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Introduction

Well-known as "The Summer Capital of the Philippines", Baguio City is one of the country's major cities outside of Metropolitan Manila. Located in the mountainous region of the Northern Philippines, the temperature of the area is around 10 to 25 degrees Celsius (50 to 77 degrees Fahrenheit), roughly 10 degrees lower than the national average. For a tropical country, this tiny mountain resort city's cool climate serves as a tourist magnet – an oasis of sorts, serving as a temporary relief for the people from the lowlands. This influx of short-term inhabitants helps swell up the city's coffers. However, it may not be seen as a clear advantage from an environmental point of view. In addition to the average population increase by birth, tourist-turned-settlers also contribute to the uncontrolled population growth which has become a very rapid process in Baguio. This surge in the number of long-term and short-term inhabitants set off a chain of interconnected processes such as urbanization, densification and deforestation. Coupled with natural landslide hazards, landslide risk management becomes a very vital issue to be tackled in the government's decision and policy-making.

RECLAIM-II, or the Asian Program for Regional Capacity Enhancement for Landslide Impact Mitigation Phase II, is a project by the University of the Philippines Diliman (UPD) and the Asian Disaster Preparedness Center (ADPC) which aims to tackle the landslide risk and mitigation issue. This Norwergian Geotechnical Institute (NGI)-supported project was formally launched last May 7, 2007 together with the academe, the community, and the Baguio City government. The pilot site for study is located at the boundary of Barangay San Luis and the Baguio Pines Garden Subdivision.

Figure 1: Location of Baguio City

Local lore says that Baguio's name came from a variety of moss named "bagiw" in the language of the Ibaloi (the local ethnic group). It is enclosed by the latitudes 16.43500373° and 16.35992305° and the longitudes 120.54459170° and 120.63704130° (see Fig.1). "The Pine City", a moniker attributed to the large but now swiftly declining population of pine trees, is situated in the Cordillera Administrative Region (CAR) in the island of Luzon. It was originally

conceptualized by the Americans during their occupation in the early 1900's as a recreational spot. However, Baguio's quickly growing reputation triggered the rise in population density over the years. After nearly a decade, it was chartered as a city by the Philippine Assembly.

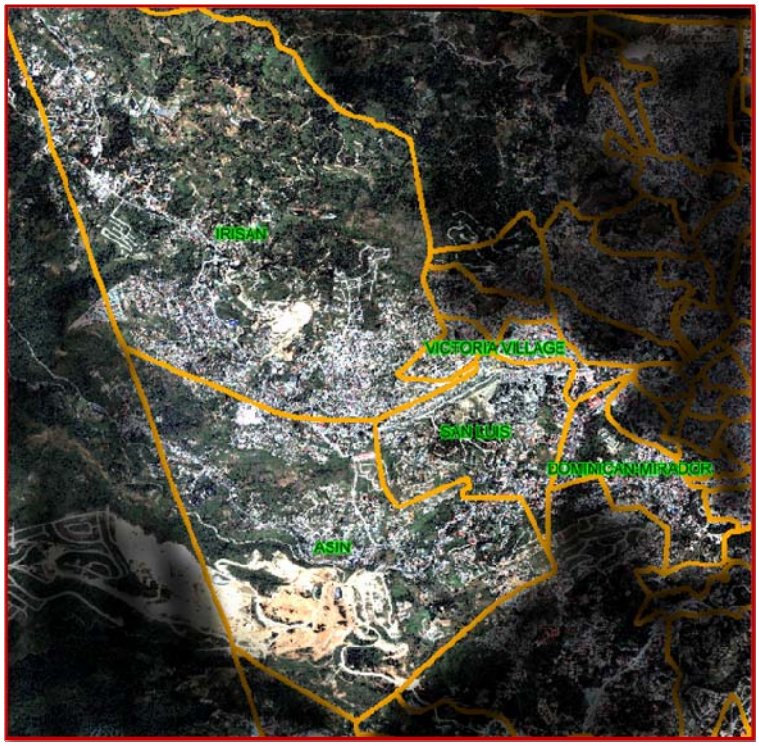

Figure 1: The Study Area.

From the capital city of Manila, a trip to Baguio takes around 4 to 6 hours of travel by land. It is considered as a center of education in the northern parts of the country due to its several academic institutions and a climate favorable to learning.

For the purposes of this study, we focused on five (5) out of one hundred and twenty-nine (129) barangays in Baguio. The barangays selected are San Luis, Dominican-Mirador, Asin, Irisan and Victoria (see Fig.2). These barangays are adjacent to each other, with barangay San Luis as the center. From the city proper, these barangays can be reached in 15 to 30 minutes' drive.

Landslide Monitoring in Bgy. San Luis

Monitoring a site for land movement (or suspected land movement) is an essential part of landslide studies. Together with the readily observable evidence of land movement (tilted plants etc.), researchers nowadays have the capabilities to validate the general direction and the rate of the land movement. This section describes the Landslide Monitoring activity of the Philippine RECLAIM-II Project.

Figure 2: Setting up the Total Station for Landslide Monitoring.

