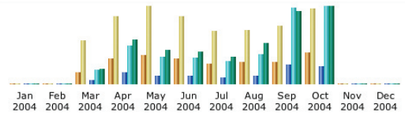
GeoSemantica Update

During the first half of this year GeoSemantica has seen a surge in activity. Currently the digital library holds 58.79 gigabytes of geospatial data in the form of shapefiles and raster images as well as a significant number of digital documents. The application continues to prove itself as a mechanism for cooperative authoring. Scientists, geographers, sociologists, planners, and students are starting to come together in the project digital rooms to share information. The exercise has proven fruitful, and further fine-tuning of the application is planned. GeoSemantica has partnered with the Community Communications sub-project to introduce and train sociologists and planners in the use of the application. As a result, GeoSemantica now enjoys over 600 registered users. The partnership has also provided a platform for demonstrating preliminary products and results of the study areas. GeoSemantica's statistics show that over 1000 maps have been published (exported) in GeoSemantica.



Month	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Jan 2004	0	0	0	0	0
Feb 2004	0	0	0	0	0
Mar 2004	162	602	19244	75623	404.53 MB
Apr 2004	350	932	62842	205110	1.20 GB
May 2004	397	1063	42777	143996	941.01 MB
Jun 2004	346	933	43246	141302	882.31 MB
Jul 2004	281	732	34536	120630	735.64 MB
Aug 2004	302	733	43664	159734	1.09 GB
Sep 2004	307	794	103305	403173	1.94 GB
Oct 2004	437	1035	94691	411457	2.07 GB
Nov 2004	0	0	0	0	0
Dec 2004	0	0	0	0	0
Total	2582	6824	444305	1661025	9.19 GB

Fig. 1. Geosemantica monthly Web server statistics showng number of visitors, pages, hits and bandwidth.

The library now holds two important geospatial datasets: GeoCover Landsat images and rasters of the Shuttle Radar Topography Mission (SRTM). Both of these datasets feature raster (GeoTIFF) images at 30 metres resolution and cover the complete South American continent. Having these two important datasets in the digital library has attracted a lot of interest and a significant amount of traffic to the site (see Figure 1).

The GeoSemantica working group met in Colombia in May 2004 to plan the implementation and delivery of the servers. The development team continues the task of migrating GeoSemantica to .NET architecture. Thanks to the partnership with GSC's Pathways project, we are co-developing GeoSemantica/Pathways, which is on track, and we expect the delivery of GeoSemantica version 1.0 in the first half of 2005.

Mr. Otto Krauth

International Day for Natural Disaster Reduction (UN/ISDR) - October 13, 2004

Above: The Project, at work in the streets; right: Poster panel exhibition.

Members of MAP:GAC in Bolivia presented a series of poster panels as part of Expo-Feria which took place on Paseo del Prado in La Paz, Bolivia on October 10, 2004 as Bolivia's contribution to the International Day for Natural Disaster Reduction (UN/ISDR). The panels contained information about the multinational activities of the project, as well as those specific to Bolivia.

An outcome of significance was that the public, the majority of whom were 'non-technical', understood MAP:GAC and celebrated the initiative. In addition, it came as a surprise to many that the Geological Survey, traditionally a mining institution, is taking part in this type of geoscience research.

Mr. Hugo Garcia

XII Peruvian Geological Congress October 26–29, 2004

The XII Peruvian Geological Congress followed MAP:GAC's Geoscience Working Group meetings in Lima, Peru, and was attended by a large contingent from the project. The congress theme of "Geology: generating natural science knowledge, added value and evolution" was regionally focused, with all presentations having some Peruvian content. Speakers included Andean experts such as Dr. Victor Ramos and Dr. Etienne Jaillard. There was a strong representation from South American universities and international mining companies with interests in the region.

