



**MINISTRY OF TRANSPORTATION
DIRECTORATE GENERAL OF CIVIL AVIATION
DIRECTORATE OF AIRPORT**



Natural Disaster Management at Airports in Indonesia

**Enhance Climate Change Action Workshop
Bali, 18 December 2019**



OUTLINE

INDONESIA AIRPORT SYSTEM & NATURAL DISASTER DATA

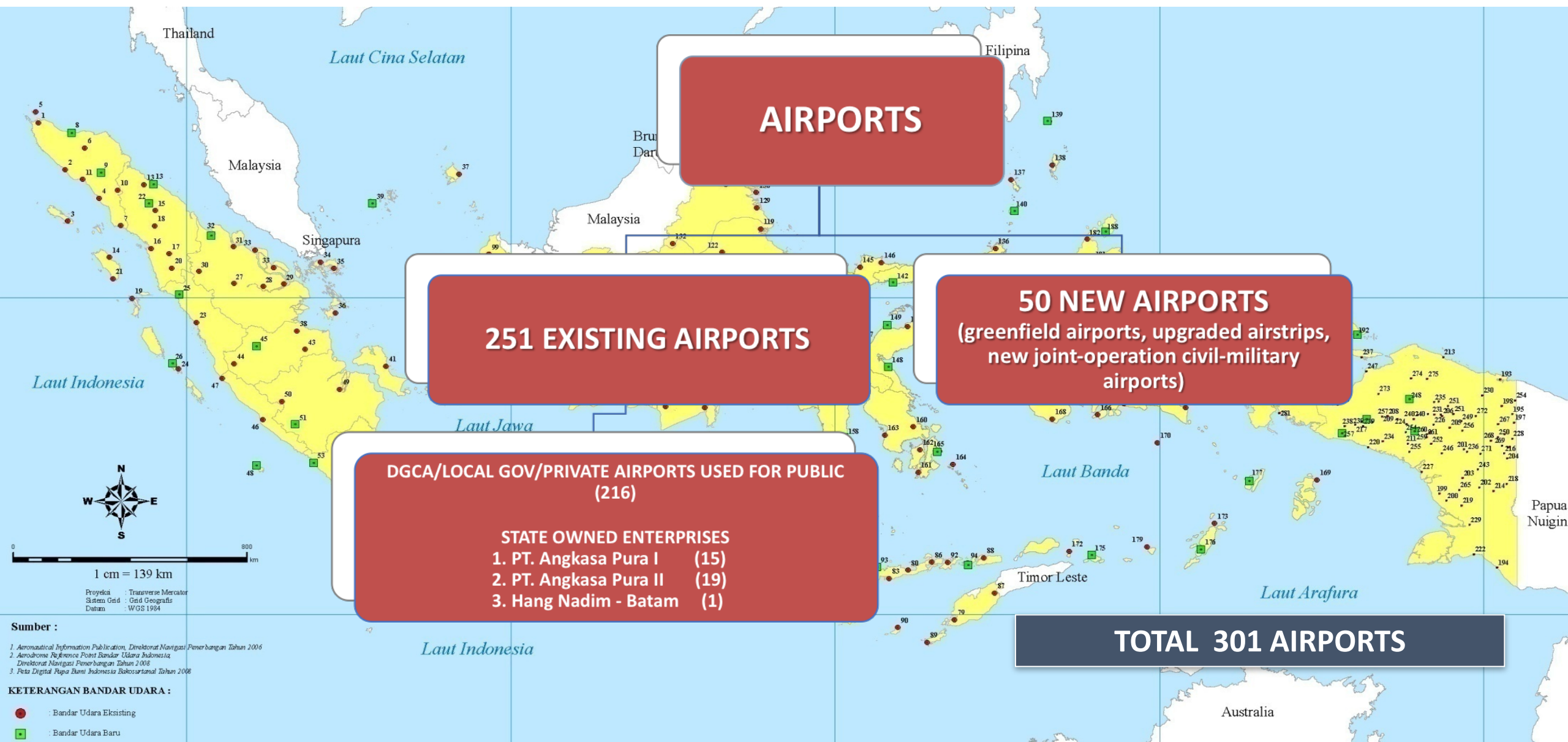
POLICIES ON AIRPORT IN DISASTER-PRONE AREA

SAMPLE CASES



AIRPORT PROFILE

(Ministerial Decree Number 166 Year 2019 Regarding National Airport System)





