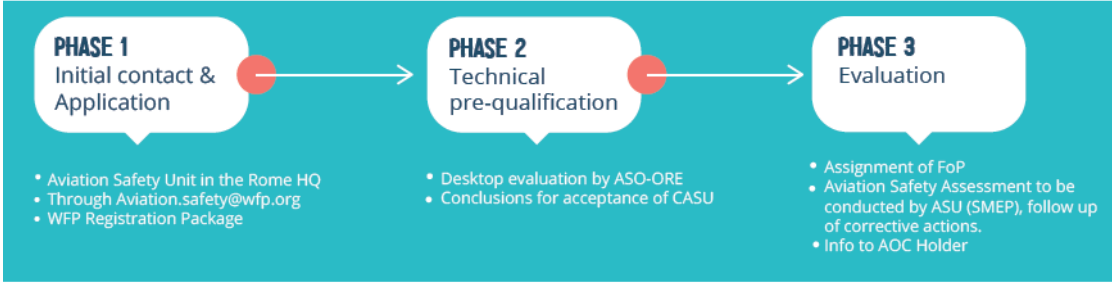


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OPERATOR REGISTRATION PROCESS

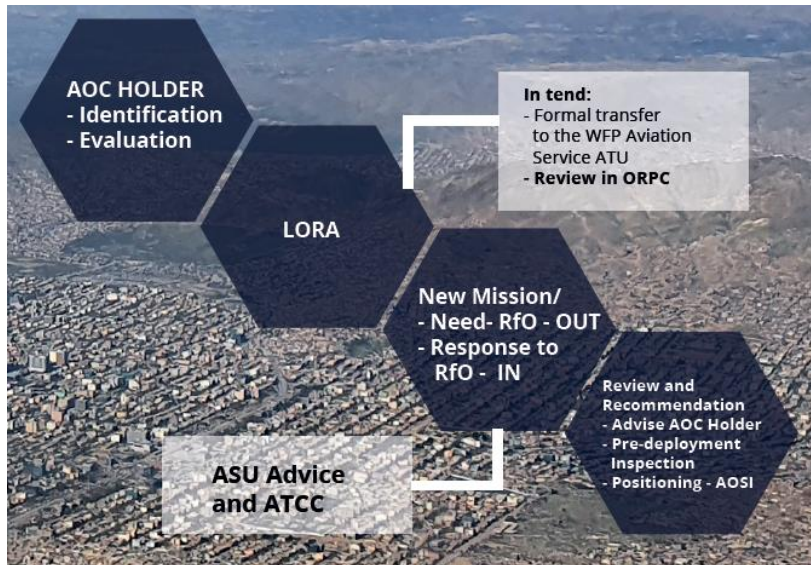


PHASES OF THE REGISTRATION



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OPERATOR CHARTERING PROCESS

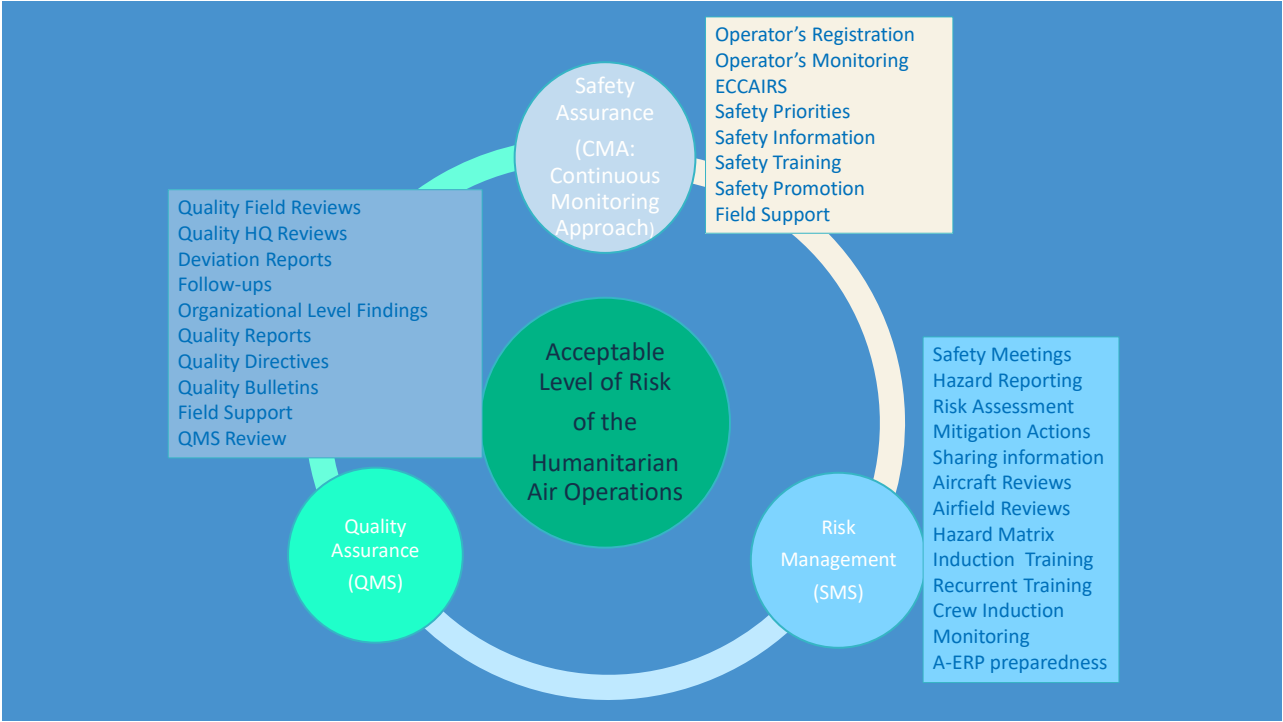


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SMILE: STD MONITOR & IMPLEMENTATION LEVEL EVALUATION OPERATORS RISK EVALUATIONS ASSESSMENT



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AVIATION GROUND SUPPORT

What did we expect to happen?	What Actually happened?	What went wrong and why?	What went well and why ?	Actions
• Movement of cargo and pax by air and ground • Search and Rescue • Multiple requests from diverse humanitarian entities and Host government	• Movement of cargo and pax by air, ground and water • Search and Rescue by air and water-boats, using Military helicopters and International entities boats • A single focal point (Head of Logistics) was assigned by Head of Supply Chain to consolidate requests and prioritize movements	• N/A	• Met expectations of DoDMA and Humanitarian partners • Assignment of dedicated Focal Point for approval of all cargo & pax requests • Assignment of dedicated focal point for processing cargo requests from external partners • Erection of warehouses at airport, with dedicated staff	• Suggested actions: - To standardize measures: dedicated Logistics focal point to consolidate and approve all requests (internal & external); dedicated staff to liaise with all requesters and control inventory for airlifting; erection of mobile storage units-MSU or warehouses at airport) - Prioritization of cargo must be done by non-Aviation WFP Staff, ideally Logistics - Establishment of Social Media Groups (Whatsapp) for Comms with different humanitarian actors for better coordination

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COORDINATION WITH WFP, GOVT., PARTNERS

What did we expect to happen?	What Actually happened?	What went wrong and why?	What went well and why ?	Actions
- Firm support of International Community - Continuous support from National Department of Disaster Management Affairs-DoDMA - Smooth coordinations with WFP CO & HQ	- Intl. Community contributed with funds for the emergency response, including helicopter operation - DoDMA actively benefitted from aerial assets for distribution of its food and NF items - Coordinations with WFP were effective and easy flow	- Initial expectation from DoDMA to request cargo movement at the last minute, without a plan. Lack of planning from their side, then Emerg. Avn. Ops Center was established; WFP explained the process, then DoDMA complied. - WFP