The congress was the venue for the presentation of the preliminary draft of INGEMMET and DINAGE's binational geological map, a MAP:GAC initiative. Mr. José Sánchez of INGEMMET presented the map and Mr. Robert Shaw attended to questions generated by the map at the MAP:GAC booth in the exhibition hall. The group who produced the binational map, including Shaw, Sánchez, Mr. Luis Pilatasig, Mr. Guillermo Rosero, and Mr. Oscar Palacios were able to meet with Jaillard, a French geologist who has been working in the same area, to discuss further details of the map and local geology. A final version will soon be available. The MAP:GAC booth at the congress provided information on the project to those interested and was staffed by Mr. Paul Rovers, Ms. Malaika Ulmi, Ms. Rosa Vargas, and Shaw.

Ms. Malaika Ulmi

MAP:GAC Newsletter
Production Team

Editor-in-Chief:
Catherine Hickson

Features:
Oscar Cerritos
Mike Ellerbeck
Jennifer Getsinger
Reginald Hermanns
Lionel Jackson
Monica Jaramillo
Otto Krauth
Paul Rovers
Mark Stasiuk
Malaika Ulmi

Design & Layout:
Loretta Wong

Geological Survey of Canada
101-605 Robson Street
Vancouver, B.C.
V6B 5J3
Tel: 604.666.0183
Fax: 604.666.7507
Email: map@pma-map.com
Web: www.pma-map.com
NRCan / RNCan

Funded by:
CIDA / ACDI

Multinational Andean Project:
map:gac
http://www.pma-map.com
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Manager's Desk
November 2004

Top: First day of the Geoscience Working Group meeting, Lima, Peru; bottom: Mr. José Mendía signing GWG minutes while Mr. Hugo Garcia looks on.

October marked a very important time for MAP:GAC. Twice a year the Geoscience Working Group (GWG) meets to discuss how the Project as a whole is progressing and to review the work of the individual countries. The mid-year meeting took place in Lima, Peru, October 21–23, 2004. The meeting covered a wide range of topics, with one part on cooperative multinational products. The first of these will be Volume 1 of *Amenazas Geológicas en las Comunidades Andinas* (*Geological Hazards in Andean Communities*). The timeline for this publication starts with submittal and acceptance of articles up until December 31, 2004. January will be a peer review period with publication anticipated in April. This document is intended to be the first of several volumes to highlight the scientific and technical work of the Project in geological hazards (volcanoes, earthquakes, and landslides) and community communications. The subject of peer review of all national geoscience agency publications was also discussed. I took the opportunity to stress the importance of high-quality publications. Though true of all work of each national geoscience agency, it is especially important that any natural hazard studies be scrutinized and subject to peer review, as often property values and the lives of people depend on the results. Thus they must be of the highest scientific calibre, a goal expected as well as achievable given the high quality of expertise of our MAP:GAC participants.

Dr. Catherine Hickson

Geoscience Working Group Meetings
October 21–23, Lima, Peru

The mid-year Geoscience Working Group Meetings (GWG) were hosted by INGEMMET and held in the Prince Hotel in Lima, Peru. Project leaders of all participating countries attended: Mr. José Mendia of SEGEMAR, Mr. Hugo Garcia of SERGEOTECMIN, Dr. Jorge Muñoz and Dr. José Frutos of SERNAGEOMIN, Dr. Marta Calvache and Ms. Gloria Ruíz of INGEOMINAS, Mr. Elías Ibadango of DINAGE, Mr. Antonio Guzmán of INGEMMET, and Mr. Jesús Guerrero and Mrs. Elda Perdomo of INGEOMIN. Mr. Roberto Page, the group's Technical Coordinator, was present, as well staff of the Geological Survey of Canada, including Project Manager, Dr. Catherine Hickson, Community Communications sub-project leader, Mr. Mike Ellerbeck, Landslide sub-project leader, Ms. Monica Jaramillo, and GeoSemantica sub-project leader, Mr. Otto Krauth. Also attending were Dr. Fernando Muñoz-Carmona, Community Communications and Seismology, Dr. Reginald Hermanns, Landslides, Ms. Malaika Ulmi, and Mr. Paul Rovers. The meetings provided an opportunity for the CIDA representative (newly appointed to the project), Mr. Brian McKay, to become familiar with the progress, people, and details of MAP:GAC.

