

# GEOSCIENCES DIVISION

## VULNERABILITY AND RISK ASSESSMENT

One of the major contribution of the Mines and Geosciences Bureau to the Disaster Risk Reduction Management / Climate Change Adaptation initiatives of the National Government thru a new project, Vulnerability and Risk Assessment (VRA) which started in year 2015. With the accomplished geohazard maps as a key input, VRA primarily aims to generate exposure maps of the population, build-up areas and lifeline infrastructures such as roads to rain-induced hazards such as flooding and landslides. It however also provides an opportunity to update the existing geohazard maps and validate those cities or municipalities in which the 10K geohazard mapping and assessment was undertaken thru outsource and thru MOA with mining companies.

10K Geohazard Maps and the hazard exposure maps generated by the VRA activity proved useful to the Local Government Unit as a vital input in their respective Contingency Planning, Preparedness and Mitigation Plan for Disaster Risk Reduction as well as their integration with the Comprehensive Land Use plan.

For CY 2017, twelve (12) municipalities of Caraga Region were covered by the VRA program (Figure 1). These are:

1. Magallanes, Agusan del Norte
2. Las Nieves, Agusan del Norte
3. Sibagat, Agusan del Sur
4. Santa Josefa, Agusan del Sur
5. Tago, Surigao del Sur
6. San Miguel, Surigao del Sur
7. La Paz, Agusan del Sur
8. San Jose, Province of Dinagat islands
9. San Luis, Agusan del Sur
10. Talacogon, Agusan del Sur
11. Bunawan, Agusan del Sur
12. Rosario, Agusan del Sur

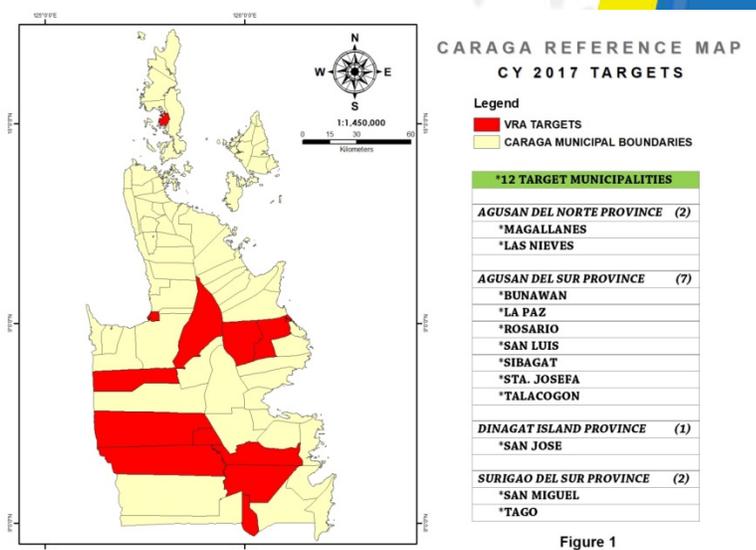


Figure 1

Updating of 1:10,000-scale landslide and flood susceptibility geohazard maps of San Miguel, Surigao del Sur generated by SRDP Consultancy Services was done during the VRA activity.

## VRA in Magallenes, Agusan del Norte:



A rockfall incident in Purok 3, Brgy. Taod-oy with the debris materials blocking a segment of a gravel-paved secondary road (MGB fieldmen for scale).



Guiasan Elementary School which is located in a flood prone area. Right photo shows a school teacher pointing the usual flood height experienced by the school during heavy rains.



Photos show a river protection installed along the confluence of the Taguibo River to the Agusan River in Brgy. Poblacion in response to flood hazards.

## VRA in Las Nieves, Agusan del Norte



Pinana-an Elementary School at Brgy. Pinana-an, Las Nieves, Agusan del Norte are exposed to high to very High flood susceptibility.

## VRA in Sta. Josefa, Agusan del Sur



Local residence pointing out the highest flood height they experienced in Purok 3 of Barangay Concepcion. Geographic coordinates 7° 59' 06.4" north latitude 126° 00' 12.1" east longitude.