The monitoring equipment that we used is a called a Total Station (Fig. 3). It is an electronic instrument for measuring distances and angles. It is a standard tool for land surveyors in measuring point locations. Using the principles of trigonometry and triangulation, these distances and angles are processed by a built-in computer to determine the position or the X, Y and Z (Northings, Eastings and

Elevations) of the targets. A Total Station's solid-state emitter generates a modulated microwave or infrared carrier signal within its optical path. The signal is then reflected by a specially-built Porro prism. Distances are determined by "emitting and receiving multiple frequencies and determining the integer number of wavelengths to the target for each frequency" (www.csanet.org).

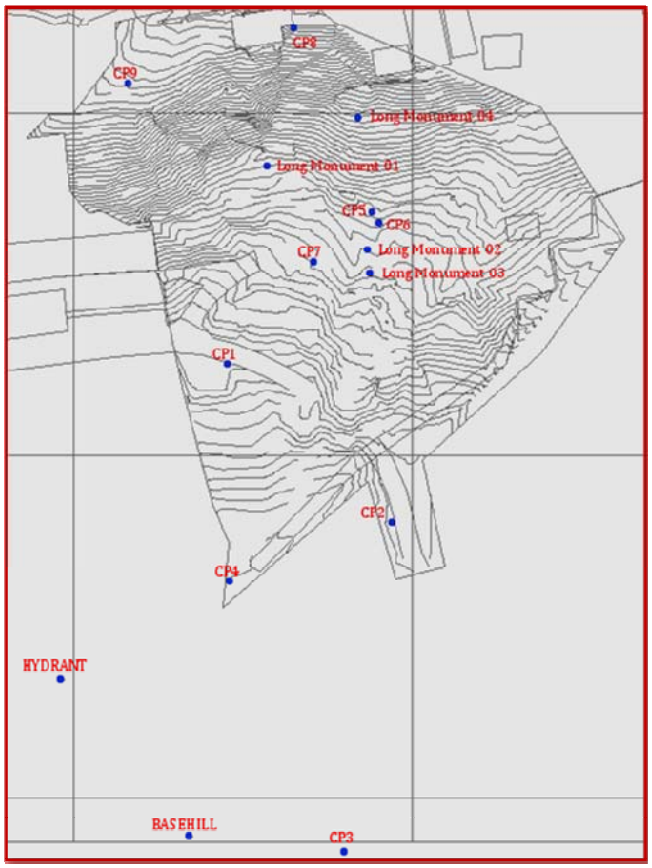

Figure 3: Locations of the established monitoring points overlain on a detailed topographic map.

We chose the Traditional Total Station over other equipment for the following reasons:

1. The area of interest is has very steep slope of the mountain but with an available stable measuring point facing the slope.
2. A Total Station's vertical displacement measurements have better accuracy than a GPS.
3. The study area is thickly vegetated, making it impossible to use a Prismless Total Station.

Measurements were taken in the sunup on a monthly basis. A thick layer of fog usually visits the area in the afternoon making it difficult to gather measurements. The Total Station is set up at a fixed point located on top of a solid rock outside the active landslide area named Base Hill. Another fixed point, CP1 or Control Point 1, is used to form the Base Line of the measurements. The elevations of these two points were derived using survey-grade GPS. To check the accuracy of CP1 and Base Hill's difference in elevation, Direct Leveling was employed before the initial reading. Leveling is the "process of directly or indirectly measuring vertical distances to determine the elevation of point or their differences in elevation." (LaPutt 1987, p124) Direct or Spirit Leveling is the most precise type of Leveling and is commonly used in projects with high accuracy requirements such as construction.

There are three types of measuring points: First are nails driven on paved roads with paint markings. Second are concrete cylindrical monuments which are 15 cm in diameter and 30 cm in length. Third are concrete cylindrical monuments which are 15 cm in diameter and 1m in length. The average dV and dH or the vertical and horizontal deviations are recorded before taking the positions of the strategically-placed monuments. These deviations should be minimized as much as possible by very fine

adjustments to the Total Station's handles. A typical monitoring fieldwork takes around 4 to 5 hours. The measurements are then loaded to the portable computer from the Total Station's internal memory for inventory.

The rod where the prism is mounted should be perfectly vertical during measurements. Slight inclinations will result in an erroneous reading. A rod-man holding the prism has a tendency of movement. Though small, these involuntary movements can remove the rod from its verticality during the time of reading. Issues regarding these human errors were anticipated before the start of the fieldwork. Statistically, the "accuracy of a measurement of a quantity will be improved if a mean is taken from several observations." (Muskett, p155) Applying this surveying principle, thirty (30) readings were made for each monument and the mean of these readings is the recorded result. In most cases, the prism is placed on top of the monuments thus, totally eliminating the rod-man factor.

