SLGS NEWSLETTER

SRI LANKAN GEOTECHNICAL SOCIETY

A Member Society of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE)

Established in 1986

2010 January: No 1

A Message from the Editor

Happy New Year 2010!

This is the first SLGS newsletter of the new decade. In September 2009, SLGS had its annual conference and general meeting. Associate Prof. Ken Kawamoto of Saitama University, Japan, Dr. Asiri Karunawardena, Director /Geotechnical Engineering Division, NBRO and Dr. Saman Thilakasiri, Senior Lecturer, Department of Civil Engineering, University of Moratuwa made valuable presentations during the annual conference.

Since the last issue, there were three SLGS monthly forums, all on very interesting topics; "Earth Retaining Structures in Transport Applications" by Dr. Priyantha Jayawickrama, on 18th June 2009, " Earthquake induced forces on piles in layered residual formations in Sri Lanka" by Dr. Saman Thilakasiri on 22nd July and on " Behavior of sand subjected to cyclic loading and their modeling" Dr. Nalin De Silva. SLGS appreciates their contribution and request for cooperation of prospective resource personnel, at a time we badly need resource personnel.

Dr. Asiri Karunawardena presented a paper at the17th ISSMGE conference and he represented Sri Lanka at the Meeting of Representatives of Asian Societies. ISSMGE Council met in Alexandria on 4 October 2009 elected Professor Jean-Louis Briaud as the next President of ISSMGE for the period 2009 - 2013. Professor Zuyu Chen was elected as the Vice President for the Asia Region. With this new leadership of the ISSMGE at the dawn of a new decade, SLGS wishes its members all the very best in future endeavors.

Dr(Eng). Udeni P. Nawagamuwa – Editor Newsletter

Office bearers of the SLGS for the years 2009-2010

Mr. K S Senanayake	*President*
Mr. K L S Sahabandu	*Hony. Secretary*
Mr. W A A W Bandara	*Treasurer*
Prof. B L Tennekoon	*Past President*
Mr. D P Mallawaratchie	*Past President*
Prof. Athula Kulathilaka	*Vice President*
Mr. A J Amarasinghe	*Asst. Secretary*
Mr. Mahinda Rathnasiri	*Asst. Treasurer*
Dr. Asiri Karunawardena	*Editor – Journal*
Dr. U. P. Nawagamuwa	*Editor – Newsletter*
Dr. N.H. Priyankara	*Committee Member*
Dr. L.I.N. de Silva	*Committee Member*
Ms. T.J. Jayasundara	*Committee Member*
Mr. M.L.I. Abeysinghe	*Committee Member*
Mr. H.R. Maduranga	*Committee Member*

Dr. Priyantha Jayawickrama of Texas Tech University gave a speech on "Earth Retaining Structures in Transport Applications" on 18th June 2009

Professor Jean-Louis Briaud was elected as the next President of ISSMGE for the period 2009 - 2013.

The Vice-Presidents for the period 2009-2013 are:
Africa - Dr Samuel Ejezie
Asia - Professor Zuyu Chen
Australasia - Professor Michael Davies
Europe - Professor Ivan Vanícek
North America - Professor Miguel Romo Organista
South America - Professor Jorge Bonifazi

You may communicate with Professor Jean-Louis Briaud, President ISSMGE on what is important to ISSMGE members. His contact information is on his web site at https://ceprofs.civil.tamu.edu/briaud/.

Contents

The Grand Canyon Geology

Prepared by Dr. (Eng) U.P. Nawagamuwa, Department of Civil Engineering, University of Moratuwa

View from Grandview Point (Photo:Inernet)

Sunset in Grand Canyon (Photo: Udeni Nawagamuwa)

The Grand Canyon Geology

The **Grand Canyon** is a steep-sided gorge carved by the Colorado River in the United States in the state of Arizona. The Grand Canyon is 277 miles (446 km) long, between 4 - 18 miles (6.4 - 29 km) wide and over a mile deep (1.6 km), which makes it the largest canyon on land. The Grand Canyon features one of the world's most studied geologic histories anywhere, because it possesses the most complete sequence of rock that represents two billion years of Earth's geologic history in North America. There are 40 identified rock layers and 14 major unconformities that indicate where there are gaps in the geologic record. It is by far one of the most fascinating and easily accessible places for geologists to catalog the Earth's major events and delve into our planet's veiled past.