AIRPORTS IN NATURAL DISASTER AREA





AIRPORTS IN NATURAL DISASTER AREA

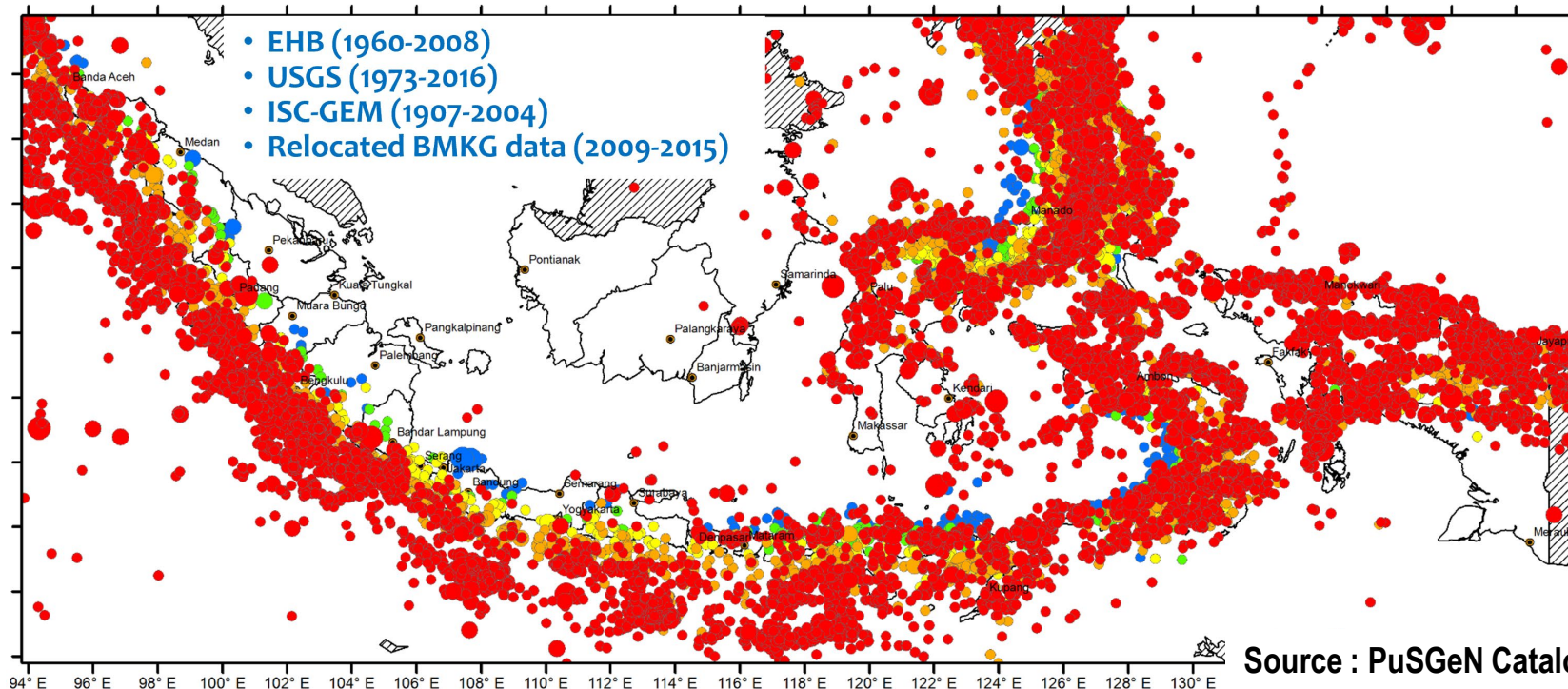




Airport Location Vs Earthquake Distribution Data (Historical)



