

Understanding earthquakes in Myanmar through digitalization, improved data processing and integration

Impact Story

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The above image shows earthquake monitoring equipment that allows the Department of Meteorology and Hydrology of Myanmar to collect and process seismic data information.

Nay Pyi Taw, Myanmar – In 2015, a 6.8 magnitude earthquake struck Myanmar's ancient city of Bagan, with more than 2,000 of iconic temples. Four people were killed and dozens of ancient structures known as pagodas were damaged. A tectonically active area with several high risk zones, earthquakes in Myanmar can reach a

magnitude of up to 8 making it one of the most earthquake-prone countries in the region. Many inhabited areas lie on tectonic faults in Myanmar including the capital city Nay Pyi Taw housing all state institutions headquarters and leadership in the country.



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Photo by ADPC

Experts from the University of Bergen, Norway, leading a group of seismologists from the Department of Meteorology and Hydrology of Myanmar to inspect earthquake monitoring equipment in Nay Pyi Taw.

The big shift: Digitalization of analogue monitoring and database

At the Department of Meteorology and Hydrology (DMH) in Nay Pyi Taw, the main seismic monitoring center operates to gather data from the field stations and issues earthquake information to the public. Much of the work used to be done manually and with limited functionality. However, a lot has changed in the last few years, as DMH's seismic experts now work with advanced technologies in seismology, and are in the process of integrating digitalized data from all seismic stations in Myanmar to a central software.

Thanks to "SeisAn", an open source free software for seismic analysis and monitoring, as well as capacity development programs through hands-on exercises by ADPC and the University of Bergen, Norway, DMH'S seismologists can now monitor all seismic events, and determine epicenters as well as possible affected areas much faster. SeisAn is a system, which integrates all data gathered from seismic monitoring stations and allows to analyze data from even the slightest movements of underground tectonic plates, which are the sources of earthquakes. The ability to process and store such information will, in the long-term outlook, allow for an extensive seismic archive and development of Myanmar's own seismic models.

At DMH seismic monitoring center's situation room, several seismological officers participate in a workshop on seismic data processing with SeisAn software delivered by Mr. Hasbi Ash Shiddiqi from University of Bergen. "This is an informal training based on previous workshops, which we spontaneously organized to teach the program to new staff and others from the department. We focus on data processing, so DMH officers know the right procedures to calculate magnitude, research velocity and scale," says Mr. Shiddiqi.

Ms. Pa Pa Tun, one of DMH's seismological team members with 10 years of experience at the department, has been trained on using SeisAn. She said: "earlier, we used to monitor earthquakes manually, and couldn't detect or analyze events weaker than 3.0. We only had paper-based database. Now with digitalized monitoring system we can integrate data from all seismic stations across the country and in 2 to 3 years of gathering data, we will be able to develop an archive and more long-term scenarios." Ms. Pa Pa Tun adds that the ADPC-facilitated trainings by the Norwegian experts will improve the capacity of DMH tremendously because most of the current staff came from the background of physics and mathematics, and not seismology.

Developing Myanmar's own seismic monitoring model

In 2017, Ms. Pa Pa Tun will participate in a study and research trip to University of Bergen in Norway. Her colleague Mr. Tun Lin Kyaw has just returned from such capacity development visit and is excited about the new capabilities DMH is developing for more effective seismic monitoring. "During each research trip we first evaluate what our technical problems are. Mainly, it is about various digitizers provided by different countries. We have to have them in one format. Once this process is finished, we will have data from all stations in Myanmar. As more stations are built, even a small seismic event will be recorded and archived," said Mr. Tun Lin Kyaw.

Mr. Tun Lin Kyaw and University of Bergen experts have been developing a seismic model for Myanmar. "Back in 2014, we didn't even have a database; now we have software system to store data and archive them. Earlier, we had to work with seismic data from other countries; now we can work more independently. The last thing missing is Myanmar's model," Mr. Tun Lin Kyaw explains.

For DMH's Director General Dr. Hrin Nei Thiam, regular research and study trips of the seismic department's staff to University of Bergen are an added value of the project besides the capacity development workshops conducted

by the Norwegian experts in Myanmar. "Without this, it would be difficult to get this opportunity. Our seismological department needs more digitalization. Scenario building is very important. With capacity building and necessary infrastructure, we can better serve the public," she says.

Digitalization and integration of seismic data is the key first step in strengthening the capacities at DMH's seismology department, says Dr. Peeranan Towashiraporn, Director, ADPC. "Having the capability to detect, analyze, and understand earthquakes will move DMH closer to being able to disseminate information on earthquakes and provide tailored advisory messages to other government agencies and the general public. Such mechanisms hadn't been properly in place in Myanmar."

The next important step for Myanmar's seismology will be to ensure that the technical enhancement is supported by right policies. The last challenge will be the revision of Standard Operating Procedures for DMH to improve the process and flow of information from the field stations all the way to the management of DMH. In addition, there should be a process in place for tailor-made messages to government, state agencies and the public. "We've already seen a major change in the mindset as a result of the increased capacity of DMH's seismological staff, who are proactive in their projects and work, and networking with the Norwegian experts," says Dr. Peeranan Towashiraporn, adding that with such a good base, the policy improvement should be a realistic goal.



As the training group of seismologists look on, a staff member from the Department of Meteorology and Hydrology of Myanmar checks earthquake monitoring equipment for any damage.

PROJECT DETAILS:

Improving Seismic Monitoring and Data Integration Capability in Myanmar

June 2012 - December 2017

Donor: Ministry of Foreign Affairs, Norway

Key Activities:

- Assess the state of the Department of Meteorology and Hydrology's existing seismic network and capacity to process and analyze earthquake data to identify critical needs and gaps
- Introduce modern techniques and tools to systematize and integrate the country's seismic network and improve earthquake data collection, processing, and analysis of the Department
- Develop specific protocols and standard operating procedures to enhance regular Department operations in terms of seismic data processing, archiving, and dissemination
- Conduct capacity building activities through hands-on training, knowledge and technology-sharing workshops, peer-to-peer learning, and short- and long-term staff exchange programs to enhance skills and knowledge of the Department on seismic monitoring and seismic hazard assessment



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