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INDIAN SOCIETY OF ENGINEERING GEOLOGY
(IAEG India National Group)
A Biannual Newsletter

ISEG NEWS

www.isegindia.org
www.joegindia.com

Bridging Communication Gap.....Dissipating Information

MESSAGE FROM THE PRESIDENT

Dear Members,

It has been more than a year since I got the opportunity to serve the society as its President. At the outset, I want to convey my heartfelt thanks for the love, affection and support received from all, especially from the Executive Council members.

The last year has been very challenging, severe and exhaustive for all of us. The pandemic situation is such that it can either overwhelm you or make you fight with every bit of imagination and resourcefulness. I am happy and proud that our society has chosen the later option. The progress made by the society despite the covid-19 pandemic situation resulting in its inability to organise physical events is appreciable. We could manage to organise knowledge sharing webinars and uninterruptedly continued our publications.

Today the government has recognised the unique value of hydropower in the country. Many new projects are coming up and some important ones are soon to be commissioned. With major boost in hydropower and infrastructural industry, the role of geotechnical professionals will also increase in the years to come. Now the time has come for the society which has a pool of talented engineering geology and geotechnical professional to play a pivotal role in mitigating the geological risks associated with these projects.

The society provides a common platform where the academicians and practicing technocrats can discuss,

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MESSAGE FROM THE SECRETARY

Dear colleagues,

It give me immense pleasure in bringing out the April 2021 issue of society's newsletter. As we all understand, under the shadow of pandemic and amidst restriction it has been very difficult in carrying out all the planned regular activities of the society viz., EGCON-2020, GOP etc. However, the Executive Council under the pragmatic leadership of our President Sh. A.K. Singh took sincere efforts in organising online events viz., knowledge sharing webinar series by eminent experts. The series could attract significant viewership and its our endeavour now to continue and organise more such events.

The society has achieved a major milestone by streamlining its flagship publication – The Journal of Engineering Geology. During last year, three backlog issues of the journal viz., vol. 42(2017), vol. 43(2018) and vol. 44 (2019) were published online. It gives me great contentment to announce that this year too we were able to publish vol. 45 (2020) issue of the journal in April itself. Efforts are being taken to bring out vol. 46 (No 1) of the journal by end of June 2021 as a special issue.

I'm pleased to inform that, now all the back issues of the journal from 2004 onwards are available as high quality pdf's on our journal website www.joegindia.com. I hope this facility shall be very useful to the members. The Editorial Board of the journal has been reconstituted to include few International experts from rock mechanics, geotech-nical and engineering geophysics domain.

Society is putting great effort for indexing the journal with reputed international databases. This will not only increase the viewership of the journal but will also attract some very high quality research

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"Dare to be free, dare to go as far as your thought leads, and dare to carry that out in your life."

— Swami Vivekananda

ISEG COUNCIL 2020-21

ISEG DELHI-NCR CHAPTER

SHRI A. K. SINGH, PRESIDENT, ISEG BECAME VICE PRESIDENT OF INCOLD

Shri A.K. Singh, President, ISEG and CMD, NHPC became Vice-President of the Indian Committee on Large Dams (INCOLD). He has also become a member of the Editorial Board of INCOLD Journal. INCOLD in collaboration with Central Water Commission (CWC), Dam Rehabilitation Improvement Project (DRIP), and National Hydrology Project (NHP) has organized a Symposium on "Sustainable Development of Dams and River Basins" under the aegis of ICOLD at New Delhi as Hybrid event from 24th-27th February 2021. INCOLD is the Indian Chapter of the International Commission on Large Dams (ICOLD). ISEG Congratulates Shri A.K. Singh for achieving this great Honour.

MESSAGE FROM THE PRESIDENT

(Continued from page 1)

deliberate and come out with some out-of-the-box solutions for complex problems being faced by infrastructure & hydro projects. Geological uncertainties are one of the major source of hurdles in timey completion of the hydro power projects and need to be addressed earnestly with advanced technology and pragmatic decision making.

I'm happy to note that despite the pandemic situation significant progress has been achieved by the society in publication work. I hope the good work continues and all set targets are achieved within the stipulated time schedule.

Warm regards

(A.K. Singh)
President, ISEG

If anything is worth doing,
do it with all your heart.

-Buddha

MESSAGE FROM THE SECRETARY

(Continued from page 1)

articles for publication. A committee has been constituted to accelerate this process and I'm sure very soon the journal will get indexed internationally.

The society in its Annual General Meeting held during March 2021 has taken a drastic step of providing discounts on various categories of memberships on trial basis of one year and introduction of student member category. All these measures are being taken to increase the membership base of the society and encourage more and more young scholars and professionals to join the society. I hope these announcements shall yield very good results.

Another important aspect that I wish to emphasize is regarding membership of IAEG which highlights the strength of ISEG as a national group at the international forum. The society has announced discounts on IAEG membership up to June 30th 2021. I sincerely request all members to come forward and subscribe to the annual membership of IAEG. We hope to cross 100 membership target this year.

During these tough time of Covid-19, the council has met three times under the guidance of our worthy President and blessings of senior members. The society is leaving no stone unturned to serve its members and engineering geology fraternity. With these remarks, I compliment Editor with his team and put forward the present issue of ISEG NEWS. Feedback from members is most valuable and will be earnestly sought always.

Regards and Best Wishes!

(S.L. Kapil)
Secretary, ISEG

EDITORIAL

Dear Members,

"And when all the wars are over,
A butterfly will still be beautiful."

-Ruskin Bond

It is for sure that Corona will go away one day but we will still be there. Just don't loose faith and hang on. Let's keep helping each other to overcome all our hardships and grief that surrounds us during this period of pandemic. Our souls will be healed and the world will again become a good place for all to live happily and prosper.

The society's newsletter is a great medium of communication between the Executive Council and its Members. It not only brings a variety of interesting articles to the readers but also make them aware of various activities being undertaken by the society along with innumerable efforts made by the Executive Council for its progress. Various achievements of the society and its office bearers are also documented in the newsletter on regular basis. Therefore, publication of the newsletter makes society not only more connected but vibrant as well.

Last year during May 2020, we had lost a very eminent personality and a towering figure from the field of engineering geology in form of Dr. V.S. Krishnaswamy, who was very dear to engineering geology fraternity in India, especially to the ISEG. He was not only one of the founding member of the society but also the first Editor of the Journal of Engineering Geology and later on its President. As a mark of respect and in his remembrance, April 2021 issue of ISEG NEWS carries a short biography of VSK as he was fondly called by his colleagues. This is a heart felt tribute by patrons of our society viz., Dr. Prabash Pandey, Sh. Y. Deva & Sh. M. Raju. We're sincerely indebted to them for this most humble contribution.

