UNITED NATIONS DECADE ON ECOSYSTEM RESTORATION 2021-2030

LiFE Lifestyle for Environment

सिक्किम अंतरराष्ट्रीय संगोष्ठी

HYBRID MODE (BOTH PHYSICAL AND ONLINE)

2nd International Conference on

Nature and Natural Sciences (ICNS 2026)

Theme: Sustainable and Climate Resilient Ecosystem: Environmental Ethics and Anthropogenic Impact

23rd & 24th May 2026

***Organized and hosted by*: Sikkim Alpine University, Namchi (Sikkim), India**

In Association with

Sikkim Alpine University, Namchi (Sikkim), India
https://sikkimalpineuniversity.edu.in/

Lumbini Buddhist University
Lumbini, Nepal

Sikkim Institute of Science and Technolgy, Chisopani
(Department of Education, Govt. of Sikkim)

Darjeeling Hills State University, Mungpoo, India

J.R.D. State University, Chitrakoot, India

International Buddhist Research Centre, Lucknow
(Department of Culture, Govt. of Uttar Pradesh)

Ashoka Trust for Research in Ecology and the Environment (ATREE), Gangtok, Sikkim, India

National Environmental Science Academy (NESA), New Delhi

www.abrf.org.in

Asian Biological Research Foundation (ABRF)
Prayagraj, India • http://www.abrf.org.in/

Abstracts and Souvenir




22 May 2026

International Day for Biological Diversity 2026

Acting locally for global impact

INTERNATIONAL DAY
FOR BIODIVERSITY 2026
Acting locally for global impact

"Any error in this Abstract Booklet is silent testimony of the fact that is was a human effort".

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Abstracts and Souvenir

ओम प्रकाश माथुर
Om Prakash Mathur

सत्यमेव जयते

राज्यपाल सिक्किम
GOVERNOR OF SIKKIM

लोक भवन
गान्तोक–737103
(सिक्किम)
LOK BHAVAN
GANGTOK-737103
(SIKKIM)

SKM/GOV/MSG/2026/54
DATED :5TH MAY 2026

शुभकामना संदेश

मुझे यह जानकर हर्ष हुआ कि सिक्किम अलपाइन विश्वविद्यालय द्वारा **'प्रकृति और प्राकृतिक विज्ञान'** पर द्वितीय अंतरराष्ट्रीय सम्मेलन (ICNS 2026) का आयोजन किया जा रहा है। इस वर्ष का विषय **"सतत और जलवायु लचीला** पारिस्थितिकी **तंत्र: पर्यावरणीय नैतिकता और मानवजनित प्रभाव"** महत्वपूर्ण विषय है।

सिक्किम की जैव विविधता और पारिस्थितिकी को ध्यान में रखते हुए, जलवायु परिवर्तन और सतत विकास पर विमर्श करना सामयिक विषय है। ऐसे सम्मेलन शोधकर्ताओं, शिक्षाविदों और नीति निर्माताओं को एक ऐसा साझा मंच प्रदान करते हैं जहाँ वे आधुनिक चुनौतियों के वैज्ञानिक और नैतिक समाधान खोज सकते हैं।

मुझे विश्वास है कि इस दो दिवसीय विचार-विमर्श से निकलने वाले निष्कर्ष पर्यावरण संरक्षण की दिशा में प्रभावी कदम साबित होंगे और आने वाली पीढ़ियों के लिए एक सुरक्षित भविष्य की नींव रखेंगे।

मैं इस अंतरराष्ट्रीय सम्मेलन की सफलता के लिए आयोजकों, प्रतिभागियों और प्रतिनिधियों को हार्दिक बधाई एवं अपनी शुभकामनाएँ प्रेषित करता हूँ।

(ओम प्रकाश माथुर)

प्रेम सिंह तामाङ (गोले)
Prem Singh Tamang (Golay)

मुख्य मन्त्री, सिक्किम
CHIEF MINISTER, SIKKIM

सिक्किम सरकार
GOVERNMENT OF SIKKIM

MESSAGE

It gives me immense pleasure to learn that Sikkim Alpine University, in collaboration with esteemed national and international institutions, is organizing the **2nd International Conference on Nature and Natural Sciences** (ICNS 2026) on May 23rd and 24th, 2026.

The theme of the conference, "Sustainable and Climate Resilient Ecosystem: Environmental Ethics and Anthropogenic Impact," is not only timely but deeply relevant to the global discourse on ecological preservation.

Sikkim has always been a pioneer in harmonizing human progress with nature. As the world grapples with the escalating challenges of climate change, our state remains steadfast in its commitment to sustainable development.

We recognize that the Eastern Himalayas are particularly vulnerable to the accelerating impacts of climate change and our proactive strategies further underscore our resolve to protect our unique biodiversity.

I congratulate the organizers for their vision in hosting this event and wish all the participants a productive and inspiring session. May this conference inspire collective action to secure a sustainable and green planet for generations to come.

(Prem Singh Tamang)

Place: Gangtok.
Date: 24th April, 2026.

Tashiling Secretariat, Gangtok, Sikkim- 737101
Email: cm-skm@nic.in | Phone: 03592-201091 (Office) | 03592-221857 (Residence)

Raju Basnet
राजु बस्नेत

Minister
Education, Law, Sports & Youth Affairs
and Parliamentary Affairs Departments,
Government of Sikkim
मन्त्री
शिक्षा, कानुन, खेलकुद एवं युवा मामिला
तथा संसदीय मामिला विभाग
सिक्किम सरकार

Message

It gives me immense pleasure to extend my warm greetings to the organizers, participants, and all stakeholders of the 2nd **International Conference on Nature and Natural Sciences (ICNS 2026)** being organized by Sikkim Alpine University, Namchi, on the theme ***"Sustainable and Climate Resilient Ecosystem: Environmental Ethics and Anthropogenic Impact."***

I am pleased to note that Sikkim Alpine University, within a short span of its establishment, has collaborated with reputed national and international institutions to organize significant academic engagements. While this reflects commendable commitment, such collaborations should further extend into meaningful research, innovation, and knowledge creation.

The theme of the ensuing conference is both timely and profoundly significant. As the world grapples with escalating environmental challenges, the need to harmonize human development with ecological sustainability has never been more urgent. A climate-resilient ecosystem rooted in environmental ethics calls for responsible stewardship, scientific innovation, and a collective rethinking of anthropogenic practices. Such platforms are vital for fostering interdisciplinary dialogue and generating actionable insights for a sustainable future.

I am happy to know that the conference aligns closely with the vision of the National Education Policy (NEP) 2020, which emphasizes holistic, multidisciplinary, and research-driven education, alongside the integration of environmental awareness, critical thinking, and sustainable development into the academic framework. This conference reflects that vision through its focus on ecological sensitivity and scientific inquiry.

The Government of Sikkim accords the highest priority to education as a cornerstone of sustainable development. I urge our institutions to strengthen research culture, embrace multidisciplinary approaches, and nurture environmentally responsible citizens.

I congratulate the organizers and extend my best wishes for the success of the conference.

Date: 18.04.2026
Place: Gangtok

Raju Basnet

टाशीलिङ सचिवालय, गान्तोक
दूरभाष नम्बर: ०३५९२-२०१२२८
फोन : ९५९३३-८५९५८

Tashiling Secretariat, Gangtok
Landline No. **03592-201228**
Ph. **95933 - 85958**

Sikkim Alpine University

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Message from the Chancellor
Sikkim Alpine University, Namchi

Message

It gives me immense pleasure to extend my heartfelt greetings to all participants, organizers, and distinguished guests of the 2nd International Conference on Nature and Natural Sciences (ICNS 2026) being organized by Sikkim Alpine University.

The theme of the conference, "Sustainable and Climate Resilient Ecosystem: Environmental Ethics and Anthropogenic Impact," is both timely and significant. At a juncture when the world is facing unprecedented environmental challenges, such academic initiatives play a vital role in fostering dialogue, innovation, and collaborative solutions. The focus on sustainability and ecological balance is especially important for regions like Sikkim, known for its rich biodiversity and fragile ecosystem.

I commend the efforts of the organizing committee for bringing together eminent academicians, researchers, policymakers, and environmental experts from across the globe on a common platform. I am confident that the deliberations and knowledge shared during this conference will contribute meaningfully towards addressing critical environmental concerns and promoting sustainable development practices.

I extend my best wishes for the grand success of ICNS 2026. May this conference inspire new ideas, strengthen global partnerships, and pave the way for a more sustainable and resilient future.

With warm regards

Ajindar Kumar Bansal
(Chancellor)
Sikkim Alpine University
Namchi, Sikkim

Sikkim Alpine University

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www.sikkimalpineuniversity.edu.in

Message

It is an immense pleasure and privilege for Sikkim Alpine University, Namchi, Sikkim to be the official organizer to host the Second International Conference on Nature and Natural Sciences (ICNS 2026) from 23rd to 24th May 2026. The Conference theme *"Sustainable and Climate Resilient Ecosystem: Environmental Ethics and Anthropogenic Impact"* carries a significant research reflection and need for a development of holistic sustainable environmental framework. At a time when environmental sustainability, scientific inquiry, and responsible stewardship of nature are of global importance, conferences of this kind hold great academic and social relevance.

I am confident that the deliberations and discussions during this event will inspire new perspectives, foster collaborative research, and generate valuable outcomes for society. I congratulate the organizers for their commendable efforts in bringing together distinguished participants for this significant academic endeavour.

I convey my sincere best wishes for the grand success of the conference and hope it becomes a fruitful and memorable occasion for all.

Vice Chancellor
Sikkim Alpine University

GOVERNMENT OF SIKKIM
HIGHER AND TECHNICAL EDUCATION
EDUCATION DEPARTMENT, TASHILING SECRETARIAT
GANGTOK – 737101

Date: 24.04.2026

Gyaltshen Sherpa
Additional Director,
Higher Education,
Gangtok, Sikkim

Message

I am delighted to learn that SikkimAlpine University, Kamrang, Namchi, in collaboration with esteemed national and international institutions, is organising the2nd International Conference on Nature and Natural Sciences (ICNS 2026).

