NATIONAL REPORT
Submitted by Indonesia

BASIC INFORMATION

1. ICG/PTWS Tsunami National Contact (TNC)

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2. ICG/PTWS Tsunami Warning Focal Point (TWFP)

TWFP Agency name : Center for Earthquake and Tsunami BMKG
Name :
Position : Head of Center for Earthquake and
Telephone Number Tsunami :
Email Address :
Postal Address : 10610

TWFP 24x7 point of contact (office, operational unit or position**, not a person**):

Name of office, operational unit or position: Center for Earthquake and Tsunami BMKG
E-mail Address :
Telephone Number
Cellular phone number
Fax

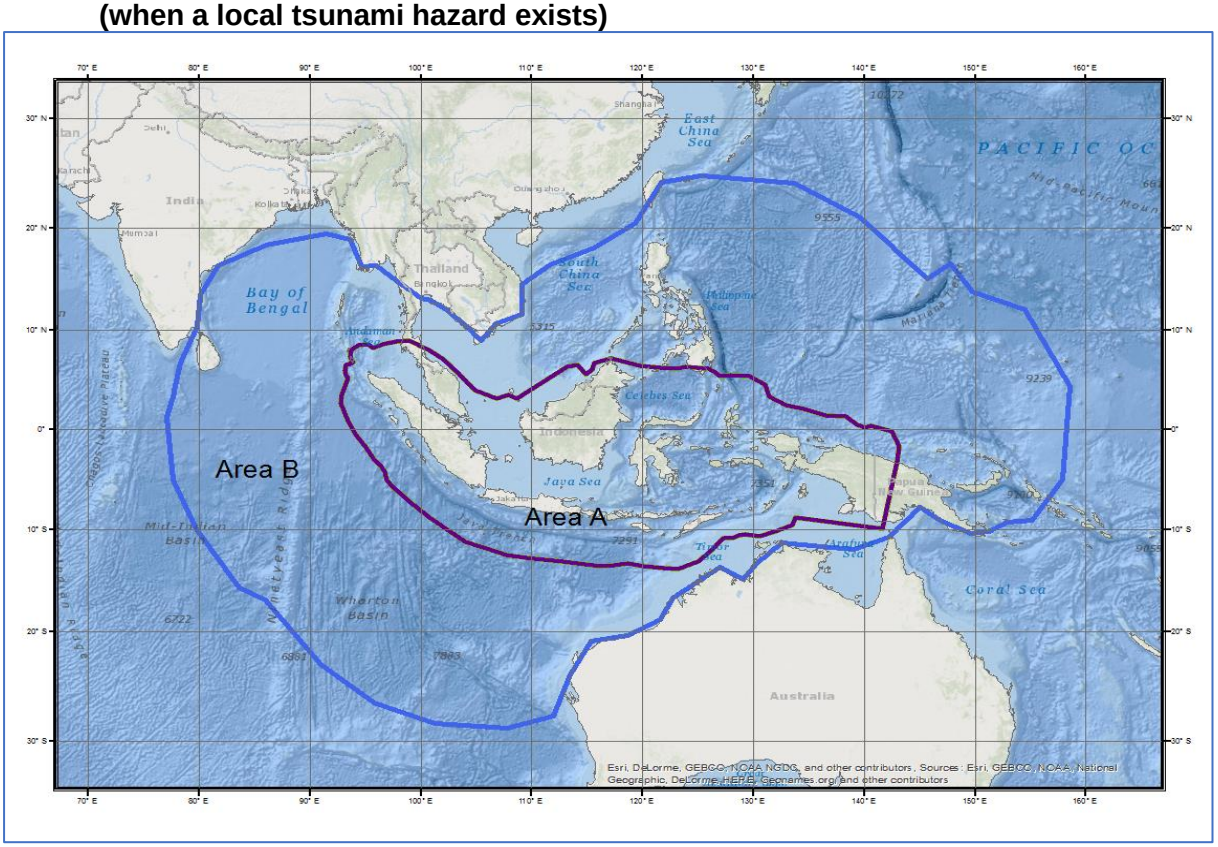
National Tsunami Warning Centre (if different from the above)
A centre officially designated by the government to monitor and issue tsunami warnings and other related statements within their country according to established National Standard Operating Procedures

