OPERATION

003: ADAPTIVE CAPACITIES OF HUMAN COMMUNITIES AND NATURAL SYSTEMS IMPROVED

PROGRAM 1: GEOLOGICAL RISK REDUCTION AND RESILIENCY PROGRAM

Geological Assessment for Risk Reduction and Resiliency Program (Geoscience Development Services)

Geohazard Assessment - Identification and Mapping of Geohazards for Critical Land Areas

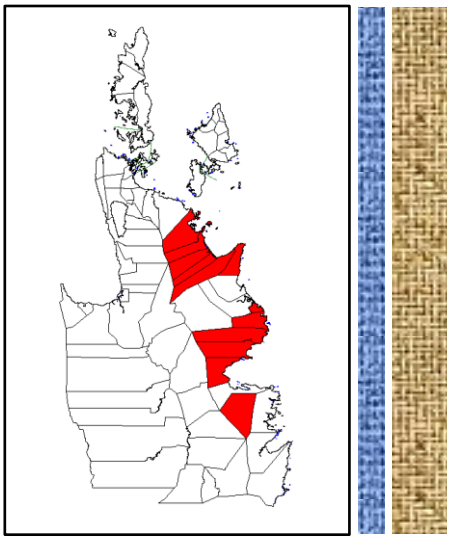
Land Geological Assessment
Field Mapping and Survey

Vulnerability & Risk Assessment & Updating

With the completion of the 1:10,000-scale geohazard mapping project, the Mines and Geosciences Bureau was tasked to continue its contribution 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 rain-induced susceptibility maps as a key input, VRA primarily aims to generate exposure maps of the population, build-up areas and lifeline infrastructures, specifically road networks to rain-induced flooding and landslides. It 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/or thru MOA with mining companies.

For this year, twelve (12) municipalities of the Province of Surigao del Sur were covered by the VRA program. These are:

1. Tagbina
2. Lianga
3. San Agustin
4. Marihatag
5. Cagwait
6. Bayabas
7. Cortes
8. Lanuza
9. Carmen
10. Madrid
11. Cantilan
12. Carrascal



Municipality of Tagbina, Surigao del Sur

Flood height (0.75m) in Purok 1 of Barangay Batunan near the Batunan Elementary School. The Hinatuan River and Candiisan River contributes to the moderate flood susceptibility in the area.

Wood bridge constructed over Linaw River (Subang Linaw) located at Purok 7 of Barangay Magsaysay. The bridge was flooded during typhoon Sendong and Pablo. Local residents evacuate on the nearby elevated area during the flood event.

Municipality of Lianga, Surigao del Sur

Purok 1-4 houses in Brgy. Liamtico vulnerable to tidal flooding due to proximity in shoreline Geographic Coordinate: 8° 33' 57.1'' N 126° 6' 44.4''E

Agac-Ac River in Purok 4 Brgy. Poblacion with no levee or dike to protect the nearby houses and road.

Municipality of San Agustin, Surigao del Sur

Drainage canal in Brgy. Hornasan near Sto. Niño National High School is not sufficient and may cause localized flooding in the area.

Overbank flooding occurs when the river channel overflow during heavy rains affecting the residents in Purok 3 Brgy. Janipaan

Brgy. Official in Buhisan showing the flood water level in Purok 5 during heavy rains. Geographic Coordinate: 8° 45' 3.81'' N 126° 12' 24.96''E

Municipality of Marihatag, Surigao del Sur

Shallow and damaged drainage canal adjacent to the gymnasium in Purok 3 of Barangay Amontay is noted and geo-tagged. Water overflows during moderate to heavy rainfall. Drainage systems or lack of it are essential factors which affect the flood situation of the area especially during typhoons. Important conditions, such as this, are noted for the technical report and updating of geohazard maps.

Active scouring (on red dashed lines) of the outer meander of the river in Purok Nangka of Barangay Bayan is noticeable as seen on the upper left side of this photo. The behavior of rivers like flow direction and current are correlated to communities and existing infrastructures adjacent to the area with regards to flood susceptibility.

Municipality of Cagwait, Surigao del Sur

Landslide and flood prone areas are noted in Barangay Unidad. Photo A shows recent manifestation of such event along the concrete road of Purok Mondalo. Debris fell from an approximately 3-meter high area (red dashed lines) but did not reach the road. There were no mitigating measures seen during the conduct of assessment. Unidad Elementary School (Photo B) in Purok Brotherhood sits on a foot slope. Trees such as coconut dominate the area which helps hold and stabilize the slope's angle of repose. A resident of Purok Mondalo showing the flood height (red dashed lines) experienced in the area which is about half a meter (Photo C). Lastly, Photo D shows slightly elevated houses due to stagnant flooded area in Purok Riverside.

Municipality of Bayabas, Surigao del Sur

National highway going to Tandag in Barangay Cagbaoto which is always flooded during intense rainfall. Highest flood height recorded was 1 meter according to anecdotal accounts.

Tabing-Dagat Elementary School situtated at Purok 1 of Barangay La Paz. The school previously serves as an evacuation center but the extent of the storm surge can reach the building. Currently, the school is no longer used as an evacuation center.

Municipality of Cortes, Surigao del Sur

View of River Scouring at Purok 8 of Barangay Mabahin due to typhoon Basayang affecting the road on the way to Purok 4 of the Barangay. Geographic location 9° 11' 11.15'' North latitude 126° 10' 7.36'' East longitude.

