

ISSN: 2327-4336

Volume 13, Number 8, August 2025



# Journal of Geoscience and Environment Protection



ISSN: 2327-4336



<https://www.scirp.org/journal/gep>

# Journal Editorial Board

ISSN 2327-4336 (Print) ISSN 2327-4344 (Online)

<https://www.scirp.org/journal/gep>

---

## Editor-in-Chief

**Prof. Valentine Udoh James**

Pennsylvania Western University, Clarion, USA

## Editorial Board

**Prof. Sheikh D. Abubakar**

Usmanu Danfodiyo University, Nigeria

**Prof. Tapos Kumar Acharjee**

Bangladesh Agricultural University, Bangladesh

**Prof. Ayad M. Fadhil Al-Quraishi**

Tishk International University, Iraq

**Prof. Mokhles K. Azer**

National Research Centre, Egypt

**Prof. Raimundo Jiménez Ballesta**

Universidad Autonoma de Madrid, Spain

**Dr. Ali Darvishi Bolorani**

University of Tehran, Iran

**Dr. Mukesh Singh Boori**

University of Central Asia, Tajikistan

**Prof. Jianmin Chen**

Fudan University, China

**Prof. Elizabeth Gordon Colón**

Central University of Venezuela, Venezuela

**Prof. Mohamed Abdelhamid Dawoud**

National Water Research Center, Egypt

**Prof. Mohamed Ahmed El-Sadek**

Nuclear Materials Authority, Exploration Division, Egypt

**Prof. Akram Othman Esmail**

Salahaddin University, Iraq

**Dr. Silvério Manuel Domingues Figueiredo**

Quinta do Contador-Estrada da Serra, Portugal

**Prof. Peter G. Flood**

University of New England, Australia

**Prof. Yehia Yehia Hafez**

King Abdulaziz University, Saudi Arabia

**Prof. Benedict Ilozor**

Eastern Michigan University, USA

**Dr. Azizallah Izady**

Sultan Qaboos University (SQU), Oman

**Dr. Pathmakumara Jayasingha**

University of Colombo, Sri Lanka

**Prof. M. A. Khalifa**

Menoufia University, Egypt

**Dr. Juan Ma**

Fayetteville State University, USA

**Dr. Georges Martial Ndzana**

University of Dschang, Cameroon

**Dr. John Paul Odhiambo Obiero**

University of Nairobi, Kenya

**Prof. Reccab Manyala Ochieng**

University of Zambia, Zambia

**Prof. Martins Yusuf Otache**

Federal University of Technology, Nigeria

**Prof. Cheng Heng Pang**

University of Nottingham Ningbo China, China

**Prof. Orhan Polat**

Dokuz Eylul University, Türkiye

**Prof. Suresh Chand Rai**

University of Delhi, India

**Dr. Gireesh Raman**

Intel Corporation, USA

**Dr. Marcello Ruberti**

University of Salento, Italy

**Dr. Amirhomayoun Saffarzadeh**

Kyushu University, Japan

**Prof. V. I. Solomatin**

Moscow State University, Russia

**Dr. Mustafa Din Subari**

Universiti Teknologi Malaysia, Malaysia

**Dr. Samaneh Torbati**

Urmia University, Iran

**Dr. Kelestemur Gülüzar Tuna**

Firat University, Türkiye

**Dr. Rahul Verma**

Botswana International University of Science and Technology, Botswana

**Prof. Leiming Yin**

Chinese Academy of Sciences, China

**Dr. Xiaochun Zhang**

Carnegie Institution for Science, USA

**Prof. Qixing Zhou**

Nankai University, China

**Dr. Prosper Kojo Zigah**

Georgia Southern University, USA

# Table of Contents

**Volume 13    Number 8**

**August 2025**

## **Integrating Remote Sensing and GIS for Groundwater Potential Mapping in the Santa-Babadjou Corridor**

B. D. Njumba, M. L. F. Niba, J. B. Ndefru ..... 1

## **Evaluation and Application of Roadway Surrounding Rock Stability Based on Comprehensive Index Method**

J. C. Feng, Z. H. Ji, X. Y. Wu, J. J. Shi, C. Y. Dong, G. X. Niu, Y. Q. Gao..... 27

## **Heavy Metal Contamination in Soil and Purslane (*Portulaca oleracea*) in Bassa Industrial Zone, Douala-Cameroon: Implications for Environmental Health and Ecosystem Sustainability**