NTWC Agency Name: Center for Earthquake and Tsunami BMKG
NTWC Agency Contact or Officer in Charge (person):
Name : I
Position : Coordinator of Earthquake Information and Tsunami Early Warning Division
Telephone Number:
Email address:
Postal Address: 10610

3. Tsunami Advisor(s), if applicable

(Person, Committee or Agency managing Tsunami Mitigation in country)
Name : Dra. Prasinta Dewi, M.A.P
Title : Deputy of Mitigation - National Disaster Management Agency
Postal Address :
E-mail Address :
Emergency Telephone Number:
Emergency Fax Number:
Emergency Cellular Telephone Number:

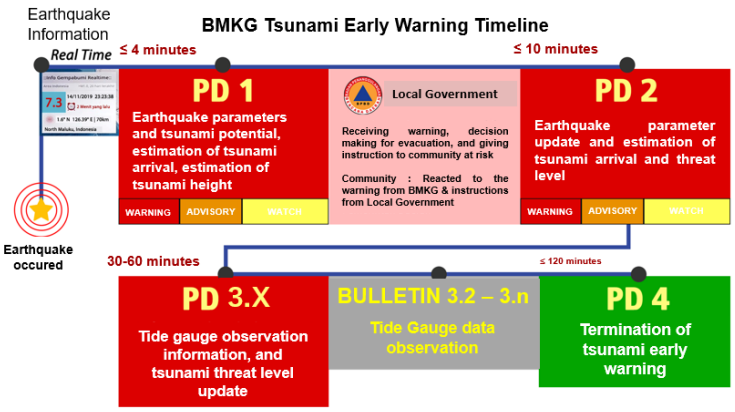
4. Tsunami Standard Operating Procedures for a Local Tsunami (when a local tsunami hazard exists)



SOP NTWC on Area A

When there is an earthquake in Seiscomp and the epicenter is in area A with a magnitude of M ≥ 5.0 and on TOAST there is a Tsunami proposal in Indonesian

Territory, TWFP will disseminate bulletin 1 of the tsunami early warning within 4 minute and subsequent bulletins with the following timeline:



If after the update there is a tsunami proposal in Indonesian territory, the officer sends PDT-2: GB+Tsunami prediction parameter update based on FocMec (Easywave), Tsunawi within <15 minutes from OT followed by making a press release. If there is new sea level data until the last ETA, send PDT-3.X + tsunami predictions based on FocMec(Easywave) periodically and repeatedly if there is sea level data. The officer sends an end PDT-4 warning based on the last ETA + 2 hours or the leadership's consideration: obs data, focal, bedtime + Press Conference.

If after the update there is no tsunami proposal in Indonesian Territory, the officer makes a press release followed by ending the PDT-4 warning based on the latest ETA + 2 hours or leadership considerations: obs data, focal, sleep-night + Press Conference.

SOP NTWC on AREA B

When an earthquake occurs in Seiscomp and the epicenter is in area B. Pay attention on TOAST, whether there is a tsunami proposal in Indonesian territory.

If there are no proposals, check whether M ≥ 6.5 officers send earthquake parameters only to BMKG officials by SMS (<15 minutes). If there is tsunami information from PTWC or JMA or TSP or SCS, then the officer makes a press release.

If there is a proposal, send tsunami early warning bulletin 1: earthquake parameters + tsunami prediction (Easywave) in <15 minutes with GUI DSM followed by WA. The officer contacted the leadership (KBMG, D3, KPG and KPS). Send the second tsunami early warning bulletin: Update earthquake parameters with tsunami predictions based on FocMec (Easywave), Tsunawi in <20 minutes from the previous tsunami early warning bulletin, followed by making a press release. If there is new sea level data up to the last ETA, send the 3.X tsunami early warning bulletin with tsunami predictions based on FocMec(Easywave) periodically and repeatedly if there is sea level data. The officer sends a final tsunami warning based on the last ETA + 2 hours or the leadership's considerations: obs data, focal, td-tdur and Press Conference.

