

Ashani Savinda Ranathunga

B.Sc. Eng. (Ruhuna), Ph.D. (Monash), AMIESL

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<u>Profiles</u>: https://scholar.google.com/citations?user=kwrw3oAAAAJ&hl=en

Personal data

Full name : Ashani Savinda Ranathunga

Date of birth : 02nd November 1988

Gender : Female Civil status : Married

Education

Doctor of Philosophy (Ph.D.)

Sept 2013 - May 2017

Monash University, Australia

Specialized in Geotechnical Engineering

Supervisor: Prof Ranjith P.G.

Thesis Topic: "Investigation of Long-Term Safe Storage of Carbon Dioxide in Deep Coal Seams

with Enhanced Methane Recovery"

Bachelor of Science in Engineering (B.Sc. Eng. Hons. first class) July 2008 - Jan. 2013

University of Ruhuna, Sri Lanka

Specialized in Civil and Environmental Engineering

GPA 3.87/4.0 (First class honours)

Professional Qualifications

- Associate Member, Institute of Engineers, Sri Lanka.
- Member, International Society of Soil Mechanics and Geotechnical Engineering
- Member, Society of Petroleum Engineers.
- Member, Sri Lankan Geotechnical Society.

Awards

- Outstanding Research Performance Merit Award, University of Moratuwa, Sri Lanka.

 Dec. 2019
- Best PhD Thesis Award 2017 awarded by the Department of Civil Engineering, Monash University, Australia for the best PhD thesis.

March 2018

- Civil Engineering Nominee for the *Mollie Holman Medal for Excellence in a PhD Thesis*, Monash University, Australia.

March 2018

- *Postgraduate Publication Award (PPA)* – 2017 awarded by Monash University, Australia for the best PhD candidate in research publications during his/her candidature.

Feb. 2017

- *Mallika De Mel memorial Gold award* sponsored by Ronnie De Mel foundation for the student of best overall performance in Engineering, University of Ruhuna, Sri Lanka.

May 2013

Fellowship and Scholarships

- Monash Graduate Scholarship (MGS) awarded by Monash University, Australia.

Sept. 2013 – Jan. 2017

- Faculty of Engineering International Postgraduate Research Scholarship (FEIPRS) awarded by Monash University, Australia.

Sept. 2013 – Jan. 2017

- *Dr. A.N. Kulasinghe memorial scholarship* for the undergraduate of best performance in Civil Engineering awarded by State Engineering Cooperation (SEC), Sri Lanka.

Oct. 2010 - Jan. 2013

• Grants and other

- Senate Research Committee (SRC) Long Term Grant for the project titled *Investigation on the Applicability of use of Bottom Ash for Restoration of Clay Mines in Sri Lanka*. Grant No: SRC/LT/2019/17.

April 2019

- Nominee from Sri Lanka for the *Young Members Presidential Group (YMPG)* of International Society of Soil Mechanics and Geotechnical Engineering.

Oct. 2019

Current Affiliations

- Lecturer, Department of Civil Engineering, University of Moratuwa, Sri Lanka.
- Research Associate, Deep Earth Energy Laboratory, Monash University, Australia.

Research Interests

CO₂ sequestration, Enhanced Coal Bed Methane Recovery, Geothermal Energy, Sustainable Wellbore materials, Soft Ground Improvement, Hydrofracturing, Waste products for soil amendments

Research Experiences

• University of Moratuwa, Sri Lanka

Lecturer in the Department of Civil Engineering

June 2017 - present

- Use of industrial by-products for soft soil stabilization
- Use of industrial by-products for rehabilitation of mines
- Sustainable materials for wellbores
- CO₂ sequestration in deep coal seams

• Monash University, Australia

Research Associate Research Assistant April 2017 - present

May 2014 – April 2017

in Deep Earth Energy Laboratory, Monash University, Australia.

- CO₂ sequestration in deep coal seams
- Enhanced Coal Bed Methane Recovery
- Coal matrix swelling due to CO₂
- Sustainable materials for wellbores
- Geothermal Energy

Teaching Experiences

• Faculty of Engineering, University of Moratuwa, Sri Lanka

- Lecturer

- Lecturer (on contract)

March 2018 to present

June 2017 to March 2018

• Faculty of Engineering, University of Sri Jayawardanepura, Sri Lanka

Visiting Lecturer

March 2018 to Aug. 2018

• Faculty of Engineering, Monash University, Australia

- Teaching Associate

Feb. 2014 to April 2017

- Demonstrator

Feb. 2014 to April 2017

• Faculty of Engineering, University of Ruhuna, Sri Lanka

- Lecturer (on contract)