MDRRMC personnel pointing out the highest flood height approximately 1.5 meters rated as high flooding experience by the residence of Purok 7 Barangay Tigao. Geographic location 9° 13' 6.1'' North latitude 126° 10' 5.45'' East longitude.

Municipality of Lanuza, Surigao del Sur

Office hall of Barangay Bunga located at Purok 2 experienced moderate flooding approximately 1.0 meters height. Geographic location 9° 15' 18.54'' North latitude 126° 0' 32.29'' East longitude.

Purok 2 Barangay Agsam experienced moderate to high flooding approximately 1.20 meters. Geographic location 9° 13' 0.77'' North latitude 126° 2' 33.04'' East longitude.

Municipality of Carmen, Surigao del Sur

Photo showing the flood height located in Purok 1, Brgy. San Vicente.

This photo shows the condition of the old bridge located in Brgy. Hinapuyan which connects Brgy. Hinapoyan going to Carmen proper.

Photo showing the flood height located in Purok Duranta, Brgy. Poblacion in which indicates as low flooding. GPS Coordinates: N9.24035 E126.02542

Municipality of Madrid, Surigao del Sur

Photo showing the flood height in the premises of Madrid National High School located in Purok 2 which indicates low flooding susceptibility. GPS Coordinates: N9.25986 E125.96628

Photo showing the flood height (low flooding) of Purok 5, Brgy. Quirino experienced. GPS Coordinates: N9.25918 E125.95891

According to interview, they experienced moderate to flooding during TS Basyang that happened last February, 2018. GPS Coordinates: N9.27352 E125.95881

Municipality of Cantilan, Surigao del Sur

Residents in Purok 6 pointing the highest flood height they experienced during Typhoon Basyang.

Landslide was observed along the road cut of Brgy. Consuelo to Brgy. Magasang route.

Municipality of Carrascal, Surigao del Sur

Photo showing the high flood height experienced in Purok 6, Barangay Adlay, Carrascal, Surigao del Sur. GPS Coordinates: N9° 24’ 33.7’’ E125° 53’ 52.3’’.

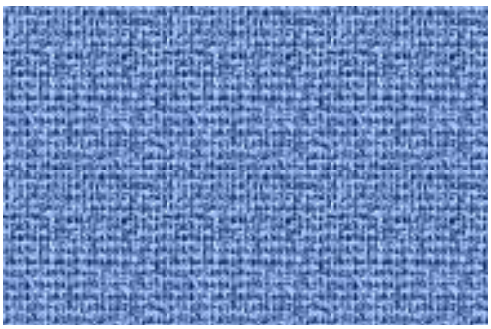
A landslide observed near a building in Camp David Primary School located in Purok 8- Sitio Ban-ban, Barangay Panikian, Carrascal, Surigao del Sur. GPS Coordinates: N9° 19’ 45.2’’ E125° 54’ 50.9’’.

Ground Subsidence Assessment

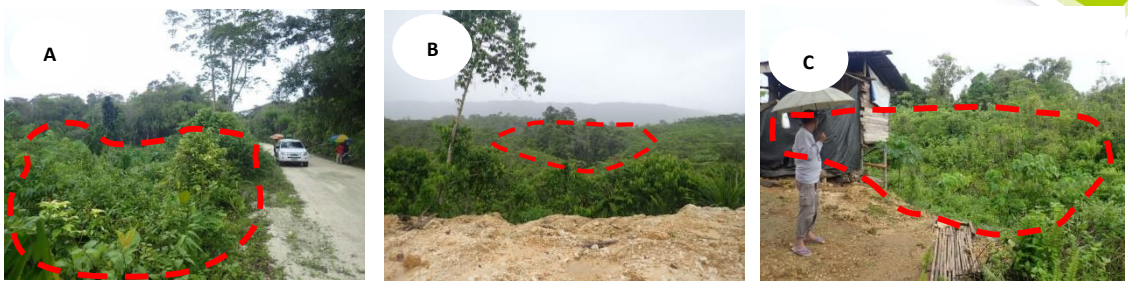
Ground (karst) subsidence assessment was conducted in the Municipality of Hinatuan, Province of Surigao del Sur which is predominantly underlain by limestone lithology. Presence of sinkholes were mapped and, in selected areas where community or built-up area are present, Ground Penetrating Radar (GPR) survey were conducted to determine presence of underground cavities and subterranean openings that has a potential to collapse.

Talisay

A) Cover solution observed at Enchanted River about 74.40 meters. **B**) Cover subsidence adjacent to Enchanted along road going to Barangay Cambatong. **C**) Cover collapsed noted along road going to Enchanted River approximately 1.30 meters in diameter. **D)** Photo of cover subsidence along the road going to Barangay Cambatong. **E)** A cover subsidence type of sinkhole located at lagoon area of enchanted River. It is approximately 0.70 meters in diameter and 0.3 meters depth. **F)** View of cover collapsed type of sinkhole located at the second cottage from the restroom of enchanted river.



Cambatong



A) Cover subsidence going to Barangays Portlamon, Campa, Harip and Baculin. **B)** Cover subsidence showing distinct vegetation along road to Barangay Cambatong with road outcrop. **C)** A cover subsidence type of sinkhole situated at Sitio Dreamland-B behind residential house and Sitio Hall.