SOP NTWC on AREA C

When there was an earthquake in Seiscomp and the epicenter is in area C. Check if there is any tsunami information (Obs) from TSP or PTWC or SCS? If yes, pay attention on TOAST, whether there is a Tsunami proposal in Indonesian Territory.

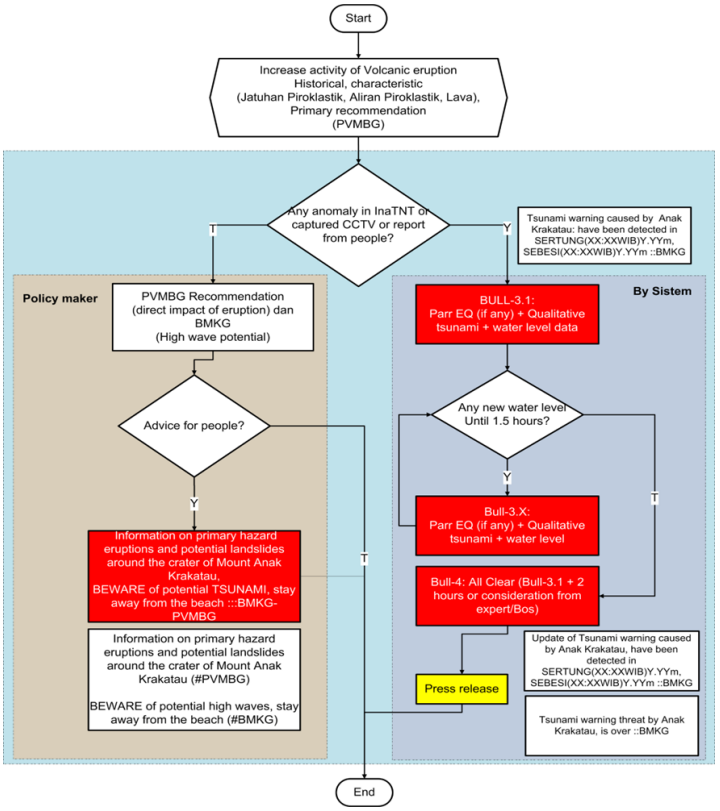
If there is no proposal, check whether M ≥ 8.0, the officer sends earthquake parameters only to BMKG officials via SMS (<60 minutes), then makes a press release but if M < 8.0, then the officer only makes a press release.

If there is a proposal, send tsunami early warning bulletin 1: earthquake parameters and tsunami predictions based on FocMec (Easywave) in <60 minutes with DSM GUI followed by WA. The officer contacted the leadership (KBMG, D3, KPG and KPS). Send tsunami early warning bulletin 2: Updating earthquake parameters and tsunami predictions based on FocMec (Easywave), Tsunawi within <30 minutes from the previous tsunami early warning, followed by making a press release. If there is new sea level data up to the last ETA, send a tsunami early warning 3.X bulletin containing tsunami predictions based on FocMec (Easywave) periodically and repeatedly if there is sea level data. The officer sends the final warning bulletin 4 tsunami early warning based on the last ETA + 2 hours or leadership considerations: obs data, focal, td-tdur + Press Conference.

SOP for Atypical Tsunami

The ability to detect atypical tsunamis is crucial for enhancing the overall effectiveness of tsunami warning systems, as it allows for a more comprehensive approach to tsunami risk assessment. While ordinary or typical detection methods rely heavily on seismic data, atypical tsunami detection focus on detection unusual sea-level fluctuations and confirmed with additional data like seismic, CCTV, oceanic radar, volcanic activities or event community reports. BMKG will receive information about increased sea volcano activity with tsunami potential from PVMBG (Indonesian Center for Volcanology and Disaster Mitigation).