Here are the summary of the measurements taken:

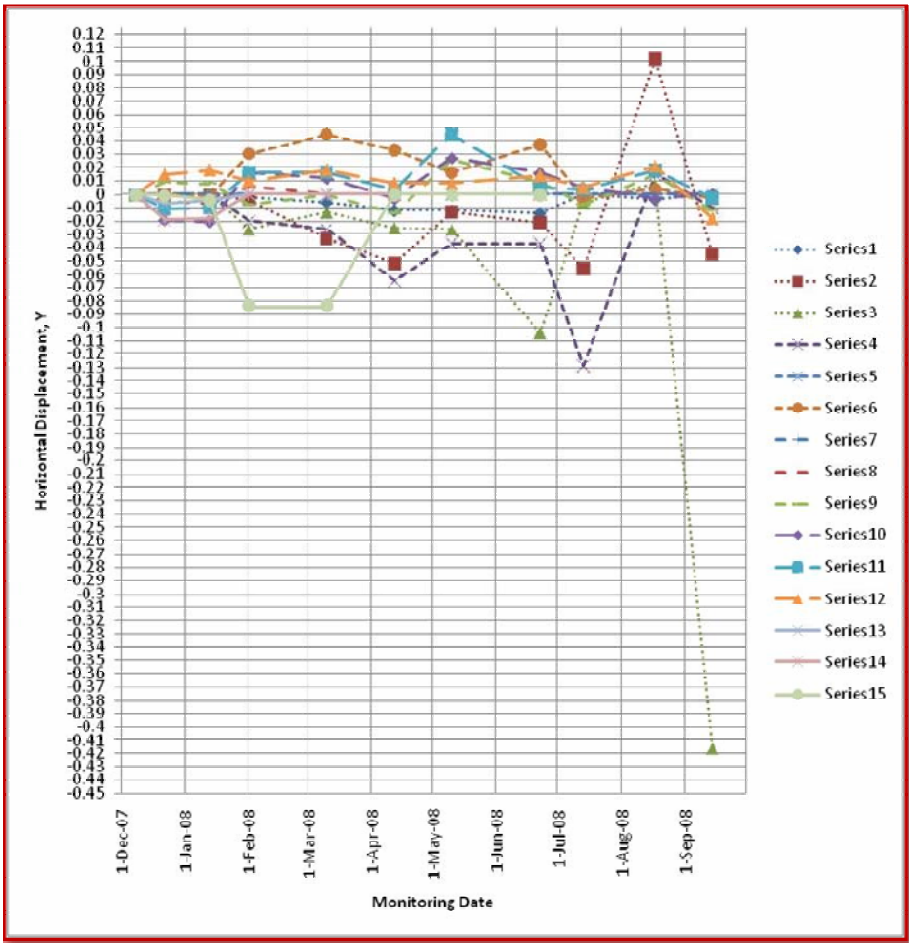

Figure 4: Relative Northings in meters.

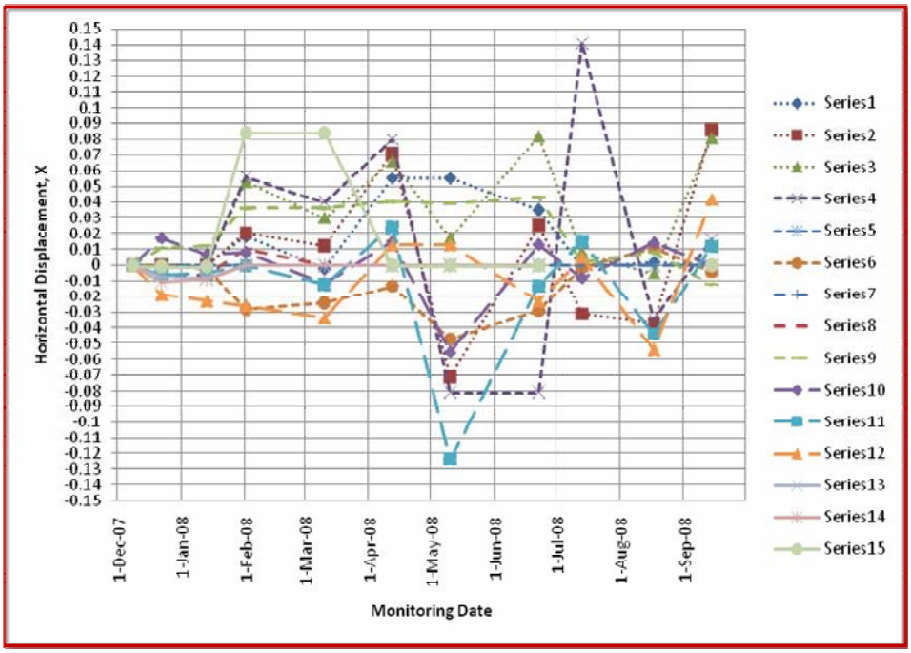

Figure 5: Relative Eastings in meters.

The graphs above not only validated the existence of abnormal land movement but also gave us an idea of how fast the land mass moves. Change in elevation of up to approximately three centimeters per month is a considerable threat to life and property; but the good news is, it can be mitigated. The absence and/or poorly constructed community drainage systems was perceived as a major contributor to the movement of land. Below is the graph for rainfall (Fig. 8) from the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) weather station in Baguio City.