Page reminded the group that March, 2005, will mark the middle of MAP:GAC. With that in mind, the project's progress was updated through sub-project reports and discussion on multinational products such as the multicountry hazard map, the journal to be produced in the next year, the translation of the UN/ISDR book *Living with Risk*, and the standardized glossary of landslide terminology. The group agreed to use GeoSemantica more, and will use the medium in future for communication and document exchange.

Dr. Fernando Muñoz-Carmona facilitating RimSim Exercise.

To further the communication aspect of the project, Tuesday, October 26 was dedicated to a natural disaster simulation event called "Rim Sim". Rim Sim is a six-hour role-playing exercise consisting of an eight-party negotiation that focuses on creating a framework for long-term disaster-recovery efforts after a hurricane and earthquake. The simulation involves three developing countries affected by the disasters, and two wealthy countries that oversee the funding of the recovery. The MAP:GAC group rose to the challenge, took on various roles of professionals in disaster mitigation from fictitious countries, and showed a strong ability to collaborate and come to a consensus on an appropriate strategy for the situation presented to them. Mr. Guillermo Rosero of DINAGE acted as the Finance Minister, charged with deciding how much money was available for the countries struggling with damaged infrastructure after a hurricane and earthquake. Perdomo was the Emergency Director of one of the afflicted countries, working together with the General of the Army of the same country, Mr. Napoleon Baez of DINAGE. The concerns of the Humanitarian Organization's representative, Guzmán, and the Environmentalist, Muñoz, were taken into account in the group's plan for allocation of the financial support. Mr. Lionel Fidel of INGEMMET, Mr. Oscar Kempff of SERGEOTECMIN and Ibadango proved very persuasive in their roles as business leaders and mayors. The MAP:GAC group was joined by Mr. Manuel Zapato of Civil Defense from INGEMMET's case study area of Matucana, and Mr. Yackzon Ynga, a sociologist with the municipal government in Matucana. They made a great team as Economic Consultants from a wealthy donor nation. Muñoz-Carmona facilitated the exercise and ensured that everyone was heard and kept on task. Congratulations to the entire group for their enthusiasm and for reaching a viable consensus. Everyone gained new insight into the needs of the various players in the natural hazard mitigation arena, the role of science in emergency planning and rebuilding, and the ripple effects of natural disasters.

Ms. Malaika Ulmi

Landslide Fieldwork in Peru: Matucana and Payhua in September

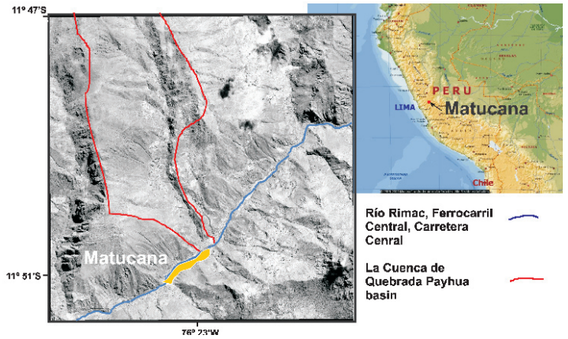

Figure 1: Location of Matucana / Quebrada Payhua study area. The Quickbird panchromatic satellite image, used as a map base, is seen here.