If there is a notification (alert) from InaTNT Sea Level Monitoring System or captured by CCTV and/or if officers receive information from people/community, then the shift officer checks whether there are sea level rise anomalies observed at the nearest location. Officers checked the website https://magma.vsi.esdm.go.id/ for real-time information to confirm regarding volcanic eruption information as well.



If the anomalous rise in sea level from InaTNT is identified and determined to be a tsunami by officers and leaders from the Earthquake and Tsunami Center, then shift officers will immediately disseminate tsunami early warning information through Tsunami Bulletin 3 until the end of the tsunami threat closed by Tsunami Bulletin 4. BMKG will ensure information is sent to stakeholders and holding a press conference after ending the tsunami early warning.

5. Tsunami Standard Operating Procedures for a Distant Tsunami (when a distant tsunami hazard exists)

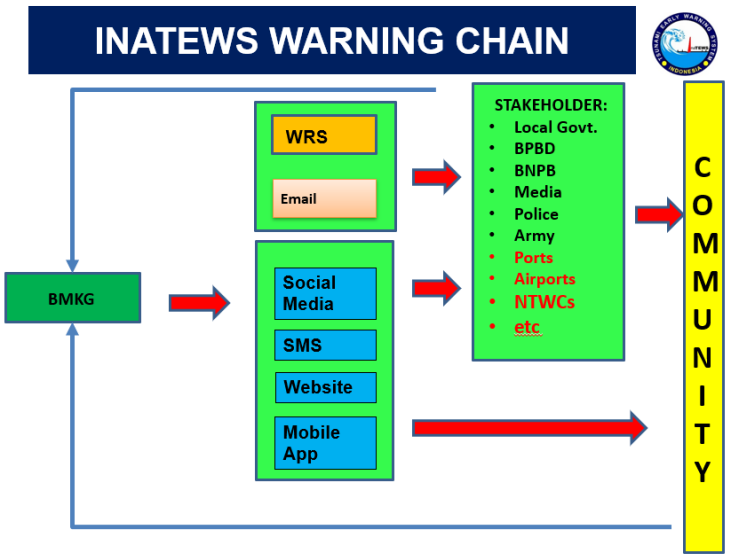
The organization who responsible and has authorization for identifying and characterizing tsunamigenic events in Indonesia is the Indonesian Meteorological, Climatological, and Geophysical Agency (Badan Meteorologi, Klimatologi, dan Geofisika or BMKG). The BMKG is the government agency in Indonesia responsible for monitoring and providing information about earthquakes and tsunami early warnings. BMKG has become the focal point of the Indonesia Tsunami Early Warning System (InaTEWS) in place to detect and respond to potential tsunamis in the region. The BMKG, besides serving as the National Tsunami Warning Center (NTWC), also acts as a Tsunami Service Provider (TSP) for the Indian Ocean region in collaboration with India and Australia. BMKG also receives information from all warning centers across the Indian Ocean, Pacific Ocean, and South China Sea. From these sources, BMKG gathers critical data to monitor and identify potential tsunami that may affect especially in the Indonesian and Indian Ocean region.

The BMKG addresses potential distant tsunami threats based on predefined cluster areas (Area A, B and C), each of which has distinct response times and handling procedures. The decision to issue early tsunami warnings relies on the proposals generated by the Decision Support System TOAST based on detected earthquake event with appropriate magnitude as an input.

The organization that typically acts on the information provided by the agency responsible for characterizing the potential tsunami threat in Indonesia is the Indonesian National Disaster Management Agency, known as "Badan Nasional

Penanggulangan Bencana" or BNPB in Indonesian. BNPB is the government agency responsible for coordinating disaster management and response efforts in Indonesia. BNPB plays a central role in disseminating warnings to the public, coordinating evacuation efforts, and implementing disaster response measures to mitigate the impact of the tsunami.