Another feature of this issue is an article contributed by Dr. D.S. Rawat of NIRM on one of the engineering marvel of the country– The Kaleshwaram Lift Irrigation Scheme. The 2nd part of the three part series on "Geology by Non-Geologists" complied by Sh. M. Raju published in this issue gives very intriguing information on this subject. The only way to make something interesting is to become interested in it. I hope our members shall find this edition of ISEG NEWS captivating as well as informative.

The editorial team, with the blessings of our Hon'ble President Sh. A.K. Singh and Secretary Sh. S.L. Kapil has tried its best in bringing out all the publications including the newsletter even during the time of pandemic. We are also thankful to all the authors for keeping faith in ISEG publications and sending their articles to us.

In boxing, they say it's the punch you don't see coming that knocks you out. In the wider world, the reality we ignore or deny is the one that weakens our most impassioned efforts toward improvement. Although the editorial team always aspires to improvise but there are some aspects which we might have ignored. Therefore, we request our readers to come up with suggestions and ideas for the improvement of our publications.

Nothing is more sturdy than the human spirit. We wish for the well being of all our members and hope that all of us will sail through these hard times fervently.

All the best!

(Rahul Khanna)

Editor

Heavy Discount on ISEG & IAEG Memberships

ISEG MEMBERSHIP RATES

- **Admission fee (one time)**
  New Members : ~~₹ 1000/-~~ **₹ 500/-**
- **Institutional/Associate Membership**
  (Annual) : ₹ 20000/- per annum
- **Individual Membership**

(i) Annual Membership : ₹ 1500/-

(ii) Life Membership

For age < 35 years	: ~~₹ 5000/-~~	**₹ 3000/-**
For age 35-50 years	: ~~₹ 4000/-~~	**₹ 2500/-**
For age > 50 years	: ~~₹ 3000/-~~	**₹ 2000/-**

Student Members: ₹ 2000/-

One time admission fee is payable for all types of membership. Student membership is valid for 5 yrs. and can be updated as life member after payment of balance amount on expiry.

Membership forms available at ISEG website: www.isegindia.org

Dully filled-in application form, along with payment, may be sent to:

S.L. Kapil, Secretary
Indian Society of Engineering Geology
C/o Executive Director & HoD,
Engineering Geology & Geotec Division,
NHPC Ltd., Sector-33 Faridabad,
Haryana-121003
E-mail: india.seg@gmail.com

IAEG MEMBERSHIP

Indian Society of Engineering Geology (ISEG) is affiliated to International Association of Engineering Geology and the Environment (IAEG). Membership for IAEG is annual. Any ISEG Member, who wishes to join IAEG with bulletin is required to a pay fee of 19 Euros (INR 2050-) and without bulletin 7 Euros (INR 750/-) including GST.

As per decision taken during the AGM 30% discount is offered before 30th April '21 over the basic fee and 15% discount between 1st May till 30th June. The new rates including GST for 2021 are as follows:

Member Category	Up to April 30th	Up to June 30th
Without Bulletin	₹ 525/-	₹ 650/-
With Bulletin	₹ 1450/-	₹ 1750/-

In order to become IAEG Member, ISEG Members may pay the membership fee in ISEG Bank Account through online transfer and fill the Registration form available on ISEG website indicating payment details and mail to Secretary. Bank details are given below:

Name of the Bank: UCO Bank, GSI Branch, Aliganj, Lucknow
Name of account: 'INDIAN.SOC.OF.ENG.'
Account Number: 90330200000045
IFSC Code No. : UCBA0002024

All ISEG members are requested to join the IAEG, **preferably membership with bulletin** and strengthen our association with IAEG.

Secretary, ISEG

SUBMISSION OF TECHNICAL PAPERS AND ARTICLES

Interested authors can submit technical papers/articles/bio-sketches/ memoirs/ short articles/ news-clippings w.r.t. engineering geological projects/ invitations to workshops/conferences related to Engineering geology & Geotechniques etc. for publication in ISEG Journal and Newsletter to the Editor, ISEG on E-mails: isegpapers.gmail.com or to the Secretary, ISEG on india.seg@gmail.com.

REPORT ON ANNUAL GENERAL BODY MEETING OF ISEG HELD ON 06.03.2021

Annual General Body Meeting of the ISEG for the year 2021 was held on 6th March 2021. Due to Covid-19 pandemic, restrictions on physical meetings are imposed therefore the meeting was conducted virtually in online mode using MS Teams platform. Many Senior members, council members and patrons of the society attended the meeting.

Sh. S.L. Kapil, Secretary, ISEG welcomed all the distinguished members of the society and expressed his happiness over the presence of several veteran members. In the absence of Hon'ble President, Shri A.K. Singh due to an urgent engagement, Secretary, ISEG read out the Presidential address. The President expressed pleasure over the progress made by the society despite of the Covid-19 pandemic. He eulogized the increasing role of geotechnical professionals in infra and hydro projects and suggested that such a learned pool can play a major role in mitigating the geological risks by providing platform for out of the box solutions to complex geological problems.

The AGM was attended by many veteran members who also shared their valuable experiences and suggestions for the betterment of the society.

Secretary, ISEG presented the account of various activities and the achievements of the society during previous year. Appreciable progress has been made in the editorial work and the society was able to publish 03 nos. long awaited back issues of the journal viz., vol. 42 (2017), vol. 43 (2018) and vol. 44 (2019) along with April 2020 issue of ISEG Newsletter. The vol. 45 (2020) of the journal is scheduled to be published in April 2021.

Members emphasized for increasing the visibility of the journal and getting it indexed with international agency. Accordingly, the house agreed to form a committee of four members viz., Sh. Rahul Khanna, Editor, ISEG; Sh Vipul Nagar, Jnt. Editor, Sh. Sumit Dabral, Life Member & Dr. Ashit Swain, Council Member to expedite the indexing process of the journal with international databases.

Secretary further informed the house regarding three internationally renowned experts namely Dr. Rajinder Bhasin, NGI, Norway, Dr. Bineshian Hoss, Amberg, Australia and Dr. T. Fechner, Geotomography GmbH, Germany have been added to editorial board of JoEG. House was also informed about the new webinar series started by ISEG for disseminating knowledge. The members appreciated the activities being carried out by the society.

The Secretary and Editor presented the progress of editorial works and status of publishing of journal and newsletter. As the treasurer could not attend the AGM due to official field work, the audited account details shall be shared through email with the members.

Secretary announced a rigorous membership drive and informed the house that as the expenses on publications has reduced due to online publications it is propose to reduce the membership charges under various categories and introduce a new Student member category to encourage more young students and professionals for joining the society. The student membership shall be valid for 5 yrs. It can be upgraded into a regular life membership either on expiry of the term or a student entering a regular employment by payment of balance fee applicable at that time. The house welcomed the introduction of student category however for reduction of membership charges across various categories was approved to be implemented on trail basis for one year.