Head of Supply Chain assigned a staff to coordinate requests from external partners	Expectations from several external entities were managed by the WFPM Focal Point (Head of Logistics) as he consolidated and prioritized all requests (cargo & pax)	- Continue replicating the filters by WFP for processing requests of external entities - WFP COs must continue assuring support in terms of provision of staff temporarily deploying to emergencies

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SYSTEMS, TOOLS & EQUIPMENT

What did we expect to happen?	What Actually happened?	What went wrong and why?	What went well and why ?	Actions
- TAKEFLITE Software full utilization - Booking Hub: full utilization - Flight Tracking System (APEX) APP utilization	- TakeFlite utilization as expected - Booking Hub: not utilized as main modality was cargo, AD-HOC passenger flights and MEDEVACS. - Flight Tracking System APP not working well; website based version used instead	Flight Tracking System APP not working well, as it constantly required Admin rights; website based version was used instead	Strong support from HQ Staff (Dusi & Dario) for processing CMRs and passenger manifests	- Procurement of Slot management software for future complex ops - Support of GIS Services in order to map all landing sites. Alternatively, Google Earth Pro can be used for that purpose - To enable the remote activation of the Booking Hub and obtain active support from its HQ based Staff

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DISCUSSION TOPICS

- The After-Action Review approach
- Areas of review
- Review (5 review areas)
 - Staffing
 - Air Assets / Operations
 - Logistics Operations
 - Coordination
 - Systems, Tools and Equipment

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THANK YOU



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NACC
HUMANITARIAN AVIATION CAMPAIGN



Steven Albritton - Miami Int. Airport

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WELCOME

MDAD HURRICANE PREPAREDNESS
AND RECOVERY – July 16, 2024

Steve Albritton, Chief
Facilities Management & Engineering Division

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KEY POINTS:

Drivers To A Successful Disaster Recovery

- **Identify Your Vulnerability**
 - For MIA Its Hurricanes. Hurricane Season–June 1st through November 30th
- **Preparation is Key- Planning must include all users and stakeholders**
- **Communications – Must be clear and unified**
- **Resources (People, Materials and Equipment) – Must be assured, affordable and appropriate to mitigate the risk**
- **Implementation -There must be a clear process to deploy the plan**
- **Apply Lessons Learned – (Continuous Improvement)**