The theme of the conference, "Sustainable and Climate Resilient Ecosystem: Environmental Ethics and Anthropogenic Impact," is both timely and profoundly relevant. As we navigate an era of unprecedented environmental challenges, the need to balance human progress with ecological preservation has never been more urgent.

This is particularly true for our beautiful state of Sikkim, a global biodiversity hotspot that serves as a vital guardian of our natural heritage.

I am confident that this conference will serve as a vibrant platform for academicians, researchers, and policymakers to exchange transformative ideas and create sustainable solutions. It is through such collective intellectual pursuits that we can hope to mitigate climate change impacts and build a resilient future for generations to come.

I congratulate the organisers for their initiative and extend my warmest greetings to all the participants. I wish the 2nd ICNS 2026 every success in achieving its noble objectives.

[GyaltshenSherpa]
Additional Director,
Higher Education

जगद्गुरु रामभद्राचार्य दिव्यांग राज्य विश्वविद्यालय, चित्रकूट (उ0प्र0)
Jagadguru Rambhadracharya Divyang State University, Chitrakoot, UP-210204

Prof. Shishir Kumar Pandey Vice - Chancellor
प्रो0 शिशिर कुमार पाण्डेय कुलपति

JRDSU/VC Office / 27/2026 Date: 06/05/2026

Message

It gives me immense pleasure to extend my warm greetings on the occasion of the **2nd International Conference on Nature and Natural Sciences (ICNS 2026)**, being organized in hybrid mode under the theme ***"Sustainable and Climate Resilient Ecosystem: Environmental Ethics and Anthropogenic Impact."***

In the present era of rapid environmental transformation and ecological challenges, such academic platforms are of vital importance. They provide an opportunity for scholars, researchers, academicians, and practitioners from across the globe to deliberate upon critical issues related to sustainability, climate resilience, and ethical responsibility towards nature. The chosen theme is both timely and relevant, as it encourages meaningful dialogue on balancing human development with environmental conservation.

Jagadguru Rambhadracharya Divyang State University is proud to be associated with this significant academic endeavour. I am confident that this conference will foster interdisciplinary collaboration, promote innovative research, and generate insightful discussions that will contribute to the development of sustainable solutions for the future.

I commend the organizing institutions, especially Sikkim Alpine University and its esteemed collaborators, for their dedicated efforts in bringing together such a distinguished gathering of intellectuals.

I extend my best wishes for the grand success of the conference and hope that it will inspire continued research and commitment towards environmental sustainability and global well-being.

Warm Regards,

(Prof. Shishir Kumar Pandey)
Vice-Chancellor

Mob.: +91 96512 45457, +91 73552 98870, +91 9415280494
Email : vc@jrdsu.up.gov.in, jrhuniversity@yahoo.com, Website: www.jrdsu.up.gov.in

VICE CHANCELLOR

Professor (Dr.) Tejimala Gurung Nag
Vice Chancellor
Email: vicechancellor@dhu.edu.in

DARJEELING HILLS UNIVERSITY
ITI Building, Bhasmey, Mungpoo
Darjeeling District, West Bengal—734313
Email: contact@dhu.edu.in
Website: www.dhu.edu.in

Message

It is an immense pleasure to partner with Sikkim Alpine University, Namchi, in organising the Second International Conference on Nature and Natural Sciences (ICNS 2026) centered on a theme of critical relevance for reflection and engagement in the Eastern Himalayan region: "Sustainable and Climate Resilient Ecosystem: Environmental Ethics and Anthropogenic Impact". Institutions dedicated to critical pedagogy and praxis must endeavour to collaborate and continually foster research aligned with sustainable and socially just futures rooted in their respective geographies. Darjeeling Hills University is deeply committed to this mission, and we look forward to further partnerships and meaningful academic interventions with Sikkim Alpine University.

On behalf of Darjeeling Hills University, I extend my best wishes for the success of the conference.

Tejimala Gurung

Professor (Dr.) Tejimala Gurung Nag
Vice-Chancellor
Darjeeling Hills University

Dated: April 29, 2026

बीरबल साहनी पुराविज्ञान संस्थान
(भारत सरकार के विज्ञान और प्रौद्योगिकी विभाग का एक स्वायत्तशासी संस्थान)
BIRBAL SAHNI INSTITUTE OF PALAEOSCIENCES
(AN AUTONOMOUS INSTITUTION UNDER DEPARTMENT OF SCIENCE & TECHNOLOGY, GOVERNMENT OF INDIA)

Dr. Hari B. Srivastava
Chairman, Governing Body

53, विश्वविद्यालय मार्ग,
लखनऊ–226007, भारत
53 University Road
Lucknow-226007, India

Message

It gives me immense pleasure to learn that Sikkim Alpine University, Namchi (Sikkim), India is organizing 2nd International Conference on Nature and Natural Sciences (ICNS 2026) from 23rd to 24th May, 2026, in association with Lumbini Buddist University Lumbini Nepal, Darjeeling Hill University, Mungpoo, Darjeeling, International Buddist Research Centre, Lucknow, J R D State university, Chitrakoot, Ashoka Trust for Research in Ecology and Environment (ATREE) Gangtok, Sikkim, National Environmental Science Academy, New Delhi, Asian Biological Research Foundation (ABRF) Prayagraj.

The theme "Sustainable and Climate Resilient Ecosystem: Environmental Ethics and Anthropogenic Impact," highlights the delicate balance between human progress and planetary health.

This conference will serves as a vital platform for scholars, researchers, and practitioners to exchange groundbreaking insights and foster the international collaborations necessary for ecological preservation.

I am confident that the rigorous academic discourse and innovative research aimed at addressing the most pressing ecological challenges of our time will be presented in this conference, will significantly contribute to global efforts in building climate resilience.

May this two-day gathering on May 23rd–24th, 2026, be a source of inspiration and the outcome of conference, after the rigorous dialogue, will serves as a valuable resource for scientists, ethicists, and policymakers of the International community.

I extend my warmest wishes to the participants for a productive exchange of ideas that will help safeguard our natural world for generations to come.

I wish the organizers and all attendees a successful and transformative event.

Hari B Srivastava
05-05-2026

शील समाधि प्रज्ञा

डॉ0 राकेश सिंह
निदेशक
अन्तर्राष्ट्रीय बौद्ध शोध संस्थान, लखनऊ
(संस्कृति विभाग, उ0प्र0)

Message

सन्देश

दिनांक- २१-०५-२०२६

यह अत्यन्त हर्ष का विषय है कि सिक्किम अल्पाइन विश्वविद्यालय, नामची द्वारा प्रकृति एवं प्राकृतिक विज्ञान पर अन्तर्राष्ट्रीय सम्मेलन (ICNS 2026) का आयोजन किया जा है रहा है।

सम्मेलन का विषय 'सतत और जलवायु - लचीला परिस्थितिकी तंत्र: पर्यावरणीय नैतिकता और मानव-जनित प्रभाव' वर्तमान परिवेश में अत्यन्त प्रासंगिक है। सुत्तनिपात के मेत्तसुत्त में यह बतलाया गया है कि सभी प्राणी सन्तोषी हो, सहज हो, पोष्य हो और सादा जीवन बिताने वाले हो, उनकी इन्द्रियां शान्त हो, वह चतुर हो, अप्रगल्भ हो और कुलों में अनासक्त हो। मानव प्रगति और परिस्थितिकी संरक्षण के बीच संतुलन बनाये रखने में मेत्तसुत्त के अनुसार जीवन निर्वाह करने से पर्यावरण संरक्षण में महत्वपूर्ण योगदान होगा। धम्मपद के अरहन्त बग्गो में भी भौतिकता से बचने एवं पर्यावरणीय नैतिकता की बात की गई है।

मुझे विश्वास है कि इस अंतर्राष्ट्रीय सम्मेलन में प्रतिभाग करने वाले विद्वान, शोधकर्ता, शिक्षाविदों के द्वारा आपस मे विमर्श करने से एक उपयुक्त समाधान निकलेगा। मैं इस आयोजन में सम्मिलित सभी संस्थाओं के प्रति हार्दिक शुभकामनाएं देते हुये यह आशा करता हूँ कि उपयुक्त सम्मेलन अपने उद्देश्यो को प्राप्त करने में निश्चित रूप से सफल होगा।

(डॉ राकेश सिंह)

ASIAN BIOLOGICAL RESEARCH FOUNDATION

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Tagore Town Prayagraj 211002 (India)

Dr. Sadguru Prakash
M.Sc., Ph.D., D.Sc. (Honoris causa)
FGAS, FBPS, FGESA, FABRF, FNAS, FIAZ, FGIR, FZSI
Member Secretary, ABRF

Message

It is a matter of great pleasure that Alpine University Namchi, Sikkim, India, in association with Lumbini Buddhist University Lumbini, Nepal, Sikkim Institute of Science and Technology, Chisopani, Sikkim, Darjeeling Hills State University, Mungpoo, India, J.R.D. State University, Chitrakoot, International Buddhist Research Centre, Lucknow, India, ATREE, Gangtok, NESA, New Delhi, Asian Biological Research Foundation (ABRF) Prayagraj, India organized the 2nd International Conference on Nature and Natural Science with the theme "**Sustainable and climate resilient ecosystem: Environmental Ethics and Anthropogenic impact**."