Issue of low representation at IAEG from India group was also discussed. To encourage more members to join IAEG, Secretary, ISEG announced a proposal to offer a discount of 30% on regular charges on annual subscription on joining before 30th April 2021 and 15% on joining before 30 June 2021. The house agreed to the proposal.

Secretary, ISEG requested all members to contribute articles for publication in JoEG & Newsletter and expressed his gratitude to all members who were present in the meeting.

The detailed MoM is available on ISEG website www.isegindia.org.

REPORT ON ISEG COUNCIL MEETING (TERM 2020-21) HELD ON 30.10.2020

The Second meeting of the ISEG council for the term 2020-21 was held on 30th August 2020 in online mode via zoom app due to restrictions on physical meetings amidst Covid-19 pandemic.

Secretary, ISEG Sh. S.L. Kapil conducted the meeting in absence of Sh. A.K. Singh, President, ISEG who could not attend due to other pre-occupations. Secretary welcomed all the council members especially the senior patrons of the society Dr. Gopal Dhawan, Ex-CMD, MECL and Sh. R.N. Misra, Ex-CMD-SJVN.

Secretary, ISEG appraised the house w.r.t. the non-feasibility of organising the scheduled events viz., GOP & EGCON-2020 due to Covid-19 pandemic. Instead, the society may consider organising live webinar sessions free of cost for the participants. It was decided to distribute certificates to participants attending the webinars for encouragement. The Society will provide an honorarium @Rs 4000/- per lecture of normally 1 hr 30min duration to the presenter. The house agreed to this proposal.

Secretary informed the house about the various efforts being taken up to increase the membership of the society as 17 new members including THDC as institutional member has been added during the year. The house expressed its happiness and it was decided that every council member shall bring 5 new members into the society. New institutional members shall also be roped in. Secretary was unhappy with the poor representation at IAEG as only 35 members has joined IAEG. He desired that all council members should subscribe to IAEG membership immediately.

Secretary, ISEG apprised about the recent publications of the back volumes of Society's journal and April 2020 issue of ISEG News. He mentioned the difficulties being faced in bringing out the volumes due to paucity of articles. Dr. Gopal Dhawan advised that every council member must contribute at least one article for ISEG publications. He emphasised the need of regular publication of JOEG. The efforts of editorial team were highly appreciated.

Several other issues viz., permanent office space, format of new certificate of the ISEG Membership, increase in the AMC charges of society's website and revamping of website were also discussed. Secretary expressed thanks to all participants especially the senior members for sharing their valuable suggestions.

Detailed MoM is available on ISEG website: www.isegindia.org.

KALESHWARAM LIFT IRRIGATION SCHEME : ENGINEERING IMAGINATION INTO REALITY

D. S. Rawat
Scientist, NIRM
Bengaluru– 560070,
Karnataka, India.

Kaleshwarm lift irrigation is interlinked scheme is located in Telangana State. The scheme is formulated to irrigate 7,38,835 hectares in thirteen districts of the state with the approximate construction cost of more than Rupees 80,499.71 Crores.

The source of water for the scheme is near Medigadda village, which is near the confluence of the Pranahita River and the River Godavari, at 20 km from the Kaleshwaram temple. Water will be lifted from 100 m elevation to the higher elevation up to 630 m with the help of a multi-stage lifting mechanism. The total demand of water is 225 thousand million cubic feet (TMC), out of which 169 TMC for irrigation, 40 TMC for drinking purpose and 16 TMC for industrial utility in the state. A total 20 reservoirs (17 live reservoirs with the capacity of 147.71 TMC and 20 lifts have been constructed to lift water from the River Godavari. The electric power required to operate the entire lift will be 4627 MW. The project is expected to bring a major boost in the socio-economic status of the people in the command area with assured irrigation facilities.

The major components of the scheme are barrages, water conveyer system consisting of Gravity canals & tunnels, lift system, reservoirs and distributary network systems. Total length of the scheme is 500 km from the source (Medigadda barrage) to the destination point (Narketpally). Mechanical motors of capacity ranging from 40 MW to 139 MW each have been installed for lifting of water as per the site topography and volume of water.

The main litho-units exposed in the project area belongs to Peninsular Gneissic Complex (PGC) of the Archaean age. Underground structures in the form of tunnels, pump houses, shafts, draft tubes and delivery mains were found challenging for designers, engineers and geologists due to adverse geological features encountered during the construction in the various packages. All the underground structures in various packages are constructed with Norwegian Methods of Tunneling (NMT), "Q" system for rock mass characterization and design support system. The main support measures for stabilizing the rock mass of underground openings are rock bolts and shotcrete. In the geologically adverse underground reaches, the rock mass was supported with steel ribs, rock bolts and with suitable grade of concrete as per design/site condition.

A. The Salient features of Kaleshwaram Lift Irrigation Scheme :

Name of the Components	Number/Length/ Capacity
Gravity canal	1531000 m
Total tunnel length	203000 m
Pressure mains/ Delivery mains	98000 m
Total length of the water conductor system	1832000 m
No. of lifts	20
No. of reservoirs	20
Total pump houses	19
Total pumps	82
Total capacity of reservoirs	147.71 TMC
Total water being lifted from the Godavari river	195 TMC
Water lifted from the Sripada Yellampalli reservoir	20 TMC
Ground water availability	25 TMC
Total water availability	240 TMC
Water for irrigation (new + stabilization Ayacut)	169 TMC
Drinking water supply (twin cities & enroute villages)	40 TMC
Water supply to industries	16 TMC
Designed power rating	4627 MW
Districts benefitted (New ayacut)	13 Districts

B. To complete the entire scheme within a scheduled frame, the scheme was divided into seven links. The link wise detail of the scheme is given below:

Link-I: The total length of this link is 46300 m. Three barrages have been constructed at Medigadda, Annaram and Sundilla for live storage of 33.18 TMC on the river Godavari. Medigadda barrage is 2100 m long for storage of 16.17 TMC at 100 m full reservoir level. Annaram barrage is 800 m long with storage capacity of 10.87 TMC at 119 m FRL. Sundilla barrage is 1500 m in length and storage capacity is 8.83 TMC. The total length of the Gravity canal and delivery mains are 163000 m and 21950 m respectively. The destination reservoir of this link is