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THE 3 PHASES OF HURRICANE PREPAREDNESS/RECOVERY

Phase 1	Phase 2	Phase 3
Prior To The Beginning of Every Hurricane Season	Impending Storm	Post-Storm
Initial Preparedness Procedures	Pre-Storm Preparedness	Damage Assessment/Recovery

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PHASE I – INITIAL PREPAREDNESS

Prior To The Beginning Of Every Hurricane Season

- Update Hurricane Manual
- Confirm County Emergency Operations Center Aviation Liaison
- Annual Video Taping and Aerials (For Risk Management)
- Notices/Memos To Staff and Airport Business Partners
 - Update Employee Contact
 - Hurricane Preparedness Policy and Call In Procedures
- FEMA Forms Training
- Identify Airport Safe Zones:
 - Staging Areas and Safe Zones for Storm Riders and Stranded Passengers
 - Inventory of Cots and Blanket
- Accommodations and Food for Storm Riders
- Debris Sweeps: Airside, Construction Sites, Garages, Lots and Roadways
- Emergency Power Check (All Generators)
- Establish Volunteer List:
 - Storm Riders: Alpha/Bravo
 - Charlie Team (Post Storm Damage)
- Coordinate with Airport Security Division, Airport Police, Airport Fire Rescue, CBP and TSA.

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PHASE 2 – IMPENDING STORM

Pre-Storm Preparedness

- Broadcast Information To Public and Business Partners
- Storm Riders Sent Home To Secure Personal Property
- Canal Water Levels are Verified
- Fuel Farm Check Conducted
- Debris Sweeps/Checks Are Conducted: Airside, Construction Sites, Roofs, Garages, Lots, Roadways & Perimeter
- Removal of Flags
- Secure Parking Garages, Roads and Perimeter
- Set Up Command Center
- As Flights Depart Passenger Loading Bridges are Retracted and Secured, Baskets Cleared of Debris and Stowed Prior to Storm
- Terminal Doors are Locked
- Doors are Sandbagged
- Windsocks are Removed
- MIA Mover and Skytrain – Shut Down at 35 MPH Sustained Winds

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PHASE 3 - POST STORM ASSESSMENT

Facilities Development/ Facilities Management & Engineering/HNTB/Airport Managers/Risk Management/Finance+

- After The Storm Subsides and The County Emergency Operations Center Provides The “All Clear” The Process Begins To Provide The Estimated Damage Level At MIA and GAA’s (Due Within 2 Hours)
- Assessment Will Be Based On Visual Observation of Damage Level:
 - Minor •Moderate •Severe •Catastrophic (Closed)
- Assessment Areas:
 - MIA Terminal Damage Level
 - MIA Cargo Area Damage Level
 - GAAs Damage Level
 - Utilities Damage Level
 - Charlie Team Assessment
- Within 48 – 72 Hours Provide Preliminary ROM (Rough Order Of Magnitude) Damage Assessment To The Mayor’s Office
- Compile Information for Final Damage Assessment
- Complete FEMA Forms (FEMA Department Liaison/Risk Management)
- Update Broadcasting Information to Public and Business Partners – “Airport is Open”

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THANK YOU



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Rachel Burbidge - EUROCONTROL

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5th Miami Aviation Safety Campaign

The Impacts of Climate Change for Airports in the Caribbean

Rachel Burbidge, EUROCONTROL
16th July 2024

Supporting
European
Aviation

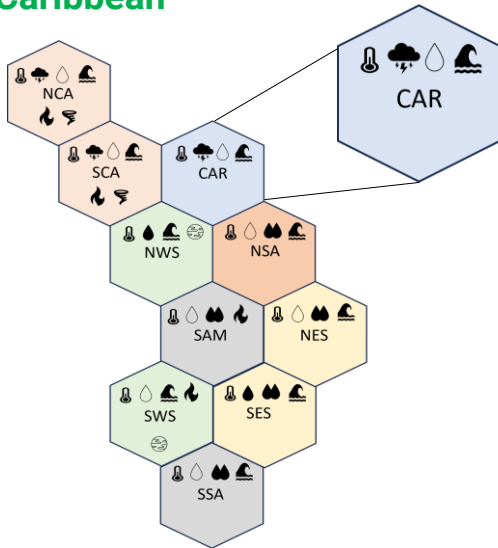




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Climate Change Projections for airports in the Caribbean



- **IPCC:** climate change effects and impacts increasing throughout the LAC region
- But effects, and impacts for airports, will vary across the region.