Tsunami early warning information in Indonesia is disseminated by BMKG through a multi-mode system to ensure that as many people as possible receive timely and accurate information. BNPB receive information from BMKG and are responsible for disseminating warnings to various government agencies, local authorities, and the public. Local Disaster Management Agencies: At the local level, there are disaster management agencies in provinces and districts. These agencies receive information from BNPB and are responsible for implementing disaster response plans, including evacuations if necessary. They also disseminate information to their local communities. The dissemination of tsunami information in Indonesia is a collaborative effort involving government agencies, local authorities, media outlets, and technology to reach as many people as possible and ensure their safety during tsunami events. It's important for individuals in tsunami-prone areas to be aware of these channels and to follow evacuation instructions when a warning is issued.



BMKG will issue an "all-clear" announcement or tsunami threat termination once it is determined that the tsunami threat has passed or is no longer significant. This indicates that it is safe for evacuated residents to return to their homes and for normal activities to resume. If a tsunami occur, following this information, relevant institutions can promptly initiate the necessary response actions on the ground in the affected areas.

During the intersessional period, various actions are taken in response to tsunami bulletins issued by organizations such as the Pacific Tsunami Warning Center (PTWC), Northwest Pacific Tsunami Advisory Center (NWPTAC), and South China Sea Tsunami Advisory Center (SCSTAC). The specific actions taken may include:

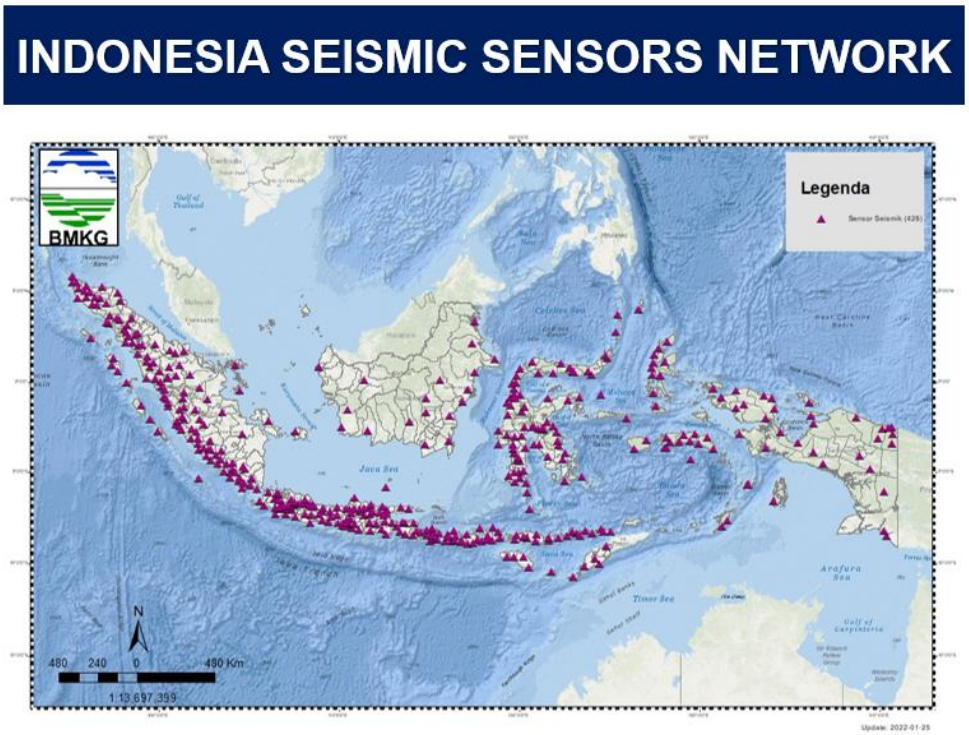
1. Communication and Coordination: Relevant government agencies, emergency management organizations, and coastal communities are alerted to the tsunami bulletin. This involves disseminating information about the potential threat and the details of the tsunami event, including its expected arrival time and estimated impact.
2. Activation of Tsunami Warning Systems: Tsunami warning systems, including sirens, public address systems, and text messaging alerts, may be activated in coastal areas that are within the potential impact zone of the distant tsunami.