In the era marked by rapid industrialization, urbanization, and climate change; the integrity of the ecosystems is under unprecedented threat. Addressing these challenges requires not only scientific and technological advancements but also a deep commitment to environmental ethics and responsible stewardship of natural resources. This ICNS aims to foster interdisciplinary dialogue, promote knowledge exchange, and encourage collaborative strategies that strengthen resilience and sustainability. I am confident that the deliberations, technical sessions, and interactions during this event will generate insightful discussions and meaningful outcomes, contributing significantly to global environmental conservation and climate resilience. This conference serves as a vital platform for scholars, researchers, policymakers, academicians, and industry experts from across the globe to deliberate on pressing environmental challenges and explore innovative solutions for a sustainable future. Insightful keynote lectures, technical sessions, and interactive discussions enriched academic dialogue and strengthened collaboration.

I extend sincere appreciation to all distinguished speakers, delegates, organizers, and participants for making this event a grand success and reaffirm our collective commitment to a sustainable and prosperous future for India.

With regards

(Sadguru Prakash)
Org. secretary, ICNS 2026

Sikkim Alpine University

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www.sikkimalpineuniversity.edu.in

Date: 05/05/2026

MESSAGE

It gives me immense pleasure to extend my heartfelt शुभकामना and warm greetings to all the distinguished scholars, scientists, academicians, researchers, students, and participants attending the **2nd International Conference on Nature and Natural Sciences (ICNS 2026)** hosted by Sikkim Alpine University, Namchi, Sikkim.

The conference theme, **"Sustainable and Climate Resilient Ecosystem: Environmental Ethics and Anthropogenic Impact,"** is both timely and significant, reflecting the urgent need for collective scientific inquiry, ethical responsibility, and sustainable action in addressing contemporary environmental challenges.

I am confident that this conference will serve as a vibrant platform for interdisciplinary dialogue, exchange of innovative ideas, and meaningful collaboration among experts from diverse fields of natural and environmental sciences. The deliberations and scholarly contributions made here will certainly inspire future research and strengthen our shared commitment towards ecological balance and sustainable development.

I convey my sincere शुभकामना for the grand success of ICNS 2026 and wish all participants a fruitful, enriching, and memorable academic experience in Sikkim Alpine University.

Pribat Rai

Dr. Pribat Rai
(Convener)
Deputy Director (Academics)
Sikkim Alpine University

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Message

It is a matter of great pride and privilege to extend my warm greetings to all participants, distinguished guests, and organizers of the 2nd International Conference on Nature and Natural Sciences (ICNS 2026), being hosted by Sikkim Alpine University.

The theme of this conference, *"Sustainable and Climate Resilient Ecosystem: Environmental Ethics and Anthropogenic Impact,"* aptly reflects the pressing environmental concerns of our time. In an era where climate change and ecological imbalance pose serious global challenges, such academic platforms are essential to encourage meaningful discussions, exchange of innovative ideas, and collaborative research efforts.

I would like to express my sincere gratitude to our Hon'ble Chancellor, **Shri Ajindar Kumar Bansal**, and the Hon'ble Vice-Chancellor, **Prof. Sushil Kumar Tiwari** for their constant guidance, encouragement, and for providing me the opportunity to organize this significant academic event. Their visionary leadership continues to inspire and strengthen the academic environment of our University.

Sikkim, with its unique ecological diversity and commitment to sustainable practices, provides an ideal backdrop for deliberations on environmental ethics and resilience. I am confident that this conference will serve as a catalyst for generating practical solutions and strengthening interdisciplinary cooperation among scholars, researchers, and policymakers.

I sincerely appreciate the dedicated efforts of the organizing committee in bringing together experts from various fields and regions. Their commitment to academic excellence and environmental awareness is truly commendable.

I extend my best wishes for the successful conduct of ICNS 2026. May this conference foster insightful dialogue, inspire future research, and contribute significantly towards building a sustainable and resilient world.

With regards

Satyam Dixit
Registrar
Sikkim Alpine University
Namchi, Sikkim

ABOUT THE ORGANIZERS

Sikkim Alpine University (SAU), Namchi (Sikkim), India

Sikkim Alpine University has been granted the status of a State Private University, established in 2021 by the state Legislature of the Government of Sikkim under Act No.4 of 2006, and subsequently amended by the Act No. 14 of 2021. The university is recognized under section 2(f) of the University Grant Commission (UGC) Act, 1956 and is empowered to confer degrees as per Section 22 of the same act.

Sikkim Alpine University is also the member of Association of Indian Universities and SAU is also recognized and approved by UGC, Pharmacy Council of India, Bar Council of India, Rehabilitation Council of India. Sikkim Alpine University Academic Vision is designed to attract the world's best minds to contribute to the prosperity of Sikkim and the Nation. We aim to cultivate change-makers by ensuring our students graduate as:

- Efficient Communicators who lead with clarity
- Resourceful Creators who drive innovation
- Discerning Critical Thinkers who solve complex global issues
- Multidimensional Collaborators ready for the modern workforce

Lumbini Buddhist University, Lumbini, Nepal

Lumbini Buddhist University is a distinguished public institution established in 2004 and located in Lumbini, the sacred birthplace of Lord Buddha and a UNESCO World Heritage Site. Conceived as an international hub for Buddhist education and research, the university is guided by the principles of peace, compassion, and coexistence derived from Buddhist philosophy. It aims to blend ancient wisdom with contemporary knowledge by offering a wide range of academic programs from the bachelor's to the doctoral level in disciplines such as Buddhist Studies, Humanities and Social Sciences, Development Studies, and emerging applied and technical fields. Through its academic framework, the university seeks to nurture intellectually competent, ethically grounded, and socially responsible individuals. With its central campus in Lumbini and additional campuses, including its city campus in Butwal, along with a growing network of affiliated colleges across Nepal, the university serves a diverse body of national and international students. It actively promotes research, intercultural dialogue, and global academic collaboration, often engaging in partnerships, conferences, and scholarly exchanges. By integrating spiritual values with modern education, Lumbini Buddhist University plays a vital role in advancing higher education in Nepal while contributing to global efforts in peacebuilding, sustainable development, and cultural preservation.

Sikkim Institute of Science and Technolgy, Chisopani
(Department of Education, Govt. of Sikkim)

The Sikkim Institute of Science and Technology (SIST) is established in the year 2018 vide Notice No 515/DIR (HE)/HRD, dated 17.01.2017. The project is fundedby Government of India's flagship, RUSA project and all the programmes are approved by All India Council for Technical Education (AICTE). It is the only State Engineering College of Sikkim located at Chisopani, Dist. Namchi, Sikkim and is affiliated to Central University, Sikkim popularly known as Sikkim University.

Darjeeling Hills University, Mungpoo, Darjeeling (W.B.), India
(A State Govt. University)

Darjeeling Hills University is located in the Himalayan foothills of the Gorkhaland Territorial Administration region, and commenced operations in the year 2021. Established by the Government of West Bengal for opening up new vistas in the academic arena of Darjeeling, its campuses are nestled amidst the pine-studded slopes of the Eastern Himalayas, and blanketed by the emerald-green tea and rejuvenating cinchona plantations. Institutionally aligned with the complementary visions of the National Education Policy 2020 and the West Bengal State Education Policy 2023, it aims to cater to the long-awaited need for reforms in higher education and research priorities in this region. As per the Preamble of its founding legislation, the university was established to promote advancement and dissemination of knowledge and learning, and extending higher education, to serve the society and nation. Furthermore, the State Education Policy plans to place special emphasis on enhancing the educational attainment of students in the region by, among other initiatives, augmenting the educational infrastructure; this education policy also places great concern on the betterment of education for children of workers in the tea growing areas of the region, along with the need to enrol more women into the education system due to the low score of the region on the Gender Parity Index. Broadening its focus beyond traditional disciplines, the university is in the process of developing programmes and curriculum which focus on capacity building and development needs of the region in areas such as Counselling Psychology, Cultural Studies, Development Studies, Eastern Himalayan Heritage, Himalayan Environment Management, Himalayan Studies, Horticulture and Medicinal Plants, Media Studies, Medicinal and Aromatic Plants, Patients and Geriatric Care, Public Policy, and Tourism Management. Darjeeling Hills University, through such initiatives, seeks to position itself as a centre for regionally grounded yet globally attuned scholarship, and aspires to contribute meaningfully to sustainable regional development and inclusive knowledge creation.

International Buddhist Research Centre, Lucknow

(Department of Culture, Govt. of Uttar Pradesh)

The International Buddhist Research Institute was established by the Department of Culture, Government of Uttar Pradesh, in 1985. It is an autonomous body under the Department of Culture. The Institute's objective is to study the various Buddhist traditions prevalent across different parts of India within a national context, to conduct research related thereto, and to preserve the traditional and foundational beliefs, human values, and artistic artifacts associated with the cultural significance of Buddhist sites.

The primary objective of the Institute is to study the Buddhist traditions prevalent across various regions of India within both national and international contexts, to encourage research activities related to them, and to highlight the cultural significance of Buddhist sites. To this end, the Institute undertakes the documentation and preservation of traditional and foundational beliefs, human values, Buddhist art, faith, and artifacts.

J.R.D. State University, Chitrakoot, India

Jagadguru Rambhadracharya Divyang State University, often referred to in short form as J.R.D. State University, is a public state university located in Chitrakoot. Established in 2001 by Jagadguru Rambhadracharya, the university was created with a unique mission to provide higher and professional education primarily for persons with disabilities. Recognized by bodies such as the University Grants Commission (UGC), it offers a wide range of undergraduate, postgraduate, and professional programs across disciplines including arts, social sciences, computer science, education, management, music, and fine arts. The university is known for its inclusive and disability-friendly campus, providing facilities like accessible infrastructure, specialized teaching methods, and even free education, accommodation, and food for eligible differently-abled students. Over time, it has expanded its academic structure with multiple faculties and departments, and more recently, it has moved towards becoming a broader state university admitting general students as well, while continuing its core focus on empowerment, rehabilitation, and social integration through education.

Ashoka Trust for Research in Ecology and the Environment (ATREE), Gangtok, Sikkim, India

This trust is a globally recognised non-profit organisation focused on environmental conservation and sustainable, socially just development. ATREE engages in the generation and dissemination of rigorous interdisciplinary knowledge that informs and is informed by the needs of grassroots communities, policymakers and the wider public. It prioritizes capacity-building for producing the next generation of scholars and leaders.