Baculin

A) View of Cover subsidence type of sinkhole located along the road on the way ton Barangay Baculin close to intersection. **B)** Massive cover solution a type of sinkhole located at Purok 1 Sitio Airport. Bottom of the sinkhole is where the water source of Sitio Airport is located. **C)** A cover solution near/adjacent to the massive sinkhole (B).

Harip

Cover subsidence observed along the road going to Barangay Harip.

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%

Geohazard IEC Materials Dissemination

Geohazard IEC Materials Dissemination Refers to the number of geohazard maps (flood/landslide exposure maps) disseminated by the Office to LGUs.

P/A/P	ANNUAL TARGET	ANNUAL ACCOM	% ACCOM
Maps disseminated (no.)	378	510	135%
Posters disseminated (no.)	1000	1062	106%
VCDs disseminated (no.)	60	100	167%
Pamphlets/Fliers disseminated (no.)	500	862	172%
Signages/Billboards installed (no.)	2	2	100%
Tri-Media (no.)	4	4	100%

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 Course on Method Development and Validation of Analytical Procedures for Analysis of Geological and Environmental Samples	MGB Central Office, LGSD Division	September 18-21, 2018	Selah Garden Suite Hotel (Selah Pods) Pasay City, Metro Manila	Cecilia L. Consuegra Jusrit Elvie B. Seguis
2. 33rd Philippine Chemistry Congress	Integrated Chemist of the Philippines	May 30, 2018-June 1, 2018	Philippine International Convention Center, Manila	Cecilia L. Consuegra
3. Training Course on Internal Quality Control in the Analytical Laboratory and Estimation of Uncertainty of Analytical Measurements	MGB Central Office, LGSD Division	April 10-14, 2018	Greenhills Elan Hotel, ,Greenhills	Cecilia L. Consuegra Jusrit Elvie B. Seguis
4. ISO/IEC 17025:2017 Internal Auditing	Neville Clarke, Philippines	March 20-21, 2018	MGB ROXIII Analytical Laboratory	Cecilia L. Consuegra Jusrit Elvie B. Seguis, Archielyn C. Nimez, Samuel A. Jardenil and Irene B. Siclon
5. ISO/IEC 17025:2017 Internal Auditing	Neville Clarke, Philippines	April 10-14, 2018 2018	MGB ROXIII Analytical Laboratory	Cecilia L. Consuegra Jusrit Elvie B. Seguis, Archielyn C. Nimez, Samuel A. Jardenil and Irene B. Siclon
6. 79th PIChE Annual Convention	PIChE National	Feb. 21-224, 2018	Bellevue Manila, alabng city, Munitnlupa, Metro Manila	Jusrit Elvie B. Seguis

B. Geology Personnel - Domestic

Title of Training Program	Organizer / Sponsor	Date of Program	Venue	Name of Attendees
1. Geocon 2018	Geological Society of the Philippines	December 11-12, 2018	Manila Hotel, City of Manila	Romeo M. Dalodado, Melvin A. Mantilla, Elaine L. Galido, Liza T. Pacete, Beda Louie O. Cagampang, Ralph Angelo B. Plaza, Kate A. Boquilon, Claysterkim J. Paloma, Noel G. Lumague, Vernie A. Nonato, Mye Karla C. Semblante
2. Drone Operator Training Course	MGB Central Office / Hobby Dynamics DSI	November 5-7, 2018	MGB Central Office, Quezon City	Beda Louie O. Cagampang
3. Training on Migrating from Arc Map to ArcGIS Pro	MGB Central Office, LGIMS	Sept. 17-18, 2018	MGB 13 Training Center	Romeo M. Dalodado Noel G. Lumague Elaine L. Galido Melvin A. Mantilla Liza T. Pacete Kate A. Boquilon Beda Louie O.Cagampang Claysterkim J. Paloma Ralph Angelo Plaza Vernie Nonato Mye Karla Semblante
4. Seminar – Workshop on Standardization of methodologies and in the conduct of nationwide coastline shifts and assorted hazards as affected by sea level change and geological factors	MGB Central Office , Marine Geological Survey Division	August 28, 2018 – September 1, 2018	Selah Pods Hotel, Pasay City	Kate A. Boquilon Noel G. Lumague, Janeth S. Aparri
5. 2018 Sylvatrop Writing workshop	DENR-ERDB & Sylvatrop Editorial Board	June 19-22, 2018	Orchid Garden Suites, Malate, Manila	Kate A. Boquilon

Title of Training Program	Organizer / Sponsor	Date of Program	Venue	Name of Attendees
6. The Landslide Mapping Project – Natural Hazard Mapping using Unmanned Aerial Vehicle (Drone)	Bolko Janseen	May 18, 2018	MGB 13 Training Center	Romeo M. Dalodado, Melvin A. Mantilla, Elaine L. Galido, Liza T. Pacete, Beda Louie O. Cagampang, Ralph Angelo B. Plaza, Kate A. Boquilon, Claysterkim J. Paloma, Noel G. Lumague, Rubenar Cagubcob Janeth S. Aparri Vernie A. Nonato, Mye Karla C. Semblante
7. Annual MGB Geoscience Workshop	MGB Central Office (LGSD) and MGB Region V	February 1-7, 2018	Legaspi City, Albay	R.M. Dalodado, Melvin A. Mantilla, Elaine L. Galido, Liza T. Pacete, Beda Louie O. Cagampang, Ralph Angelo B. Plaza