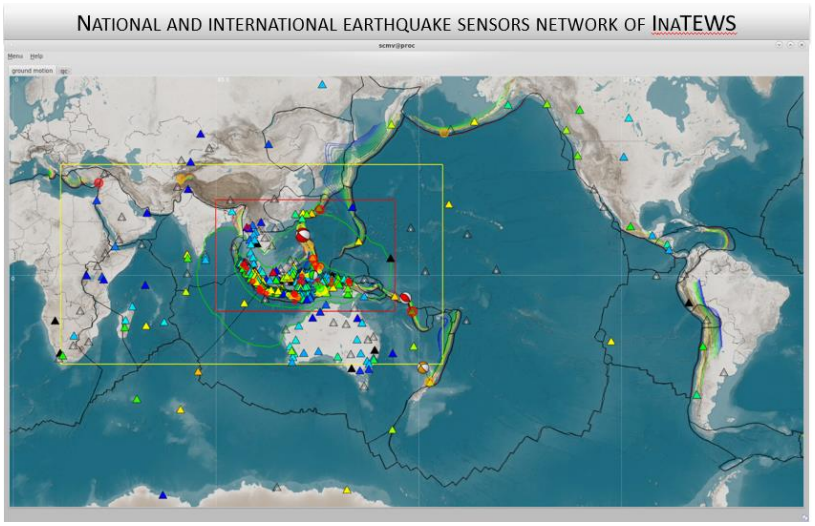
These systems are used to alert residents and visitors to the threat and provide evacuation instructions.

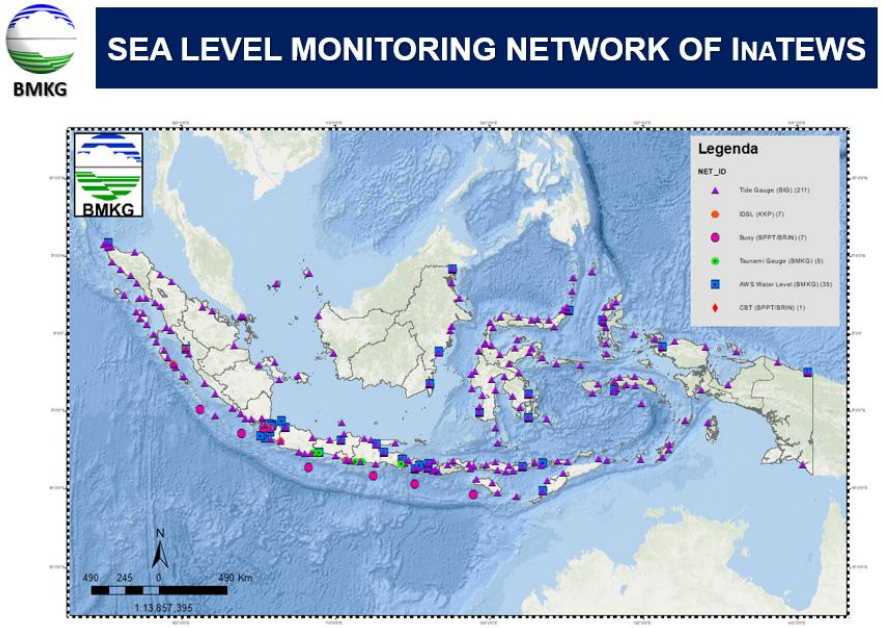
3. Coastal Monitoring: Continuous monitoring of coastal areas is conducted to assess sea level changes and tide gauges. This data is compared to the expected tsunami arrival time and height to determine if evacuation orders should be issued or canceled.
4. Coordination with International Agencies**: In cases of distant tsunamis originating in other regions or countries, relevant national agencies may coordinate with international tsunami warning centers and neighboring countries to share information and ensure a coordinated response.
5. Monitoring Bulletin Updates: Authorities and emergency management agencies closely monitor updates and bulletins from the tsunami warning centers. This includes tracking any changes in the projected tsunami wave height and arrival time.
6. Crisis Communication: A designated spokesperson or agency communicates regularly with the media and the public, providing updates on the situation, any changes to the threat level, and instructions for residents and visitors.
7. Recovery and Assessment: After the distant tsunami threat has passed or is deemed no longer significant, authorities assess the situation, provide information on when it is safe to return to evacuated areas, and begin recovery efforts if necessary.