July 2013 to Aug. 2013

- Instructor (Temporary)

Jan. 2013 to June 2013

- Instructor (Student)

Jan. 2012 to Jan. 2013

Other Experiences

• Leadership and teamwork

- Civil Engineering Track co-chair for *Moratuwa Engineering Research Conference* (*MERCon 2018*), 4th International Multidisciplinary Engineering Research Conference held in Colombo, Sri Lanka.
- Active member of the organizing committee for IC3G 2016, *International Conference on Geo-mechanics, Geo-energy and Geo-resources* held in Melbourne, Australia.
- Co-president of the organizing committee of *Civil Engineering Research Exchange Symposium* (CERES) 2012 (Moratuwa, Peradeniya and Ruhuna) held in Faculty of Engineering, University of Ruhuna.

- Active member of the organizing committee for EFOR 2010, 10-year anniversary exhibition held in Faculty of Engineering, University of Ruhuna.

• Professional trainings/skills

Teaching:

- Staff Development Course (SDC), University of Kelaniya Sept. 2018 Jan. 2019
- Demonstrator Development Programme (DDP), Monash University, Australia

Feb. 2014

- Teaching associate conversational thinking (TACT), Monash University, Australia Feb. 2014
- Ethics and professional conduct, Privacy and Equal Opportunity, Monash University, Australia

 Aug. 2015

Research:

- Research Integrity, Monash University, Australia

Sept. 2015

- Occupational Health and Safety (OHS) and Risk Management, Monash University,
 Australia Oct. 2013
- License for FEI Quanta 3D FEG FIB Scanning Electron Microscope (SEM) provided by Monash centre for Electron Microscopy (MCEM), Monash University, Australia.
 Jan. 2014

Professional Activities

Reviewer

Engineering Geology, Fuel, Journal of Supercritical Fluids, Journal of Natural Gas Science and Engineering, Minerals (MDPI), Journal of Petroleum Science and Engineering, Powder Technology, Energies (MDPI), Transport in Porous Media, and Journal of Geo-mechanics and Geophysics for Geo-energy and Geo-Resources (G4), Journal of Cleaner Production, SN Applied Sciences, Experimental Thermal and Fluid Sciences, Energy Sources, Part A: Recovery, Utilization and Environmental Effects

• Executive Member, Sri Lankan Geotechnical Society

2018, 2020

• Editor – Journal, Sri Lankan Geotechnical Society

2019

- Industrial Training
 - Surath Wickramasinghe Associates Pvt Ltd. (SWA), Sri Lanka On Three 20 Condominium Project (On the job trainee)

Aug. 2011 to Oct. 2011

- Central Engineering Consultancy Bureau (CECB), Sri Lanka Uva Wellassa University Project (On the job trainee)

Aug. 2010 to Oct. 2010

Publications

Book Chapters

1. **Ranathunga AS**, Perera MSA, Ranjith PG (2017). Challenges and issues for CO₂ storage in deep coal seams. *Rock Mechanics and Engineering, Volume 4: Chapter 3: Excavation, Support and Monitoring,* Taylor and Francis group, CRC press, Balkema, Netherlands, pp 87 – 130, https://www.taylorfrancis.com/books/e/9781315708126/chapters/10.1201/b20406-3.