How Was the Canyon Made?

Scientists cannot be completely sure how the canyon was created and there are still theories evolving, but they do have a very educated guess. Erosion is what most target as the main contributor to the creation of the Grand Canyon. This was caused mostly by water, ice and wind, however; continental drift, weather and climate changes, and even volcanoes were also contributing factors to the formation of the Grand Canyon. Most scientists agree that the largest component in the creation of the canyon was water and the path of the Colorado River.

Flash Floods and the Arid Desert

Flash floods are one of the most destructive forces on our planet, with the power and force to move boulders, uproot trees, obliterate buildings, wash out roads, and destroy bridges. The reason flash floods occur in places like the Grand Canyon, is because of the desert climate. The Grand Canyon is situated in an arid desert that only receives an average of 26 inches (66 cm) of rain each year. Since the ground receives so little moisture, it bakes under the sun each day, which makes it difficult and almost impossible to absorb water easily. When the skies open up and rain pours down, the water falls at such a rate that the ground is not able to absorb it fast enough and this causes a flash flood. Since the water cannot be absorbed it goes wherever it can; moving fast downhill and picking up debris along the way.

Today's flash floods are powerful, but they are nothing compared to the floods that helped shape the canyon! When the Earth was young its climate, weather and geology was very unstable. From the little history we can find locked away in fossils, old and petrified trees, rocks, magma, soil and the ocean, scientists are able to document that the worst, largest, and most catastrophic naturally occurring disasters were during the time when the Earth was young. Everything was more extreme; tsunamis, volcanic eruptions, storms, droughts and earthquakes. The climate and the Earth itself were exceptionally unstable.

Droughts lasted longer and so did storms, which made the effects of floods much more devastating. In fact, amidst the many layers of rock that the canyon holds there are breaks and some gaps where time periods are missing or an uneven spread of sediment; this is called an unconformity. Throughout the 40 layers of rock there are 14 unconformities that have geologic history gaps as large as 165 - 250 million years and 12,000 feet of sediment washed

Access Roads used by Red Indians (Photo: Udeni Nawagamuwa)

away in some places. Scientists can only speculate about how large these natural disasters must have been to cause so much damage; one theory is that large floods either caused by storms or glacier melt.

Geology

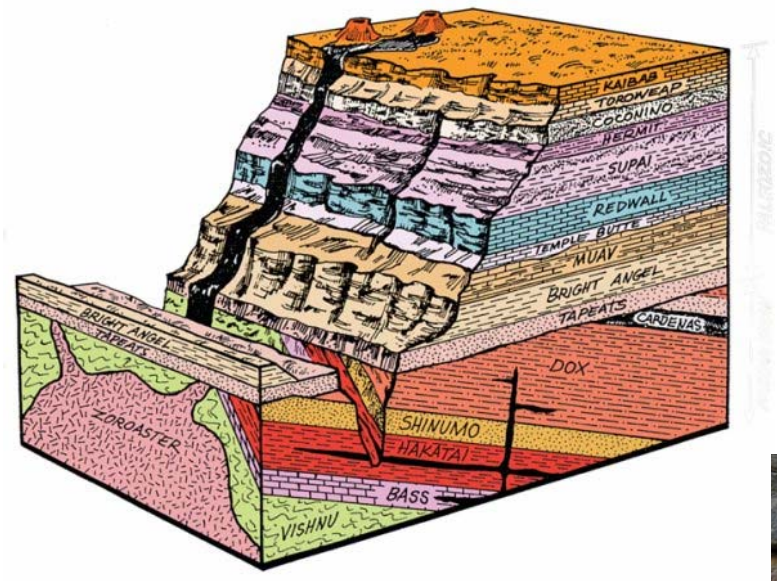
The canyon's major exposed sedimentary rock layers range in age from 200 million to two billion years old! The canyon's oldest layer is called the Vishnu Group; it is made of thousands of feet of sand, ash, mud and silt and is the dark-colored, garnet-studded layer at the bottom of the canyon in the Inner Gorge. This layer was created two billion years ago in the Precambrian time period when all land mass on earth was comprised of a few islands that plate tectonics caused to slam into each other and form the first few growing continents.