6. National Sea Level Network

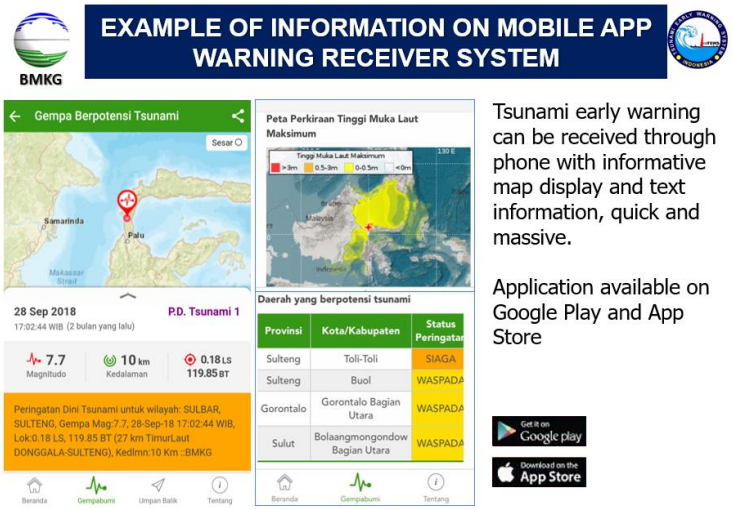
BMKG currently has 438 seismic sensors and a water level monitoring network integrated into the InaTNT system of 382 stations. BMKG also utilized seismic data from international data sharing to improve quality of earthquake parameter.







7. Information on Tsunami occurrences



Tsunami early warning can be received through phone with informative map display and text information, quick and massive.

Application available on Google Play and App Store

Get it on Google play

Download on the App Store

8. Web sites (URLs) of national tsunami-related web sites

https://inatews.bmkg.go.id/
https://rtsp.bmkg.go.id/
https://inatnt.bmkg.go.id/

9. Summary plans of future tsunami warning and mitigation system improvements.

- Expanding tsunami scenario database as well as improvement bathymetry and topography data
- Utilization of GNSS data for earthquake magnitude calculation, focal mechanism determination and verification of tsunami sources
- Integration accelerometer data to enhance hypocenter accuracy and develop new magnitude for earthquake in Indonesia
- Enhance seismic network and dissemination system
- Developed a New Earthquake and Tsunami Sistem Processing for InaTEWS
- GNSS real time integration
- Sea level real time integration
- Development of seismic sensor communication system by internet with openseedlink concept which located outside of BMKG Building (Cyber Building)
- Development of magnitude new formula according to tectonic characteristics of Indonesia
- Establish MT analysis catalog (focal mechanism)
- Added tsunami measuring equipment in each warning segment
- Tsunami symposium to commemorate the 20th anniversary of the Indian Ocean tsunami in Aceh on 2024

NATIONAL PROGRAMMES AND ACTIVITIES INFORMATION

BMKG Indonesia have public awareness national programmes and activities, such as SLG, BMKG Goes to School, and Indonesia Tsunami Ready Community Programmes:

1. The Sekolah Lapang Gempa (SLG) Earthquake Field School

- The SLG (Earthquake Field School) is a capacity building activity to enhance local government and community awareness and response
- LDMO, Community, Army, stakeholders related to the disaster management and reponse, School, community, private sector are involved.
- The scope of the SLG:
    1. Field Survey and advocating the implementation of the 12 indicators
    2. TOT Workshop of the SLG
    3. School Exercise

2. BMKG Goes to School

BMKG'S GOES TO SCHOOL

BMKG conducts an education activity for school:

- The natural warning
- How to response a big or long duration shaking
- How to prepare the Tsunami Ready School
- Tsunami Simulation