Source : PM 39 year 2019



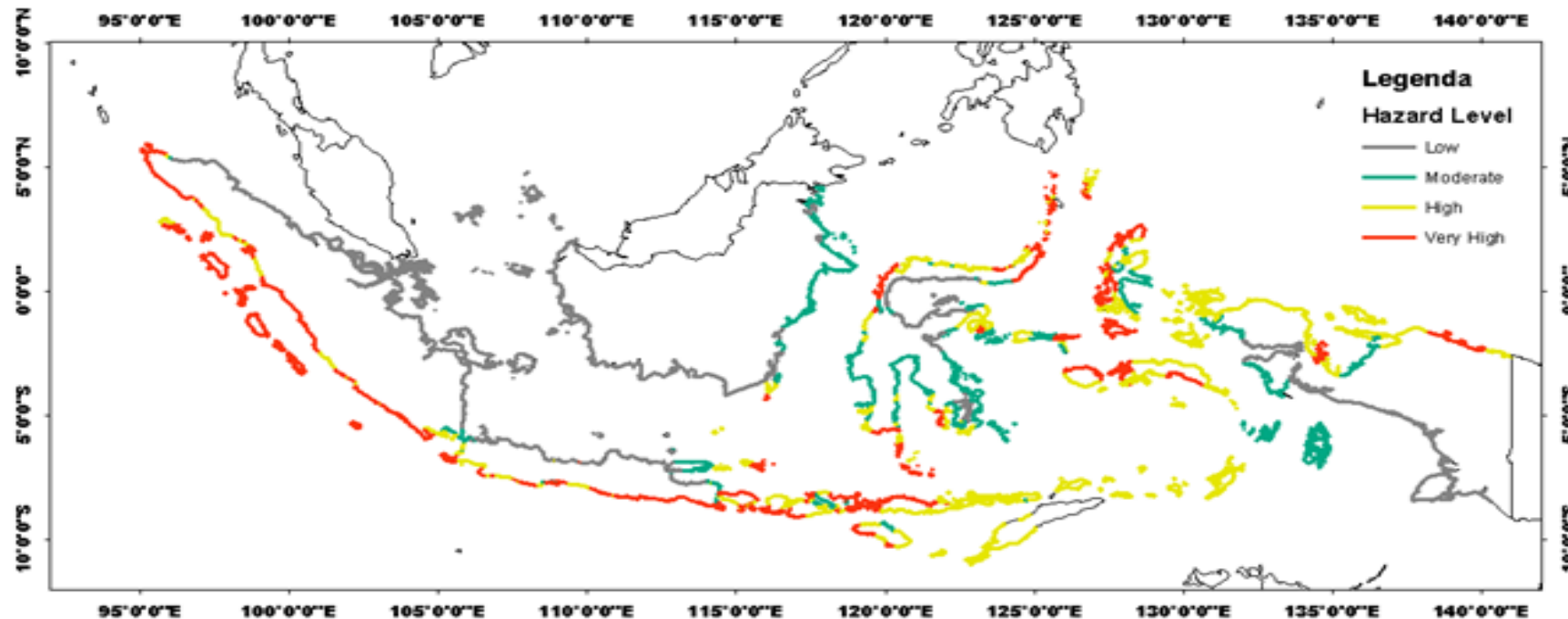
Source : PuSGeN Catalogue 2017: all Shocks (1907-2016)



Airport Location Vs Tsunami Hazard Level (coastline)



Source : PM 39 year 2019



Source : Latif & Haris 2019



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CLIMATE CHANGE IMPACTS VS NATURAL DISASTER

The latest ICAO Doc 9184 Airport Planning Manual Part II identifies nine physical climate change impacts:

1. sea level rise
2. storm surge
3. increased intensity of storms
4. temperature change
5. changing precipitation
6. changing icing conditions
7. changing wind
8. desertification
9. changes to biodiversity

Common natural disaster in Indonesia:

1. Earthquake
2. Volcanic Eruptions
3. Tsunami



AIRPORTS IN DISASTER-PRONE AREA

ISSUES:

- ❖ Damage to airport's main infrastructures due to natural disaster
- ❖ Lack of ground handling equipment for loading and unloading;
- ❖ Lack of warehouse to accommodate goods in a short time;
- ❖ No emergency procedure to handle goods and supplies;
- ❖ Traffic management.



National readiness for airports in disaster-prone area :

- 1.Law and Regulations
- 2.Airport Infrastructures
- 3.Human resources
- 4.Operational Procedures



AIRPORTS IN DISASTER-PRONE AREA

2

DISASTER IMPACTS DUE TO EARTHQUAKE

1



Source : Prof Masyhur Irsyam (ITB)