Caribbean:

- More extreme tropical cyclones
- Temperature increases will continue
- Decrease in precipitation / increase in droughts
- Increase in extreme rainfall events
- Relative sea level rise projected to increase

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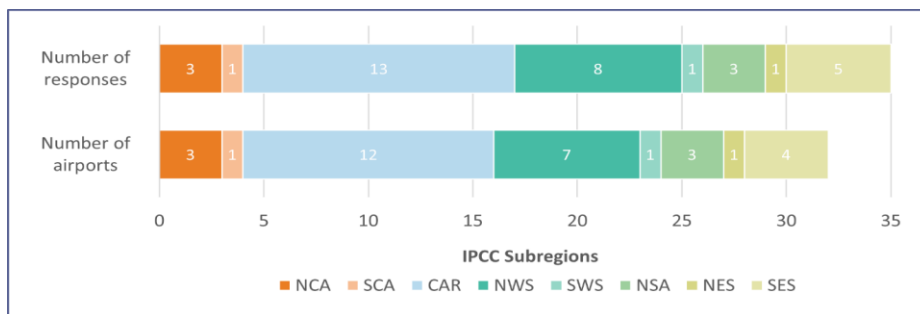
103

ACI-LAC Airport Stakeholder Survey 2023



Stakeholder Survey: available online November 2022 – March 2023 in English and Spanish

- What climate change impacts do airports in the region expect to experience?
- What will be the biggest challenges?
- What measures to adapt and build resilience to the impacts of climate change are being implemented, are planned or are required?

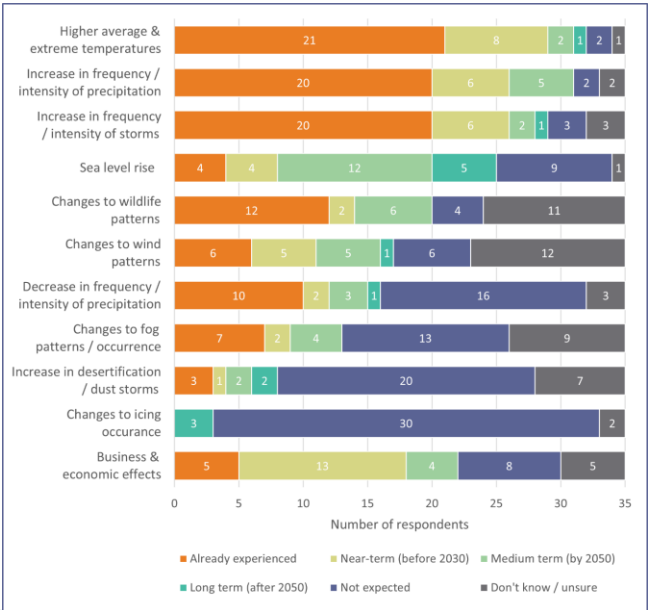


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Timescale climate effects expected in LAC

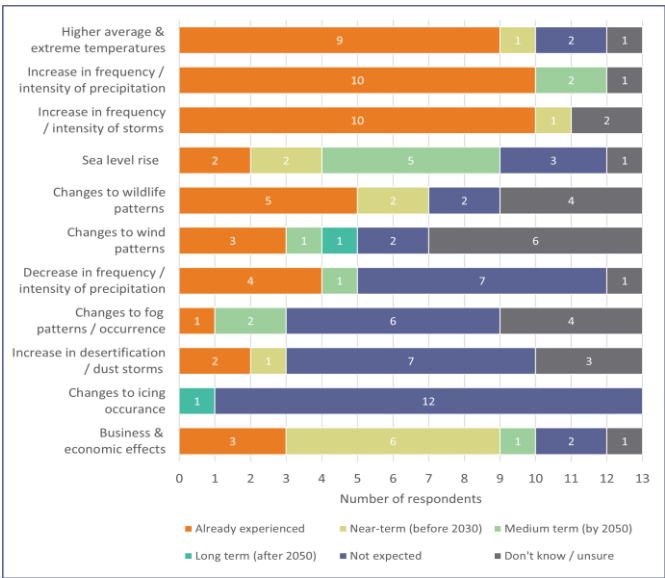


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Timescale climate effects expected in the CAR region



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Impacts of Storms



- Disruption to operations:
 - delays, re-routings, route extensions, trajectory management, HFE, increased fuel burn and emissions
 - potential en-route capacity loss and congestion
- Larger / more intense convective systems could affect multiple airports
- Damage and flooding infrastructure
- Increase in lightning strikes: airport closures

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Higher average and extreme temperatures



- Changes to aircraft performance: take-off, payload, runway length, landing speed
 - Phoenix 2017: too hot for some regional jets to take-off (certification)
- Heat damage to airport surface (e.g. runway, taxiway)
- Heat damage to equipment e.g. ATM equipment, electronic equipment
- Conditions for passengers, personnel, ground handlers,

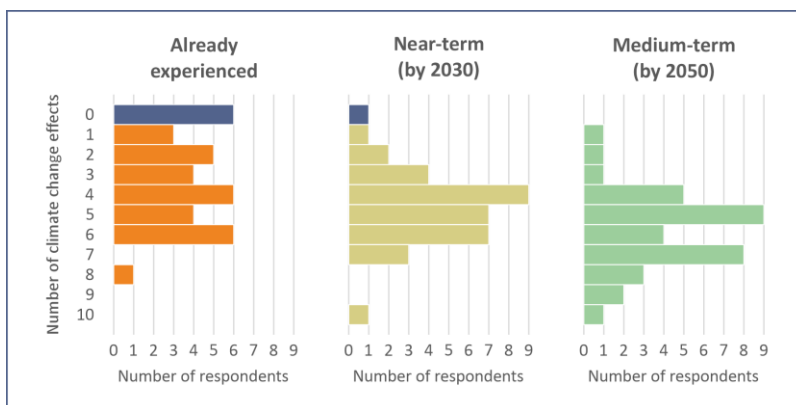
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Sea-level rise & storm surge