Continued on page 6

KALESHWARAM LIFT IRRIGATION SCHEME : ENGINEERING IMAGINATION INTO REALITY

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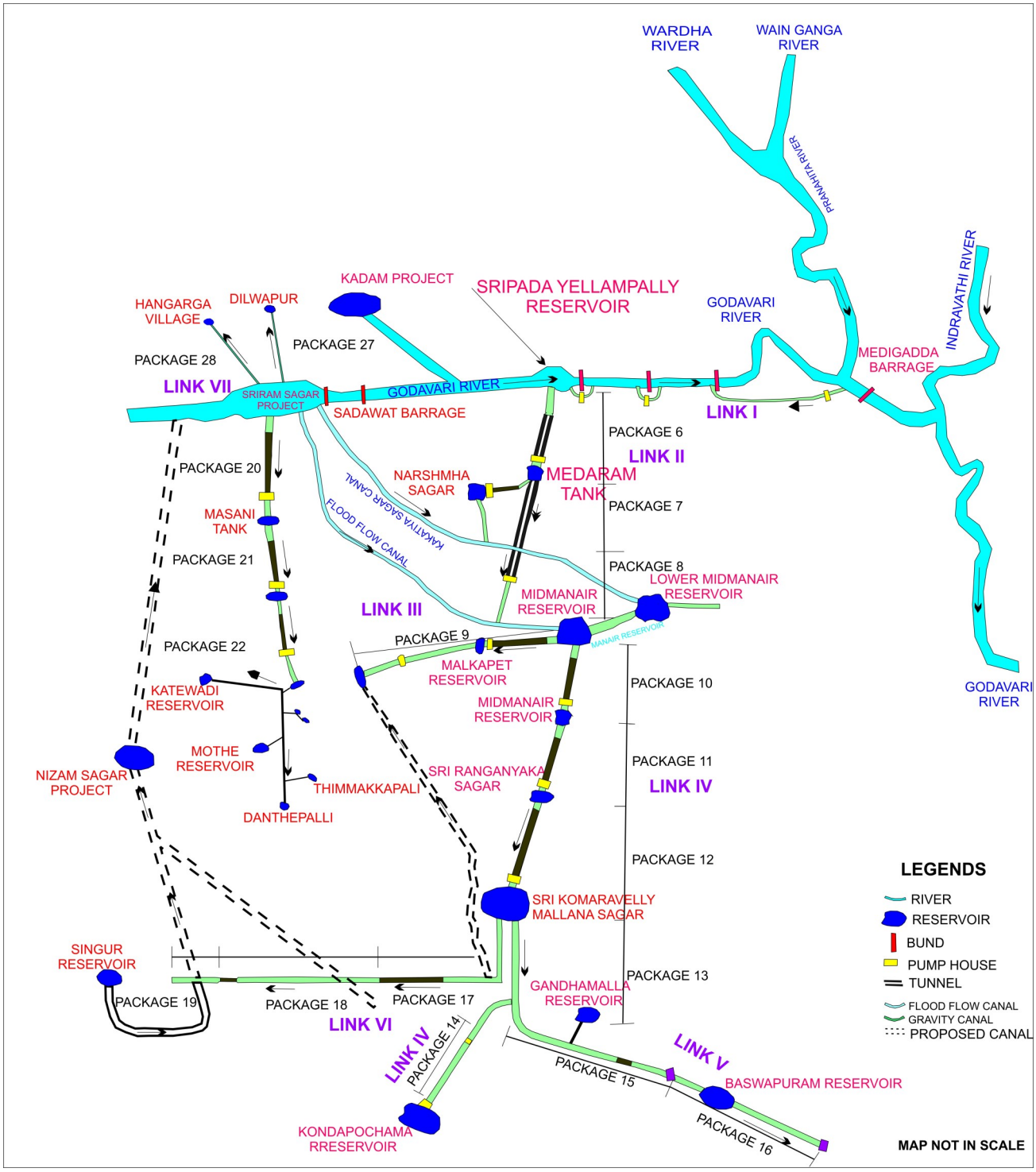


Figure 1 General layout map of KLIS (modified from source map I & CAD Telangana State)

Kaleshwaram irrigation project is unique as it has set many records with the world's longest water tunnels, aqua ducts, underground surge pools, and biggest pumps. By the time the water reaches Kondapochamma Sagar, the last reservoir in the system about 227 kms away in Gajwel district, the Godavari water would have been lifted to a height of 618 metres from its source at Medigadda. The project had to be built at such a size and scale because while the Godavari flows at 100 metres below Mean Sea Level, Telangana is located at 300 to 650 metres above MSL. Thus, the project involves lifting water using gigantic pumps with mindboggling capacities which is one of its kind in the entire world.

KALESHWARAM LIFT IRRIGATION SCHEME : ENGINEERING IMAGINATION INTO REALITY

.....Contd. from page 6

Sripada Yellampalli which has the a storage capacity of 20.175 TMC at 148 m FRL.

Link-II: The length of this link is 65630 m from the source of Sripadda Yellampalli reservoir to the Mid Manair reservoir. The major components of this link are gravity canals 12200 m, twin tunnels 49800 m and 36400 m long delivery mains.

Link-III: is for conveying water from the Mid Manair reservoir to the Upper Manair reservoir, feeding Malka pet Reservoir along the way. The total length of this link is 45480 m. The major components of this link are gravity canals with 27500 m in length, tunnels 12000 m and delivery/pressure mains of 5920 m in length.

Link-IV: is for conveying water from the Mid Manair reservoir to Kondapochamma Sagar and networks for Ananthagiri, Sri Komaravelli Mallana Sagar, Sri Ranganayaka Sagar. The total length of the link is 446220 m. The main components of the link are open gravity channels 394000 m in length, tunnels and delivery mains length are 41400 m and 10820 m respectively.

Link-V: The total length of the link is 208650 m. This link has been constructed for carrying water from Sri Komaravelli Mallana Sagar to Mulkalapalli village of Chityal Mandal and feeding Gandhamalla and Baswapur reservoirs. The storage capacity of this link is 21.26 TMC. The main components of the scheme are gravity canal 122150 m and tunnel with the length of 1450 m.

Link-VI: The total length of this link is 625000 m The main components of the links are gravity canal, tunnels and delivery/ mains with length of 581000 m, 43000 m and 930 m respectively.

Link-VII: carries water from the foreshore of Sri Ram Sagar Project (SRSP) reservoir in three commands. One off-take is from Godavari River at Package 20, which conveys water to a series of reservoirs, canals and tunnel system in Package 20, 21 & 22 and irrigates 2,18,298.77 hectares an ayacut under Nizamabad and Kamareddy districts. The second off-take for this link is from SRSP foreshore and it conveys water to irrigate ayacut in Nirmal district under Package 27. The third off-take for this link is from SRSP foreshore and creates ayacut. The total length of this scheme is 395000 m. The main components of the link are gravity canals 285000 m, tunnels are 55000 m in length.

C. List of the reservoirs situated on the route of Kaleshwaram lift irrigation scheme:

Medigadda, Annaram and Sundilla barrages have been constructed on the river Godavari for live storages of 16.17, 11.9 and 5.11 TMC respectively.