Residents of prk. 2-C, Brgy. Lingayao, Las Nieves, Agusan del Norte were exposed to high flood susceptibility.



Photo shows residence pointing out the highest flood level of road network going to Aurora Elementary School in Purok 4 Barangay Aurora. Inaccessible when heavy rainfall strikes. Geographic coordinates 8° 00' 49.8" north latitude 126° 01' 03.5" east longitude



Lingayao Elementary school in Brgy. Lingayao, Las Nieves, Agusan del Norte is exposed to moderate to high flood susceptibility.

## VRA in Sibagat, Surigao del Sur



Residents of Prk. 5, Brgy. Tag-oyango, Las Nieves, Agusan del Sur are exposed to moderate flood susceptibility.



A landslide at the back of one of the school building in San Isidro Elementary School in Brgy Afga occurred last April 2017 due to heavy rainfall.



Road cut along Prk 5, Sitio Kahayagan, Brgy. Del Rosario, Sibagat, Agusan del Sur - named as "Tacluban" due to frequent landslide along the road due to very steep slope. rainfall.

## VRA in San Miguel, Surigao del Sur



Photo of Bitaugan creek going to Brgy Bitaugan proper, unable to cross during heavy rainfall due to increase of water level. Geographic coordinates 9° 02' 19.0" North latitude 125° 53' 48.2" East longitude.

A riverbank erosion scouring a gravel-paved road in Purok Bacan-Bacan, Brgy. Layog affecting the gravel-paved barangay road and some houses nearby.



Road network going to Barangay Bitaugan showing muddy and highly damage which hard to access on motorcycles crossing the road. Geographic coordinates 9° 01' 42.4" North latitude 125° 53' 28.5" East longitude.

Segments of gravel-paved dirt road which are highly and moderately susceptible to flood in Brgy. Caras-an (Left) and Umbay (Right), respectively.



Active river scouring in Cagdao creek embankment spotted in Purok 5-B of Barangay Castillo. The observed scoured was almost hit the access road in the area. Geographic coordinates 8° 54' 53.6" North latitude 125° 57' 55.0" East longitude.



Farm-to-market road in Brgy. Badong which is very high in flood inundation, about 2 meter flood height is reported due to riverine flooding from the Tago River.



Photo of local residence in Barangay San Roque Purok Daan II pointing out the highest flood height they experienced. Geographic coordinates 8° 54' 14.7" North latitude 126° 00' 14.3" East longitude.



## VRA in San Luis, Agusan del Sur



Road network going down to Barangay Binicalan proper showing muddy and rough, difficult to access on motorcycles crossing the area especially in bad weather condition. Geographic coordinates 8° 22' 26.4" north latitude 125° 33' 17.7" east longitude.



Local residence point out the highest level of flood water they experienced during heavy rainfall and typhoon located in Purok 3 Barangay Don Alejandro. Geographic coordinates 8° 26' 38.5" north latitude 125° 43' 11.8" east longitude.



Massive landslide at road network Purok 7 Barangay Don Alejandro occurred last January 2017 brought by intense heavy rainfall. Geographic coordinates 8° 23' 32.5" north latitude 125° 41' 02.7" east longitude.

## VRA in Talacogon, Agusan del Sur



Geotagging of Sabang Gibong Elementary School in Purok 1 Barangay Sabang Gibong. School building was installed on elevated flooring with approximate height of 2.50-3.0 meters to avert flood hazard. Geographic location 8° 19' 24.78" north latitude 125° 53' 18.4" east longitude.



View of residential houses in Sitio Tumulog Barangay Zillovia located on a slope terrain. Barangay Zillovia falls under moderate to high landslide susceptibility. Geographic location 8° 20' 23.2" north latitude 125° 31' 28.4" east longitude.



Local residence pointing out the highest flood height they experienced in Purok 3 Barangay San Nicolas. Building on the picture is the Talacogon National High School. Geographic location 8° 27' 31.1" north latitude 125° 46' 51.7" east longitude.