C. Geology Personnel – Abroad

Title of Training Program	Organizer / Sponsor	Date of Program	Venue	Name of Attendees
1. 3rd BGR-CCOP International Training Course on Risk Sensitive Spatial Planning for CCOP Member countries	Federal Ministry for Economic Cooperation and Development Germany and CCOP	Nov. 12-22, 2018	Hanoi, Vietnam	Kate A. Boquilon

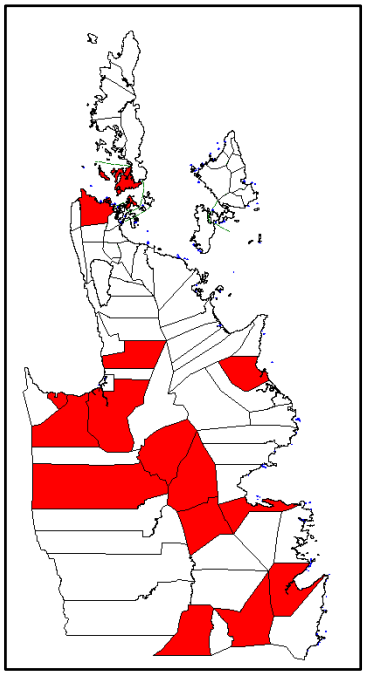
Capacity Building on Geosciences

P/A/P	ANNUAL TARGET	ANNUAL ACCOM	% ACCOM
Trainings/Seminars conducted for/attended by MGB Technical Personnel (no.)	8	14	175%

Conduct IEC to LGUs

This year commenced the formal IEC campaign on the Vulnerability and Risk Assessment (VRA) that was duly accomplished by the Office in year 2015 and 2016, to wit, covering the following LGU's:

1. Butuan City, Agusan del Norte
2. Buenavista, Agusan del Norte
3. Esperanza, Agusan del Sur
4. San Francisco, Agusan del Sur
5. Prosperidad, Agusan del Sur
6. Barobo, Surigao del Sur
7. Bislig City, Surigao del Sur
8. Cabadbaran City, Agusan del Norte
9. Nasipit, Agusan del Norte
10. Tandag City, Surigao del Sur
11. Surigao City, Surigao del Norte
12. Veruela, Agusan del Sur
13. Bayugan City, Agusan del Sur
14. Trento, Agusan del Sur



Photos showing the resource speakers during the IEC on VRA, Miss Elaine L. Galido, Supervising Geologist (Upper photos) and Miss Rubenar L. Cagubcob, (Lower photos) Geologist II at the LGU of Barobo, Surigao del Sur

Photos showing the resource speakers during the IEC on VRA, Miss Elaine L. Galido, Supervising Geologist (Leftr photo) and Miss Rubenar L. Cagubcob, (Right photo) Geologist II at the LGU of Bislig City

Mr. Felix Balansag, Buenavista Municipal Administrator giving the welcome remarks during IEC on Risk Exposure Assessment

The Municipal Administrator of San Francisco LGU at the center of the conference giving the welcome remarks during IEC on Risk Exposure Assessment

The Municipal Administrator of San Francisco LGU at the center of the conference giving the welcome remarks during IEC on Risk Exposure Assessment

Conduct IEC to LGUs

P/A/P	ANNUAL TARGET	ANNUAL ACCOM	% ACCOM
Seminars/Workshops for LGUs (no.)	14	14	100%
Lectures presented (no.)	5	6	120%
Advisories issued (no.)	5	5	100%

Geohazard Operation Center

The Geohazard Operation Center was activated during the passage of Tropical Cyclone "Basyang" in central Caraga Region on February 13, 2017. Advisories were issued to the LGUs and mining companies operating in Caraga Region prior to the expected landfall of the storm.

After the event, teams were organized to assess the extent of the damage from this event that caused high magnitude floods and several landslides in several municipalities/cities of Surigao del Norte, Surigao del Sur and Agusan del Norte provinces. Spot reports, incident reports and geohazard assessment reports were generated and provided to the concerned LGU's and stakeholders affected by the flooding and landslides.

Geohazard Operation Center

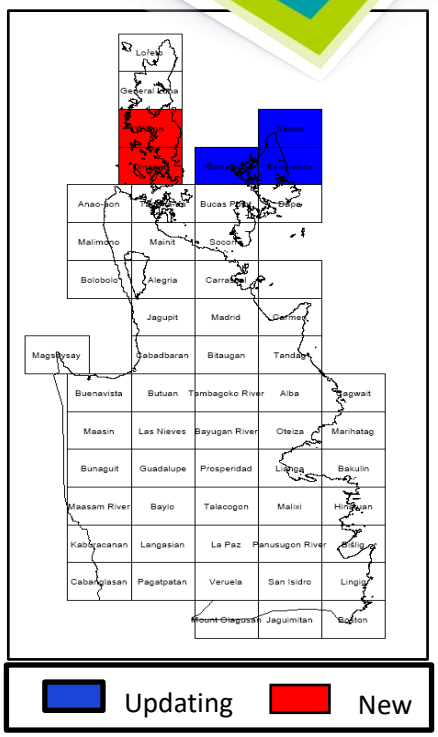
P/A/P	ANNUAL TARGET	ANNUAL ACCOM	% ACCOM
Advisories re-issued (no.)	36	62	172%
Incident/Flash Reports prepared (no.)		1	
Pre Disaster and Risk Assessment Meetings attended (no.)		1	

Geologic Mapping

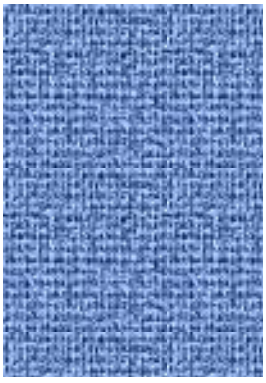
For this year, three (3) geologic quadrangle maps in northern Siargao Islands namely Sapao, Numancia and Esperanza quadrangles were updated while geologic quadrangle mapping was conducted in Wilson and Dinagat Quadrangles covering southern Dinagat Islands and Nonoc group of islands of Surigao City to generate two (2) new quadrangle maps.