National Environmental Science Academy, New Delhi

National Environmental Science Academy (NESA) was founded by the late Prof. T.R.C. Sinha, the then Head of the Zoology Department, M.J.K. PG College, Bihar University to create awareness, promote and protect the environment. Conceptualized and initiated in 1984, the organization was registered as a society in 1988 under the Societies Act XXI of 1860 at Patna. This Academy operates at the national level, presently having its Head of*f* Oce at 206, Raj Tower-1, Alaknanda Community Centre, New Delhi. The main objective of the Academy is to bring awareness about environmental issues among the masses and strive for sustainable solutions by arranging lectures, demonstrations, training programs, seminars, symposiums, conferences, publishing journals, and organizing any other activities supporting the cause. The main objective of the Academy is to bring awareness about environmental issues among the masses by arranging lectures, workshops, training programs, seminars, symposia, conferences, publishing journals, etc.

www.abrf.org.in

Asian Biological Research Foundation (ABRF), Prayagraj, India

The ABRF Prayagraj, India is a self-supporting, academic and research associated body. It is basically non-profit and Non-Government Organization: (1) to provide a common platform for scientists associated with biological sciences to interact with one another for mutual benefit and to enhance the innovative knowledge on the subjects (2) to encourage, facilitate and perform the activities related to conservation of water, nature and biodiversity (3) to promote the new scientific knowledge that has emerged from recent advances and to felicitate the persons and organizations internationally for their outstanding services rendered in basic, applied and modern biological sciences including all branches of Botany, Zoology, Agriculture, Veterinary Science, Environmental Science, Molecular Biology, Biotechnology, Biochemistry, Bioinformatics, Microbiology, and so on, (4) to collaborate with National and International Institutions, Government and Non-Government Organizations, Schools, Colleges, Institutions, Universities, Private and Public sector Industries to achieve the objectives of the ABRF. The ABRF confers following categories of awards and honours through search and nominations:

1. **ABRF Lifetime Achievement Award** (above 57 years of age)
2. **Hon. Fellowship/Fellowship (FABRF)**
3. **ABRF Excellence Award for Environmental/Agricultural/Botanical/ Zoological Research**
4. **ABRF Global Recognition Award**
5. **Outstanding Extension Professional/Agriculture Scientist/ Social Services Award**
6. **Best Teacher Award for Agricultural/Botanical/Environmental/Zoological Innovations**
7. **Eminent Ichthyologist/ Environmentalist/ Ecologist/ Entomologist/ Geneticist/ Parasitologist/Cytologist/ Taxonomist/ Plant Pathologist/ Physiologist/Biotechnologist/ Anthropologist Award**
8. **Senior Botanist/ Zoologist/ Biochemist/ Scientist/ Environmentalist Award** (above 45 years of age)
9. **Innovative Botanist/Zoologist/Scientist/ Environmentalist/Agriculture Scientist/ Biotechnologist/ Extension Professional Award**
10. **Innovative Biologist Award for Wild Life/ Biodiversity Conservation**
11. **Vigyan Ratna Puraskar** (No age bar)
12. **Paryavaran Shri Samman** (No age bar)
13. **Young Botanist/Zoologist/Scientist Award** (below 30 years of age; mainly for research scholar)

Note: Only ABRF Life Members are eligible for applying these awards. Each award will consist of a potted plant, anangvastram, a multicoloured award certificate and a Medal. ABRF Award selection is strictly based on API and biodata both. For detail guidelines, please log on to website: **http://www.abrf.org.in [email id: secretary.abrf@gmail.com]**

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Abstract No. 1

APPLICATION OF ARTIFICIAL INTELLIGENCE IN BIODIVERSITY, WATER, AND WILDLIFE MANAGEMENT

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ABSTRACT

Artificial Intelligence (AI) has emerged as a transformative tool in environmental management, particularly in biodiversity conservation, water resource management, and wildlife protection. By leveraging machine learning, deep learning, and data analytics, AI enables efficient monitoring, predictive modeling, and decision-making. AI-based image recognition and bioacoustic systems are widely used to identify species automatically. Convolutional Neural Networks (CNNs) can analyze images and sounds to detect species with high accuracy. AI systems analyze real-time sensor data to monitor water quality. AI improves efficiency and accuracy in water monitoring processes. AI-powered camera traps, drones, and satellite imagery track animal movements. AI systems can process visual and thermal data to detect animals and monitor biodiversity effectively. Environmental degradation, climate change, and biodiversity loss are pressing global issues. Traditional conservation and management methods are often limited by scale, time, and resource constraints. AI offers innovative solutions by processing large datasets, identifying patterns, and automating complex tasks. Recent studies show a rapid increase in AI applications for environmental sustainability, including biodiversity conservation and water management. AI technologies such as machine learning (ML), deep learning (DL), and remote sensing have significantly improved environmental monitoring and analysis. The study highlights how AI-driven technologies enhance ecological sustainability while addressing global environmental challenges. AI has the potential to transform environmental management by providing innovative solutions to complex problems. However, its effectiveness depends on data quality, ethical considerations, and interdisciplinary collaboration. The integration of AI with traditional ecological knowledge can enhance sustainability and conservation efforts. Artificial Intelligence is revolutionizing biodiversity conservation, water resource management, and wildlife protection. Artificial Intelligence is a powerful tool for biodiversity conservation, water management, and wildlife protection. It offers scalable, efficient, and accurate solutions to environmental challenges. However, addressing challenges such as data limitations, ethical concerns, and environmental impacts is crucial. The future of AI in environmental management lies in responsible implementation, collaboration, and continuous innovation. By leveraging AI effectively, we can achieve sustainable development and protect natural ecosystems for future generations.

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Abstract No. 2

UPSCALING OF LIVELIHOOD THROUGH ECOSYSTEM RESTORATION, SMART AGRICULTURE AND AGRO-ECOTOURISM

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ABSTRACT

As the globe need to produce almost 70% more food by 2050 in order to feed an expected 9 billion people, the problem of food security will only get aggravated. The issue of food security is exacerbated by agriculture's great vulnerability to changes in the climate. Climate change is already having a negative impact on agriculture with rising temperatures, greater weather variability, shifting agro-ecosystem boundaries, exotic crops and pests, and more often extreme weather events. Climate change has a wide range of negative effects on plant physiology and metabolism, soil fertility and carbon sequestration, microbial activity, and diversity, limiting plant growth and productivity and, eventually, food production. It has also greater impact on the nutritional quality of primary cereals and the output of farm animals. Food security has been already adversely affected by insufficient food supplies, variations in the price of staple foods, a high demand for agrofuels due to unexpected weather changes. Therefore, major adaptation investments will be necessary to sustain existing yields and enhance production and food quality to fulfil demands from great number of nations facing crisis as the consequence of natural disasters. The goal of climate-resilient agriculture (CRA) is to enhance long-term farm returns and productivity by sustainable utilization of natural resources through crop and livestock production systems. CRA practices need to integrate strategies of dealing landscapes-cropland, livestock, forests and fisheries-that addresses the interconnected challenges of food security and mitigate the climate change. In the context of climate change, CRA practises lower hunger and poverty for future generations, especially when done sustainably. CRA practises have the capacity to change the situation and maintain productivity in agriculture on a local, national, and international scale. Climate resilience is a fundamental concept of climate risk management and climate-resilient practises lead to improved access to and use of technology, open trade policies, greater utilisation of resource conservation techniques and increased agricultural and livestock tolerance to stress caused by climate change. In this paper, we will discuss about the tolerant crops and breeds of livestock and poultry, feed management, water management, fine tuning the gap between current management practices and essential agro-advisories, soil organic carbon, integrated farming system, IPM, cropping system, optimizing crop calendar, value chain, agro-ecotourism, agro-forestry programmes for climate change adaptation, remote and proximal optical sensors (e.g. Green Seeker and SPAD-502), crop rotation, organic farming, natural farming as clean /green, low-greenhouse-gas-emitting technology that promote adaptation and mitigation in all sectors to achieve resilience directly and indirectly against climate change impacts in the short, medium and long term. The paper will cover how farmers, research institutions, funding agencies, governments, non-governmental organisations, and the corporate sector

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Abstract No. 3

SUSTAINABLE AND CLIMATE RESILIENT LIVESTOCK AND MEAT PRODUCTION SYSTEM: ENVIRONMENTAL ETHICS AND ANTHROPOGENIC IMPACTS FROM A VETERINARY PERSPECTIVE

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ABSTRACT

Livestock and meat production systems are integral to global food security, nutritional and rural livelihoods, yet they are increasingly challenged by climate change and their own contributions to environmental degradations. Anthropogenic impacts from these systems include greenhouse gas emissions, land-use change, water depletion and environmental pollution as necessitate a transition towards sustainable and climate resilient practices. Sustainability in livestock systems can be enhanced through improved feeding strategies, genetic selection for efficiency, precision livestock farming and enhances health management to reduce emissions intensity and resource use. In meat processing system, climate resilience is addressed through water and energy optimization, waste reduction and adaptation of cleaner technologies. The integration of circular bioeconomy approaches such as the valorization of slaughterhouse by-products further contributes to minimizing environmental footprints. Environmental ethics provides a critical foundation for balancing human needs with ecological limits, ensuring intergenerational equality and animal welfare. Key strategies include improved pasture management, agroforestry integration, precision livestock farming, climate smart breeding of indigenous resilient breeds and sustainable manure management to reduce emissions and enhance soil health. Veterinary professionals play a critical role through disease surveillance, nutritional interventions, and welfare monitoring and community education. In developing countries, including Nepal, achieving climate-resilient livestock and meat production requires context specific innovations, policy support, and capacity building. The study emphasizes that a holistic integration of environmental sustainability, ethical responsibility and veterinary science is essential for developing resilient food systems capable of meeting future demands while safeguarding ecosystem health.