Sundilla barrage is important from where water will be lifted to the existing Sripadda Yellampalli reservoir which has a storage capacity of 20.175 TMC.

Medaram reservoir is a existing storage and its capacity has been increased up to 0.78 TMC. Medaram is the first storage reservoir of KLIS where water will convey through, open channel, gravity canal, tunnels and then stored in the surge pool. From the surge pool through draft tubes water will reach in the pump house from where, with the help of seven numbers of heavy mechanical pumps (7 x 124.29 MW each) water will be lifted to a delivery cistern from where water will store in Medaram.

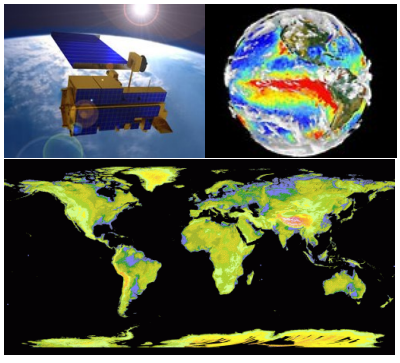
Ananthagiri reservoir has a facility for storage of maximum 3.5 TMC of water. Sri Ranganayaka Sagar (Imamabad Sagar) has been constructed for storage of a maximum 3.0 TMC.

Sri Komaravelly Mallana Sagar is the biggest storage facility of 50 TMC of entire KLIS. Malkapet, Konda Pochamma, Amaralabanda, Katchapur, Thimmaka Palli, Issaipet, Bhumpally, Gujjal, Katewadi, are the storages ranges for 0.09 to 7.0 TMC each of KLIS water for lift water up-to the destination at Narketpally.

Mothe, Kondem Cheruvu, Gandhamalla and Baswapuram are the reservoirs for storage of 3.50 TMC, 2.90 TMC, 9.87 TMC and 11.39 TMC of KLIS water.

FACT SHEET

ASTER FOR EARTH MAPPING



(Source : NASA—Terra in Visible Earth)

ASTER (Advanced Space borne Thermal Emission and Reflection Radiometer) is a Japanese sensor provided on Terra (EOS AM-1) satellite of NASA launched in Dec'99. ASTERS creates high resolution images using 3 different sensor subsystem viz., VNIR, SWIR, & TIR which cover 14 multi spectral bands from visible to thermal infrared spatial resolution ranging from 15 to 90m.

ASTER images are used for cloud studies, surface mapping, soil and geologic studies. It is used to create detailed maps of surface temperature of land, emissivity, reflectance, and elevation. The unique ability of ASTER to change viewing angles provides stereoscopic capability for generating Digital Elevation Models (DEMs).

The ASTER GDEM V3 is the latest improved version of Global DEM released during 2019 covering the planet from 83°N to 83°S including polar regions. It adds additional stereo-pairs, improving coverage and reducing the occurrence of artifacts. The refined production algorithm provides improved spatial resolution, increased horizontal and vertical accuracy. This version is available in the GeoTIFF format with 30m postings and 1 x 1 degree tiles. Version 3 has significant improvements over the previous releases. It is said to have better ground resolution and accuracy than SRTM data.

The ASTER GDEM V3 is available free to users worldwide at USGS Earth Explorer delivery system or NASA Earth Data Search delivery system https://terra.nasa.gov/data/aster-data.

VSK – TRIBUTE TO A STALWART ENGINEERING GEOLOGIST

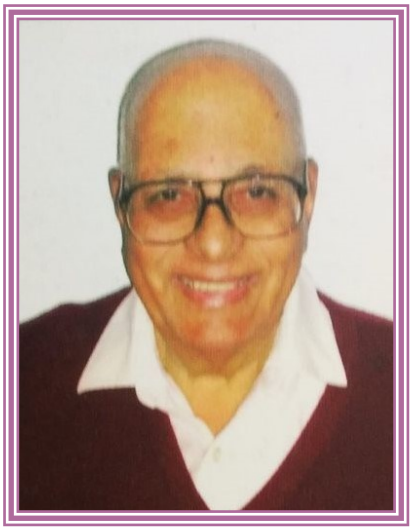
Born on 19 September 1923, Shri V.S. Krishnaswamy, popularly remembered as VSK among his admirers, bid final adieu to the world last year at the age of 97 years. He was a born leader and an Earth Scientist of great eminence. A staunch follower of Dr. J.B. Auden, he headed the newly formed Engineering Geology Division in the Geological Survey of India (GSI) and went on to promote the discipline that once had the distinction of rendering engineering geological services across the country. VSK graduated with Honours in 1944, did his Post Graduation in Geology from Presidency College of the Madras University, and received higher education and training in Engineering Geology at the U.S. Bureau of Reclamation, Denver, Colorado. After short stints as a Demonstrator at Presidency College, and subsequently as a Geologist at the Tata Iron and Steel Co., Jamshedpur, he joined the GSI in 1946, superannuated as Director General in 1978, and moved to the United States, where he breathed his last in 2020.

Spearheading engineering geological investigations for a host of river valley projects in the Northern, Western and Southern Regions of the Department, VSK excelled in his work and was revered as an outstanding engineering geologist of his time. His other significant contributions in different parts of the sub-continent, include initiation of geothermal studies in India, setting up of environmental and urban geology wings in the GSI, launching of specialised integrated projects like CRUMAN SONATA-a supreme geoscientific investigation across the Son-Narmada-Tapi rift zone, etc. As a dynamic leader, VSK earned a name for himself as an extremely competent administrator, innovator and visionary. As a mark of respect on his significant contributions, the Geological Society of India chosen him for the *"GSI Sesquicentennial Commemorative Award, 2005."*

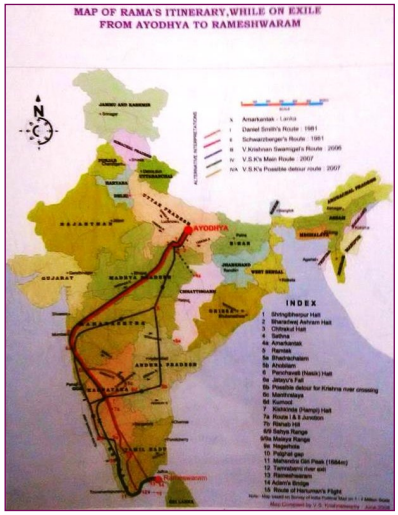
Shri Krishnaswamy, a pioneering Engineering Geologist, was one of the founder members of the Indian Society of Engineering Geology (ISEG) and served it as its Founder Editor and subsequently as its President for the term 1978-79. His outstanding organisational capabilities and acumen were seen when he played a pivotal role in the birth of the IAEG in India during the XXII International Geological Congress (IGC) at Vigyan Bhawan, New Delhi. Later, as the Vice President of the IAEG, he once again played a key role in bringing the 4th International Congress of the IAEG to New Delhi in 1982.