R. L. Londe, E. V. Manga, L. T. Nanganoa, G.-N. N. Tataw, L. N. Fofung ..... 44

## **Air Quality Assessment in a Protected Natural Area: A Case Study of Banco Forest, Abidjan (Côte d'Ivoire)**

Y. S. L. Hermann, A. Eric-Michel, A. Hilaire, K. Pierre, A. Davy, Y. O. Bernard, K. K. Georges, Y. Véronique..... 65

## **Mechanisms for the Formation of Metamorphic Temperature and Pressure Gradients in Orogenic Belts**

M. K. Zhang, G. W. Zhang ..... 85

## **Assessing the Indicators of Water Stress in Usangu Agricultural Wetland, Tanzania**

G. Masige, A. Opere, J. Mulwa..... 102

## **Land Cover Classification through GIS-Based Clustering of Morphometric Terrain Features: The Chepelarska River Basin (Western Rhodopes, Bulgaria)**

V. Stoyanova, S. Genchev, E. Tcherkezova, G. Metodieva ..... 121

## **Environmental Assessment of High-Speed Rail Projects in Australia: Balancing Development and Sustainability**

S. Shadvar, A. Rahman..... 129

## **Comparative Examination of the DRASTIC and Susceptibility Index Approaches for Assessing Aquifer Vulnerability in Porous Media**

C. T. Wade, B. E. Manou, M. A. Daouda, T. N'Tcha, K. Sadio, F. D. Ngom ..... 142

## **Recycling Organic Waste in the Face of Global Warming**

B. T. S. Parfait, K. J. Trésor, D. N. Benjamin ..... 178

## **Land Use Changes and Their Impact on the Value of Ecosystem Services in the Model Region**

J. Makovníková, S. Kološta, B. Pálka ..... 193

**Effect of Development Interventions on Rangelands and Rangelands Management Strategies in Burder Landscape, 1986-2022, Wajir County, Kenya**

A. M. Harret, S. Maingi, O. Fred ..... 207

**Mapping Water Quality Using Remote Sensing Technology: A Case Study of Lake Victoria**

G. W. Simiyu, J. Mwatelah ..... 225

**Assessing Land Use/Land Cover Change, Drivers, and Community-Based Interventions for Sustainable Water Availability in the Kidunda River Catchment, Ruvu Basin**

E. J. Mmassy, E. Mutayoba, L. Mfwango, S. Chidodo, N. Chilagane ..... 253

**Ecosystem Services, Threat and Dynamics of Phumdis: Comprehensive Study on Loktak Caldera Lake, Manipur through Remote Sensing and Ground Visit**

A. Sarkar, S. Basak ..... 267

**Advances in Satellite-Based Methane Monitoring for the Oil and Gas Sector: Global Trends, Governance Strategies, and China's Response**

S. Yuan, N. F. Yang ..... 301

**Infiltrability Variations on Surface Features of Sahelian Soils around Niamey (Southwestern Niger)**

H. A. Harouna, A. A. Toure, M. B. Moussa, M. Grippa, S. N. Adamou, B. Hassane, I. Ide ..... 321

**Use of Multicriteria Analysis (MCA) to Map the Specific Vulnerability of Groundwater in the City of Daloa (Central-Western Ivory Coast)**

Y. E. Kré, Y. Tuo, O. M. J. Mangoua, Y. M. Kamenan, B. Dibi ..... 353

**Climate Change and Flooding in Upper Rupununi, Guyana: A Participatory Approach**

T. Williams, J. Rosales, K. Benn ..... 376

**From Waste to Walkways: Recycled Plastic Pavement Blocks for a Circular Economy**

V. I. Seshie, A. Ewusi, C. Owusu ..... 394

**Economic Activities of Banana Cultivation and Phosphorus Contribution to a Brazilian RAMSAR Estuarine System**

K. L. Agostinho, V. G. Chiozzini, E. S. Braga ..... 417

**Geochemical Characterization and Classification of Crude Oils from Eastern Lake Albert Basin, Western Uganda**

E. A. D. Daniel ..... 451

**Identifying and Mapping Municipal Solid Waste Disposal Sites in Kenya Using Remote Sensing and GIS—A Case Study of Juja and Dandora Areas**

J. P. Akinyi, E. Nduati ..... 468

# Journal of Geoscience and Environment Protection (GEP)

## Journal Information

### SUBSCRIPTIONS

The *Journal of Geoscience and Environment Protection* (Online at Scientific Research Publishing, <https://www.scirp.org/>) is published monthly by Scientific Research Publishing, Inc., USA.

#### **Subscription rates:**

Print: \$39 per issue.

To subscribe, please contact Journals Subscriptions Department, E-mail: [sub@scirp.org](mailto:sub@scirp.org)

### SERVICES

#### **Advertisements**

Advertisement Sales Department, E-mail: [service@scirp.org](mailto:service@scirp.org)

#### **Reprints (minimum quantity 100 copies)**

Reprints Co-ordinator, Scientific Research Publishing, Inc., USA.