TSUNAMI WASHOUT

3



Terminal bandara SIS Al Jufrie - Palu

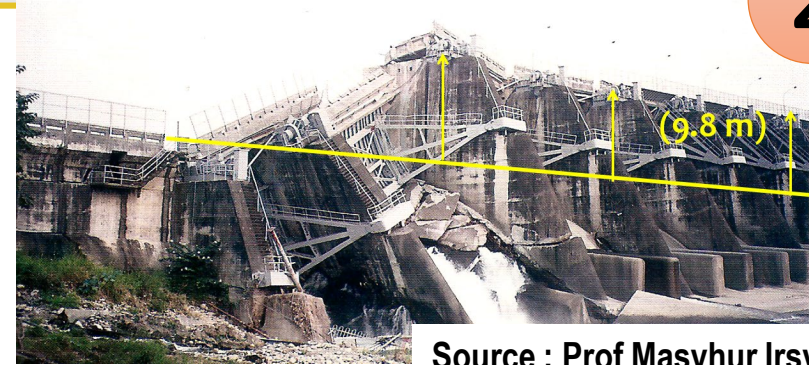
BUILDING DAMAGE

4



Runway bandara SIS Al Jufrie - Palu

GROUND CRACKING



Source : Prof Masyhur Irsyam (ITB)

UPLIFTING & SUBSIDENCE

5



Source : Prof Masyhur Irsyam (ITB)

LIQUEFACTION

6



Source : Prof Masyhur Irsyam (ITB)

LANDSLIDE



AIRPORTS IN DISASTER-PRONE AREA

LAW AND REGULATIONS

1. Law No. 24 of 2007 regarding Disaster Management
2. Law No. 1 of 2009 regarding Aviation
3. Ministerial Decree No.20 of 2014 regarding Procedure for Determining the Location of Airports
4. Ministerial Decree No.150 of 2015 regarding Airport Irregular Operation
5. Ministerial Decree No. 39 of 2019 regarding National Airport System
6. Director General Decree No. KP 96 of 2019 regarding Airport Guidance Book to Disaster Readiness



AIRPORTS IN DISASTER-PRONE AREA



*As many as 75 existing airports are located in disaster-prone area **

AIRPORT INFRASTRUCTURE – DEVELOPMENT POLICY

1. Airports at disaster-prone area are planned, constructed and developed to meet criteria for a minimum 3C runway classification in order to be ready serving specific aircraft types such as **Hercules C-130 or another 50-seat aircrafts**
2. Airports at disaster-prone area are **equipped with infrastructures and supporting facilities which resilience to natural disaster** so that able to serve flight operations
3. To support operations in managing incoming disaster relief aid and evacuation, an airports could be used as a **disaster crisis centre** if suits with the following criterias:
 - safe or not affected by disaster and;
 - able to be reached in one-hour flight duration from the nearest hub-airport
 - located 500 KM from disaster prone region.



AIRPORTS IN DISASTER-PRONE AREA

HUMAN RESOURCES

1. Since 2010 Directorate General of Civil Aviation in collaboration with UNDP (United Nation Development Program) and DHL Deutch Post in Bonn has conducted trainings / workshops in the area of disaster management which is called **Get Airport Ready For Disaster (GARD)**.
2. GARD training has been executed in:
 - a. Sultah Hasanuddin in Makassar (2009)
 - b. Mutiara Airport in Palu (2010)
 - c. El Tari Airport in Kupang (2011)
 - d. I Gusti Ngurah Rai Airport in Bali (2011)
 - e. Polonia Airport in Medan (2012)
 - f. Sultan Iskandarsyah Airport in Aceh (2012)
 - g. Fatmawati Airport in Bengkulu (2012)
 - h. Minangkabau Airport in Padang (2013)
 - i. I Gusti Ngurah Rai Airport in Bali (2016)
 - j. Selaparang Airport in Lombok (2016)
3. In 2019, DGCA Indonesia has stipulated DG Decree regarding Airport Guidance Book to Disaster Readiness as a guide for airport specifically those whom categorised as disaster crisis centre airport in the preparation of 'Disaster Preparedness Manual'



AIRPORTS IN DISASTER-PRONE AREA

OPERATIONAL PROCEDURES

1. Establishment of **Airport Irregular Operation Management Committee**
2. The committee consists of airport operator, DGCA regional office, airline, air navigation provider, security agents and CIQ
3. The committee shall coordinate the management of airport in the occurrence of irregular operation such as natural disaster, to ensure the sustainability of airport operation at certain level of service
4. The operational procedures to handle surge capacity should consist of procedures for airside and landside.
 - a. The airside procedure should cover: a) assessment of airport facilities; b) outsourcing personnel from other airports, if needed; c) coordination with local government, local BNPB and other related agencies; d) open/add operational hours at airport(s) in the vicinity as an alternate airport; e) apron capacity management, tighter slot time arrangement, faster ground time, priority for evacuation and logistic aids aircraft, no remain overnight aircraft; and f) all cargo aircraft should bring their own equipment and personnel for unloading.
 - b. The landside/terminal procedure should cover: a) establishment of a coordination centre, including appointing qualified personnel; b) coordination with CIQ (customs, immigration, quarantine); and c) adding capacity for terminal (temporary terminal), water supply, electricity, if needed.