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Abstract No. 4

BEEKEEPING PROSPECTS AND FLORAL RESOURCE AVAILABILITY IN BANGLADESH: AN ECOSYSTEM-BASED APPROACH

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ABSTRACT

Beekeeping plays a vital role in enhancing agricultural productivity, biodiversity conservation, and rural livelihoods through pollination services and honey production. Bangladesh, with its diverse agro-ecological zones, offers substantial potential for sustainable beekeeping based on rich and seasonally diverse bee flora resources. This study assesses the beekeeping potential and availability of bee forage in three major ecosystems of Bangladesh: home gardens, agricultural crop fields, and forest ecosystems. Information on major nectar- and pollen-producing plant species was compiled through field observations, farmer and beekeeper surveys, and review of secondary literature. Home gardens were found to provide year-round floral resources, including fruit trees, vegetables, ornamentals, and medicinal plants, supporting small-scale and backyard beekeeping. Agricultural landscapes contributed significantly through mass-flowering crops such as mustard, sesame, black cumin, sunflower, litchi, jujube, mango, and various pulse crops, offering high honey yields during peak flowering seasons. Forest ecosystems, particularly mangrove and deciduous forests, supplied diverse and unique bee flora that support migratory beekeeping and production of specialty honeys. The integration of beekeeping within these ecosystems enhances crop pollination, improves yield and quality, and contributes to ecosystem resilience. However, challenges such as habitat loss, indiscriminate pesticide use, and lack of technical knowledge limit optimal utilization of bee flora resources. The study highlights the need for ecosystem-based beekeeping strategies, conservation of floral diversity, and promotion of pollinator-friendly agricultural practices. Strengthening policy support, farmer–beekeeper linkages, and extension services can unlock the full potential of beekeeping as a sustainable livelihood option and an ecological service in Bangladesh.

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Abstract No. 5

INTEGRATING RUMEN PHYSIOLOGY AND TRADITIONAL KNOWLEDGE FOR CLIMATE-RESILIENT LIVESTOCK SYSTEM

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ABSTRACT

Livestock production in the Himalayan region is increasingly vulnerable to climate change and anthropogenic pressures, including forage availability, thermal stress, and rising greenhouse gas emissions. Enteric methane (CH4) from ruminants is a major contributor to global warming and represents a loss of dietary energy, reducing production efficiency and sustainability.This study proposes an integrative framework combining animal physiological intervention with Traditional Ecological Knowledge (TEK) to enhance climate resilience in livestock systems. The physiological components focus on modulating rumen carbon metabolism using tea saponins (Camella sinensis) as a natural feed additive to suppress methanogenesis and redirect hydrogen towards propionate production. Experimental approaches include in vitro fermentation assays, microbial profiling (16s rRNA), functional gene analysis (mcrA), and in vivo validation of methane emissions, rumen fermentations, and animal performance.In parallel, indigenous livestock management practices such as rotational grazing, seasonal transhumance, and ethno-veterinary medicine will be demonstrated through participatory surveys and ecological mapping. These practices are further interpreted through Buddhist environmental ethics, emphasizing compassion, interdependence, and sustainable coexistence.The integration of physiological innovation with traditional knowledge is expected to reduce methaneemissions (25-45%) improve feed efficiency and strengthen ecosystem resilience. This interdisciplinary approach supports climate action, biodiversity conservation, and sustainable livestock development under the One health framework, offering policy-relevant insights for Himalayan regions.

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Abstract No. 6

CLIMATE CHANGE-DRIVEN ALTERATIONS IN WETLAND STRUCTURE AND FUNCTION

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ABSTRACT

Wetlands are areas of land with poor surface drainage, such as marshes and swamps, where water either covers the soil or remains close to the surface for long periods. These ecosystems experience periodic flooding from adjacent deepwater habitats and support specialized plants and animals adapted to waterlogged conditions. Globally, wetlands cover approximately 6% of the Earth's terrestrial surface, storing nearly 20–30% of the world's soil carbon despite occupying a relatively small area. They provide essential ecosystem services, including climate regulation, water purification, flood control, and livelihood support for millions of people. However, climate change poses serious threats to wetland ecosystems. Rising temperatures adversely affect temperature-sensitive species and can alter biological processes. Changes in precipitation patterns, particularly reduced rainfall, can lead to wetland shrinkage, exposing organic matter and releasing significant amounts of carbon dioxide and methane into the atmosphere. It is estimated that degraded wetlands contribute substantially to global greenhouse gas emissions. Additionally, climate change may shift the geographical distribution of wetlands, disrupting biodiversity and ecological balance. Wetlands are highly dependent on water availability; therefore, any alteration in hydrological cycles directly affects their structure and function, including species composition. As a result, climate change has become a critical concern for wetland management. Sustainable conservation and utilization of wetlands must integrate climate change considerations. Beyond ecological impacts, climate change also undermines fundamental human rights, exacerbates social inequalities, and creates new environmental injustices.

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Abstract No. 7

NATURE-BASED SOLUTIONS FOR CARBON SEQUESTRATION AND ECOLOGICAL BALANCE

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ABSTRACT

The accelerating pace of global climate change, driven primarily by anthropogenic greenhouse gas emissions, has intensified the urgency for effective and sustainable carbon mitigation strategies. Nature-Based Solutions (NbS) have gained considerable scientific and policy attention as ecologically viable approaches to carbon sequestration while simultaneously restoring biodiversity and maintaining long-term ecological balance. The present study explores the multifaceted role of NbS encompassing wetland conservation, riparian vegetation restoration, urban green spaces, agroforestry, and afforestation of degraded lands — in enhancing carbon stocks and stabilising ecosystem dynamics in the Kanpur region of Uttar Pradesh.Kanpur, as a major industrial city situated along the Ganga river basin, presents a compelling case study where rapid urbanisation, industrial effluents, and progressive loss of green cover have collectively disrupted local ecological equilibrium. Sustained anthropogenic pressures have led to deterioration of wetland habitats, reduction in native vegetation, and a measurable decline in aquatic and terrestrial biodiversity across the region. Field assessments were carried out at selected freshwater wetlands, riverine habitats, and urban green patches to estimate above-ground biomass, soil organic carbon content, and associated faunal biodiversity indices. Parameters including phytoplankton density, macroinvertebrate diversity, and avian species richness were recorded as bioindicators of ecosystem health at both NbS-implemented and non-implemented reference sites. Results demonstrate that sites with intact or restored natural vegetation exhibited significantly higher carbon sequestration potential and greater faunal diversity compared to degraded counterparts. Wetland ecosystems, in particular, emerged as critical carbon sinks and biodiversity reservoirs within the urban–rural interface of Kanpur district. Restored riparian zones further showed improved water retention capacity, reduced soil erosion, and enhanced habitat connectivity, collectively contributing to regional ecological resilience. The study reinforces the urgent need for integrating Nature-Based Solutions into municipal and regional environmental planning frameworks. It strongly advocates for sustained policy-level support, community participation, and interdisciplinary research aligned with India's Nationally Determined Contributions (NDCs) under the Paris Agreement, the National Action Plan on Climate Change (NAPCC), and the biodiversity targets outlined under the Kunming-Montreal Global Biodiversity Framework, ensuring a balanced and ecologically secure future.

Abstract No. 8

CLIMATE CHANGE, MITIGATION STRATEGIES AND HUMAN WELL BEING!

Sonal Kumar

Management and Higher Education Consultant, Pennsylvania, USA

ABSTRACT

Climate change is increasingly recognized as a significant threat not only to environmental and physical health but also to mental human well-being. Rising temperatures, extreme weather events, displacement, resource insecurity, and ecological loss contribute to stress, anxiety, depression, trauma, and feelings of uncertainty about the future. Communities exposed to floods, droughts, wildfires, and social disruption often experience heightened psychological distress, while vulnerable populations face disproportionate mental health burdens. In this context, climate change mitigation strategies play a critical role in protecting and promoting mental well-being alongside environmental sustainability. Climate change mitigation strategies are increasingly recognized for their dual benefit: reducing environmental impact while significantly enhancing human wellbeing. This synergy, often termed "co-benefits," demonstrates that actions like expanding urban green spaces, cleaner air, promoting active mobility (walking and cycling), community-centered sustainability initiativesand transitioning to plant-rich diets do more than lower emissions—they directly reduce stress, improve cardiovascular health, and foster social cohesion.Furthermore, engaging in collective climate action serves as a powerful psychological buffer, transforming "eco-anxiety" into a sense of agency and purpose. Climate solutions that integrate mental health support, social equity, and community resilience can strengthen both individual and collective well-being. Climate change mitigation should be viewed not only as an environmental response but also as an essential pathway for safeguarding mental health, fostering hope, and building resilient societies for future generations.

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Abstract No. 9

EFFECTS OF GLOBAL CLIMATE CHANGE

B.K. Chakraborty

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Department of Fisheries
Bangladesh & Bangladesh Agricultural University, Mymensingh, Bangladesh

ABSTRACT

Global climate change is causing severe impacts, including rising temperatures, extreme weather events, sea-level rise, and melting ice sheets. These changes adversely affect ecosystems, threaten biodiversity, disrupt agriculture, and contribute to health crises and human displacement. Rising temperatures accelerate ice melt and sea-level rise, while the increasing frequency of extreme weather events endangers both human life and natural systems. Ocean warming and acidification lead to coral bleaching and the loss of marine biodiversity, and climate change also intensifies soil erosion and habitat degradation. The human and societal consequences are equally significant. Climate change increases health risks through air pollution and heat-related illnesses, contributes to food and water insecurity due to declining agricultural productivity, and causes displacement as extreme weather damages homes and infrastructure, leading to migration and economic losses. Although efforts to reduce greenhouse gas emissions are essential, some impacts, such as sea-level rise, may be irreversible. Furthermore, rapid environmental changes are exceeding the adaptive capacity of many species, posing a serious threat to global biodiversity.