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Climate change effects will increase over time



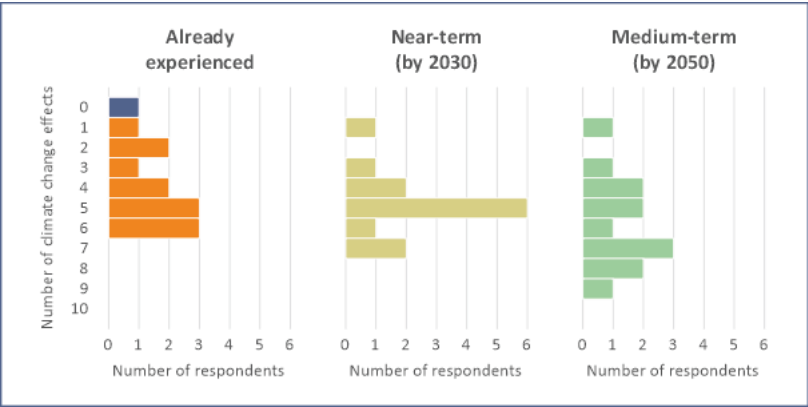
- Today: 29/35 (83%) of respondents already experiencing at least one effects of climate change
- By 2030, 34/35 respondents (97%) experiencing at least one effect
- By 2050, all respondents experiencing at least one effect

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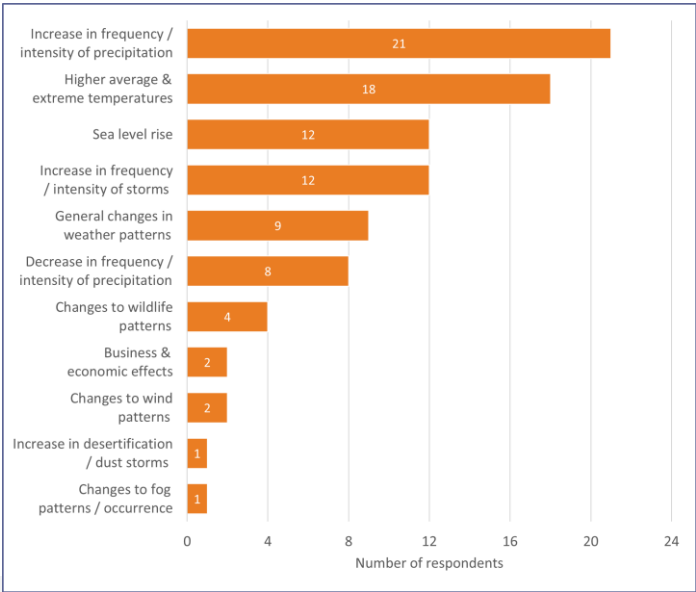
Increase in climate effects in the CAR region



- Today: 12/13 (92%) of respondents already experiencing at least one effects of climate change
- By 2030, all respondents experiencing at least one effect

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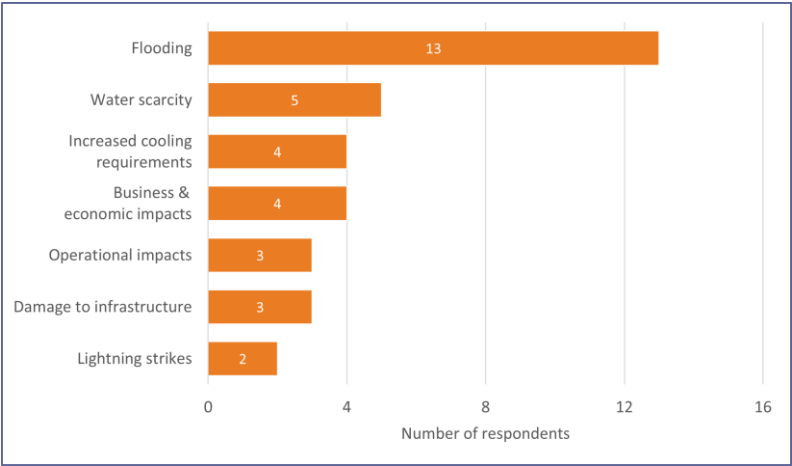
Most significant challenges for LAC Airports: effects