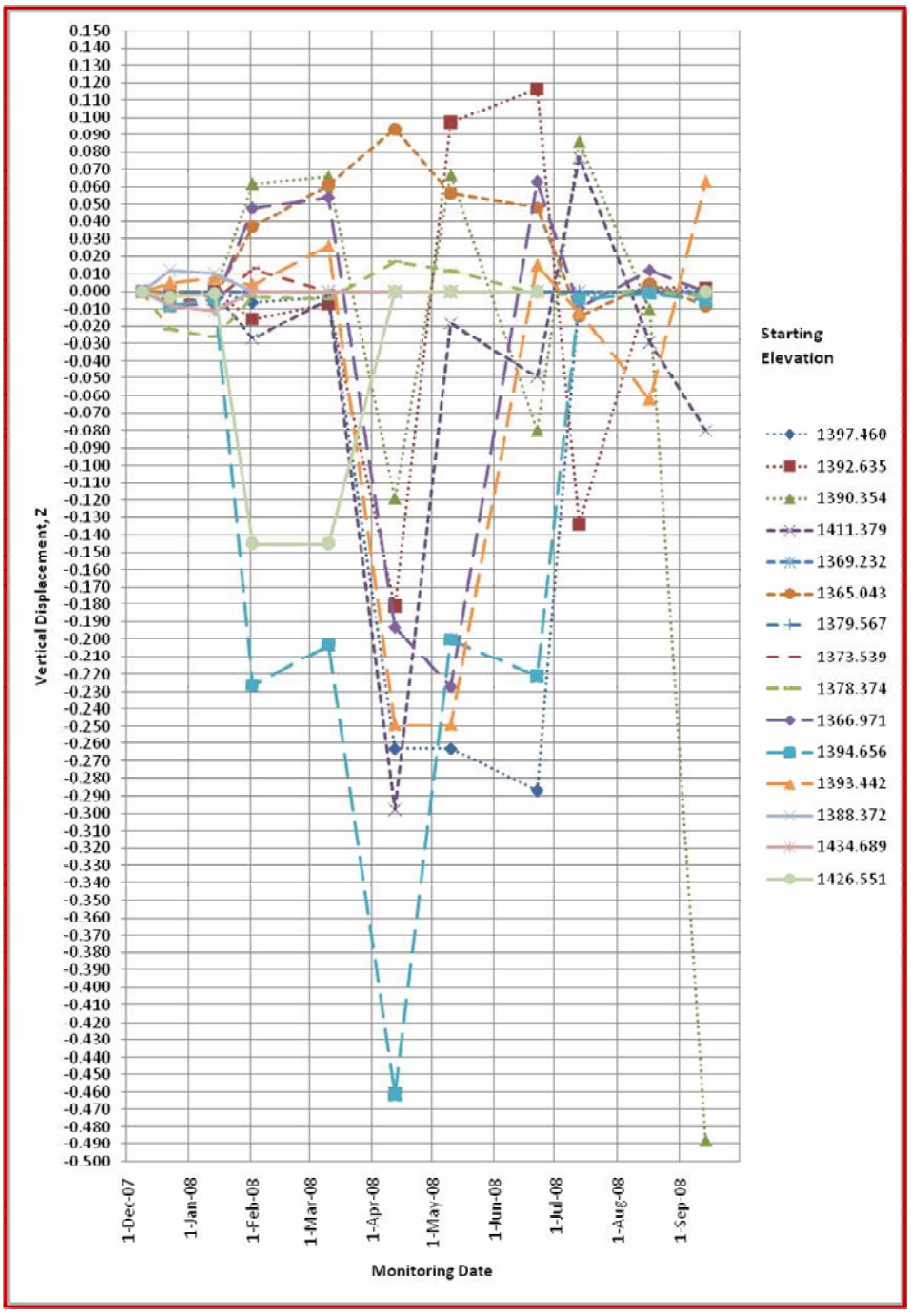

Figure 6: Relative Elevations in meters.

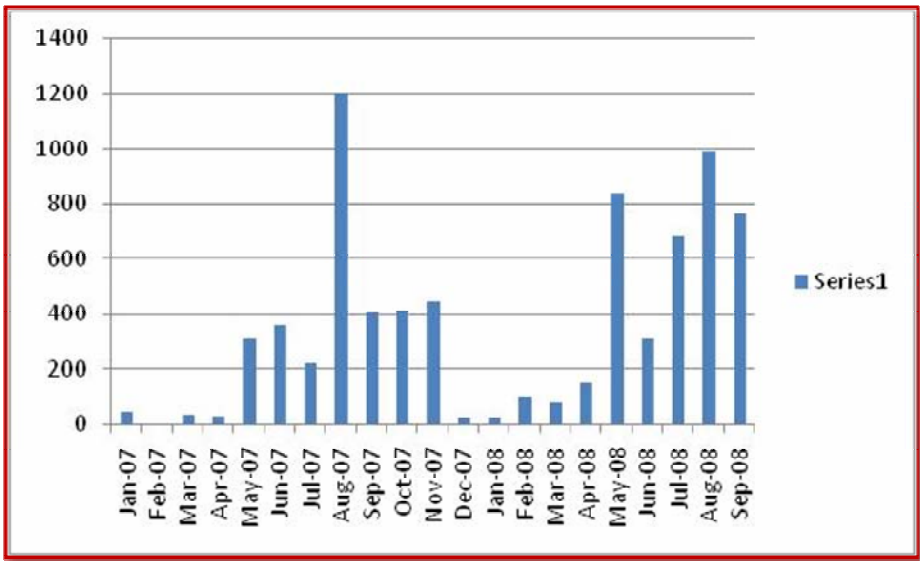

Figure 7: Rainfall graph from January 2007 to September 2008 in millimeters.