View of floating residential houses situated in Agusan River Purok Sampa Barangay San Agustin, which are highly prone to flash floods. Geographic location 8° 27' 05.2" north latitude 125° 47' 13.9" east longitude.

## VRA in Bunawan, Agusan del Sur



Photo showing 3 houses was observed near landslide prone area located at Purok 8, Bunawan Brooks, Bunawan. This site is a quarry for backfilling purposes. The wall is estimated to be around 15 – 20 meters. Distance from the house to the wall is ranging 3 – 5 meters.



Photo showing the condition of bridge from Libertad proper going to Purok 9 along Simulao River. GPS Coordinates: N8 06 28.6 E126 01 33.7



Photo showing the flood height markers on the post of Evacuation Center in Campo 6, Barangay Nueva Era were flood height reaches up to 9 ft.



Floating houses of Prk. 7, Brgy. San Marcos, Bunawan, Agusan del Sur are exposed to very high flood susceptibility

Houses exposed to high to very high flood susceptibility at Prk 2, Brgy. San Marcos, Bunawan, Agusan del Sur



## VRA in Rosario, Agusan del Sur



Photo showing the Jose Cuyos Sr. Elementary School is located in a landslide prone area. This picture is facing east. Geographic Coordinates: N8 18 02.4 E126



Sheet flooding was observe along barangay site of Tagabayan, Rosario. Geographic Coordinates: N8 22 10.1 E125 58 05.1



Photo showing the flood height in Purok 4, Wasi-an.

## VRA in San Jose, Prov. Of Dinagat Islands



Panoramic view of built up areas in San Jose, Dinagat



Drainage canals were installed along road sections of barangay Cuarinta, Dinagat

## VRA in La Paz, Agusan del Sur



Located at Purok 1 of Brgy. Valentina, La Paz. Photo showing houses built along the cliff, it is susceptible to moderate to high landslide. Creeping was observed along the area, tilting of coconut trees are one of the indicator of the ground movement. Which mean the ground is slowly moving which can be trigger by heavy rains and cause extreme ground movement.



Located at Purok 1 of Brgy. Panangagan, La Paz. Photo showing the flood height (red line), estimated 5 meters, during the extreme flooding happened in the Municipality last January 19, 2017. Overflow and backflow of the Adgawan River, Mah-mah creek and Panangagan creek are the main cause of the flooding of the said area.



Flood height (red line) of about 5-6 meters in Purok 1 of Barangay Sabang Adgawan due to overflow of Adgawan, Agusan, and Hibong River during the Typhoon Auring on January, 2017. The ponding of water lasted for about 4 months according to anecdotal accounts from the local residents. The area falls under very high susceptibility to flooding.



Flood height (red line) of about 3-4 meters in Sitio Minduyog of Barangay Lydia due to overflow of Adgawan River during the Typhoon Auring on January, 2017. The area falls under the category of very high flood susceptibility.

## Geohazard Survey & Assessment

### Vulnerability and Risk Assessment (VRA)

P/A/P	ANNUAL TARGET	ANNUAL ACCOM	% ACCOM
LGU Assessed	12	12	100%
Reports & Maps Produced	12	12	100%

### Updating of 1:10,000 Scale Geohazard maps as a Result of Changes due to Natural Calamities

P/A/P	ANNUAL TARGET	ANNUAL ACCOM	% ACCOM
LGU Assessed	1	1	100%
Reports & Maps Produced	1	1	100%

### Detailed Sub-surface Assessment

P/A/P	ANNUAL TARGET	ANNUAL ACCOM	% ACCOM
LGU Assessed	1	1	100%
Reports & Maps Produced	1	1	100%

Detailed Sub-surface assessment was conducted in Dagohoy, Bohol.

