



# ISERME 2019

INTERNATIONAL SYMPOSIUM ON  
EARTH RESOURCES MANAGEMENT  
& ENVIRONMENT

**SYMPOSIUM PROCEEDINGS**

23<sup>rd</sup> August 2019

At Sri Lanka Foundation

Colombo 07, Sri Lanka

**ORGANIZED BY**

DEPARTMENT OF EARTH RESOURCES ENGINEERING  
UNIVERSITY OF MORATUWA, SRI LANKA



# ISERME 2019



## International Symposium on Earth Resources Management & Environment

Organized by

Department of Earth Resources Engineering  
Faculty of Engineering  
University of Moratuwa  
Sri Lanka

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*ISERME 2019*

## Message from Dr. G.V.I. Samaradivakara - Symposium Chair

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Welcome to the third International Symposium on Earth Resources Management and Environment [ISERME 2019], organized by the Department of Earth Resources Engineering, University of Moratuwa, Sri Lanka.



A revolutionary change in the departmental research culture took place fourteen years back, and in 2005 with the implementation of World Bank funded project for Improving Relevance and Quality of Undergraduate Education [IRQUE]. We are grateful the "IRQUE" Project for encouraging and funding the department to organize the first annual research conference in 2006. Since then, the department has been annually organizing the research conference, which was evolved up to an International Symposium in 2017.

Since 2016, the department has been networking with local and international mining engineers and earth scientists in organizing annual symposiums, more intensely than earlier.

This year we have accepted twenty-two submissions of high quality including five abstracts and seventeen full papers which cover almost all six research themes for ISERME 2019. Each submission was reviewed in a double-blind way twice by the internal and external review panels appointed by the Symposium Organizing Committee.

On behalf of the Department of Earth Resources Engineering, I wish to extend my sincere thanks to Professor K.K.C.K Perera, Vice-Chancellor of the University of Moratuwa and Professor N.K. Wickramarachchi, Dean-Faculty of Engineering of the University of Moratuwa for granting their kind permission for this symposium.

I greatly appreciate the sponsorships given by the Faculty of Graduate Studies of the University of Moratuwa and well-wishers of the department in industry who made ISERME 2019 possible. The external and internal reviewers of the symposium are appreciated for their timely insightful reviews. Thanks are also extended to all the authors for their excellent submissions.

I am certain that this symposium will continue to network with all the researchers in the fields of mining and earth resources engineering, for mutual benefit through knowledge sharing.

I also look forward to meeting with all of you again at ISERME 2020, with a wider participation of international researchers having similar research interests, in the coming year.

I wish you all, a productive and enjoyable Symposium!

Dr. G.V.I. Samaradivakara - Symposium Chair - ISERME 2019  
Head - Department of Earth Resources Engineering, University of Moratuwa  
23<sup>rd</sup> August 2019

## Message from Eng. P.V.A. Hemalal - Symposium Secretary

It is with great pleasure I fulfill the responsibility of coordinating the activities leading to ISERME 2019 the theme "Earth Resources Management and Environment" as the symposium secretary. The symposium is no doubt the greatest annual academic event of the Department of Earth Resources Engineering of the University of Moratuwa. I consider it an honor to play a pivot role in organizing activities leading to this great event, networking with many organizations and individuals.



The event brings together many academics, students, industry leaders, alumni and well wishers and is graced by the Vice-Chancellor, University of Moratuwa and Professor S.B.S. Abayakoon, Senior Professor of Civil Engineering, University of Peradeniya as the Chief Guest and Professor Ajith De Alwis, Senior Professor of Department of Chemical and Process Engineering as the Key-note Speaker.

This forum provides an ideal opportunity for the students to mix along with the senior industry professionals and industrialists and learn firsthand the new trends of development in the industry and in academia elsewhere, and sharpen one's skills to suit the changing circumstances. In an informal setting, the academics will also have a chance to feel the pulse of the industry and exchange views which will help guide future research.

I hope that the theme is an inspiration to the young professionals to chart their future role as there is still a lot to be done to tap the vast potential of industrial minerals in the country and accordingly plan their future and make themselves ready to undertake the future management of country's mineral resources raising the stature of the industry to greater heights.

I sincerely thank all the academic colleagues for the valuable advice offered, non-academic staff members and the student body effectively fulfilling the individual tasks undertaken to make the event a success. This event would not have been possible without the financial assistance of the sponsors.

Eng. P.V.A. Hemalal  
Symposium Secretary - ISERME 2019  
Senior Lecturer - Department of Earth Resources Engineering  
University of Moratuwa  
23<sup>rd</sup> August 2019

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