Enhancing the Barangays' Capacity

The *Barangay* is the smallest political unit in the Philippines. It evolved from the malay word *Balangay* – meaning sailboats. A family group of around 100 people occupy each boat. The captain of the boat and the leader of the family group is the *datu.* In the contemporary setting, the datu is replaced by the *Punong Barangay* or the Barangay Captain. Each barangay also has a *Sangguniang Barangay* or a Barangay Council composed of seven (7) members. The Captain and the Councilors are democratically elected by their constituents. Being the connection of the municipal government to the communities, the Barangay is responsible in implementing and upholding the policies, programs and plans of the higher government.

This Barangay setting gave us a good starting point for our proposed mapping process. The assumption is that the people living in the community intimately know the areas which pose immediate danger to their property and life. The knowledge that they possess is not exactly scientific. Their basis may be historical, or relative to a previous event - information which is particularly helpful in areas where there is no recorded landslide occurrences. Or they may be instinctive, a knowledge which is not exactly true but can be verified.

Since its launch, the project has conducted a number of activities designed to increase the awareness of the community on landslide hazards, risk and prevention. The last week of November 2007 marked the first consultation that was done with the management of the subdivision together with the outgoing and the incoming elected officials of Barangay San Luis. The municipal government was represented by Ms.

Cordelia Lacsamana from the Baguio City Planning Office. We were able to gather the officials' generous support in information dissemination and the organization of a more crucial consultation involving the residents.

Figure 8: Consultation with the San Luis Officials and the BPG Subdivision Management. BPG Clubhouse.

The second consultation was arranged two weeks after the first. This time, we spoke with the residents from the affected areas at the San Luis Barangay Hall. The enthusiasm of the people in relating their place's landslide history gave us very valuable information and insight for the analysis of the project's social impact and future planning. The discussions were very lively, resulting in a very productive activity for the Barangay.

Figure 9: Consultation with the Residents. San Luis Barangay Hall.

Risk mapping workshops were made every Sunday after lunch. Sunday is widely regarded as a family day in the Filipino culture. Holding the workshops on Sunday radiates an atmosphere of commitment and importance. The attendance of the people on a Sunday shows us that they are willing to sacrifice a day of rest and bonding to help a cause that will equip them with information needed to protect those that are dear to them. Most of our attendees are Barangay Officials (the Captain and several Councilors or "Kagawad"). These officials oversee the welfare of their constituents. Their attendance bears great weight due to the knowledge that they can impart into the mapping process. We first get to know them then conduct an

orientation about the project, our purpose and our plans. We did this with the facilitation of the Center for Disaster Preparedness (CDP) staff, Mayfourth Luneta and Rita Santos. A short lecture on landslides was delivered. This lecture ensures that all of them will have the same definition for the concepts that we will use in mapping, like for example *high risk areas*. This step is very important because the achievement of a consensus is crucial to the integrity of the classification. The people from each Barangay will then identify the following: 1. Community Boundaries; 2. Landmarks and Roads; 3. High Risk Areas; 4. Low Risk Areas; 5. Safe Areas for Evacuation. These classifications are drawn on printed Google Earth images on large tarpaulin sheets. The first two steps help the people to orient themselves to the map, or more appropriately, orient the map to themselves. Most, if not all, of them saw their Barangay's top view for the first time. This new perspective is quite exciting to the people. The last three steps (classification) will then be verified by a field visit by experts in landslide studies.

The classified areas are delineated by the people by consensus, with the Barangay Captain or whoever among them was the one living the longest time in the area, leading the process. This is something that is not imposed upon them. It came naturally. After they delineated the required areas, another consensus is made to ensure that everyone agrees with the identification. Their output are then digitized and overlaid in a Geographic Information System environment.

Challenges Encountered

The most crucial activity is information gathering. Our initial meetings with the people served as an eye opener of sorts. What seems like an ideal research site turned out to be something rather complicated. We uncovered a number of political and social tensions behind the landslide site. We needed to overcome this to get the people's cooperation.

Figure 10: The San Luis Landslide Site, a view from the base hill.