## CAPACITY BUILDING FOR GEOSCIENCES DIVISION PERSONNEL

As part of its continuing advocacy to capacitate technical personnel to further enhance their knowledge and skill in the performance of their tasks and/or promote their professional growth thru participation in seminars / conferences in their respective discipline, the following training programs were attended by staff of the division:

### A. Analytical Laboratory Personnel

Title of Training Program	Organizer / Sponsor	Date of Program	Venue	Name of Attendees
1. Training Workshop on Understanding ISO/IEC 17025 for Testing and Calibration Laboratories	Mines and Geosciences Bureau	May 8-9, 2017	Icon Hotel, Timog, Quezon City	Cecilia L. Consuegra Jusrit Elvie B. Seguis
2. Seminar-Workshop on Practical and cost Effective Minimization in Disposal of Laboratory Chemicals and	Mines and Geosciences Bureau	April 4-8, 2017	Icon Hotel, North Avenue, Quezon City	Cecilia L. Consuegra Archielyn C. Nimez

Workshop				Plaza
13. Seminar- Sustainable Development of Mineral Resources for the Mining Sector of the Philippines	Japan Oil, Gas, Metals National Corporation (JOGMEC)	January 29, 2017	Manila	Romeo M. Dalodado
14. 2017 Geoscience Workshop	Mines and Geosciences Bureau	January 16-21, 2017	Lima Park Hotel, Malvar, Batangas	Romeo M. Dalodado Elaine L. Galido Melvin A. Mantilla Liza t. Pacete Kate A. Boquilon

### **CONDUCT OF INFORMATION, EDUCATION AND COMMUNICATION (IEC) TO LOCAL GOVERNMENT UNITS (LGUs)**

The Geoscience Division participated and send personnel as resource person in RDRRMC-OCD organized Pre-Disaster Risk Assessment (PDRA) seminar-workshop. Presentation on the role of DENR-MGB in Pre-Disaster Risk Assessment was delivered during the following events:

1. Workshop for the Development of the Manual of Operations (MOO) for the Regional Disaster Risk Reduction and Management Council (RDRRMC) on March 29-31, 2017 at Almont City Hotel, San Jose Street, Butuan City
2. One (1) Day Orientation on Pre Disaster Risk Assessment (PDRA) for the 9 Island Municipalities of Surigao del Norte on May 7, 2017 at Tavern Hotel, Surigao City
3. Pre Disaster Risk Assessment (PDRA) Orientation for 11 Mainland Municipalities of Surigao del Norte on May 12, 2017 at Almont Inland Resort, J.C. Aquino Avenue, Butuan City.

The 10K geohazard quadrangle maps were also maintained and made accessible for download at the MGB Region XIII website at the following portal link: <http://www.mgbr13.ph/index.php/gsd-3/10k-geohazard-provinces-quadrangle/>

Other geohazard IEC materials such as flyers, pamphlets and VCD's were also provided during the Environmental Month IEC caravan in the Provinces of Dinagat Islands, Surigao del Norte, Surigao del Sur and Butuan City and during the Geosciences Division Press Conference and Caraga Mining Symposium held in Philippine Gateway Hotel on October 5-6, 2017.

Two (2) landslide warning signages were installed in Barangay Central, Placer, Surigao del Norte and in Purok 1, Poblacion, San Jose, Province of Dinagat Island assessed as highly susceptible to rain-induced landslide.

### **GEOHAZARD OPERATION CENTER**

The Geohazard Operation Center was operationalized during the occurrence of the February 10, 2017 Magnitude 6.8 earthquake in Surigao del Norte. Teams were organized to assess the extent of the damage from this event and includes assessments of infrastructures, earthquake-induced landslides and resulting slope instability and ground subsidence if any. Reports were generated and provided to the concerned LGU's and stakeholders affected by the earthquake.

A total of seventy two (72) DENR- MGB advisories on typhoon, tropical depression, low pressure areas were reissued.