• Peer-reviewed journal papers

- 1. Zhang XG, Ranjith PG, **Ranathunga AS** (2019). Sub-and super-critical carbon dioxide flow variations in large high-rank coal specimen: An experimental study. *Energy*, 181, 148-161, doi.org/10.1016/j.energy.2019.04.213.
- 2. Zhang XG, Ranjith PG, Lu Y, **Ranathunga AS** (2019). Experimental investigation of the influence of CO₂ and water adsorption on mechanics of coal under confining pressure. *International Journal of Coal Geology*, 209, 117-129, doi.org/10.1016/j.coal.2019.04.004.
- 3. **Ranathunga AS**, Perera MSA, Ranjith PG (2019). A laboratory-scale numerical study of CO₂ flow through coal under down-hole stress conditions: Application to CO₂ storage. *Geotechnical Journal*, 7, 11-21.
- 4. Zhang XG, Ranjith PG, Perera MSA, Haque A, **Ranathunga**, **AS** (2019). The influence of CO₂ saturation time on the coal gas flow: Fractured bituminous coal. *Fuel*, 240, 153-161, doi.org/10.1016/j.fuel.2018.11.137.
- 5. Zhang XG, Ranjith PG, **Ranathunga AS**, Li DY. (2019). Variation of mechanical properties of bituminous coal under CO₂ and H₂O saturation. *Journal of Natural Gas Science and Engineering*, 61, 158-168, doi.org/10.1016/j.jngse.2018.11.010.
- 6. Zhang XG, Ranjith PG, Li DY, Perera MSA, **Ranathunga**, **AS**, Zhang BN (2018). CO₂ enhanced flow characteristics of naturally-fractured bituminous coals with N₂ injection at different reservoir depths. *Journal of CO₂ Utilization*, 28, 393-402, doi.org/10.1016/j.jcou.2018.11.001.
- 7. Zhang XG, Ranjith PG, **Ranathunga AS**, (2018). Effects of water and brine saturation on mechanical property alterations of Brown coal. *Energies*, 11(5), 1116, doi.org/10.3390/en11051116.
- 8. **Ranathunga AS**, Perera MSA, Ranjith PG, Zhang XG (2017). Super-critical carbon dioxide flow behaviour in low rank coal: A meso-scale experimental study. *Journal of CO*₂ *Utilization*, 20, 1-13, doi.org/10.1016/j.jcou.2017.04.010.
- 9. **Ranathunga AS**, Perera MSA, Ranjith PG, Rathnaweera TD, Zhang XG (2017). Effect of coal rank on CO₂ adsorption induced coal matrix swelling with different CO₂ properties and reservoir depths. *Energ Fuel*, 31, 5297–5305, doi.org/10.1021/acs.energyfuels.6b03321.
- 10. **Ranathunga AS**, Perera MSA, Ranjith PG, Wei CH (2017). An experimental investigation of applicability of CO₂ enhanced coal bed methane recovery technique to low rank coal. *Fuel*, 189, 391-399, doi.org/10.1016/j.fuel.2016.10.116.
- 11. **Ranathunga AS**, Perera MSA, Ranjith PG, De Silva GPD (2017). A macro-scale view of the influence of effective stress on carbon dioxide flow behaviour in coal: An experimental study, *Geomechanics and Geophysics for Geo-Energy and Geo-Resources*, 3, 13-28, doi.org/10.1007/s40948-016-0042-2.
- 12. Rathnaweera TD, Ranjith PG, Perera MSA, **Ranathunga AS**, Wanniarachchi WAM, Yang SQ, Lashin A, Al Arifi N (2017). An experimental investigation of coupled chemico-mineralogical and mechanical changes in varyingly-cemented sandstones upon CO₂ injection in deep saline aquifer environments, *Energy*, 133, 404-414, doi.org/10.1016/j.energy.2017.05.154.
- 13. Rathnaweera TD, Ranjith PG, Perera MSA, Bandara KMAS, Wanniarachchi WAM, **Ranathunga AS** (2017). Investigation of relative flow characteristics of brine-saturated reservoir formation: A

- numerical study of the Hawkesbury formation. *Journal of Natural Gas Science and Engineering*, 45, 609-624, doi.org/10.1016/j.jngse.2017.06.029.
- 14. **Ranathunga AS**, Perera MSA, Ranjith PG (2016). Influence of CO₂ adsorption on the strength and elastic modulus of low rank Australian coal under confining pressure. *International Journal of Coal Geology* 167, 148-156, doi.org/10.1016/j.coal.2016.08.027.
- 15. **Ranathunga AS**, Perera MSA, Ranjith PG, Bui H (2016). Supercritical CO₂ saturation-induced mechanical property alterations in low rank coal: An experimental study. *The Journal of Supercritical Fluids* 109, 134-140, doi.org/10.1016/j.supflu.2015.11.010.
- 16. Perera MSA, **Ranathunga AS**, Ranjith PG (2016). Effect of coal rank on various fluid saturations creating mechanical property alterations using Australian coals. *Energies* 9(6), 440, doi.org/10.3390/en9060440.
- 17. Zhang XG, Ranjith PG, Perera MS, **Ranathunga AS**, Haque A (2016). Gas Transportation and Enhanced Coalbed Methane Recovery Processes in Deep Coal Seams: A Review. *Energ Fuel* 30, 8832-8849, doi.org/10.1021/acs.energyfuels.6b01720.
- 18. Perera MSA, Ranjith PG, Rathnaweera TD, **Ranathunga AS**, Koay A, Choi X (2016). A Review of CO₂-Enhanced Oil Recovery with a Simulated Sensitivity Analysis. *Energies* 9, 481, doi.org/10.3390/en9070481.
- 19. **Ranathunga AS**, Perera MSA, Ranjith PG, Ju Y, Vishal V, De Silva PNK (2015). A macro-scale experimental study of sub and supercritical CO₂ flow behaviour in Victorian brown coal. *Fuel* 158: 864-873, doi.org/10.1016/j.fuel.2015.06.047.
- 20. Perera MSA, Ranjith PG, **Ranathunga AS**, Koay A, Zhao J, Choi S (2015). Optimization of enhanced coal-bed methane recovery using numerical simulation. *Journal of Geophysics and Engineering* 12, 90, doi.org/10.1088/1742-2132/12/1/90.
- 21. **Ranathunga AS**, Perera MSA, Ranjith PG (2014). Deep coal seams as a greener energy source: a review. *Journal of Geophysics and Engineering*, 11,1-17, doi.org/10.1088/1742-2132/11/6/063001.