The cooperation of the Barangay is important for a couple of reasons. Primarily, it is because they are the ones who will benefit from the project. We need to give them a detailed background of the research project. The name of the project, RECLAIM, gave them a misconception that we have a hidden goal of reclaiming their land. At first thought, it is quite shallow. But once we learned the history of the place from the people, it became something deeper. Reality is, most of them are informal settlers – informal in the sense that they don't have the necessary papers to make their ownership recognized by the government, but most of them have every right in the world to own their piece of land. The ancestral land issue is another story, and it gave us a very difficult time in getting their trust. However, it is something that we insisted to do because they need to know the geo-hazards they are in

and the solutions that can be done. We also uncovered a very heated conflict between the Baguio Pines Garden Villas management and the residents which made it a little more complicated. One thing that the workshops were able to bridge was that they established a connection and gave the people the assurance that we are an independent team pursuing an academic and socio-technical program to help them live safely. We also need to gather elevation data from their parcels, which meant that we have to get their permission to erect total station prisms inside their lots (in some instances, on top of their houses). Without these elevation data, we can't generate an accurate topographic survey plan of the area which is needed for the preliminary drainage design and slope motion monitoring.

The consultations unveiled a hidden side of the project area's history. This helped us establish a more detailed timeline of the events that holds extreme importance to our research. The following information was provided by the residents:

- 1996. No landslides yet.
- Mr. Muñoz (The name of the subdivision owner known to the people) blasted the rocks at the foot of the location of the community. The land movement started after that.
- The same area was featured in the Midlands television news program. Apparently, there was an identified sinkhole near the area and the community was to be demolished by Mr. Muñoz for safety purposes. The people reacted intensely because first, Mr. Muñoz has no right to demolish them as he doesn't own their land. Second, because most of them are already living in the place long before Mr. Muñoz bought the piece of land beside them to develop it into a subdivision. They are arguing that Mr. Muñoz wants them out not because of their safety but because he doesn't want to be responsible for any untoward incident that may occur when the landslides worsen. They say that Mr. Muñoz is not from Baguio City, thus the people treat him as an "outsider" invading their "territory".
- There is a natural main canal just to the right of the project site.
- Bang-ar, the local term of the place where the canal is located, is also in San Luis. They say that more people are affected by landslides in that place and they are pushing for the inclusion of that location to the project.
- The people are grateful for the aid of the project but are reacting slightly to the part where they will help in tapping their drainage to a proposed drainage system. They want Mr. Muñoz to take part in the construction of the recommended drainage because his subdivision project is the prime reason for the landslide.
- They say that there is a piece of land in the neighboring area of Irisan offered to them by Mr. Muñoz in place of their present location, however, the people say that that piece of land is as safe as their present location so they don't really see any fair exchange.
- There is also an Non-government Organization, Kiwanis Club, that is involved in the study of the sinkhole area close to their location.
- A lawsuit was filed by the people versus Mr. Muñoz. The case is ongoing as of this writing.

The people were very reluctant to cooperate due to their suspicion that we are just a part of a ploy of Mr. Muñoz, and that any land survey undertaken will be for the purpose of his land grabbing. They stressed that if this was indeed a research project to help alleviate the landslide hazard, then the subdivision's management should have their part in the solution. This newly discovered conflict made the research a lot more complicated as we had to weigh the two sides every time we make a move. The project's success hung on this very brittle thread. We managed to get their permission to erect the total station prisms inside their territories (provided that we don't measure their lands' legal boundaries), unfortunately, most of them were not fully convinced with our intentions.

On the fieldwork aspect, the terrain, weather conditions, and the thick vegetation were prime factors in the delay of the topographic survey. Slopes with loose soil are as steep as 75%. We had to create paths and clear some area for the prism to be established and detected by the total station. The area is also a locally known habitat of snakes. During our topographic survey, the Philippines was experiencing three weather disturbances (Local names: Mina, Nonoy and Lando). We had to time our fieldwork right in order to avoid an unproductive trip from Manila. The total stations are water resistant but only to a certain extent and since they use laser technology, the measurements will be extremely compromised if done during a downpour. Since Baguio is a highland, the appearance of fog is also a problem.

Recommendations

The workshops that we have done are for naught if the people don't use the knowledge that we have imparted. The same goes with the working community risk maps. During our presentation of output, we were glad that the Barangays are already using the printed satellite images for Barangay planning.

Figure 11: The people of the five barangays meet with Dr. Rhodora M. Gonzalez.

We have achieved big things since the beginning of the project, but we know that our task is far from over. These great strides are just the beginning of a milestone. A milestone of cooperation, a manifestation of the Filipino bayanihan in modern times. With the academe, the community and the government working hand-in-hand, we have a chance to put our country in a positive spotlight and make this world a better place. Alas, the RECLAIM projet's drainage canal construction phase cannot be done. It was a big disappointment.