### **COASTAL GEOHAZARD ASSESSMENT**

For CY 2017, coastal geohazard survey was conducted in fourteen (14) municipalities of Caraga Region (Figure 2), namely:

1. Barobo, Surigao del Sur
2. Lianga, Surigao del Sur
3. Bislig, Surigao del Sur
4. Hinatuan, Surigao del Sur
5. Del Carmen, Surigao del Norte
6. Socorro, Surigao del Norte
7. San Jose, Province of Dinagat Islands
8. Libjo, Dinagat Island
9. Lingig, Surigao del Sur
10. Tubajon, Province of Dinagat Islands
11. Basilisa, Province of Dinagat Islands
12. Loreto, Province of Dinagat Islands
13. Cagdianao, Province of Dinagat Islands
14. Dinagat, Province of Dinagat Islands

Coastal Mapping and Assessment was conducted by mapping the shoreline using handheld GPS receiver which are superposed on old topographic maps to determine whether the shore is eroding or accreting. Beach profiling was also done at selected segments of the coast to determine the morphology and to compare beaches or coastlines in different locations. Erosion evidences such as exposed roots of vegetation in the area, eroded roads and infrastructure were also noted. Existing mitigating structural measures such as seawalls or groins to minimize

erosion rates were likewise mapped. Field assessment were supplemented by interview with the locals to gather anecdotal records on longer-term coastal erosion rates brought about by normal conditions (alternate *amihan* and *habagat* periods) as well as extreme weather events like the passage of storms or typhoons.

Representative pictures of the activity are given in Annex B.