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Abstract No. 10

SUSTAINABLE USE OF NATURAL RESOURCES FOR ENVIRONMENT AND LIVELIHOODS

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ABSTRACT

This study looks at how sustainable lifestyles are closely connected with the way natural resources are managed. In simple terms, if we do not take care of our natural resources, it becomes difficult to maintain a healthy environment and a stable life for people. A healthy ecosystem supports both nature and human survival, especially in rural areas where people depend directly on land, water, and forests.The study discusses some important approaches like ecosystem-based adaptation, community-based natural resource management, and the sustainable livelihoods framework. These approaches mainly focus on helping communities become stronger, more independent, and more involved in decisions that affect their environment. In many places, it has been seen that when local people take part in decision-making and use their traditional knowledge, they are better able to handle problems like climate change and shortage of resources. It is also important to understand that natural resources should not be managed separately. Land, water, energy, and biodiversity are all connected, and planning should consider this connection. The study also mentions that modern tools, government policies, and market-based systems can improve resource management, but they should be used carefully along with local knowledge. Another important point is cooperation. When local communities, researchers, and policymakers work together, better and more practical solutions can be developed. Traditional ecological knowledge, which has been developed over many years, still plays a very important role and should not be ignored. This study suggests that future natural resource management should focus on simple, flexible, and community-based approaches. A balanced use of traditional knowledge and modern methods can help in solving environmental problems and improving people's livelihoods in a practical way.

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Abstract No. 11

FRESHWATER ECOSYSTEMS UNDER ANTHROPOGENIC STRESS: INTEGRATING POLLUTION DYNAMICS, BIODIVERSITY LOSS, AND SUSTAINABILITY FRAMEWORKS

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ABSTRACT

Freshwater ecosystems are among the most threatened ecological systems globally, facing escalating pressures from anthropogenic activities. What unfolds here is an analysis of how pollution, dwindling species variety, and long-term environmental care relate across these habitats, with attention given to combined strategies for stewardship. Urban growth at high speed, waste from manufacturing sites, chemicals washing off farmland, along with shifts in climate patterns - each plays a role in changing the structure, composition, and living conditions of streams, ponds, and marshes. Elements like lead, mercury, nitrogen compounds, synthetic debris, and newly identified hazardous substances interfere with natural processes, resulting in excessive plant growth, breakdown of shelter spaces for organisms, and poisons building up through feeding chains.At once, populations of freshwater life shrink faster than ever, their numbers falling due to broken habitats, outside competitors, because river and lake flows shift. From this, natural systems grow less able to recover, their ability fading to support clean water, fish stocks, control of weather patterns. By linking pollutant behavior to measures of biological variety, this work reveals cycles where environmental harm intensifies itself. Following this, current models for sustainable practice - including coordinated water governance and nature-centered methods - are examined for how well they reduce human-driven damage. Instead of isolated efforts, a blend of research observation, regulatory steps, local involvement, alongside new tools appears necessary here. Still, balancing nature protection with human progress defines lasting fresh water solutions. When pollution controls improve, species thrive alongside stronger rules guiding shared resources. Resilience grows where ecosystems regain balance despite mounting pressures from climate shifts and land use demands. Thus, the paper integrates pollution dynamics with biodiversity indicators to highlight feedback mechanisms that exacerbate ecosystem degradation.

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Abstract No. 12

OPERATIONALIZING ENVIRONMENTAL ETHICS THROUGH POLICY-DRIVEN CLIMATE ACTION: EVIDENCE FROM MADHYA PRADESH

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ABSTRACT

Environmental ethics has emerged as a critical foundation for shaping sustainable development and climate action strategies at the regional scale. This study examines how environmental ethics is embedded within policy frameworks and translated into practice in Madhya Pradesh, India. The study employs a qualitative policy analysis approach supported by secondary data evaluation to assess environmental governance frameworks and their effectiveness. Key policy instruments, including the State Action Plan on Climate Change (SAPCC), forest conservation programs, water resource management initiatives, and biodiversity protection strategies, are analyzed to evaluate their alignment with ethical principles such as ecological integrity, intergenerational equity, environmental justice, and sustainability-oriented governance. A policy-analytical approach supported by region-specific evidence is used to assess implementation outcomes. In the Narmada valley belt, the expansion of multiple wildlife corridors and landscape connectivity initiatives reflects a strategic effort to maintain habitat continuity across fragmented forest ecosystems. These corridors facilitate faunal movement, promote genetic exchange, and reduce human–wildlife conflict, thereby enhancing ecological resilience under changing climatic conditions. Such interventions indicate a transition toward eco-centric environmental governance. Wetland conservation further reinforces this ethical framework. The designation of Bhoj Tal (Upper Lake) and Tawa Reservoir as Ramsar Site underscores the state's commitment to sustainable water resource management, biodiversity conservation, and adherence to international environmental conventions. These wetlands provide essential ecosystem services, including water security, habitat support, and climate regulation. Furthermore, the study highlights climate justice by addressing climate vulnerabilities of agrarian and forest-dependent communities through inclusive and equitable adaptation strategies. Despite notable progress, challenges remain in policy implementation, monitoring, and public engagement. Strengthening institutional capacity and participatory governance is essential for achieving long-term sustainability and climate resilience.

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Abstract No. 13

AN APPLICATION STRATEGY OF A SPATIAL SOIL AND CLIMATIC DATABASE TO CONTROL INFESTATION BY *LANTANA CAMARA*

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ABSTRACT

Lantana camara is an invasive plant species in India. Existing works on *Lantana camara* have identified the ideal soil and climate conditions for its growth and successful infestation. However, there is a need to combine the knowledge of specific soil types and dominant climatic conditions to identify if a landscape is susceptible to infestation, for management decision and preparedness. In this study we investigated the landscape among 5 major climatologically homogeneous regions (CHRs) in India, classified based on soil properties and climate, to determine their susceptibility to infestation by *Lantana camara* in near (2020s) to far future (2050s and 2080s). The study showed that landscape under certain soil types in North East (NE) CHR, that includes West Bengal, Assam, Mizoram, Manipur, Meghalaya, Tripura, can become the most susceptible region to such infestation in 2020s and 2050s, if projected climatic conditions becomes prevalent. Such zones were classified as 'susceptible', while the remaining soil types, even though climatologically estimated to be suitable to such invasion, were not suitable in terms of soil properties and classified as 'not susceptible'. However, the projected climatic conditions for 2080s are not suitable for *Lantana camara* invasion in any of the CHRs in India. The potential uses of *Lantana camara* biomass for agriculture, that is the predominant land use practice in this region, is also explored – with an aim to support targeted integration of community to utilise the *Lantana camara* biomass for controlling its infestation.

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Abstract No. 14

NATURE'S SHIELD: STRENGTHENING ECOSYSTEMS AGAINST CLIMATE CHANGE

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ABSTRACT

A climate-resilient ecosystem refers to a natural or managed system that can absorb, adapt to, and recover from the impacts of climate change while maintaining its essential structure, functions, and services. As global temperatures rise and extreme weather events such as floods, droughts, and heatwaves become more frequent, the resilience of ecosystems has emerged as a critical area of study and action. Climate-resilient ecosystems are characterized by biodiversity, functional redundancy, and strong ecological interactions, which collectively enhance their ability to withstand disturbances. Healthy forests, wetlands, grasslands, and coastal systems act as natural buffers against climate impacts. For instance, mangroves protect coastal communities from storm surges, while forests regulate temperature and store carbon, mitigating greenhouse gas emissions. The conservation and restoration of these ecosystems are therefore essential strategies in addressing climate change. Additionally, integrating traditional ecological knowledge with modern scientific approaches can improve ecosystem management and resilience. Human activities such as deforestation, pollution, and unsustainable land use significantly reduce ecosystem resilience, making them more vulnerable to climate stressors. Hence, sustainable practices, including afforestation, water conservation, and biodiversity protection, are crucial for strengthening ecosystem resilience. Policies and community participation also play a vital role in promoting adaptive management strategies. In conclusion, fostering climate-resilient ecosystems is not only vital for environmental sustainability but also for securing livelihoods, food security, and overall human well-being in the face of a changing climate.

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Abstract No. 15

HYDROGEOCHEMICAL ASSESSMENT AND HUMAN HEALTH VULNERABILITY DUE TO HEAVY METAL CONTAMINATION IN THE SINGRAULI DISTRICT

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ABSTRACT

In the industrial corridor of Singrauli, India, the hydrogeochemical aspects of groundwater have been compromised by the mining operations and allied activities. This research evaluates the seasonal dynamics of prominent heavy metals and associated health risk in the groundwater of this region. Data was collected across two seasons, revealing a significant seasonal variation in the groundwater chemistry. During the monsoon, one-fourth of the samples exceeded Fe limits and one-tenth exceeded Mn, while a few samples showed elevated Al, Cd, and Pb across both seasons. The result of one-way ANOVA demonstrated significant seasonal variations in the concentrations of B, Ba, Al, Cr, Co, Fe, Cu, Ni, As and Ag within the study area. Factor analysis further indicated that both geogenic and anthropogenic sources influence the occurrence of these heavy metals. Environmental indices, including the Heavy metal Pollution Index (HPI), revealed 4% contaminated samples during monsoon, while the Heavy metal evaluation Index (HEI) concluded medium to high pollution in approximately 17% of samples during the same phase. Nemerow Index (NI) analysis indicated high- level contamination in 8.5 % of monsoon samples, compared to 2% during post- monsoon. Health risk assessment, including hazard quotient (HQ) and hazard index (HI), revealed that the non- carcinogenic risks were higher for children (HI> 1) compared to infants and adults. Carcinogenic risk was reported for all the age groups via the ingestion route, primarily attributed to Cd, Cr and Pb. These results highlight the critical impact of industrial and geological activities on water safety, thus necessitating immediate monitoring and remediation to protect the environment and public health.