Appendix

NIKON DTM-332 TOTAL STATION SPECIFICATIONS	
Telescope	
Tube Length	158mm/6.22 in.
Magnification	33x (21x/41x with optional eyepieces)
Effective diameter of objective	45mm/1.77 in. (EDM: 50mm/1.97 in.)
Field of view	1°20′
Resolving power	2.5″
Minimum focusing distance	1.3m/4.26 ft.
Distance measurement	
Range with Nikon specified prisms	
Normal conditions	(Ordinary haze, visibility approx. 20km/12.5 miles)
With reflector sheet (5 x 5cm)	5 to 100m (16.4 to 328 ft.)
With mini prism	1,000m/3,280 ft.
With single prism	2,000m/6,560 ft
With triple prism	2,600m/8,530 ft.
Good conditions	(No haze, visibility of over 40km/25 miles)
With reflector sheet (5 x 5cm)	5 to 100m (16.4 to 328 ft.)
With mini prism	1,200m/3,930 ft.
With single prism	2,300m/7.540 ft.
With triple prism	3,000m/9,840 ft.
Accuracy (Prism/Precise mode)	±(3+2ppm x D)mm ±(3+3ppm x D)mm (−20°C to −10°C, +40°C to +50°C
Measuring Interval[*1]	
Precise mode	1.6 sec. (initial 1.6 sec.)
Normal mode	1.0 sec. (initial 1.4 sec.)
Least count	
Precise mode	1mm/0.002 ft.
Normal mode	10mm/0.02 ft.
Ambient temperature range	−20°C to 50°C/−4°F to +122°F
Atmospheric correction	
Temperature range	−40°C to 60°C/−40°F to +140°F
Barometric pressure	400 to 999mmHg/533 to 1,332hPa/15.8 to 39.3 in.Hg
Prism offset	−999 to 999
Angle measurement	
Reading system	Photoelectric detection by incremental encoder
Horizontal angle	Single
Vertical angle	Single
Minimum increment (Degree, Gon, MIL6400)	Degree: 1/5/10″, Gon: 0.2/1/2mgon, MIL6400: 0.005/0.02/0.05mil
DIN 18723 accuracy (horizontal and vertical)	5″/1.5mgon

NORTHINGS	8-Dec-07	22-Dec-07	13-Jan-08	1-Feb-08	10-Mar-08	12-Apr-08
Long Monument 01	-	-	1815684.169	1815684.167	1815684.163	1815684.157
Long Monument 02	-	-	1815660.014	1815660.010	1815659.981	1815659.962
Long Monument 03	-	-	1815652.993	1815652.967	1815652.980	1815652.968
Long Monument 04	-	-	1815698.412	1815698.392	1815698.386	1815698.347
BASEHILL	1815488.620	1815488.620	1815488.620	1815488.620	1815488.620	1815488.620
HYDRANT	1815533.931	1815533.931	1815533.930	1815533.961	1815533.976	1815533.964
CP1	1815626.358	1815626.358	1815626.358	1815626.358	1815626.358	1815626.358
CP2	1815580.117	1815580.112	1815580.110	1815580.123	-	-
CP3	1815484.125	1815484.134	1815484.133	1815484.117	1815484.125	1815484.111
CP4	1815562.904	1815562.885	1815562.884	1815562.920	1815562.916	1815562.901
CP5	1815670.752	1815670.741	1815670.742	1815670.768	1815670.768	1815670.755
CP6	1815667.853	1815667.868	1815667.871	1815667.863	1815667.871	1815667.861
CP7	1815656.397	1815656.390	1815656.392	-	-	-
CP8	1815725.792	1815725.773	1815725.774	-	-	-
CP9	1815708.403	1815708.402	1815708.399	1815708.319	1815708.319	-

NORTHINGS	10-May-08	22-Jun-08	13-Jul-08	17-Aug-08	14-Sep-08	
Long Monument 01	1815684.157	1815684.155	1815684.155	1815684.151	-	
Long Monument 02	1815660.001	1815659.993	1815659.937	1815660.039	1815659.994	
Long Monument 03	1815652.967	1815652.889	1815652.883	1815652.891	1815652.475	
Long Monument 04	1815698.375	1815698.375	1815698.246	1815698.261	1815698.251	
BASEHILL	1815488.620	1815488.620	1815488.620	1815488.620	1815488.620	
HYDRANT	1815533.947	1815533.968	1815533.965	1815533.969	1815533.966	
CP1	1815626.358	1815626.358	1815626.358	1815626.358	1815626.358	
CP2	-	-	-	-	-	
CP3	1815484.151	1815484.134	1815484.126	1815484.141	1815484.129	
CP4	1815562.931	1815562.920	1815562.925	1815562.922	-	
CP5	1815670.797	1815670.757	1815670.760	1815670.778	1815670.775	
CP6	1815667.861	1815667.867	1815667.872	1815667.893	1815667.875	
CP7	-	-	-	-	-	
CP8	-	-	-	-	-	
CP9	-	-	-	-	-	