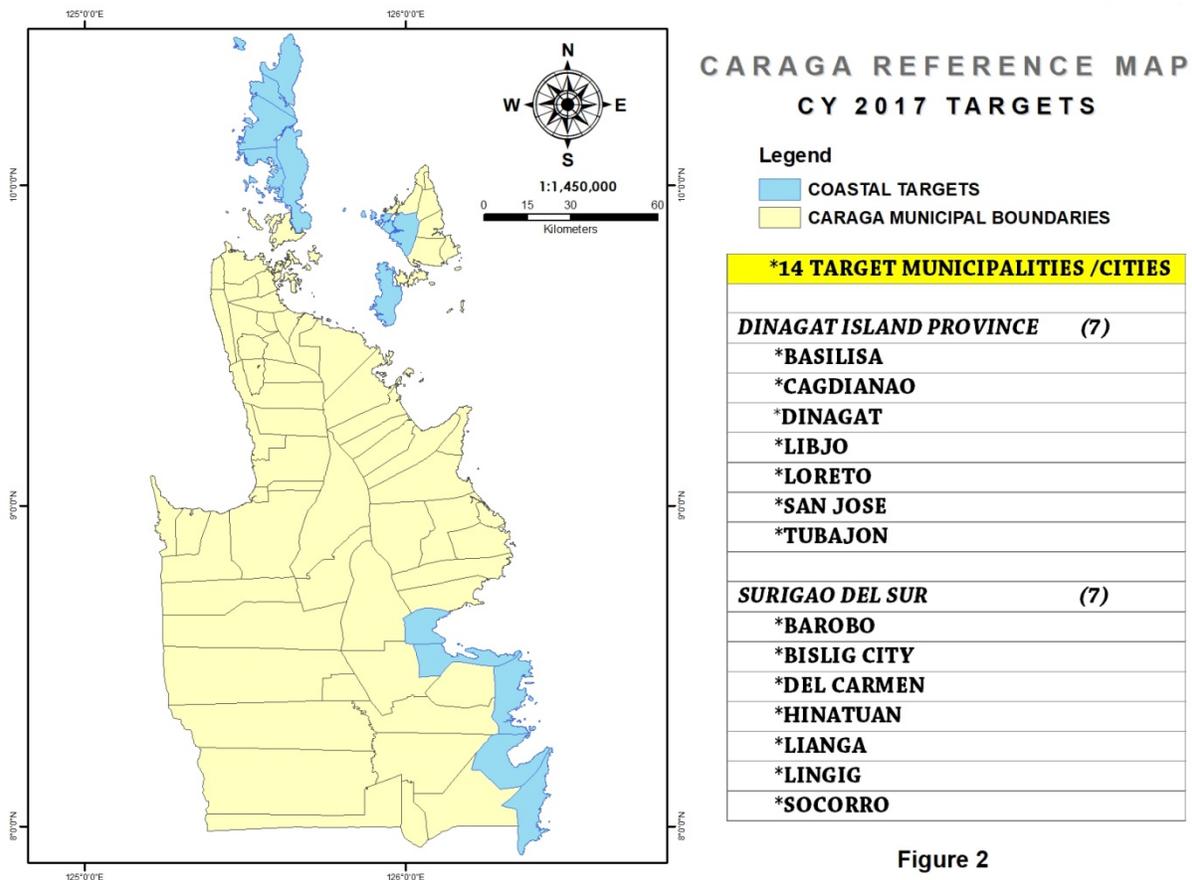


Figure 2

### Coastal Geohazard Assessment

P/A/P	ANNUAL TARGET	ANNUAL ACCOM	% ACCOM
LGU Assessed	14	14	100%
Reports & Maps Produced	14	14	100%

Some pictures taken during the conduct of Coastal Geohazard Assessment:



Houses along the coast in Brgy. Gamut which aside from being prone to coastal hazards, are also prone to rock fall from nearby steep slopes. Located in Barobo, Surigao del Sur



A view of Talisay Seaside Elementary School near the mangroves area in Brgy. Poblacion which is prone to coastal hazards. Located in barobo, Surigao del Sur

**Barobo, Surigao del Sur**

Houses within the mangroves area in Brgy. San Fernando which is prone to tidal flooding and storm surge.



Damages observed on the seawall along the coast in Brgy. Poblacion.

**Bislig City, Surigao del Sur**



Houses in Brgy. Tidman built beyond the seawall making them unprotected and vulnerable to coastal hazards.



Damages observed on the seawall in Brgy. Lacasa which are the effects of storm surges during typhoons that hit the area.

**Hinatuan, Surigao del Sur**

## Ground Water Resource Assessment:



Water sampling and water quality analysis at Loreto, Province of Dinagat Islands

## Hydrological and Hydrogeological Study:

Assisted Geologist in the conduct of hydrological and hydrogeological study at Krominco Inc., Province of Dinagat Islands



## ISO/IEC 17025:2017 Preliminary Systems Appraisal (Gap Analysis):

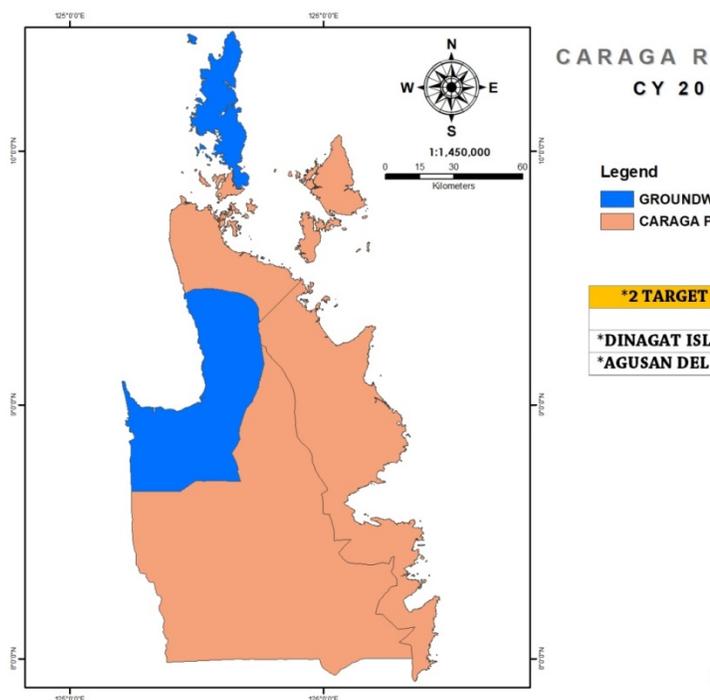


## GROUNDWATER RESOURCE ASSESSMENT

Two (2) Provinces of Caraga Region are the target of the Groundwater Resource Assessment program for this year namely the Province of Agusan del Norte (Tier 1) and the Province of Dinagat Islands (Tier 2). The Office duly accomplished the conduct of groundwater resource assessment of the twelve (12) LGU's of Agusan del Norte namely: Buenavista, Butuan City, Cabadbaran City, Jabonga, Kitcharao, Magallanes, Las Nieves, Carmen, Santiago, Nasipit, R.T. Romualdez and Tubay while under Tier 2, (7) LGU's of Dinagat Islands were covered namely: Basilisa, Cagdianao, Dinagat, Libjo, Loreto, San Jose and Tubajon (Figure 3).