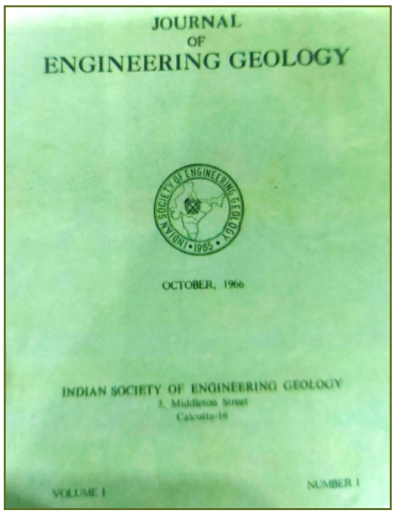
True to his versatility, during his time in the US, VSK shifted his attention to the research on Lord Rama's path from Ayodhya to Rameshwaram and, as the founder member of the Indo-US Club of Ramayana Readers and Researchers, brought out a publication on 'Pictorial and Multi-lingual Valmiki Ramayana' (ISBN-978-81-907830-0-2) in the year 2008. The publication has original Valmiki slokas translated into seven languages with beautiful backdrop of heart rendering coloured 3D pictures, drawn exclusively for the publication. The occasion of the release of the publication witnessed a message from none other than Lord Shri Ramanuja Chinna Jeeyar Swamy who complimented the team for publishing Sri Ramayana in multilingual way for the benefit of the mankind.

The engineering geological fraternity pays respectful homage to its leader VSK, who inspired generations of workers to follow a path of dedication in Nation building.



Sh. V.S. Krishnaswamy
(1926—2020)





Sh. V. K. Krishnaswamy edited the inaugural volume of the ISEG journal (Vol. 1, No. 1) published in 1966. This landmark volume of the Journal of Engineering Geology contained speeches given by the dignitaries during the inaugural function of the Indian Society of Engineering Geology held on 15th October 1965 at Kolkata.

Compiled by:
Dr. Prabhas Pande
Yogendra Deva
Mandapalli Raju

OBITUARY

Dr. D.N. Seshagiri

Dr. D.N. Seshagiri, former Director, a pioneering engineering geologist of GSI passed away on 16th May, 2021 due to cardiac arrest. He had been suffering from dementia for some years. Dr. Seshagiri, born on 14th May, 1934, Graduated from Presidency College (B.Sc. Geology), obtained Post Graduate degree in Applied Geology from Andhra University, Waltair and Ph.D. in Engineering Geology from Florida (USA). Joined Geological Survey of India in 1960 and superannuated as Director (Selection Grade) in 1992. During service in GSI, carried out investigations of 109 hydroelectric projects, 36 irrigation projects, 2 multipurpose projects, 4 reservoir augmentation projects, 4 water supply projects, 16 post construction safety related studies, 4 nuclear power plant site selection, 4 communication projects, and 6 slope stability studies. His contribution in site selection, pre-construction investigation and being Resident Geologist-in-Charge for the Idukki Dam and Project is worth mentioning. He contributed a landmark study of Nilgiri Hills, which was accepted as authorized document of the district administration even today. His pioneering study of zonation of landslide susceptible areas in the Nilgiris was the first zonation study in the country which was published by GSI as its Misc. Pub. No. 57 of 1982, 'The Nilgiri Landslides', a reference for future zonation studies in India and other countries.

Dr Seshagiri, a very knowledgeable, intelligent, lively, lovely, jovial, and sharp witted person, brought laurels to Engineering Geology discipline of GSI during his time. One of his companions mentioned that he once told to Late V.S. Krishnaswamy, the then Director General, GSI, a very imposing personality of that time, 'sir, you can't have heart attack and I can't have brain tumor, because, I have no brain and you have no heart'. Late VSK used to love him for his sharp wits and for his go getter attitude. Besides close to higher hierarchy, Shri Seshagiri used to be very friendly with his juniors and subordinates in office. It was also reported that he was a great negotiator across the table. During inauguration of the Idukki Project by the then Prime Minister, Mrs. Indira Gandhi, he was a VIP in the first row while DG, GSI, late C. Karunakaran was given a seat in 3rd row. He developed excellent rapport with state administration and other engineering fraternity wherever he worked.

He has worked in Sri Lanka, Yemen, Arab Republic and Nepal. Was empanelled as a Top Level Expert with Central Water Commission and WAPCOS and also as Consultant with KREDL, Bangalore. Was awarded 'Life Time Contribution in the field of Engineering Geology/Rock Mechanics/Excavation' by the International Association of Engineering Geology.

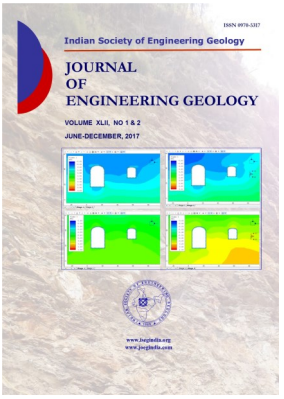
He also immensely contributed to Madras Cricket Association. He was an active committee member of Tamil Nadu Cricket Association and a Qualified Umpire in cricket, responsible for maintaining the Chepauk Cricket Test Pitch at Chennai. He was also running a league team for AICS Tournament for 4-5 years at a point of time.

Dr. Seshagiri immensely contributed to the Indian Society of Engineering Geology, served to its 'Journal of Engineering Geology' as Editor for a term during 1979-80. He was also actively associated in the Fourth Congress of International Association of Engineering Geology, New Delhi in December, 1982. He also functioned there as Associate Secretary of the Organising Committee, Member of Working Group of the Organising Committee, Member of Sub-Committees like, Technical Sessions, Editorial Committee of Congress Proceedings and Member of Inaugural and Valedictory Sessions and proved himself as a real big showman there.

Dr Seshagiri was having fragile, 5 feet height and hardly 50 kg weight, a very unassuming personality. Despite his fragile personality, he was very dynamic with his command over subject and language, he could dictate terms to any authority. His colleagues often consult him for amicable solutions to any critical issues, thereby he earned a name that he was an able negotiator across the table. People say his wisdom gets doubled over drinks, which he loves. Many opine that Dr Seshagiri means full of activities, energy and life. It is difficult to believe that such a lively person also has to face reality of life, death. As many VIPs are engulfed in the pandemic, the Almighty, possibly, organizing a big show in heavens, where Dr D.N. Seshagiri has been indented to conduct the show there.