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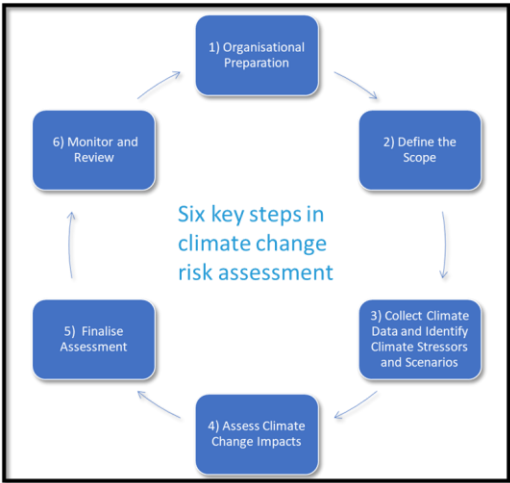
Most significant challenges for LAC airports: impacts



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Climate change risk assessment for airports

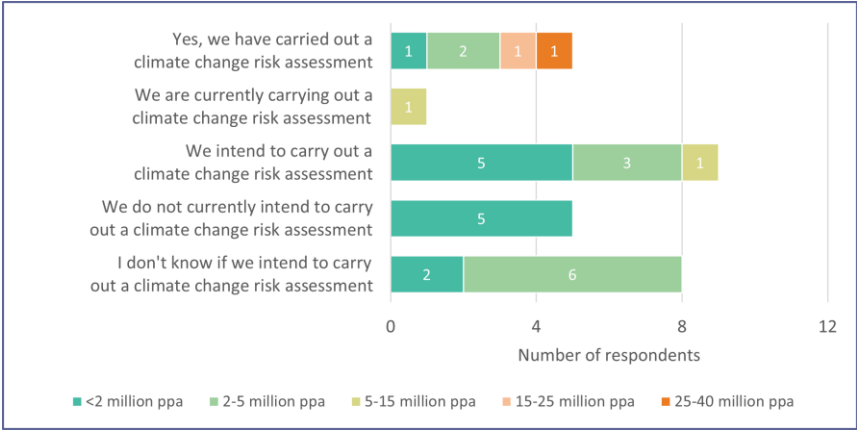


Source: ICAO Key Steps for Aviation Organization Climate Change Risk Assessment and Adaptation Planning

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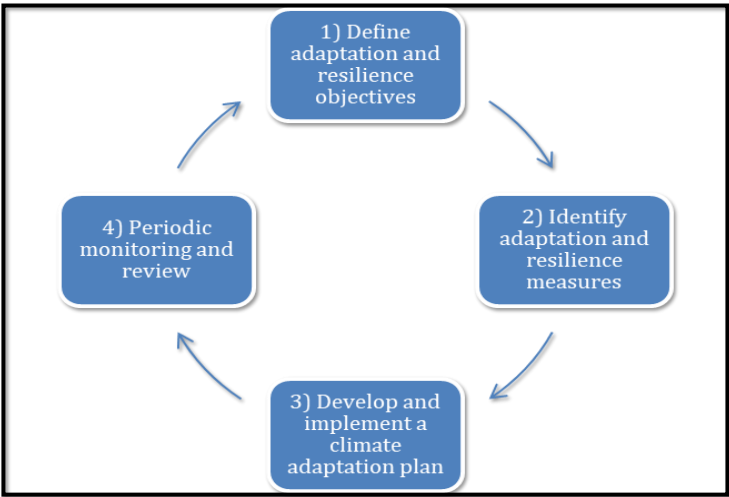
Climate change risk assessment at LAC airports



- Five (18%) have already carried out a climate change risk assessment.
- One airport was in the process of carrying out a risk assessment at the time of the survey
- Nine airports (32%) intend to carry out a risk assessment.



Climate change adaptation for airports

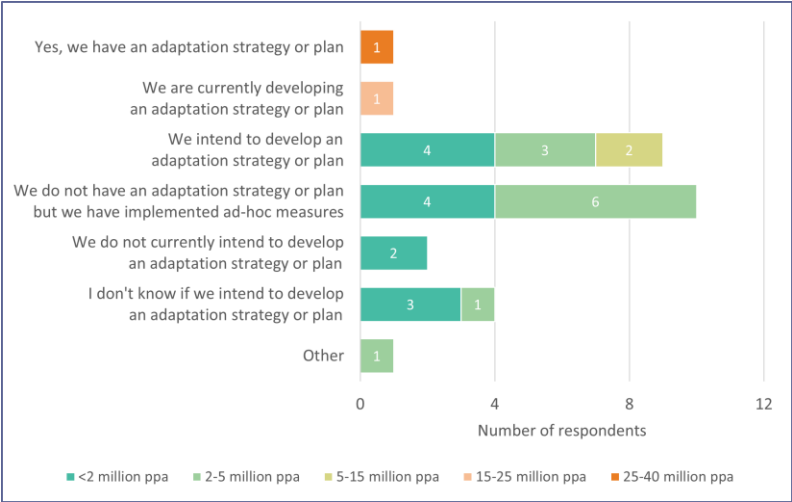


Source: ICAO Key Steps for Aviation Organization Climate Change Risk Assessment and Adaptation Planning