Abstract No. 16

EVALUATING SOIL PHYSICOCHEMICAL CHARACTERISTICS: INSIGHTS FROM DEHRADUN, UTTARAKHAND

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ABSTRACT

Soil quality plays a vital role in supporting plant growth, crop yields, and ecosystem health. This research assessed soil conditions in Dehradun, Uttarakhand, through analysis of four samples gathered in early 2025 from varied urban zones—residential, agricultural, and open areas. We examined eight essential physicochemical parameters per sample: pH, electrical conductivity (EC), organic carbon (OC), and key nutrients such as nitrogen (N), phosphorus (P), sulphur (S), potassium (K), and iron (Fe). Measurements followed standard ICAR protocols. Results from Sites 1, 2, and 4 generally stayed within medium or optimal limits. In contrast, Site 3 revealed concerns, including marginal available nitrogen (291 kg/ha) and high EC (2.8 dS/m), both of which may hinder plant performance. Soil traits differed by land use, with agricultural sites showing richer nutrients and urban areas displaying quality declines. These results stress the need for routine soil assessments and site-specific interventions to preserve fertility. Ongoing surveillance is advised to keep properties in suitable ranges.

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Abstract No. 17

FOREVER CHEMICALS (PFAS): ENVIRONMENTAL PERSISTENCE, TOXICOLOGICAL IMPACTS, AND SUSTAINABLE REMEDIATION STRATEGIES

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ABSTRACT

Per- and polyfluoroalkyl substances (PFAS), known informally as "forever chemicals," make up a large group of synthetic, and human, chemicals which contain fluorine. "Forever chemicals" because of their extraordinary chemical stability and thus environmental persistence. PFAS are very widely used in industry and consumer products, such as non-stick coatings, foams for fire fighting, clothing that repels rain, etc. Packaging for prepared foods also contains PFAS. They can travel long distances in the atmosphere and water and can accumulate over time in the food chain. PFAS are known to cause effects on humans, including effects on endocrine system, suppressed immunity, carcinogenic effects, and developmental toxicity.This paper provides an overview of the classes of PFAS, their sources, fate and behaviour in the environment, methods of analysis, toxicity, and risks. Emerging remediation technologies such as adsorption, advanced oxidation processes, photochemical degradation and sustainable bio-based solutions are also discussed. The current regulatory frameworks and global initiatives to control PFAS are reviewed with comments on the challenges faced in risk assessment and management. There is an urgent need for Green Chemistry alternatives, robust monitoring and mitigation strategies to address the long-lasting environmental and health effects of PFAS contamination.

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Abstract No. 18

CONSERVATION, RESEARCH AND COMMERCIALIZATION PERSPECTIVES OF INDIAN HORSESHOE CRABS AT FAKIR MOHAN UNIVERSITY, BALASORE, ODISHA: CRCIHSC INITIATIVES AND NO-MBUCRC PROSPECTS

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ABSTRACT

Horseshoe crabs (Class Merostomata, Subclass Xiphosura) are considered "living fossils" with a lineage spanning over 400 million years. Out of the four known species, two species namely *Tachypleus gigas* and *Carcinoscorpius rotundicauda* are found distributed in South and Southeast Asia. More significantly, the two species have been studied across the estuarine and beach ecosystems of the north-Odisha coast for breeding and spawning activities. However, recent studies show a drastic decline in the population of these two species in the coast largely due to the degradation of breeding habitats, over fishing activities, predation, coastal tourism, and changes in beach dynamics. It was understood that a sustainable *in situ* conservation plan needs to be enforced in coordination with the State wild life department and other stakeholders such as the coastal communities, NGO's and local industries. Center for Research and Conservation of Indian Horseshoe Crabs (CRCIHSC), Fakir Mohan University has been in the fore front conducting systematic field-based monitoring programs (including tagging activities) across estuaries and beaches in Balasore and Bhadrak districts, habitat degradation and threat analysis, capacity building for students and researcher communities through training in ecological and genetical approaches, and local knowledge documentation through community engagement and perception studies. This has created an impetus for the development the viable horseshoe crab population sites as a "Conservation Reserve or Biodiversity Heritagesite" by State Wildlife department. Further, the University has been assisted by the Science & Technology Department, Govt. of Odisha towards ex situ breeding of the species at the laboratory scale and field scale for research on the potent principles of hemocyanin for biomedical applications. NO-MBUCRC is a team of researchers from the University exploring the medical and research applications of the horseshoe crab species under the Odisha Marine Biotechnology Research and Innovation Corridor(OMBRIC) initiative to enhance blue economy prospects of the state. A commitment towards balancing commercialization with conservation will serve to restore and maintain healthy viable population of these species and will create research applications so vital for sustaining challenges in health and environment.

Abstract No. 19

STUDY OF HERITABILITY AND GENETIC ADVANCE FOR IMPROVEMENT OF BREAD WHEAT (*TRITICUM AESTIVUM* L.)

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ABSTRACT

The parental diallel crosses always having diversified parents showed high hertiability in F1 crosses for days to reproductive phase and plant height followed by moderate heritability for number of grains per spike and harvest index, low heritability for grain yield was due to the involvement of non-fixable genetic effects, moderate genetic gain indicated that longer grain filling period or a high reproductive phase should be more considerable for selection. Low genetic gain coupled with high heritability and moderate heritability could be provided vigorous selections pressure. Such variability in genetic gain and hertability estimates indicated for pedigee method of selection in breeding programme to enhance the grain filling period for better recovery of grain yield.

Abstract No. 20

CHEMISTRY OF CLIMATE CHANGE AND GLOBAL WARMING

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ABSTRACT

Climate change and global warming are mostly driven by chemical processes involving greenhouse gases such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). These gases trap heat in the Earth's atmosphere through the greenhouse effect, leading to a steady increase in global temperature. Other activities like fossil fuel combustion, deforestation, and industrial releases suggestively rise their concentration. Atmospheric chemical reactions further influence ozone depletion and climate patterns. Understanding the chemistry behind these procedures is essential for developing moderate strategies such as carbon capture, green energy alternatives, and emission control, which are crucial for achieving sustainable environmental development.

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Abstract No. 21

ENVIRONMENTAL ETHICS AS A CONSTITUTIONAL IMPERATIVE: NAVIGATING JUDICIAL TRENDS IN CLIMATE ACTION AND INTERGENERATIONAL EQUITY

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ABSTRACT

The intersection of aggressive anthropogenic development, characterized by rapid urbanization, industrial expansion, and subsequent ecological degradation, presents an existential crisis that traditional, fragmented statutory frameworks often fail to adequately mitigate. Consequently, environmental ethics, historically viewed as a philosophical construct emphasizing intergenerational equity and the intrinsic value of nature, has undergone a critical metamorphosis within Indian jurisprudence. This paper investigates the judicial elevation of these ecological ethics into binding constitutional mandates. By examining the expansive, progressive interpretation of Article 21 (Right to Life) of the Constitution of India, read harmoniously with the Directive Principles of State Policy (Article 48A) and Fundamental Duties (Article 51A(g)), the study maps the trajectory of environmental litigation from basic pollution control to the enforcement of comprehensive climate resilience. The research critically focuses on the proactive role of the Supreme Court of India and the National Green Tribunal (NGT) in embedding doctrines such as the Public Trust, the Precautionary Principle, and the Polluter Pays framework into the bedrock of state policy. Through an analysis of landmark and contemporary judicial interventions, the paper demonstrates how the higher judiciary has consistently stepped in to compel institutional accountability against severe anthropogenic stressors, effectively acting as the primary driver of national climate action. It highlights the persistent enforcement gaps between court-mandated environmental safeguards and grassroots regulatory compliance by state pollution control boards and corporate entities. The paper also discusses that while the judiciary has successfully institutionalized environmental ethics, it however, requires a transition from reactive, court-driven interventions to robust, legislatively anchored governance that prioritizes strict localized policy compliance, capacity building, and holistic ecosystem development for present and future generations.

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Abstract No. 22

CONSERVATION OF MANGROVES FOR SUSTAINABILITY-ROLE OF LOCAL COMMUNITY PERTAINING TO COASTAL LINE OF VENGURLA, MAHARASHTRA

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ABSTRACT

Mangroves are unique highly productive trees or shrubs that thrive in coastal saline or brackish water. These habitats are vital biodiversity hotspots sheltering diverse fauna. They function as crucial productive coastal ecosystem, protect the shore line from erosion, storing carbon and providing nurseries for fish and other organism. Mangroves serve as biodiversity hub. They trap sediment clearing coastal water. Local community are the corner stone of sustainable tourism as their involvement ensures tourism aligns with local values prevent exploitation, fosters conservation and provide authentic community driven experience. The present investigation aims to focus on participation of local community in conservation of mangroves for sustainability with the help of mangrove boat safari tours through shallow coastal mangrove forest. The boat safari through mangrove forest is designed to sustainable expose fragile coastal ecosystem enabling wild life viewing while protecting their habitat and also livelihood. Women run ecotourism initiative such as Swamini mangroves safari allow women to make tangible economic contribution to their household. Mangrove boat safari highlights ecotourism and sustainability.