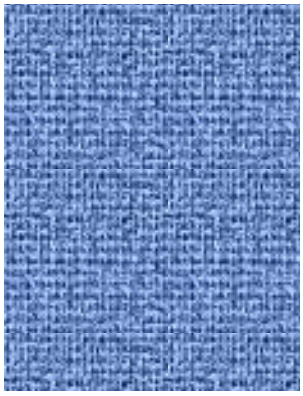
Finalization of the quadrangle maps will be undertaken once the petrographic and paleontologic analysis of selected samples submitted to Petrolab of MGB Central Office becomes available to supplement field megascopic rock description with microscopic mineral and rock identification and firmly establish the stratigraphic sequence of the different rock formations.

Posted below are some pictures during the conduct of geologic mapping in San Isidro & Pilar, Surigao del Norte.



A massive limestone outcrop observed along the quarry site located at Barangay Tigasao, San Isidro, Surigao del Norte. The limestone is white, fossiliferous (mostly bivalves and corals) with iron oxide stains in exposed surface and fractures. GPS location: 9°55'18.7"N 126°06'08.6"E.





Outcrop of white bedded limestone located at Barangay Salvacion, Pilar, Surigao del Norte.

Geologic Mapping

P/A/P	ANNUAL TARGET	ANNUAL ACCOM	% ACCOM
Geological Mapping and Surveys - Quadrangle Mapping			
Quadrangles assessed/surveyed (no.)	5	5	100%
Geologic Reports with Maps prepared (no.)	5	5	100%
Mineral Resource Inventory			
Provincial Resource Maps updated and submitted to MGBCO (no.)	1	1	100%
Provision of Laboratory Services			
Samples analyzed (no.)	700	772	110%
Determinations made (no.)	15000	18970	126%

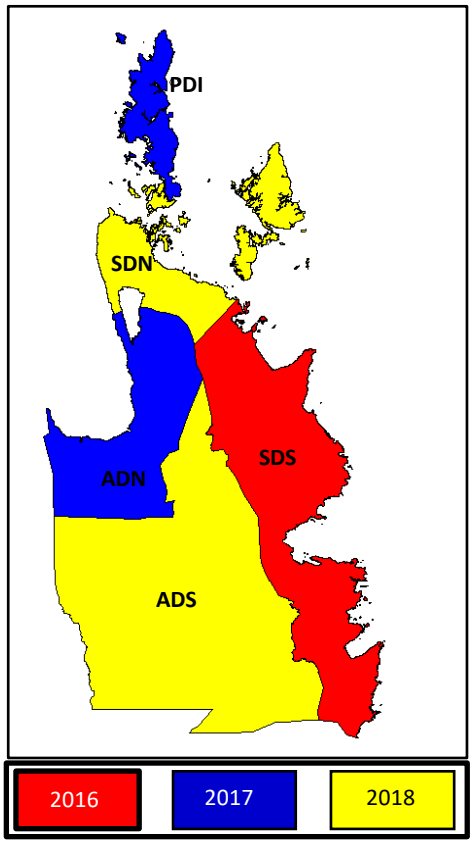
Groundwater Resource Assessment

Groundwater Availability Assessment was conducted in two (2) provinces of Caraga Region for CY 2018 namely Surigao del Norte during the 1st semester and Agusan del Sur during the 2nd semester.

Domestic water source (surface waters, springs and water wells) were located and characterized and water quality test were undertaken per municipality of the covered provinces. Water quality parameters measured are pH, temperature, oxidation-reduction potential (ORP), conductivity, salinity and Total Dissolve Solids (TDS).

For the province of Surigao del Norte, a total of 368 water sources were mapped and 365 point source sampled.

Todate, all of the five (5) provinces comprising Caraga Region were already covered by the 1:250,000-scale Groundwater Availability Mapping and Assessment, a program which started in CY 2016.



Esperanza, Agusan del Sur

Spring source in P-1, Brgy. Duangan, Esperanza that supplies potable water in the barangay proper in Level II category. Geographic coordinates 8° 36’ 48.2” N / 125° 43’ 26.2” E.

Individual jetmatic pump used to get potable drinking water located in Purok 6, Brgy. Dakutan. GPS Coordinates: 8° 38' 53.44" N, 125° 40' 39.50" E

San Francisco, Agusan del Sur

Photo shows a concrete box installed to the surface water source (creek) of Barangay San Isidro. It supplies 5 Puroks (1, 2, 3, 4, and 5) of the Barangay and is mainly used for drinking. The water never dries out but is turbid during heavy rains and rainy season. GPS coordinates: 8° 28' 45.0717" N, 125° 58' 30.2978" E.