The canyon was formed only five to six million years ago and is much younger than the lowermost layers. In fact, most of the canyon walls are deposited marine sediment from when ocean covered the land. Each layer of rock responds differently to the erosive qualities of the Colorado River. Some rocks become cliffs and others form slopes or erode faster than different layers, this creates the variety of textures you will find at the Grand Canyon. The vivid hues that the canyon features originate because most of the rock layers contain iron and other mineral deposits.

The Grand Canyon Today

Today the canyon is one of the world's most amazing natural wonders, where people come from all over the world to marvel at its beauty and mystery. The Grand Canyon is 277 miles (446 km) long, between 4 - 18 miles (6.4 - 29 km) wide and over a mile deep (1.6 km), which makes it the largest canyon on land. Erosion is still occurring and will continue to do so, but at a much slower rate than in the past. This is mostly due to the Glen Canyon Dam. The dam is harnessing the hydroelectric power of the Colorado River, controlling how much water is put in the river and filtering out much of the sediments that erode before it hits the canyon.

The Grand Canyon National Park is a place of wonder and beginning, where learning about our geologic past is being used to ensure a better future.



Grand Canyon Rock Layers (Photo: Internet)

Rock types found in Grand Canyon
(Photo: Udeni Nawagamuwa)

Unconformities in Grand Canyon (Photo: Internet)

Special Acknowledgment……..
Eng. Krishan Ginige and Eng (Mrs) Thushari Ginige of Arizona, USA for providing facilities to visit this marvelous place….. for more info about the place please visit http://www.nps.gov/grca/index.htm

Environment Risk Assessment at Waste Disposal Landfill site: Emerging soil physical processes and properties

By Associate Prof Ken Kawamoto

Graduate School of Science and Engineering, Saitama University, Japan

A summary of the paper presented at SLGS Annual Conference

Pollution control, site-specific remediation and rehabilitation technique, and risk assessment at waste disposal landfill sites are vital social and engineering problems in not only developed countries but developing countries. In the conference presentation, first, general information on municipal solid wastes (MSW) in Japan and Sri Lanka such as annual change in total discharge amount of MSW, collection rate of MSW, and waste treatment methods were provided. Landfill structures including anaerobic landfill, anaerobic sanitary landfill, semi-aerobic landfill, and aerobic landfill were also introduced (Fig. 1).

In order to do risk assessment of waste dumping sites, accurate evaluations on various impacts to human health and surrounding environment, and global environment must be needed. A possible approach to an accurate risk assessment is to develop a process-based risk model for various chemicals in the waste-soil-water-air-human system and is to utilize the model for risk-based corrective action. In the process-based model, fate and transport of environmental impact masses such as landfill gases, heavy metals, and others can be expressed quantitatively in each process including production, transport, emission, and human health/environmental effects, and the predicted mass flux in each process can be link each other.

The process-based risk model is likely to be useful to risk assessment at waste dumping sites, however, lack of physical, chemical, and biological knowledge we can not develop the model for practical purposes. Especially, lack of knowledge on landfill gas transport and colloid-facilitated transport (CFT) of contaminants, both are emerging soil physical and chemical issues in the fields of geotechnical and geoenvironmental engineering, discourages accurate predictions of environmental impact masses in the process-based risk model. In the second part of the presentation, recent research works and strategies on landfill gas and CFT were reviewed based on the new viewpoints of filed investigations, laboratory experiments, and numerical simulation analyses.