The small city of Matucana, Huarochirí, Peru (Fig. 1), occupies a physiographic setting common in the Andes where the only convenient level ground occurs along valley floors or on fans. It shares the 1 km wide flood plain of Río Rimac with the main highway (Carretera Central) and railroad (Ferrocarril Central). Carretera Central is a strategic highway that connects the Pacific coast to the Amazon basin. At an elevation of 2390 m above sea level, Matucana is separated from the channel of Río Rimac by a dike underlying Carretera Central. Mountain peaks and ridges rise to more than 5000 m within 10 km of the city. Settings such as this commonly expose villages and cities to hazards such as floods, debris flows, and rock falls. In 1959, ninety per cent of Matucana was destroyed by a flood, with accompanying loss of life. The flood was caused by debris-flow damming of Río Rimac immediately upstream. A similar disaster struck the city in 1983. In both cases, the debris flow originated from Quebrada Payhua, which joins Río Rimac immediately upstream from Matucana. This 14.9 km^2 basin is 6.1 km in length and descends 2360 m from a maximum elevation of approximately 4760 m with an overall gradient of 21°. Many other Andean Communities face similar hazards from debris flows. This is why the Quebrada Payhua and Matucana area was an excellent choice for a MAP:GAC pilot study. Investigative techniques proven here can be applied widely throughout the Peruvian Andes.

Figure 2: Field team (left to right): Mr. Manuel Vilchez Mata, Mr. Juan Zegarra Loo, Mr. Jackson Enega, Mr. Manuel Zapata, Mr. Richard Farfan Saenz, Mr. Lucio Medina Allca, Mr. Julio Colque Tula, and Dr. Lionel Jackson.

Field investigation of Quebrada Payhua was carried out by INGEMMET under the direction in the field of Mr. Juan Zegarra Loo, with the collaboration of civil defense official Mr. Manuel Zapata of Matucana and Dr. Lionel Jackson of the Geological Survey of Canada, September 8–18, 2004 (Fig. 2). The work included three additional geologists from INGEMMET (Lima) plus Mr. Jackson Enega of Matucana Television, who documented much of the work. Mr. Julio Colque Tula (Archeologist) also collaborated in the field. He assigned ages to ceramic fragments and retaining walls of terraced mountainside fields. This was valuable in establishing the long-term stability of mountain slopes and the presence or absence of recent debris-flow activity in those areas.

The surficial geology of the basin was mapped using a Quickbird satellite image taken on August 13, 2004, for this purpose (Fig. 1, Fig. 3). The fieldwork showed that Quebrada Payhua basin could be subdivided into a lower and upper basin based upon bedrock geology and attendant landslide activity. The landslide activity is most intense in the lower basin; here most of the sediment that forms debris flows is introduced into the stream system by landslides. Comparison of airphotos taken in 1951 with the 2004 satellite image indicates that the area covered by landslides in the lower basin has increased by about five times during the intervening 53 years. The cause of this increase is not known. Consequently, the amount of landslide sediment reaching Quebrada Payhua has proportionally increased as a result. This might mean that future debris flows, usually triggered by El Niño rainstorms, could be larger in volume than previous events. Damage could be compounded by the fact that Matucana has also grown during the same period (Fig. 4). Although it was not directly buried by debris flows during the 1959 and 1983 events, the city's eastern limits have likely expanded into areas that were buried. A survey of sediment within the stream channel and adjacent sediment sources will be used to calculate a maximum debris event for planning, engineering, and decision-making purposes.

Figure 3: Geologists measure and describe the upper limit of debris flow deposits within the upper basin of Quebrada Payhua (yellow line). No debris flow has exceeded this limit during at least the past 600 to 800 years based upon geological and archaeological evidence.

Figure 4: Fan of Quebrada Payhua and the eastern limit of Matucana directly across Río Rimac. It is in this area that debris flows have blocked and diverted Río Rimac into Matucana. A school and hospital are located in this part of the city. Ferrocarril Central and Carretera Central follow the left bank of Río Rimac. Debris flows buried the railroad in 1959 and both the railroad and highway (constructed in the 1960s–1980s) in 1983.