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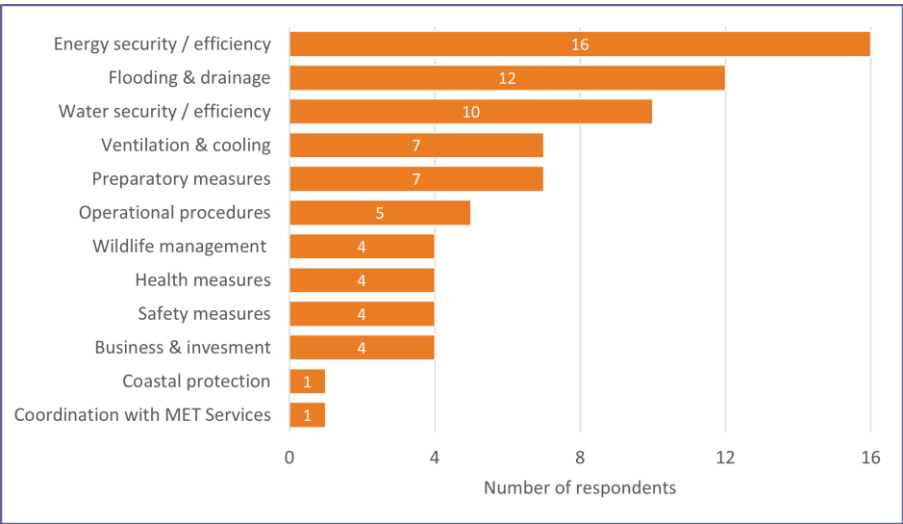
Climate change adaptation at LAC airports



- One airport has implemented a climate change adaptation strategy/plan.
- One airport was in the process of implementing a strategy or plan at the time of the survey.
- Nine airports intend to implement a climate adaptation strategy or plan.
- Ten have not implemented a full plan or strategy but have implemented some ad-hoc adaptation measures.

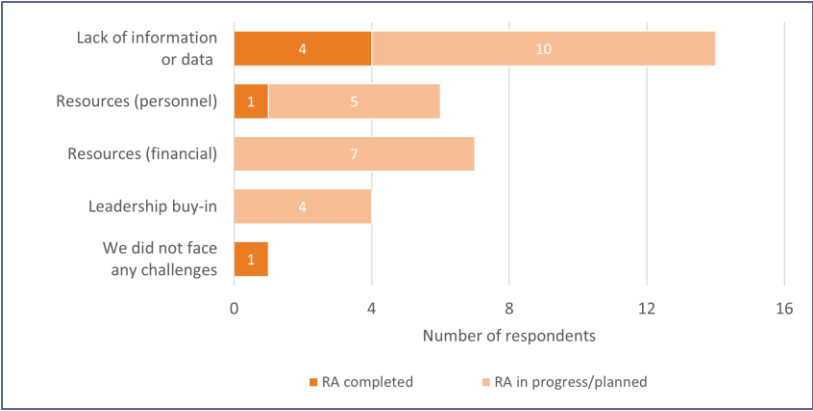


Adaptation measures being implemented by LAC Airports





Biggest challenges / support required



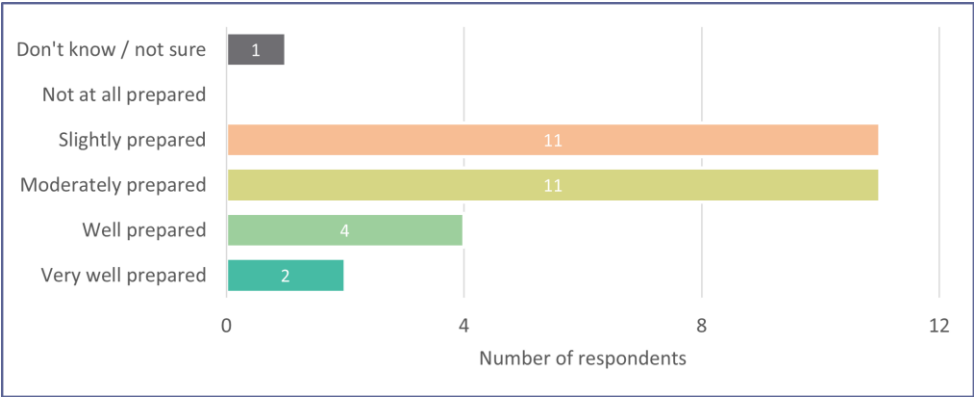
Biggest challenges:

- Lack of data: e.g. acquiring suitable data or projections of climate effects
- Lack of guidance: need for methodologies, examples of good practices, completed risk assessments and case studies
- Top management support is essential

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Level of preparedness for the impacts of climate change: LAC respondents



