

**Endorsing the Advisory on the Use of Caves as Refuge or Shelters to the National Disaster Risk Reduction and Management Council (NDRRMC)**

**WHEREAS**, The Philippines, being one of the most disaster-prone countries in the world, experiences calamities such as typhoons, flash floods, earthquakes, and landslides, which cause loss of life and property damage throughout the year;

**WHEREAS**, there are communities and individuals reported to have been using caves during calamities;

**WHEREAS**, there are cases when caves are used as shelters and refuge as influenced by culture;

**WHEREAS**, the Mines and Geosciences Bureau (MGB), as member of the NCC, provided an advisory to the NCC on the reasons as to why caves should not be used as refuge particularly during calamities such as:

1. During typhoons and other inclement weather conditions that may bring intense and long duration rainfall, caves should not be used as evacuation and/or temporary shelters and should also be closed to tourists, spelunkers and other cave enthusiasts;
2. Cave systems in the Philippines are generally highly susceptible to subsidence and roof collapse. The collapse maybe slow or very fast without any warning signs. The country, being tectonically active, has many caves in karst terrain near active faults and trenches that are characterized by numerous fractures, spalling roofs and landslides. Many caves are dissected by faults;
3. Caves are also susceptible to subterranean flash flooding during high peak discharge of underground stream and/or surface water that might shift to underground route due to heavy rainfall;
4. Ponding or shifting of subterranean creeks/river route is possible during high peak discharge that will lead to oversaturation, dissolution and erosion of carbonates soil and rocks, and thereby resulting in weakening of underlying support, cave collapse and debris flow;
5. Cave openings near shore or those that exit below sea level are prone to coastal flooding due to storm surges and abnormally high tide level;
6. In active areas affected by both tectonic and eustatic sea level rise and fall, cave networks are multi-level. These are characterized by numerous buried sinkholes and multilevel chambers which are sometimes filled-up with water, soil and unconsolidated debris. These appear to be stable cave floors but may collapse due to overloading once occupied as shelter;
7. Cave and sinkhole collapse are not only due to ground shaking because of earthquake, but also caused by gravity, lowering of water table, flooding and ponding of subterranean rivers;
8. Unventilated portion of a cave may be filled-up in time with extremely toxic gases like carbon dioxide, carbon monoxide, sulphur dioxide, ammonia and methane. Moreover, "foul air" or "bad air" inside caves has an abnormal physiological effect to humans;

**WHEREAS**, The National Cave Committee (NCC) is the implementing body of the Cave Management, Protection and Conservation Program (CMPCP) under Section 11 of DENR Administrative Order No. 2003-29 (Implementing Rules and Regulations of RA 9072), which has components of Resource Management and Utilization, Visitor Management, Conservation, Education and Public Awareness;

**WHEREAS**, The NCC is concerned with the protection of caves and the safety of its visitors;

**WHEREAS**, The National Disaster Risk Reduction and Management Council (NDRRMC), created through the Republic Act 10121, Philippine Disaster Risk Reduction and Management Act of 2010, is the agency mandated to prepare for and respond to, natural calamities, like typhoons and earthquakes;


**WHEREAS**, The NCC recognizes the mandate of NDRRMC in disaster risk reduction and management (DRRM);

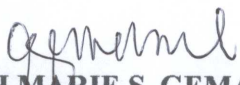
**WHEREAS**, The advisory from MGB is adopted by NCC and was recommended for the endorsement to NDRRMC;

**WHEREFORE, BE IT RESOLVED AS IT IS HEREBY RESOLVED**, The NCC resolution is hereby endorsed to the NDRRMC for their consideration in the implementation of their mandate;

ENDORSED this 20 day of February 2017, at Quezon City, Philippines.

  
**ANGEL P. BAUTISTA**  
National Museum

  
**LIZA SOCORRO J. MANZANO**  
Mines and Geosciences Bureau

  
**SARAH MARIE S. GEMANIL**  
Department of Tourism Office of Tourism  
Standards and Regulation

  
**NELSON P. DEVANADERA**  
Palawan Council for  
Sustainable Development Staff



**MARK DIA**  
Gaia Exploration Club



**JOSE DOMINICK S. GUBALLA**  
U.P. National Institute of Geological Sciences



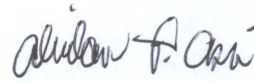
**KIT CHRISTIAN B. JORVINA**  
Department of the Interior and Local Government  
Bureau of Local Government Supervision



**JENNIFER G. GALORPORT**  
Department of the Interior and Local Government  
Bureau of Local Government Development



**VICENTE CATAJOY**  
League of Municipalities of the Philippines



**ALVIDON F. ASIS**  
League of Cities of the Philippines



**ANGELICA J. SANCHEZ**  
League of Provinces of the Philippines



**ALEX A. SANTOS**  
Filipino Cave Divers



**ALVIN R. ALCID**  
National Historical Commission  
of the Philippines



**THERESA MUNDITA S. LIM**  
Biodiversity Management Bureau  
Chair, NCC

## MGB Inputs to Cave Safety and Protocol

During typhoons and other inclement weather conditions that may bring intense and long duration rainfall, caves should not be used as evacuation and/or temporary shelters and should also be closed to tourists, spelunkers and other cave enthusiasts.