The project was greatly helped by many local people from Matucana and Payhua who recounted the events of previous disasters. This helped to piece together how and why the debris flow events occurred.

Dr. Lionel Jackson

Second Remote Sensing Workshop

Loja, Ecuador

Photo 1: Monitoring control point located in the unstable area within the neighbourhood of Reinaldo Espinosa.

The Geological Survey of Ecuador (DINAGE), the Program for Southern Development (PREDESUR), and the Private Technical University of Loja (UTPL) held a workshop on the use of differential GPS, from September 20 to 22, 2004. The workshop was offered to a number of educational institutions and development programs in the Loja region.

Instructors of the workshop were Mr. Elías Ibadango, Mr. Cesar Jaramillo, and Mr. José Tamay; technical staff of the institutions involved in MAP: GAC. All three took part in the initial dGPS workshop held in Ecuador from April 25 to May 1, 2004, conducted by Dr. Mark Stasiuk.

The most recent workshop was attended by 15 participants representing 12 institutions of the southern region, including:

Proyecto Binacional Catamayo Chira
Municipio de Loja
Universidad Técnica Particular de Loja UTPL
Ministerio de Desarrollo Urbano y Vivienda MIDUVI
Fundación Naturaleza y Ciencia Internacional
Defensa Civil de Loja
Consejo Provincial de Loja
Colegio de Ingenieros Geólogos de Minas y Petróleos de Loja CIGMYPL
Programa de Desarrollo del Sur PREDESUR
Colegio de Ingenieros Civiles de Loja CICL
Compañía de Ingenieros del Ejército No. 7
Escuela Politécnica del Ejército

Photo 2: Location of control point for the city of Loja's wind energy project at Cerro Villonaco.

Photo 3: Monitoring of the unstable area in the Santiago sector of the Loja-Cuenca highway.

Measurements for control points and monitoring were taken in sites previously established in the neighbourhood of Reinaldo Espinosa and on the Loja-Cuenca highway in the Santiago sector. In addition, control points were established in two areas that are being developed as part of a wind energy project for the city of Loja, in the San Cayetano sector of the city and on the Loja-Zamora highway in the Sabanilla sector.

This workshop served in strengthening the existing links of technical cooperation between various participating institutions and also in establishing new links of cooperation with other institutions that have shown interest in actively participating in MAP:GAC. This contributes to the objectives of the project, coordinating efforts and maximizing economic resources.

Mr. Elias Ibadango

Community Communications

As part of the Geoscience Working Group (GWG) meetings of the MAP:GAC, representatives from participating countries took part in a field visit to the pilot project area of Matucana. The trip was organized by the Department of Environmental Geology within INGEMMET and was supported and led by the Chief of Civil Defense of the Provincial Municipality of Huarochiri (Matucana), Mr. Manuel Zapata, Chief of the Office of Civil Defense for the Municipality of Huarochiri, and Mr. Lindbergh Meza, Vice-dean of the Lima Council of the College of Engineers of Peru.

Once the activities of the GWG had concluded, Mr. Mike Ellerbeck and Dr. Fernando Muñoz Carmona visited the Center for the Study and Prevention of Disasters (PREDES) headquarters where they met with the president of the institution, Dr. Gilberto Romero, to discuss the methodologies and operational and financial aspects of the social case study in Matucana. Romero had already submitted a work plan proposal to MAP:GAC, and, pending INGEMMET's approval, made a commitment to revise and modify the proposal based on the information he had received. Zapata and Mr. Yackzon Ynga, a sociologist from the Municipality of Matucana, also attended the meeting.

Following the meeting at PREDES, Ellerbeck and Muñoz Carmona visited the headquarters of the Lima Council of the College of Engineers of Peru, where they were met by the Dean of the institution, Dr. Javier Pique del Pozo who expressed his interest in signing an agreement with INGEMMET in order to work together to find feasible solutions for the community of Matucana.

Dr. Fernando Muñoz-Carmona