Peer-reviewed international conference papers

- Ranathunga AS, Ranjith PG, Perera MSA, Zhang XG (2019). Suitability of Victorian brown coal for CO₂ sequestration: An experimental overview on effect of moisture on CO₂/CH₄ exchange. 16th Asian Regional Conference on Soil Mechanics and Geotechnical Engineering (16ARC 2019), Taipei, Taiwan, 14 18 October 2019; Paper ID YMPG21, http://seags.ait.asia/16arc-proceedings/16arc-proceedings/.
- 2. **Ranathunga AS**, Jayathilaka LBDL, Vitharana TH, Elpitiya KD, Nanjitha TGT (2019). Applicability of Calcium Carbide Residues for the improvement of Soft Peaty Clay. *Moratuwa Engineering Research Conference (MERCon 2019)*, 5th International Multidisciplinary Engineering Research Conference, Colombo, Sri Lanka, 3 5 July 2019; Paper ID 1570530110. IEEE, doi.org/10.1109/MERCon.2019.8818776.
- 3. **Ranathunga AS**, Ranjith PG, Liu X. (2018). Fired-Siltstone Based Geopolymers for CO₂ Sequestration Wells: A Study on the Effect of Curing Temperature. *Moratuwa Engineering Research Conference (MERCon 2018)*, 4th International Multidisciplinary Engineering Research Conference, Colombo, Sri Lanka, 30th May 1st June 2018; pp. 595-600. IEEE, doi.org/10.1109/MERCon.2018.8421984.

- 4. **Ranathunga AS**, Perera MSA, Ranjith PG. De Silva GPD (2016). A macro scale overview on coal mass permeability alterations occur upon CO₂ injection into Australian low rank coal, *International conference on Geo-mechanics, Geo-energy and Geo-resources (IC3G 2016)*, Melbourne, Australia, 28-29 September 2016; Paper ID 92.
- 5. **Ranathunga AS**, Perera MSA, Ranjith PG, Haque RT (2016). An experimental study on behaviour of reconstituted low rank coal under different fluid saturations, *ISRM International Symposium and EUROCK* 2016, Cappadocia, Turkey, 29-31 August 2016; Paper ID 166, doi.org/10.1201/9781315388502-41.
- 6. **Ranathunga AS**, Perera MSA, Ranjith PG (2015). CO₂ sequestration in deep unmineable coal seams: A numerical study, *International Conference on Geotechnical Engineering (ICGE 2015)*, Colombo, Sri Lanka, 10-11 August 2015; Paper ID -168, www.issmge.org/uploads/publications/23/24/ICGE-15-MO-11-Ranathunga.pdf.
- 7. **Ranathunga AS**, Perera MSA, Ranjith PG (2014). An Experimental Study to Investigate Temperature Effect on Permeability of Victorian Brown Coal during CO₂ Sequestration, *ISRM International Symposium and 8th Asian Rock Mechanics Symposium (ARMS8)*, Sapporo, Japan, 14-16 October 2014; Paper ID ARMS8 PO-82, <u>ISRM-ARMS8-2014-303</u>.
- 8. **Ranathunga AS**, Madusanka ADNC, Priyankara NH, Alagiyawanna AMN (2013), Investigation of Geotechnical characteristics of Galle Fort Rampart. In: *Proceeding of International Symposium on Advances of Civil and Environmental Engineering Practices for Sustainable Development (ACEPS 2013), Galle, Sri Lanka, March 2013; pp. 44 51, Corpus ID: 211042699.*