ONLINE PUBLICATION OF ISEG'S JOURNAL OF ENGINEERING GEOLOGY

The current volume of the Journal of Engineering Geology, Volume 45 (December 2020) has been published. The journal is available online on ISEG website www.isegindia.org at the "ISEG Journal" tab available on the home page. The current volume of the journal can also be accessed directly on ISEG Journal's web portal: http://www.joegindia.com



All the back issues of the Journal of Engineering Geology published as print volumes from 2004 onwards i.e. volumes 31 to 41 are now available as high quality OCR pdf's prepared using special book scanning technology under the ARCHIVES section of the journal web portal. From volume 42 onwards, the journal has been published only in online mode.

All the back volumes may be accessed from the link: http://www.joegindia.com/journal-back-issue.html

BIOGRAPHY SERIES

GEOLOGY BY NON GEOLOGISTS

PART 2

M. Raju
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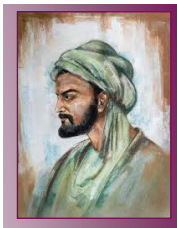
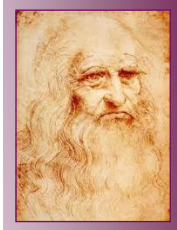
In this three part series, the author has presented short biographies of few great personalities whose field of science was different, still that was not a hurdle to find / propose new ideas in the science of Geology. In the first part of this series, published in the previous issue of ISEG NEWS, we presented short biographies of six such illustrious scientists from the non-geological sciences who made specific scientific contributions in the subject of Geology. In the second part of this series published in this issue, we continue from where we had left and bring for you biographies of seven more such notable personalities.

Ibn Sina (980-1037), also known as Abu Ali Sina, Pur Sina and Avicenna was a Persian polymath who was regarded as one of the most significant physicians, astronomers, thinkers and writers of the Islamic Golden Age and the Father of early modern medicine. His most famous works are The Book of Healing, a philosophical and scientific encyclopedia, and The Canon of Medicine, a medical encyclopedia which became a standard medical text at many medieval universities. Besides philosophy and medicine, Avicenna's corpus includes astronomy, alchemy, geography and geology, psychology, Islamic theology, logic, mathematics, physics and poetry. Ibn Sina wrote on Earth sciences such as geology in The Book of Healing. While discussing the formation of mountains, he explained that either they are the effects of upheavals of the crust of the earth, might occur during a violent earthquake, or they are the effect of water, which denuded the valleys, the strata being of different kinds, some soft, some hard. It would require a long period of time for all such changes to be accomplished, during which the mountains themselves might be somewhat diminished in size.



Ibn Sina

Leonardo da Vinci (1452-1519), was one of the first representatives of the formative period in geologic thinking, although, as has been said that the ideas of the genius were so advanced for his time that they might well pass. He recognized that valleys were cut by streams and that stream carried materials from one part of the earth and deposited them elsewhere.

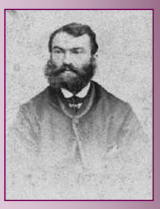


Leonardo da Vinchi

James Hutton (1726-1797), was a Scottish physician, took degree of Doctor of Medicine at Leiden University in 1749 with a thesis on blood circulation, a chemical manufacturer, naturalist, and experimental agriculturalist. He strongly proposed that granite was of igneous origin, which then called Plutonists. In opposition, a group Neptunists, which contended that granite was chemical precipitate. He also identified evidences of metamorphism in rocks. But his greatest contribution was is the concept of 'the present is the key to the past', the same physical processes and laws that operate today operated throughout geologic time, although not necessarily always with the same intensity as now, thus establishing the doctrine of 'uniformitarianism'. It explains features of the earth's crust by means of natural processes over geologic time. But, it appears that his studies were not properly recognized during his life time. However, his friend John Playfair (1748-1819), a professor of mathematics and philosophy at Edinburgh, after the death of Hutton, published in 1802, with more clarity in explanation and expanded as Hutton's principles. Hutton's work established geology as a proper science, and thus he is often referred to as the "Father of Modern Geology". Through observation and carefully reasoned geological arguments, Hutton came to believe that the Earth was perpetually being formed; he recognised that the history of the Earth could be determined by understanding how processes such as erosion and sedimentation work in the present day. He recorded his ideas and innovations in an unpublished treatise on *The Elements of Agriculture*. This developed his interest in meteorology and geology. He wrote that he had "become very fond of studying the surface of the earth, and was looking with anxious curiosity into every pit or ditch or bed of a river that fell in his way".

James Hutton

James Parkinson (1755-1824), was not only a pioneer in medicine but also internationally famous for his works on fossils. He revealed an unknown world, populated with 'hyenas the size of bears' and 'enormous marine animals', all of which both enthralled and terrified his readers. He became internationally famous for his exquisitely illustrated works on fossils, '*Organic Remains of a Former World'* was written at a time when geology was in its infancy. He revealed a world hitherto unknown; one that was littered with 'wrecks of an early Creation entombed in the bowels of the earth, a world populated with 'hyenas the size of bears' and the 'relics of a tribe of enormous marine animals, possessing the blended structure of fish and lizards', all of which both enthralled and terrified his readers. When awarded The Royal College of Surgeons' first Gold Medal, it was not for his medical publications that Parkinson was honoured, nor even his *Essay on the Shaking Palsy,* but for his ground-breaking work on fossils."



James Parkinson

Dr John MacCulloch MD (1773-1835), was a physician and was officially employed in India for geological work, who was attached to the surveying establishment in Kumaon province. He was a pioneer of geological cartography. MacCulloch's geological map of Scotland, published posthumously in 1836, remains one of the great cartographic milestones in the history of geology. Earlier, MacCulloch was the first government-appointed geologist through his work on the Board of Ordnance whilst carrying out the Millstone, Meridian and Mountain surveys.

Dr. John MacCulloch

Contd. on page 11

ANNUAL HIGHLIGHTS OF ISEG ACTIVITIES

FROM MAY 2020 TO APRIL 2021

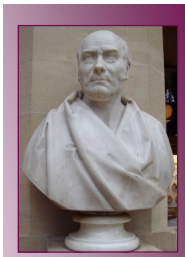
- Journal of Engineering Geology, Volume 43 (June & December 2018) published online during May 2020.
- ISEG NEWS, Volume 16, April 2020 released online during June 2020.
- Second Meeting of ISEG Council (Term 2020-21) held online mode via zoom platform on 30.10.2020 in the light of Covid-19 pandemic.
- First Knowledge Sharing Webinar Session organised by the Society on 26.09.2020 wherein two invited speakers Dr. Bineshian Hoss, Geotechnical Consultant, Amberg Technologies, Australia & Sh. Hari Dev, Scientist-E, CSMRS, New Delhi shared their vast technical acumen with ISEG members.
- Journal of Engineering Geology, Volume 44 (June & December 2019) published online during December 2020.
- Second Knowledge Sharing Webinar Session organised by the Society on 20th February 2021 wherein Dr. Rajesh Asthana, Dy. Director General, GSI and a resourceful and versatile Indian Antarctic veteran delivered lecture on "Antarctica-The Last Frontier, History, Global Perspective and Indian Endeavour".
- ISEG Annual General Body Meeting for the year 2021 was held on 06.03.2021 in online mode using MS Teams platform. The AGM was attended by many senior members, council members and patrons of the society.
- The latest issue of the Journal of Engineering Geology, Volume 45 (June & December 2020) was published online during April 2021.