E-mail: [sub@scirp.org](mailto:sub@scirp.org)

### COPYRIGHT

#### **Copyright and reuse rights for the front matter of the journal:**

Copyright © 2025 by Scientific Research Publishing Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY).

<http://creativecommons.org/licenses/by/4.0/>

#### **Copyright for individual papers of the journal:**

Copyright © 2025 by author(s) and Scientific Research Publishing Inc.

#### **Reuse rights for individual papers:**

Note: At SCIRP authors can choose between CC BY and CC BY-NC. Please consult each paper for its reuse rights.

#### **Disclaimer of liability**

Statements and opinions expressed in the articles and communications are those of the individual contributors and not the statements and opinion of Scientific Research Publishing, Inc. We assume no responsibility or liability for any damage or injury to persons or property arising out of the use of any materials, instructions, methods or ideas contained herein. We expressly disclaim any implied warranties of merchantability or fitness for a particular purpose. If expert assistance is required, the services of a competent professional person should be sought.

### PRODUCTION INFORMATION

For manuscripts that have been accepted for publication, please contact:

E-mail: [gep@scirp.org](mailto:gep@scirp.org)



**Call\_for\_Papers**

## Journal of Geoscience and Environment Protection (GEP)

ISSN 2327-4336 (Print) ISSN 2327-4344 (Online)

<https://www.scirp.org/journal/gep>

**Journal of Geosciences and Environment Protection (GEP)** is an international journal dedicated to the latest advancement of Geoscience and Environment Protection. The goal of this journal is to provide a platform for scientists and academicians all over the world to promote, share, and discuss various new issues and developments in different areas of Geoscience and Environment Protection. All manuscripts must be prepared in English, and are subject to a rigorous and fair peer-review process.

### Subject Coverage

This journal invites original research and review papers that address the following issues. Topics of interest include, but are not limited to:

#### Environmental Protection

- Air Pollution
- Chemical Pollution
- Climate Change
- Disasters Management
- Environmental Earth Sciences
- Environmental Geology and Rehabilitation
- Environmental Law and Policies
- Environmental Risk
- Global Environmental Protection Technology
- Global Warming
- Landfill Waste Management
- Mineral Processing, Waste Management and Recycling
- Nuclear Energy and Environmental Protection
- Pollution Control and Technologies
- Soil Environment and Soil Science in Other Disciplines
- Sustainability of Resources and Environment
- Waste Water Management and Aquaculture
- Water Engineering
- Water Resources Management and Water Quality

#### Geoscience

- BioGeomarkers and Their Significance for Astrogeology and Astrobiology
- Crystallography and Mineralogy
- Education and Capacity Building in Geosciences
- Endogenous, Exogenous Petrology and Geochemistry
- Energy and Mineral Deposits
- Geodynamics
- Geoethics
- Geographic Information Science
- Geological Collections and Museology
- Geophysics
- Hydrology and Hydrogeology
- International Partnership in Geosciences
- Medical and Forensic Geology
- Meteorites and Planetary Geology
- Natural Hazards
- Paleontology
- Statistics and Data Analysis in Geology
- Stratigraphy and Sedimentology

We are also interested in short papers (letters) that clearly address a specific problem, and short survey or position papers that sketch the results or problems on a specific topic. Authors of selected short papers would be invited to write a regular paper on the same topic for future issues of the GEP.

### Notes for Intending Authors

Submitted papers should not have been previously published nor be currently under consideration for publication elsewhere. Paper submission will be handled electronically through the website. All papers are refereed through a peer review process. For more details about the submissions, please access the website.

### Website and E-Mail

<https://www.scirp.org/journal/gep>

E-mail: [gep@scirp.org](mailto:gep@scirp.org)

## *What is SCIRP?*

Scientific Research Publishing (SCIRP) is one of the largest Open Access journal publishers. It is currently publishing more than 200 open access, online, peer-reviewed journals covering a wide range of academic disciplines. SCIRP serves the worldwide academic communities and contributes to the progress and application of science with its publication.

## *What is Open Access?*

All original research papers published by SCIRP are made freely and permanently accessible online immediately upon publication. To be able to provide open access journals, SCIRP defrays operation costs from authors and subscription charges only for its printed version. Open access publishing allows an immediate, worldwide, barrier-free, open access to the full text of research papers, which is in the best interests of the scientific community.

- High visibility for maximum global exposure with open access publishing model
- Rigorous peer review of research papers
- Prompt faster publication with less cost
- Guaranteed targeted, multidisciplinary audience



**Scientific  
Research  
Publishing**

**Website: <https://www.scirp.org>**

**Subscription: [sub@scirp.org](mailto:sub@scirp.org)**

**Advertisement: [service@scirp.org](mailto:service@scirp.org)**