• Local conference papers

- 1. **Ranathunga AS** (2015), Supercritical Carbon Dioxide flow behaviour in low rank coal: A meso-scale experimental study, 6th Civil Engineering Postgraduate Conference, Monash University, Australia, November 2015.
- 2. **Ranathunga AS** (2014), Effect of carbon dioxide injection on mechanical properties of Victorian brown coal, 5th Civil Engineering Postgraduate Conference, Monash University, Australia, November 2014.
- 3. **Ranathunga AS** (2013), Investigation of Long-term Safe Storage of Carbon Dioxide in Coal Seams with Enhanced Methane Recovery, 4th Civil Engineering Postgraduate Conference, Monash University, Australia, November 2013.
- 4. **Ranathunga AS**, Madusanka ADNC, Priyankara NH, Alagiyawanna AMN (2013), Investigation of indigenous knowledge used for Galle Fort construction with respect to Geotechnical Engineering. In: *Proceeding of the Conference of Young Geotechnical Engineers Sri Lanka*, Sri Lanka Geotechnical Society (SLGS), April 2013; pp. 17 20.

Dissertations

• Doctoral Dissertation

Ranathunga AS (2017), Investigation of Long-Term Safe Storage of Carbon Dioxide in Deep Coal Seams with Enhanced Methane Recovery, Doctoral Dissertation (Ph.D.), Department of Civil Engineering, Monash University, Australia, doi.org/10.4225/03/58f969b681763.

Resources: http://www.3gdeep.com/

http://www.monash.edu/engineering/departments/civil/research/themes/deep-earth

• Bachelors Dissertation

Ranathunga AS, Madusanka ADNC (2013), Investigation of indigenous knowledge adopted in construction of a colonial fort: A case study of Galle fort with respect to geotechnical engineering, Bachelors Dissertation (B.Sc. Eng.), Department of Civil and Environmental Engineering, University of Ruhuna, Sri Lanka.

Invited Talks

- "Enhanced Coal Bed Methane Recovery", Annual Civil Engineering Graduate Symposium –
 2017 organized by the Civil Engineering Society, University of Moratuwa, Sri Lanka –
 30/11/2017
- "Can Deep Coal Seams be used as a Greener Energy Source?", Department of Civil Engineering, Institute of Information Technology Sri Lanka, Malabe, 25/07/2017.
- "Deep Coal Seams as a Greener Energy Source", Geotechnical Forum organized by the Sri Lankan Geotechnical Society (SLGS) 17/05/2017

Research Supervision

Postgraduate

1. Suloshini S, Investigation on the applicability of Bottom Ash for Restoration of Clay Mines in Sri Lanka, in progress.

Undergraduate

- 1. Jayamal KGM, Soft peaty clay stabilization with industrial by products: An experimental study on strength behaviour, Undergraduate thesis, Department of Civil Engineering, University of Moratuwa, Moratuwa, Sri Lanka, 2019.
- 2. Rathnayake RMSU, Soft peaty clay stabilization with industrial by products: An experimental study on the compressibility characteristics, Undergraduate thesis, Department of Civil Engineering, University of Moratuwa, Moratuwa, Sri Lanka, 2019.
- 3. Manawadu IU, *Applicability of bottom ash for rehabilitation of clay mines*, Undergraduate thesis, Department of Civil Engineering, University of Moratuwa, Moratuwa, Sri Lanka, 2019.
- 4. Mapa MMSTM, Applicability of bottom ash as a soil amendment during clay mine rehabilitation, Undergraduate thesis, Department of Civil Engineering, University of Moratuwa, Moratuwa, Sri Lanka, 2019.
- 5. Jathurshan T, *Investigation of the Variation of Physical Properties of Manufactured Sand with its Source*, Undergraduate thesis, Department of Civil Engineering, University of Moratuwa, Moratuwa, Sri Lanka, 2019.
- 6. Vitharana TH, *Investigation of the strength behaviour of soft clays stabilized with Calcium Carbide Residues and Fly ash*, Undergraduate thesis, Department of Civil Engineering, University of Moratuwa, Moratuwa, Sri Lanka, 2018.
- 7. Elpitiya KD, *Investigation of the compressibility characteristics of soft clays stabilized with Calcium Carbide Residues and Fly ash*, Undergraduate thesis, Department of Civil Engineering, University of Moratuwa, Moratuwa, Sri Lanka, 2018.
- 8. Jayathilake LBDL, *Investigation of the applicability of Calcium Carbide Residue as a chemical stabilizer for the improvement of mechanical properties in peat*, Undergraduate thesis, Department of Civil Engineering, University of Moratuwa, Moratuwa, Sri Lanka, 2018.
- 9. Nanjitha JGT, *Investigation of the effects of Calcium Carbide Residue–Fly Ash Binder on flow behaviour of soft clay,* Undergraduate thesis, Department of Civil Engineering, University of Moratuwa, Moratuwa, Sri Lanka, 2018.