A spring seeping along a bank of a creek in Mt. Magdiwata. The water has not been tapped but is planned by a barangay to tap for additional water supply. Geographic coordinates are 8° 28’ 04.1” N/ 125° 58’ 58.3” E

Lapaz, Agusan del Sur

A spring resource in presently supplies the barangay proper of Villapaz with water for drinking and domestic uses. It is enclosed to confine the water from the source. This has been in use longer than the residents could remember. It is located in Purok 3 adjacent to a rice field. The only access to this is through manual procurement of water from the source itself.

Photo shows the location and situation of the water source supplying Barangay Kasapa II excluding its sitios. A SALINTUBIG project in 2016 provided the residents the means to access from the source to the barangay proper with four (4) tap stands. The water is used for drinking and domestic purposes. However, there are days when water could not flow because of the blockage of sediments in the source so maintenance is needed from time to time.

Bunawan, Agusan del Sur

Photo A and B show the Water Supply and Sanitation (WATSAN) Project which is from a spring source located in Purok 8 of Barangay San Teodoro. The project was handed to Bunawan Water District in 2016. It supplies the 200 households of the Barangay and is used for drinking and other domestic purposes. GPS coordinates: 8° 11' 40.3474" N, 126° 00' 27.1757" E (spring-A) and 8° 11' 27.1343" N, 125° 59' 51.1900" E (reservoir-B).

Veruela, Agusan del Sur

Barangay La Fortuna is one of the barangays of Veruela which is being serviced by the water district. However, a shallow well which has been used for five (5) decades is still being used for drinking by some residents. The well is about three (3) RCP culvert deep which is relatively open. Geographic coordinates N8° 01' 23.4"/ E125° 54' 32.8"

Level II deep well supplying drinking water to Puroks 3, 4, and 5 in Barangay Limot. The well is approximately 120 feet deep and is located at a lower elevation than the barangay, hence the use of submersible pumping to extract the groundwater. It is also located along a gully which is a natural drainage for surface runoff during rainy days. Geographic coordinates N7° 57' 48.2"/ E125° 53' 16.3"

Sibagat, Agusan del Sur

The above photo is a spring source enclosed in an intake box situated in Purok 9 of Barangay Mahayahay. It is a SALINTUBIG Project which supplies only three Puroks (3, 4, and 5) out of 11 Puroks of the Barangay. It is currently a level 2 source which has a sufficient water supply even during summer season. GPS coordinates: 8° 51' 16.2498" N, 125° 41' 35.9975" E.

A spring source enclosed in two intake boxes is what supplies barangays San Vicente and Ilihan. This is located in Purok 4, Barangay Del Carmen, Bayugan City and was implemented by the San Vicente-Ilihan Water System Association (SIWASA) in 2010.

San Luis, Agusan del Sur

A ram pump design built in Polipapa creek which is utilized by Barangay Policarpo in Purok 3. The pump does not harness electricity for it to operate.

Water source of Barangay Binikalan tapped from Ablayanon creek in Purok 3. The creek is ephemeral where long drought causes it to cease to exist.

Prosperidad, Agusan del Sur

A shallow well (20ft) in Purok 2 of Barangay Napo which supplies Purok 2 and portions of nearby puroks. The well has no proper designed casing underneath which may cause the well's subsurface to collapse. Months of May to June were also noted to have less water to nil.

An open dug well situated in Purok 7 of Barangay La Union. The well was constructed via 'bayanihan' by the local residents in the barangay due to insufficiency of funds. It was constructed approximately 30 years ago and supplies Purok 6 and Purok 7.

Bayugan City, Agusan del Sur

Photo shows the pumping station 6 of Bayugan Water District, this station is located at Purok 4 of Barangay Bucac, Bayugan City. This deepwell has a depth of 96m, and it started to operate on January 2016. It is one of the sources that supply the Bayugan City proper.

Loreto, Agusan del Sur

Spring source located at Purok 1, Brgy. San Isidro which is extracted through a pressurized pump. Most residents of this barangay utilized this for domestic use.

A 60 ft.-deep shallow well in Purok 3, Brgy. San Vicente which used as drinking water source by some residents of this barangay according to a barangay official.

Rosario, Agusan del Sur

Spring sources in Purok 6 (right photo) and Purok 7, Brgy. Bayugan 3 (left photo) which is joined into one reservoir, a barangay project aided by Philsaga Mining Corp. as part of their SDMP (Social Development and Management Program). Both the sources are in level III water distribution.

Trento, Agusan del Sur

Spring source in Purok 1, Brgy. Basa which is a Salintubig Project. This is used as drinking water source of most residents in this barangay and the municipal water association of Trento has a plan to also use this as municipal-wide water source.

Spring source located in Purok 1, Brgy. Pangyan. It is a project by the Province of Agusan del Sur and was constructed in 2014.