It is envisioned that the output of this activity in the form of groundwater resource report, maps, and database will have a long-term impact in the delineation and identification of potential high water-yielding and good quality aquifer and water sources that could be tapped in the future by the LGU in response to climate change and increasing population and industrialization of communities.

Pictorials of the groundwater resource assessment activities are attached in Annex C.



### Groundwater Resources Assessment

P/A/P	ANNUAL TARGET	ANNUAL ACCOM	% ACCOM
LGU Assessed (Province)	2	2	100%
Reports w/ Maps Prepared	2	2	100%

Some of the pictures taken during the conduct of Groundwater Resources Assessment in the Provinces of Dinagat Islands & Agusan del Norte.



Buenavista, Agusan del Norte

Taking of water samples in Brgy. Abilan Purok 3. The deep well having a depth of 48.7 meters is the primary source of potable water in residence of Purok 3. Geographic location 8° 58' 05.0" north latitude 125° 27' 48.2" east longitude.



Butuan City

Separate spring type potable water source located at Purok 6 of Brgy. San Mateo. The left intake box supplies the whole barangay of San Mateo and is a project initiated by the barangay. The right intake box also supplies the Brgy. San Mateo and some portions of Brgy. Tungao and is a project by Brgy. Tungao. According to anecdotal accounts, the right intake box was previously a pump type (to reach higher portions of the barangay) intake box but wasn't persisted due to inability of the local residents to pay. Due to the dilemma, the locals decided to construct a tub near the water source for other residents to tap.



Basilisa, Province of Dinagat Islands

Water source in Purok 5, Brgy. Diegas, Basilisa is a spring enclosed by concrete box and supplies Puroks 3, 4 and 5. According to residents, they experience low discharge of water especially during summer.

Maximum depth of penetration: 35 meters

Survey line length: 111 meters

A GPR survey line was established on the proposed training/multipurpose center in Brgy. Caluasan starting from the southwest building going northeast. Two (2) cave systems were noted during the survey, one starts near the southwest building extending up to 28 meters and the other cave system starts around the 75-meter line up to the end of survey line which may extend further northeast. Cave system identified varies its depth around 5-8 meters and 5-11 meters respectively. Several displacements were also detected.

## MISCELLANEOUS GEOLOGICAL SERVICES

A total of twenty five (25) geological services were provided to various clientele during the year in review. This could be further categorized based on purpose as follows:

### Geohazard Identification Survey

As one of the mandatory requirement for securing an Environmental Clearance Certificate for housing projects and, optionally, other land development projects as deemed applicable by the Environmental Management Bureau (EMB), Geohazard Identification Survey (GIS) was conducted on the following proposed sites:

Name of Project	Proponent	Location
1. Marrea Homes Subdivision	Marrea Estate Corporation	Brgy. Cagbas, Bayugan City, Province of Agusan del Sur
2. N.H.A. Sta. Josefa Tribal Village	LGU Sta. Josefa, Agusan del Sur	Purok-8, Sitio Tagmaruno, Barangay Sayon, Sta. Josefa, Agusan del Sur.
3. IP Housing Project under National Housing Authority (NHA)	LGU Prosperidad, Agusan del Sur	Brgy. Aurora, Prosperidad, Agusan del Sur
4. Camella Butuan Phase 5	Land Use Conversion/Development and Environmental Consultancy	Brgy. Villa Kananga, Butuan City
5. Tandag City Memorial Garden	Hon. Vicente T. Pimentel, Jr., Provincial Governor, Surigao	Purok Pag-asa I, Barangay Rosario, Tandag City, Surigao