The following are the reasons for the aforementioned recommendation:

1. Cave systems in the Philippines are generally highly susceptible to subsidence and roof collapse. The collapse maybe slow or very fast without any warning signs. The country, being tectonically active, has many caves in karst terrain near active faults and trenches that are characterized by numerous fractures, spalling roofs and landslides. Many caves are dissected by faults.
2. Caves are also susceptible to subterranean flash flooding during high peak discharge of underground stream and/or surface water that might shift to underground route due to heavy rainfall.
3. Ponding or shifting of subterranean creeks/river route is possible during high peak discharge that will lead to oversaturation, dissolution and erosion of carbonates soil and rocks, and thereby resulting in weakening of underlying support, cave collapse and debris flow.
4. Cave openings near shore or those that exit below sea level are prone to coastal flooding due to storm surges and abnormally high tide level.
5. In active areas affected by both tectonic and eustatic sea level rise and fall, cave networks are multi-level. These are characterized by numerous buried sinkholes and multilevel chambers which are sometimes filled-up with water, soil and unconsolidated debris. These appear to be stable cave floors but may collapse due to overloading once occupied as shelter.
6. Cave and sinkhole collapse are not only due to ground shaking because of earthquake, but also caused by gravity, lowering of water table, flooding and ponding of subterranean rivers.
7. Unventilated portion of a cave may be filled-up in time with extremely toxic gases like carbon dioxide, carbon monoxide, sulphur dioxide, ammonia and methane. Moreover, "foul air" or "bad air" inside caves has an abnormal physiological effect to humans.

**Photo Documentation  
(Subsidence involving Caves in the Philippines)**

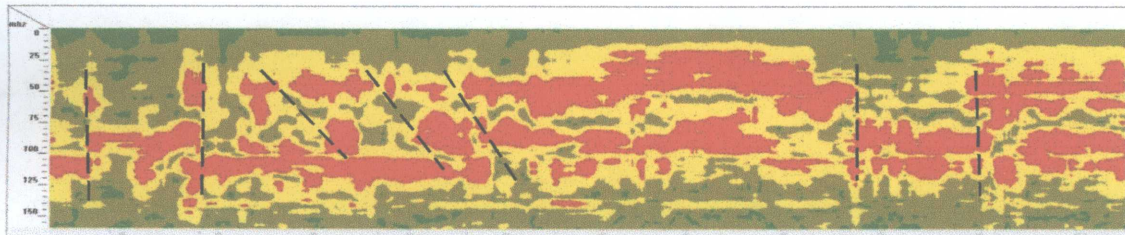


Sinkhole collapse in Antequera, Bohol due to October 2013 Bohol earthquake



Cave roof collapse in Tagbilaran City, Bohol due to October 2013 Bohol earthquake

**GPR - GENERATED IMAGE PARALLEL IN SANTA CRUZ  
ELEMENTARY SCHOOL, BRGY. POBLACION, MARIBOJOC, BOHOL**



**LEGEND :**

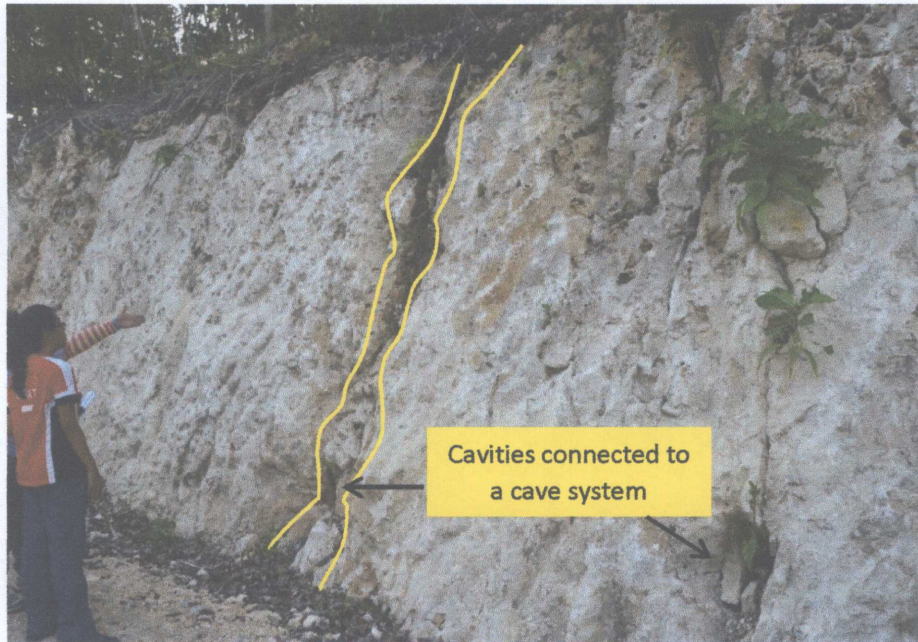
- |   |  |
|---|--|
|  Cavities / Void |  Calcareous Mud |
|  Limestone       |  Soil Layer     |

 DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES  
**MINES AND GEOSCIENCES BUREAU**  
North Avenue, Diliman, Quezon City

Radargram image of cave system showing displacements



A tension crack dissecting a hill where a cave is located in  
Maribojoc, Bohol



Cavities adjacent to a cave system found within a structurally controlled area. Presence of fault and highly fractured limestone outcrop located in the Anda, Bohol imply active tectonic movements.