(a) Gohagoda waste dumping site in Sri Lanka (anaerobic landfill/open dumping)

(b) Maharagama waste dumpsite in Sri Lanka (anaerobic sanitary landifill)

(c) Payatas waste dumpsite in Philippines (anaerobic sanitary landifill)

(c) Yorii controlled waste dumpsite in Japan (semi-aerobic landfill/Fukuoka method)

Fig. 1 Various types of waste landfill structures

Some Glimpses of SLGS Annual Conference 2009…….

President /SLGS Eng. Kirthi Sri Senanayake introducing the presenters….

Associate Prof. Ken Kawamoto of Saitama University, Japan made a presentation on Environment Risk Assessment at Waste Disposal Landfill site: Emerging soil physical processes and properties.

Dr. Asiri Karunawardena, Director/Geotechnical Engineering Division of NBRO made a presentation on Geotechnical practices in highway construction

Dr. Saman Thilakasiri of University of Moratuwa, made a presentation on Role of the geotechnical engineer in the piling industry

Participants of Asian National Society Meeting held at Alexandria, Egypt

Forthcoming Conferences

(1). **2nd International Symposium on CPT, CPT'10**
Date: 9 - 11 May 2010
Location: Hyatt Hotel & Resort, Huntington Beach, California, USA
www.cpt10.com
(2). **17th Southeast Asian Geotechnical Conference**
Date: 10-13 May 2010
Location: Taipei Int'l Convention Center (TICC), Taipei, Taiwan
http://www.17seagc.tw/welcome.htm
(3). **9th International Conference on Geosynthetics**
Date: 23 - 27 May 2010
Location: Sofitel Jequitimar Hotel , Guaruja, Brazil
www.9icg-brazil2010.info
(4). **7th International Conference on Physical Modelling in Geotechnics**
ICPMG 2010
Date: 28 June - 1 July 2010
Location: ETH Zurich, Honggerberg Campus , Zurich, Switzerland
www.icpmg2010.ch
(5). **International Symposium on Geomechanics and Geotechnics: From**
Micro to Macro
Date: 10 - 12 October 2010
Location: Tongji University , Shanghai, China
geotec.tongji.edu.cn/is-shanghai2010/
(6). **6th International Congress on Environmental Geotechnics**
Date: 8 - 12 November 2010
Location: New Delhi, India
www.6iceg.org
(7). **Fifth International Conference on Scour and Erosion (ICSE - 5) 8 - 10November**
Date: 8 - 10 November 2010Location: Holiday Inn Golden Gateway , San Francisco, California, www.icse-5.org

Geotechnical Forums since the last issue

Dr. Priyantha Jayawickrama of Texas Tech University, USA on "Earth Retaining Structures in Transport Applications" on 18th June 2009

Dr. Saman Thilakasiri of University of Moratuwa on " Earthquake induced forces on piles in layered residual formations in Sri Lanka" on 22nd July 2009

Dr. Nalin De Silva University of Moratuwa on " Behavior of sand subjected to cyclic loading and their modeling" on 24th August 2009.

SLGS and ISSMGE Membership Fees

To receive the SLGS Newsletter and other information, all members are required to fully subscribe the Membership Fees and inform the Secretariat about any change of their address. Members/Readers, please request your friends to furnish SLGS with latest contact address and membership fees due.

Membership Admission Fee Rs. 200/=
Annual Membership Fee Rs. 300/=
ISSMGE Fee Rs. 1000/=

The SLGS Newsletter comes to you in volumes of four fascicles issued in January, April, July and October in each year.

Address for Correspondence:
Sri Lankan Geotechnical Society
C/o National Building Research Organisation
No. 99/1, Jawatta Road, Colombo 5, SRI LANKA

Tel:
President: +94-77-4147496 Hony Secretary: +94-11-2668842
Treasurer: +94-11-4309494 Editor: +94-11-2562932

Note: The views expressed by authors are not necessarily the views of SLGS.

PRINTED MATTER
SLGS

If undelivered, please return to;
Sri Lankan Geotechnical Society (SLGS)
C/o National Building Research Organization (NBRO)
99/1, Jawatta Road
Colombo 5
Sri Lanka.