EASTINGS	8-Dec-07	22-Dec-07	13-Jan-08	1-Feb-08	10-Mar-08	12-Apr-08
Long Monument 01	-	-	240157.501	240157.519	240157.499	240157.556
Long Monument 02	-	-	240187.054	240187.074	240187.066	240187.125
Long Monument 03	-	-	240187.903	240187.956	240187.933	240187.969
Long Monument 04	-	-	240184.447	240184.503	240184.487	240184.527
BASEHILL	240134.340	240134.340	240134.340	240134.340	240134.340	240134.340
HYDRANT	240096.242	240096.242	240096.240	240096.214	240096.218	240096.229
CP1	240145.696	240145.696	240145.696	240145.696	240145.696	240145.696
CP2	240194.159	240194.153	240194.153	240194.169	-	-
CP3	240180.122	240180.133	240180.134	240180.158	240180.158	240180.162
CP4	240146.348	240146.365	240146.355	240146.356	240146.337	240146.363
CP5	240188.547	240188.541	240188.542	240188.547	240188.535	240188.571
CP6	240190.478	240190.459	240190.455	240190.452	240190.444	240190.491
CP7	240171.064	240171.057	240171.056	-	-	-
CP8	240164.873	240164.862	240164.864	-	-	-
CP9	240116.295	240116.294	240116.294	240116.379	240116.379	-

EASTINGS	10-May-08	22-Jun-08	13-Jul-08	17-Aug-08	14-Sep-08	
Long Monument 01	240157.556	240157.536	240157.535	240157.538	-	
Long Monument 02	240186.983	240187.079	240187.048	240187.011	240187.097	
Long Monument 03	240187.920	240187.985	240187.993	240187.988	240188.069	
Long Monument 04	240184.366	240184.366	240184.507	240184.472	240184.488	
BASEHILL	240134.340	240134.340	240134.340	240134.340	240134.340	
HYDRANT	240096.195	240096.213	240096.212	240096.223	240096.219	
CP1	240145.696	240145.696	240145.696	240145.696	240145.696	
CP2	-	-	-	-	-	
CP3	240180.161	240180.165	240180.167	240180.175	240180.163	
CP4	240146.293	240146.361	240146.353	240146.367	-	
CP5	240188.423	240188.534	240188.549	240188.505	240188.517	
CP6	240190.491	240190.455	240190.460	240190.406	240190.448	
CP7	-	-	-	-	-	
CP8	-	-	-	-	-	
CP9	-	-	-	-	-	

ELEVATIONS	8-Dec-07	22-Dec-07	13-Jan-08	1-Feb-08	10-Mar-08	12-Apr-08
Long Monument 01	-	-	1397.460	1397.454	1397.457	1397.197
Long Monument 02	-	-	1392.635	1392.619	1392.628	1392.454
Long Monument 03	-	-	1390.354	1390.416	1390.420	1390.235
Long Monument 04	-	-	1411.379	1411.352	1411.375	1411.081
BASEHILL	1369.232	1369.232	1369.232	1369.232	1369.232	1369.232
HYDRANT	1365.043	1365.043	1365.040	1365.080	1365.104	1365.136
CP1	1379.567	1379.567	1379.567	1379.567	1379.567	1379.567
CP2	1373.539	1373.534	1373.534	1373.552	-	-
CP3	1378.374	1378.352	1378.348	1378.371	1378.370	1378.391
CP4	1366.971	1366.964	1366.964	1367.019	1367.025	1366.778
CP5	1394.656	1394.648	1394.652	1394.430	1394.453	1394.195
CP6	1393.442	1393.447	1393.450	1393.446	1393.468	1393.193
CP7	1388.372	1388.384	1388.382	-	-	-
CP8	1434.689	1434.681	1434.678	-	-	-
CP9	1426.551	1426.548	1426.550	1426.406	1426.406	-

ELEVATIONS	10-May-08	22-Jun-08	13-Jul-08	17-Aug-08	14-Sep-08	
Long Monument 01	1397.197	1397.173	1397.171	1397.175	-	
Long Monument 02	1392.732	1392.751	1392.617	1392.619	1392.621	
Long Monument 03	1390.421	1390.274	1390.360	1390.350	1389.862	
Long Monument 04	1411.361	1411.330	1411.407	1411.378	1411.298	
BASEHILL	1369.232	1369.232	1369.232	1369.232	-	
HYDRANT	1365.099	1365.091	1365.077	1365.081	1365.073	
CP1	1379.567	1379.567	1379.567	1379.567	-	
CP2	-	-	-	-	-	
CP3	1378.386	1378.373	1378.371	1378.372	1378.369	
CP4	1366.744	1367.034	1367.025	1367.037	-	
CP5	1394.456	1394.435	1394.431	1394.430	1394.425	
CP6	1393.193	1393.457	1393.445	1393.383	1393.446	
CP7	-	-	-	-	-	
CP8	-	-	-	-	-	
CP9	-	-	-	-	-	

PAGASA BAGUIO STATION	
Elevation:	1500m
Latitude:	16.41 N
Longitude:	120.6 E
Monthly Rainfall (mm):	
Jan-2007	43.2
Feb-2007	0.6
Mar-2007	31.8
Apr-2007	25.4
May-2007	308.5
Jun-2007	358.4
Jul-2007	219.0
Aug-2007	1201.6
Sep-2007	408.4
Oct-2007	410.3
Nov-2007	444.8
Dec-2007	21.6
Jan-2008	24.0
Feb-2008	97.0
Mar-2008	78.7
Apr-2008	149.8
May-2008	839.8
Jun-2008	307.0
Jul-2008	681.2
Aug-2008	995.5
Sep-2008	761.0