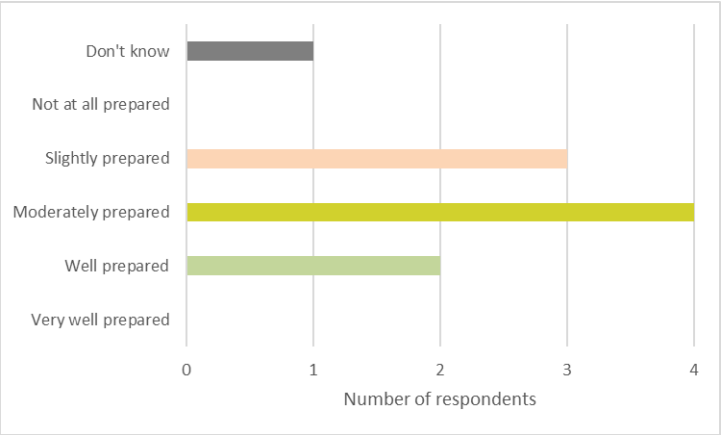
- Seventy-six percent of survey respondents consider their airport slightly prepared or moderately prepared to deal with impacts of climate change
- Just 21% consider their airport well- or very-well prepared.

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Level of preparedness for the impacts of climate change: CAR respondents



- Seventy percent of survey respondents from the CAR region consider their airport slightly prepared or moderately prepared to deal with impacts of climate change
- Just 20% consider their airport well-prepared.
- Airports in the region are starting to adapt and build resilience to the potential impacts of climate change ahead but that increased and accelerated action is needed.

Recommendations and conclusions 1/2



- The effects of climate change and the resulting impacts are a growing risk for airports in the Caribbean and across the LAC region: increasing need for airports to adapt and build resilience to the expected impacts.
- Airports across the region are beginning to engage with climate risk assessment and adaptation planning: further action is needed to augment adaptation and resilience levels at the region's airports

Key recommendations:

- **Continue awareness-raising:** continue actions to raise awareness of the potential impacts of climate change for the region's airports and the need to take action to adapt.
- **Coordination and collaboration:** collaborate, promote learning and share good practices within the LAC region, with other ACI regions and globally through peer-to-peer support, bilateral meetings, working groups, workshops, conferences and other international fora.



Recommendations and conclusions 2/2

Key recommendations cont.

- **Promote and support climate change risk assessments:** information and guidance, case studies or examples of airport risk assessments, learning opportunities such as workshops.
- **Promote and support implementation of climate change adaptation and resilience measures:** information and guidance on implementing adaptation measures, plans and strategies, case studies or examples, learning opportunities such as workshops.
- **Promote and support regionally-focused research:** identify relevant research gaps in the LAC region and promote regionally-focused research on climate change impacts, effects and adaptation measures for the region’s airports.



Directory of impacts and adaptation measures for LAC airports

8.2 An increase in frequency/intensity precipitation (average/extreme)

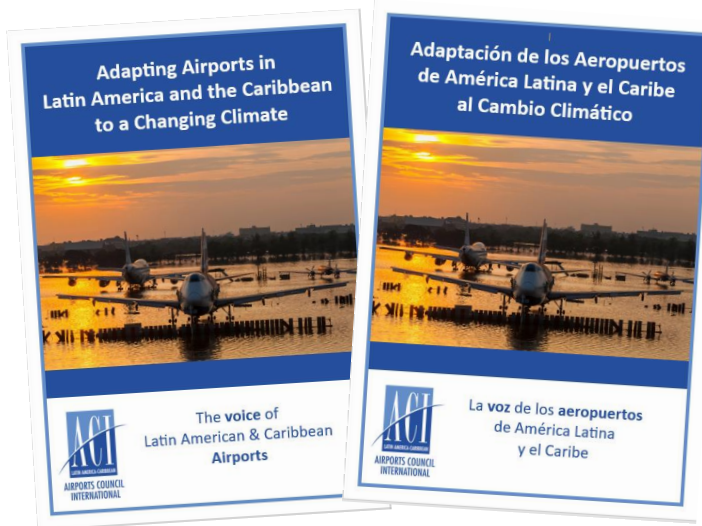
Subregions: NCA, NWS, NSA, SAM, NES, SES, SSA

Key Impacts	Potential Adaptation Measures
• Flooding of infrastructure such as airport terminals and runways • Disruption to operations (delays, diversions, cancellations) • Safety risks/delays to passengers boarding/disembarking • Low visibility conditions • Deterioration in ground handling conditions • Inundation of pollution control systems/contamination of groundwater or local water courses • Flooding of ground transport	• Increase drainage capacity of buildings and runways/<u>taxiways</u> • Runway surface condition reporting (ICAO Global Reporting Format) • Regular maintenance of drainage capacity • Water pumps to remove excess <u>water</u> • Elevation of flood-prone zones • Planning for movement of people, <u>cargo</u> and vehicles along alternative/higher routes in the event of flooding • Rainwater collection systems • Operational measures to increase resilience and flexibility such as Airport CDM (A-CDM) • Increase vegetation such as green <u>roofs</u> • Replace asphalt with porous surfaces such as <u>soil</u> • Low visibility procedures/measures e.g. ground based augmentation system (GBAS), Surface Movement Radar

Full report: coming soon



Manchester
Metropolitan
University



Thank you to ACI-LAC for the support and to all of the Survey respondents

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Thank you for your attention

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