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SAMPLE CASES



I GUSTI NGURAH RAI AIRPORT

- VOLCANIC ASH -

- ❖ Mechanism to handle volcanic ash impact to flight operation particularly on meteorology information services is stipulated under Ministerial Decree No.108 of 2016
- ❖ **Indonesia Volcanic Ash Contingency Plan Arrangement :**
 - Promulgate the status of active volcanoes via the colour code system as defined in the handbook on the International Airways Volcano Watch (Doc. 9766)
 1. Identify All active Volcano in Indonesia;
 2. Identify possible affected route;
 3. Identify area affected;
 4. Determine point of contact for volcanic ash coordination.
 5. Implement Sub regional volcanic ash state arrangement.
 6. Develop guidance for implementation of Volcanic ash Letter Agreement between BMKG and DGCA.
 - Provide Templates and a rapid means of disseminating ASHTAM's, NOTAM's, Volcanic Ash Advisories and other flight information
 - Provide Air Traffic Management policy and coordination procedure that provide a safe and orderly flow of air traffic around areas of volcanic ash
 - Develop Flow coordination chart for Volcanic Ash Contingency
- ❖ As result, 10 alternate airports at Jakarta, Makassar, Surabaya, Balikpapan, Solo, Ambon, Manado, Praya, Kupang and Banyuwangi are be prepared in case of closure of I Gusti Ngurah Rai Airport due to Mt.Agung's volcanic ash



I GUSTI NGURAH RAI AIRPORT

- VOLCANIC ASH -

- ❖ To minimize the effect of the volcanic ash, the coordination procedures between the following other entities has been arranged :
 1. Air Nav Indonesia;
 2. Directorate of Air Navigation – DGCA Indonesia;
 3. The Meteorology, Climatology and Geophysics Agency (BMKG);
 4. Darwin Volcano Ash Advisory Center (Darwin VAAC);
 5. Geological Agency of Indonesia;
 6. Airlines Operator.

This to implement a *Collaborative Decision Making (CDM)* concept as regulated under Ministerial Decree 108/2016.
- ❖ To ensure the services at I Gusti Ngurah Rai Airport and alternate airports, the respective DGCA regional offices shall coordinate with related agencies such as airport operator, Air Nav Indonesia, airlines and CIQ;
- ❖ Through coordination mechanism mentioned above, all parties could be more ready to mitigate impacts of volcano ash:
 1. Airline could mitigate the action to reschedule or cancel flights;
 2. Airports in which are selected as alternate airport could mitigate the situation to accommodate divert flights and passengers as well (if I Gusti Ngurah Rai Airport closed)
 3. I Gusti Ngurah Rai Airport could mitigate any situation to handle impacted passengers due to delayed or cancelled flights.



KULONPROGO NEW AIRPORT DEVELOPMENT PLANNING

- TSUNAMI AND EARTHQUAKE -

The plan to develop a new airport in Kulonprogo is aimed as relocation of the existing Adi Sutjipto Airport at Yogyakarta Province. The new airport will have more airside and landside capacity than Adi Sutjipto Airport.