"In the long history of humankind (and animal kind, too) those who learned to collaborate and improvise most effectively have prevailed."

— Charles Darwin

BIOGRAPHY SERIES | **GEOLOGY BY NON GEOLOGIST** | **Compiled by M. Raju** | **.....Contd. from Page 10**

William Smith (1769-1839), a Mining Surveyor, never had formal education in geology, later became Father of English Geology, stimulated to the development of stratigraphic column, finding through the sequence of rock formations arranged according to their order of formation in time. He found empirically that fossils were a highly effective means of distinguishing between otherwise similar formations of the landscape as he travelled the country working on the canal system and produced the first geological map of Britain. He realized that fossils of relative ages could be determined from a geological standpoint, in terms of what layer of rock the fossils are located and the distance these layers of rock are from the surface of the Earth. Through the synthesis of their findings, they realized that different strata could be identified by fossil contents and thus each stratum could be assigned to a unique position in a sequence. Subsequently, the concept various geologists further refined the system and found it is useful to develop stratigraphic column.



William Smith

Dr. Henry Westley Voysey (1791- 1824), was a surgeon to the Great Trigonometrical Survey in 1818, having geological knowledge as additional qualification. He worked in India in the service of East India Company. He made first contribution to an understanding of the Geology of India. He submitted a geological report of Hyderabad Region, accompanied by a geological map, drawings and a box of specimens of rocks and fossils which were forwarded to the Court of Directors in London on his demise. He was found dead in a palki on his way back from Nagpur to Calcutta on 19th April, 1824. A letter from Voysey to his superior Lambton, dated Hyderabad 8.6.1821, contained some suggestions of great significance. *"In addition to the great advantage to science and to the arts from a knowledge of the geological structure of the country obtained from section maps and collection of specimens, I conceive that a very important object of a geological enquiry lies in determining the cause of the anomalies which sometimes occur in Trigonometrical operations and which can be explained by supposing them to arise from concealing disturbing forces owing to difference in the specific gravity of the upper, lower and contiguous strata",* as a result, many regarded him as the Father of Indian Geology.

Dr. Henry W. Voysey

TO BE CONTINUED

ISEG NEWS

(A Biannual Newsletter of ISEG)

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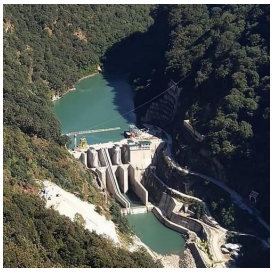
MANGDECHHU HYDROPOWER PROJECT BHUTAN WINS PRESTIGIOUS BRUNEL MEDAL



Mangdechhu hydro power project in Bhutan has been conferred with *"The Brunel Medal"* during October 5, 2020 by Institute of Civil Engineers, a top engineering body of the United Kingdom. The project received this Honour for providing employment opportunities to the local community; particularly families affected by the venture, and facilitating local people to take up business activities. The medal is named after *Isambard Kingdom Brunel*, who was an English civil engineer during the 19th century and is considered as one of the most ingenious and prolific figures in engineering history of England.

Mangdechhu project having installed capacity of 720MW is a run of the river scheme located in Trongsa district of Central Bhutan. The project is implemented by Mangdechhu Hydroelectric Project Authority (MHPA) constituted jointly by Government of India and Royal Government of Bhutan. The construction began in 2012 and the project was successfully commissioned in record period of 7 yrs. It was jointly inaugurated by Prime Ministers of India & Bhutan on 7th August 2019.

Heartiest Congratulations to Shri A.K. Mishra, Vice President, ISEG and Managing Director, MHPA for this great achievement.

SH. S.L. KAPIL, SECRETARY, ISEG ELECTED AS VICE PRESIDENT OF ISRM-INDIA NATIONAL GROUP

Shri S.L. Kapil, Secretary has also been elected as Vice President of International Society of Rock Mechanics & Rock Engineering (ISRM)-India National Group for a period of four years during the term 2020-2023. ISRM founded in 1962 is ruled by a Council, consisting of representatives of the National Groups, the Board and the Past Presidents. The ISRM Secretariat has been headquartered in Lisbon, Portugal.

The Indian National Group of ISRM founded in 1991 is presently has its headquarter at Central Board of Irrigation & Power (CBIP), New Delhi. Since its inception, the group has been involved in dissemination of information regarding rock mechanics, mining and tunnel engineering by organizing symposia, seminars, workshops and training courses etc.

Heartiest Congratulations from ISEG to Shri Kapil for this prestigious appointment.

RISHI GANGA GLACIAL OUTBURST AND FLASH FLOODS, UTTARAKHAND, INDIA

The Rishi Ganga flash floods of 7th Feb, 2021 following a glacial outburst, are making headlines all around the world. The unfortunate incidence has led to loss of lives and the fate of tens of workers trapped in the Head Race Tunnel of the under-construction 520 MW Tapovan-Vishnuprayag Hydroelectric Project, following the flood muck gushing into the Intake Adit, remains at stake.

Besides the rampant destruction, the Rishi Ganga deluge has brought in it's wake another deluge that is the deluge of speculations, comments, opinions, and accusations as immediate reactions not necessarily based on sound ground realities. Unfortunately, the hydropower industry, otherwise a robust entity in the country's search for sustainable renewable energy sources, has borne the brunt for no fault. It may be mentioned that the hydropower development in the country is up against solar and wind power as opposition to hydropower for environment and geo-hazard concerns mounts by the day. The flash floods under reference tend to seal the fate of hydropower development further.

The incidence calls for a threadbare analysis, a peep into the provisions for such occurrences in the planning of hydropower projects, and the way forward. A panel of who's who of the Indian geosciences and hydropower industry formerly from premier Indian organisations like National Hydroelectric Power Corporation, Geological Survey of India, Central Water Commission, and Indian Institute of Technology (IIT), Roorkee, discussed the issue and opine that the floods are attributed technically to GLOF (Glacial Lake Outburst Flow) and that the hydropower projects are also the victims and not the culprit for such natural hazards.
Full panel discussions is available at https://youtu.be/3ycrcZwoQm8