	del Sur	del Sur
6. Marie Louise Subdivision	Hon. Vicente T. Pimentel, Jr., Provincial Governor, Surigao del Sur	Sitio Tapo, Barangay San Isidro, Tandag City, Surigao del Sur
7. Socialized Housing Project	Kaugmarin Homedev, Inc.	P-4, Brgy. Manapa, Buenavista, Agusan del Norte
8. Green East Surigao Subdivision	Landreal Corporation	Brgy. Poctoy, Surigao City, Surigao del Norte
9. VCDU-Riverdale Subdivision	VCDU	Brgy. Libertad, Butuan City, Agusan del Norte
10. Socialized Housing Project	Kaugmarin Homedev, Inc.	Brgy. Ambago, Butuan City, Agusan del Norte
11. Camella Agusan del Sur	Land Use Conversion/Development and Environmental Consultancy	P-2, Brgy. Sta. Teresita, Bayugan City, Agusan del Sur
12. Camella Homes Butuan Phase 6 & Phase 7	Land Use Conversion/Development and Environmental Consultancy	Brgy. Villa Kananga, Butuan City, Agusan del Norte
13. Terra Verde Subdivision	VCDU	Brgy. Libertad, Butuan City, Agusan del Norte

### Solid Waste Disposal Site Suitability Assessment

As part of its technical support to the Environmental Management Bureau in evaluating the geological site suitability of proposed solid waste disposal sites prior to issuance of Notice to Proceed (NTP), Five (5) proposed sanitary landfill (SLF) / ecological solid waste management park (Eco-SWM Park) projects were assessed by the Office namely:

Name of Project	Proponent	Location
1. Sanitary Land Fill	Municipality of Santiago	Brgy. Curva, Santiago, Agusan del Norte
2. Sanitary Land Fill	Municipality of Alegria	Brgy. Julio Ouano, Alegria, Surigao del Norte
3. Eco-Solid Waste Management Park	Municipality of San Francisco	Brgy. Honrado, San Francisco, Surigao del Norte
4. Sanitary Land Fill	Municipality of General Luna, Siargao Island, SDN	Sitio Amindang, Brgy. Corazon, General Luna, Siargao Island, SDN
5. Eco-Solid Waste Management Park	Libjo Mining Corporation	Sitio Balite, Brgy. San Antonio, Libjo, Province of Dinagat Island
6. Sanitary Land Fill	Platinum Group Metals Corporation- Cagdianao Nickel	Sitio Kinalablaba, Brgy. Cagdianao, Claver, SDN

	Project	
7. Sanitary Land Fill	Municipality of Carrascal, Surigao del Sur	Sitio Quiyaoyawan, Brgy. Bon-ot, Carrascal, Surigao del Sur

**Geohazard Assessment in Response to the 6.7 Magnitude Earthquake that Occurred due to movement of the Surigao Segment of the Philippine Fault on February 10, 2017.**

Five (5) reports were generated to assess the damage and consequent risks posed after the occurrence of the main shock and numerous aftershocks of the earthquake. These reports are as follows:

1. Geohazard Spot Report on M6.7 Surigao Earthquake
2. Report on Landslide Assessment following the M6.7 Earthquake In Surigao City
3. Geohazard Assessment In the Reported Landslide at Purok13 at Sitio Pinaypayan, Mat-I, Surigao City
4. Report on Geohazard Assessment following the M6.7 Earthquake In Surigao City
5. Report on the Geohazard Assessment at Almont Beach Resort, affected by M6.7 Earthquake and Its Aftershocks

**Geohazard Certifications**

A total of eighty three (83) geohazard certifications were issued upon the request of Provincial / Local Government Units, National Line Agencies and schools for their proposed projects like construction of Farm to Market Road, Office / school buildings and eco-tourism sites. Geohazard certifications for proposed relocation/resettlement sites were also catered for budgetary purposes only since areas greater than one (1) hectare or if it has no Certificate of Non-Coverage for ECC from Environmental Management Bureau is still subject for Geohazard Identification Survey.

**Other Geological-related Assessments**

A Hydrogeological and Hydrological Study was conducted specifically on one of the watersheds in Loreto, Province of Dinagat Islands in relation to the Sangay-2 ore reserve of Krominco, Inc. with tenement reference MPSA 291-2009-XIII-SMR.