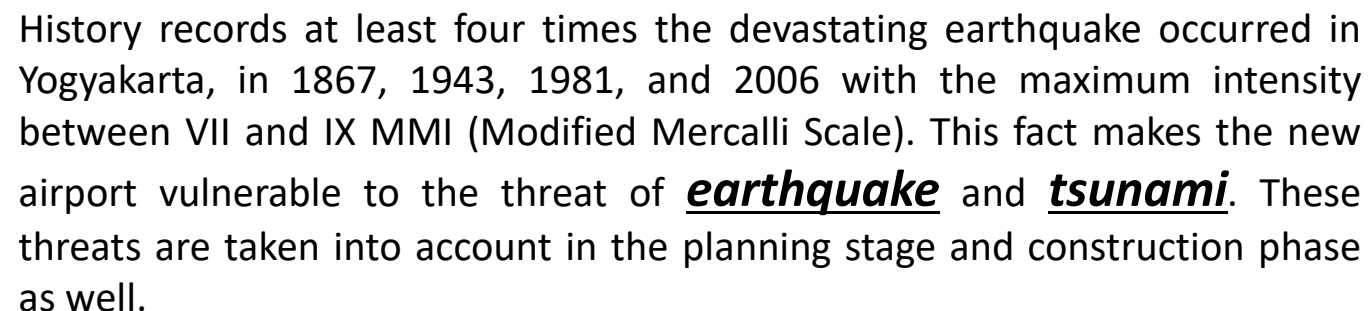


The airport roles as main gate to Yogyakarta Province and several well-known tourism sites such as Borobudur and Prambanan Temple Compounds



Borobudur Temple Compounds is one of UNESCO world heritage sites





PETA SEISMISITAS PULAU JAWA
PERIODE TAHUN 1991 - 2016

U

BADAN METEOROLOGI KLIMATOLOGI DAN GEOFISIKA

SKALA :
0 90 180 360 Km

110°0'0"E

110°0'0"E

Legend :

KEDALAMAN / MAGNITUDE	DANGKAL (D < 60 Km)	MENENGAH (60-D < 300 Km)	DALAM (D > 300 Km)
M ~ 5.0			
5.0 < M < 7.0			
M ≥ 7.0			

Keterangan :

- Turjanjani
- Sesar Geser
- Sesar Naik
- Sesar Normal

Kontur Kedalaman Slab (Km)

20	100	400
40	120	500
60	200	600
80	300	

Source Data :

- Data Seismologi, Tahun 1991-2016, Engdahl, BMRG
- Tectonic boundaries
- Institute for Geophysics, J. J. P. State Research Center, Rijkswateringen, TK 78758-4445, Peter West, 2003.
- An updated digital model of plate boundaries, C3
- Plate Tectonics
- Darnell, W., 1974, Tectonics of Indonesia, Kartaspati, E. K. et al., 1985, Seismotectonic Map of Indonesia
- Indonesian Tectonics
- Korte, Jan, Gerry Molengraaf, 2000, Neotectonics of the Sumatran fault, Indonesia
- Fault Data, Pusat Survei Geologi (PSG) Bandung
- Gary Palmer, Basics Information Geoscience (BIG)
- Plate Tectonics, Earth Science, NOAA, National Geographic, Del Loma, HERNI, Geomarine.org

Update Tahun 2017

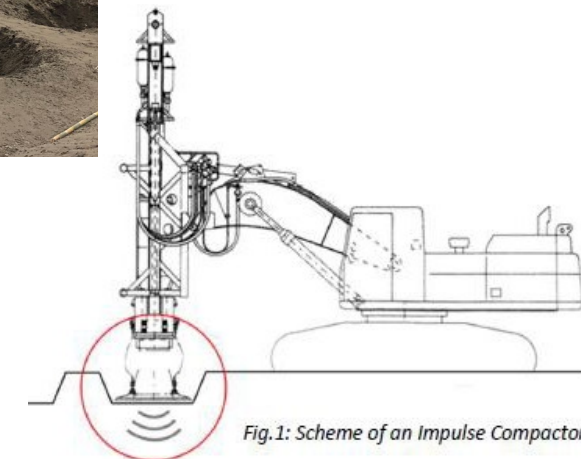


KULONPROGO NEW AIRPORT DEVELOPMENT PLANNING

- TSUNAMI AND EARTHQUAKE -

MITIGATION ACTIONS:

1. Consideration of the documented seismic data at the airport sites during feasibility study (planning phase)
2. Tsunami examination and simulation
3. Adoption of Indonesian Standard for Earthquake Resistance Building Design in design and construction phase especially to terminal buildings, runway, taxiway and apron structure
4. Construction of tsunami protection such as sea wall, runway sub-drainage system, water gate and river embankment to mitigate the possible threat of tsunami
5. Soil liquefaction mitigation through soil improvement method using Dynamic Compaction and Rapid Impulse Compaction
6. Establishment of tsunami early warning system in coordination with Indonesia Meteorology, Climatology and Geophysics Agency



Airport may be used as a temporary shelter for disaster evacuation



THANK YOU



**DIRECTORATE GENERAL OF CIVIL AVIATION
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