Sta. Josefa, Agusan del Sur

Concrete Box Captage in spring water source of Purok 10 Brgy. Patrocinio that uses rope and bucket. It is prone to contamination when intake box is not covered properly Geographic Coordinate: 7° 58' 7.6'' N 126° 2' 53.34''E

Closed Concrete Box Captage Type of the spring water source in Purok 9, Brgy. Sayon. Geographic Coordinate: 7° 58' 22.5'' N 125° 58' 5.7''E

Talacogon, Agusal del Sur

A shallow well (jetmatic type) with well depth of 30 ft. located at Purok 7, Barangay Marbon. It was constructed in 2013 and according to residents interviewed, they never experienced turbidity even during heavy rain and the water source is sufficient even during dry season.
GPS location: N8°21'44.5'', E125°47'20.1''

Barangay Zillovia is composed of 14 puroks and each purok has at least 2-3 deep wells excluding the two deep wells (**A & B**) located in Purok 1 that are currently managed by the LGU that supplies 9 Barangays. The two water sources are used alternately for level 3 distributions. GPS location: N8°26'08.1'' E125°44'30.4'' (Well 1, Photo A); N8°26'23.8'' E125°44'37.9'' (Well 2, Photo B)

Groundwater Resource Assessment

P/A/P	ANNUAL TARGET	ANNUAL ACCOM	% ACCOM
LGU Assessed (no.)			
Province	2	2	100%
Groundwater Resource Assessment Report	2	2	100%

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) were conducted on twenty one (21) proposed subdivision, housing, and resettlement/relocation sites as requested by private developers, urban poor homeowner's associations and LGUs.

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 of LGUs prior to issuance of Notice to Proceed (NTP), six (6) proposed sanitary landfill (SLF) / ecological solid waste management park (Eco-SWM Park) projects were assessed by the Office namely:

Name of Project	Proponent	Location
Sanitary Landfill Facility	LGU of Loreto, Province of Dinagat Islands	Purok Lauban, Brgy. Sta. Cruz, Loreto, PDI
Sanitary Landfill Facility	LGU of San Francisco, Province of Agusan del Sur thru the San Francisco Water District	Brgy. Bitan-agan, San Francisco, ADS
Eco- Solid Waste Management Park	LGU of Libjo, Province of Dinagat Islands thru Libjo Mining Corporation	Sitio Balite, Brgy. San Antonio, Libjo, PDI
Eco- Solid Waste Management Park	LGU of Santa Monica, Province of Surigao del Norte	Purok 7, Brgy. Mabuhay, Santa Monica, SDN
Sanitary Landfill Facility Cluster 1	LGU of the Province of Dinagat Islands	Purok 6, Brgy. San Jose, Libjo, PDI
Sanitary Landfill Facility Cluster 2	LGU of the Province of Dinagat Islands	Purok 3, Brgy. Wadas, Dinagat, PDI

Geohazard Certifications

A total of one hundred sixteen (116) geohazard certifications were issued upon the request of 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.

Analytical Laboratory Section

The Analytical Laboratory (ANALAB) Section of MGB RXIII has provided laboratory services on rocks, ores, minerals and soils to determine the mineral content on gold, nickel, iron, chromite, manganese, among others. In addition, water samples submitted were tested for total suspended solids (TSS) and pH. Furthermore, most of the water samples received in the laboratory were submitted by the Multipartite Monitoring Teams of Caraga mining companies as well as from students for their research works.

MGB Director WILFREDO G. MONCANO has visited Mines and Geosciences Bureau, Regional Office No. XIII in Surigao City sometime in March 2018. He instructed the laboratory personnel to prepare and submit a project proposal to upgrade and modernize facilities in MGB RXIII laboratory. (Please see attached copy of the Project Proposal)

Two (2) laboratory personnel, namely: **Engr. JUSRIT ELVIE B. SEGUIS** (Chemist III) and **Ms. ARCHIELYN C. NIMEZ** (Laboratory Technician II) recently passed the Licensure Examination for Chemical Technicians given by the Professional Regulation Commission last October 9, 2018 in Cebu City.

This year, the ANALAB Section has set an annual target of 15,000 on the number of determinations with 700 samples. From January to December 2018, it has accomplished a total number of 18,970 determinations and analyzed 772 samples which are equivalent to 126.47% and 110.29% of the annual target, respectively.

Revenues collected on laboratory fees amounted to Php 117,240.00 and official samples evaluated amounted to Php 7,440.00.

MGB RXIII fieldmen collected samples during stockpile validation from AAM-Phil Natural Resource Exploration and Development Corporation and these were submitted for % Ni and % Fe.

Water samples taken during the conduct of the Geological and Hydrogeological Assessment of the proposed Minahang Bayan of the Nagkahiusang Gagmay'g Minero (NAGAMI) in Barangay Mat-I, Surigao City were submitted in the ANALAB for pH determination.

An Investigation by PENRO, Dinagat in coordination with MGB RXIII Dinagat Satellite Office on the alleged water discoloration in Barangay Panamaon, Municipality of Loreto, Surigao del Norte involving AAM-Phil Natural Resource Exploration and Development Corporation, water samples were collected and submitted in MGB RXIII ANALAB for TSS analysis.

Moreover, the ANALAB Section joined the Geosciences Division Survey Team in the conduct of the Groundwater Resource Mapping and Assessment in the Municipality of Socorro, Surigao del Norte and Municipality of Talacogon, Agusan del Sur. The mapping activity included an inventory of the existing groundwater resources (e.g. springs, wells) of each barangay within the municipality, identification of the lithologic unit and the overall geomorphic characteristic of the groundwater locale, and in situ determination of the basic water chemistry.