3. Indonesian Tsunami Ready Community Programme

4. OTGA 2022 - Tsunami Community Preparedness

In order to enhance tsunami preparedness within at-risk communities and support the UN Ocean Decade Science target of "100% community at risk is prepared and resilient," the BMKG Earthquake and Tsunami Center plays a role as a speaker in the Ocean Teacher Global Academy Tsunami Community Preparedness Training Course:

Time/ Place : 4-11 December 2022/ Bogor, Indonesia
Participant : 30 persons (Indonesia, Thailand, Seychelles, Filipina, Malaysia, Bangladesh)
Topic : Tsunami Community Preparedness

5. Other Activities:

10. EXECUTIVE SUMMARY

- BMKG (Badan Meteorologi, Klimatologi, dan Geofisika), Indonesia's Meteorology, Climatology, and Geophysics Agency as Indonesia Tsunami Early Warning System (InaTEWS) has some global role :
  1. as Tsunami Service Provider (Indian Ocean) for 28 countries along the coast of Indian Ocean
  2. as ASEAN Earthquake Information Center for 10 countries of ASEAN
  3. as NTWC of IO area
  4. as NTWC of Pacific Area
  5. as NTWC of SCS area
- Indonesia continuously develops systems and adds seismographs and tsunami gauges so that it can provide fast, precise and accurate earthquake and tsunami information.
- Indonesia is home to 5,744 villages situated in areas prone to tsunamis. Ensuring the safety and preparedness of these communities is a paramount mission. Today, we stand united in our commitment to educate and advocate for the fulfillment of the 12 essential indicators of tsunami readiness of UNESCO IOC. BMKG has advocating of nine vulnerable communities in Indonesia that are at risk of tsunamis. These communities are Tanjung Benoa, Glagah, Kemadang, Pangandaran, Panggarangan, Tambakrejo, Kuta Mandalika, Purus and Lolong Belanti. By 2030, we aim to make every at-risk community in Indonesia tsunami-ready.

11. NARRATIVE

Indonesia's Meteorology, Climatology, and Geophysics Agency (BMKG) as Indonesia Tsunami Early Warning System (InaTEWS) have target to Quickly detecting earthquake and inform tsunami early warning to stakeholders and get exact response from the community to reduce and minimize disaster impact

BMKG as InaTEWS has roles to build and operate equipments for earthquake observation and/or tsunami; and provision and dissemination of tectonic earthquake information and tsunami early warning main products is earthquake information and tsunami early warning which disseminate within 4 minutes after earthquake.

BMKG acts as coordinator/focal point on the Structural Component and reporting the strengthening and development of Earthquake Information and Tsunami Early Warning System to the President at any needed time

Until 2023 BMKG already have 438 seismometers as indonesia seismic sensors network and has 382 sensors of seal level sensors network and also get international support from :

- Germany (GFZ) : 21 stasiun seismik and technical capacity building
- Japan : 20 stasiun seismic and Technical capacity building
- China (GEA) : 14 station seismic and technical capacity building
- CTBTO : 6 station seismic and technical capacity building
- USA : technical capacity building
- Australia : Technical capacity building

BMKG (Badan Meteorologi, Klimatologi, dan Geofisika), Indonesia's Meteorology, Climatology, and Geophysics Agency, has been tirelessly advocating for the safety and preparedness of nine vulnerable communities in Indonesia that are at risk of tsunamis. These communities are Tanjung Benoa, Glagah, Kemadang, Pangandaran, Panggarangan, Tambakrejo, Kuta Mandalika, Purus and Lolong Belanti.

These communities have been identified as high-risk areas, and BMKG is actively working alongside local authorities, leaders, and residents to implement essential tsunami readiness measures. Through public education, early warning systems, evacuation plans, and community engagement initiatives, BMKG is striving to enhance the resilience of these communities against this natural hazard.

The collaboration between BMKG and these communities is a testament to our collective commitment to safeguard lives and property in the face of potential tsunamis. We applaud the dedication of all involved parties and encourage others to join in supporting these vital efforts.

Date: 12 September 2023 Name: Januar Arifin, Meita Katili, Mila Apriani