MGB, RXIII is **ISO 9001:2015** (Quality Management System) Certified by NQA in which the Analytical Laboratory processes have been included and evaluated. With the guidance and assistance of Neville Clark Consultancy on MGB RXIII ANALAB **Application for ISO 17025:2017 Accreditation**, these are some of the attained activities:

- Awareness Training on ISO 17025:2017
- Conducted Gap Analysis (Preliminary Systems Appraisal)
- Seminar on the Guide to Measurement of Uncertainty
- Internal Audit Training
- Purchased Certified Reference Materials on Nickel
- Participated in the SGS Laboratory Quality Services International Proficiency Testing for Nickel and Iron - Round 1 to Round 4
- Conducted Management Review
- Preventive Maintenance of AA 7000 by Shimadzu, Manila

- Calibration of analytical balances, glasswares (volumetric flasks, graduated cylinders, pipettes, burettes, beakers) by DOST, Region 13
- Purchased thermohygrometers, digital thermometers, etc.
- Purchased D2 lamp, Ni hollow cathode lamp, Fe hollow cathode lamp, copper hollow cathode lamp, and other AAS accessories

The Analytical Laboratory personnel attended various training-workshops, seminars, and convention/congress, to wit:

DATE	ATTENDESS	TITLE
February 21-24, 2018	Jusrit Elvie B. Seguis	79th National Philippine Institute of Chemical Engineers convention, held at Bellevue Manila, Alabang City Muntinlupa, Metro Manila
April 10-14, 2018	Cecilia L. Consuegra & Jusrit Elvie B. Seguis	Training Course on Internal Quality Control in the Analytical Laboratory and Estimation of Uncertainty of Analytical Measurements held at Greenhills Elan Hotel, San Juan, Metro Manila
May 30- June 1, 2018	Cecilia L. Consuegra	33rd Philippine Chemistry Congress held at the Philippine International Convention Center, Manila
September 18-21, 2018	Cecilia L. Consuegra & Jusrit Elvie B. Seguis	Training Course on Method Development and Validation of Analytical Procedures for the Analysis of Geological and Environmental Samples held at Selah Garden Hotel, Pasay City

Concerns :

MGB RXIII Laboratory has been chosen as one of the MGB regional laboratories to be accredited for ISO/IEC 17025:2017 International Standards for Laboratory Testing. Compliance to the requirements of ISO/IEC 17025:2017 is still ongoing.

The ANALAB has already been inspected by the Board of Chemistry, Professional Regulation Commission, Manila relative to its Application for the Permit to Operate Chemical Laboratories in compliance with the Philippine Chemistry Law of 2015. Corrective actions are still being undertaken as per recommendations based on the Inspection of Chemical Establishment Report of the Professional Regulatory Board of Chemistry, PRC, Manila in order to secure Permit to Operate Chemical Laboratories.

The Application for the Permit to Purchase Chemicals still has to be processed with the Philippine National Police (PNP) and the Philippine Drug Enforcement Agency (PDEA). Until now, the fumehood scrubber in the laboratory is still unserviceable / under repair by the supplier (Exclusive Traders). This undoubtedly affects the realization of planned targets for CY 2018. Correspondingly, lesser revenues have been collected.

With the unrepaired fumehood scrubber, nickel laterite samples from umpired shipments submitted to the laboratory cannot be analyzed due to environmental and health considerations. Fumes and pungent odors are emitted during the analyses especially during the digestion of samples. Consequently, lesser revenues will be collected. Umpired samples submitted in the ANALAB are just being stored in the sample preparation room for safekeeping. Consequently, lesser revenues will be collected.

Other concerns include the laboratory's old or obsolete sample preparation equipment, no dust collector, unserviceable distilling apparatus, and hotplate, to mention a few. Moreover, the lack of manpower to provide laboratory services especially for gold analysis is a concern.

Challenges for CY 2018

With reference to the Audit Observation Memorandum (AOM) No. 101-2017-07 VFM of the Commission on Audit dated 22 December 2017 regarding laboratory equipment, physical condition and capability, and personnel complement of the analytical laboratory of MGB RXIII, this Office per MGB RXIII Letter response to COA dated February 1, 2018 proffers the following comments:

The Office shall give priority to the upgrading of its laboratory equipment and other related instruments to cope with modernization.

It shall likewise give preferential action on purchases of laboratory equipment and instruments necessary for its effective and efficient laboratory services.

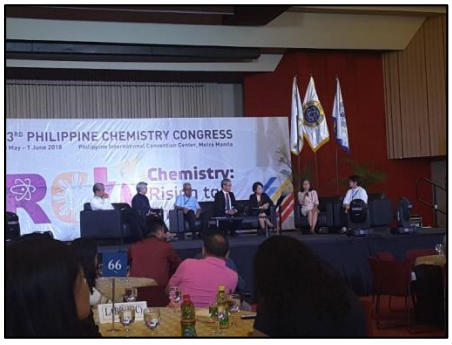
Photo Documentation

73rd National PICHE Convention
February 22-24, 2018

Training Course on Internal Quality Control in the Analytical Laboratory and Estimation of Uncertainty of Analytical Measurements
April 10-14, 2018

Esteemed guest speakers for the Plenary Session received their Plaque of Recognition during the Opening Ceremony of the 33rd PCC held in PICC, Manila last May 30-June 2, 2018

Over a thousand participants joined the annual gathering of professionals in the chemistry industry and took time to visit several exhibitor's booths during the 33rd PCC held in PICC, Manila last May 30-June 2, 2018



Discussion on the "Directions for the Development of Chemistry in the Philippines" capped the congress' Closing Ceremony during the 33rd PCC held in PICC, Manila last May 30-June 2, 2018