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Abstract No. 23

ASSESSMENT OF GROUNDWATER LEVEL AND WATER QUALITY (PH AND TDS) IN DIFFERENT ZONES OF KANPUR CITY

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ABSTRACT

Groundwater is a vital source of drinking water in urban area, its quality and availability is significantly influenced by rapid Urbanization, population growth, and anthropogenic activities. Around 1% of water demand increase per year as a basis of rise in population, economic growth, changing in pattern of demand of resources and this will be carried on with significantly over next two decades, resulted various part of the regions and the countries faces water scarcity (WWAP2018). The present study Groundwater level and water quality (pH and TDS) in Different zones of Kanpur City: aims to assess the spatial variation in groundwater depth and drinking water quality across selected zones of Kanpur city. The study is based on primary data collected through field survey conducted across six zones of Kanpur city. The major parameter analyses include groundwater level, pH value and Total dissolve solid (TDS) which are widely recognised indicators of water quality groundwater depth measured using a water sounder, while pH and TDS level determined using standard Field testing such as PH meter and TDS pen drive instruments. The study reveals noticeable special variation in groundwater levels across different zones, indicating uneven availability of groundwater resources. It also highlights need for continuous monitoring and affective of groundwater monitoring strategies for long term sustainability and to prevent potential degradation of water quality and provides valuable insights for urban planners in developing appropriate measures for groundwater conservation quality control in Kanpur city. The Understanding this variation is essential for sustainable water resource management. The study also emphasizes the importance of adopting sustainable practices such as rainwater harvesting which can help recharge groundwater levels, creating public awareness about water conservation is essential for maintaining the balance between water demand and supply.

Abstract No. 24

IMPACTS OF CLIMATE ON PAX6 AND BIODIVERSITY OF VISUAL SYSTEMS

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ABSTRACT

Aim: Evolutionary conserved genes like Pax6 prove critical in functional conservation, adaptiveness and sustainability of molecular properties and regulation of regulators. The visual system, a light sensing and a highly specialized tissue, or organ like eyes, bears different anatomical designs. It is considered to be evolved multiple times during evolution, but requires highly conserved multifunctional protein and transcription factors, Pax6 from Precambrian era till date. Our laboratory is trying to understand impacts of cellular microenvironment and Climate change on the cascade of Pax6 and its isoforms functions.Methods: Analysis of *Pax6* through PCR, ChIP, Co-IP, Western blot, RNA- and ChIP-DNA sequencing and HRMS. Enrichment of genes and pathways were done using Eukaryotic Promoter Database, DAVID, g: Profiler, GENEMANIA and STRING database, KEGG pathway. Results: Pax6 is expressed and required for visual systems for sensitivity to light to eyes for spatial vision, from slow and sessile animals to fast moving bilaterally symmetric animals of modern phyla. However, several differences exist between the putative regulatory network directing fly and vertebrate eye specification like duplication of the *Pax6* gene to toy and ey in *Drosophila* whereas in mice and humans there appears to be only one *Pax6* orthologue. Conclusion and Significance: Although the architecture of vertebrate and invertebrate eyes are dramatically different, similar types of protein homologue are found. It is likely that eyes from different phyla evolved mono-phyletically from a common ancestral precursor than having evolved independently. It proves critical to maintain functional anatomy of central nervous system and sense organs. Appears a highly significant regulator of metabolic adaptations.

Abstract No. 25

WATER QUALITY ASSESSMENT OF KANKE DAM IN RANCHI JHARKHAND INDIA

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ABSTRACT

Kanke Dam is a major water reservoir in Ranchi Jharkhand. Located in Kanke road and Kanke, this water reservoir on the River Potpoto, which is a prime source of water for Kanke Dam. It was designed by the British in the year 1954. It is an earthen dam with boulder pitching and is built at the foot of Gonda hills. The dam is popular for picnic spot and has a scenic view, sunset point and Rock Garder on Gonda Hills. The dam extend between Latitude 23°41' North and 23 °43' North and Longitude 85 °31' East and 85 °33' East, covering the areas of 182.10 Hectors of perennial water. Average Elevation is about 611m (2,004ft).This paper present the Water Quality Assessment of Kanke Dam. The analysis was carried out on the parameters such as Physical: Water Level, Temperature, and Transparency. Chemical: Hydrogen ion Concentration (pH), Dissolved Oxygen, Total Alkalinity, Chloride, Sulphate, Phosphate, Organic matter. Biological: Phytoplanktons. The range of various parameters of water of the water bodies are as Hydrogen ion Concentration (pH) (7.2), Dissolved Oxygen (10.9), Free Carbon-di-oxide (7.30),Total Alkalinity (96.8), Chloride (72.8), Sulphate (36.35), Phosphate (0.640), Organic matter (0.640). The duration of the study period is from Sept 2021 to Aug 2023.

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Abstract No. 26

TOXICOLOGICAL IMPACTS OF HEAVY METAL-RICH INDUSTRIAL WASTE ON AQUATIC ORGANISMS

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ABSTRACT

Wastewater generated by the leather industry contains a complex mixture of organic and inorganic pollutants, including heavy metals, salts, and other hazardous compounds. When discharged into aquatic systems, these effluents significantly alter the physicochemical properties of water, creating serious challenges for aquaculture. Key water quality parameters—such as total suspended solids (TSS), total dissolved solids (TDS), turbidity, pH, alkalinity, hardness, and dissolved oxygen (DO)—play a vital role in fish growth and productivity. Changes in these factors are readily perceived by aquatic organisms and can directly influence fish physiology, metabolism, and overall development. Among these, turbidity, TDS, pH, DO, and alkalinity serve as critical indicators of water quality and ecosystem stability. Elevated TDS levels, excessive turbidity, and fluctuations in pH can adversely affect fish survival and growth, while sufficient dissolved oxygen is essential for optimal aquaculture performance. In addition, the bioaccumulation of heavy metals in aquatic organisms presents further risks, not only impairing fish health but also posing potential hazards to human consumers through trophic transfer. This review highlights the urgent need for effective tannery effluent management, reliable wastewater treatment technologies, and continuous environmental monitoring to ensure sustainable aquaculture practices.

Abstract No. 27

BIODIVERSITY CONSERVATION AND ECOSYSTEM DYNAMICS

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ABSTRACT

Biodiversity is the huge variety of plants, animals, and ecosystems that make up our planet. It's the foundation of everything we need to survive: food, medicine, clean air, and even a stable climate. But human activities like cutting down forests, pollution, and climate change are threatening this balance. So, biodiversity conservation plays an important role in the quality of life of all living organisms. Here, I will study the definition of biodiversity conservation and its examples, methods of conservation, and why it should be conserved. Conservation of Biodiversity is simply the act of protecting all the different types of life on Earth, plants, animals, insects, and even tiny microorganisms. Every living thing, no matter how small, plays a role in keeping our planet balanced and healthy. This includes providing us with clean air, food, water, and medicine. But human actions like pollution, deforestation and climate change are putting this rich variety of life at risk. When we lose species or ecosystems, it affects everything, like our food, the climate, and the health of the planet. Biodiversity means the variability among living organisms from all sources, including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. Loss of biodiversity refers to the decline or disappearance of species, habitats, and ecosystems that make up the natural world. This can happen due to a variety of reasons, often caused by human activities. Some factors like pollution, erosion, evolution, urbanization, industrialization, population, and depletion lead to the loss of biodiversity. When biodiversity is lost, it messes up ecosystems and food chains, which can harm farming. It also makes it harder for nature to cope with disasters like floods and droughts.

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Abstract No. 28

EVALUATING BAIT EFFICIENCY AND TEMPORAL CAPTURE PATTERNS OF SMALL MAMMALS IN SCRUB TYPHUS ENDEMIC LANDSCAPE OF SIKKIM-DARJEELING

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ABSTRACT

A total of 48 species of small mammals have been recorded from the Darjeeling-Sikkim region so far. Ecological assessment of small mammals mainly depends on the trapping efforts using live traps and the choice of baits. Variations in capture rates of small mammals across consecutive nights can reveal critical insights into their behaviour. The current study focuses on systematic live trapping to refine methodologies for ecological assessment of small mammals. Its aim to (1) compare small mammals' capture rates across seven consecutive nights at selected locations, (2) compare the efficiency of conventional and locally used baits and (3) compare seasonal variations in live trapping of small mammals. The current study involved systematic trapping of small mammals using 60 Sherman traps for seven consecutive nights at various locations within the Darjeeling-Sikkim Himalaya. Traps were alternately baited with a peanut butter/oats mixture and dry fish. Sampling was replicated over 3 seasons. Capture rates were calculated in percentages, and differences in capture probability were evaluated using Chi-squared test of independence. The stability of capture rates across the sampling period (consecutive nights) suggests that small mammal populations may not exhibit trap-shyness or depletion. The superior effectiveness of conventional baits signifies that relying on locally used baits may lead to underrepresentation of small mammal communities. A high capture rate during the monsoon season suggests higher small-mammal activity. Thus, to increase the efficiency of monitoring small mammal communities in this region, use of conventional baiting over local baiting, with focused trapping efforts during the monsoon season could be effective. These findings need to be further strengthened by use of species accumulation analysis.

Abstract No. 29

SUSTAINABLE TEXTILE DYEING USING NATURAL DYES: ADVANCES AND FUTURE PROSPECTS

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ABSTRACT

Natural dyes have re-emerged as a sustainable alternative to synthetic colorants in the textile industry due to increasing environmental and health concerns. Derived from renewable resources, these dyes are biodegradable, non-toxic, and environmentally benign. This study highlights the application of selected natural dyes such as Indigofera tinctoria (indigo, blue shades) and Curcuma longa (turmeric, yellow shades) on textile fibers including silk and wool. The role of eco-friendly mordants is also emphasized, particularly tannin-rich Terminalia chebula and natural acid-based Citrus lemon, which improve dye fixation, color strength, and fastness properties. The study discusses dye extraction, mordanting techniques, and their influence on shade variation and durability. Although natural dyes offer significant ecological advantages, challenges such as limited shade range and reproducibility persist. Recent advancements in bio-mordants and green processing technologies indicate promising potential for enhancing performance and scalability. The integration of traditional dyeing knowledge with modern scientific approaches can promote sustainable textile processing and support the transition toward eco-friendly industrial practices.

Abstract No. 30

MATHEMATICAL MODELING OF CLIMATE CHANGE AND GLOBAL WARMING

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ABSTRACT

Climate change and global warming represent some of the most pressing environmental issues affecting humanity today. These phenomena are driven by both natural processes and anthropogenic activities, particularly the emission of greenhouse gases such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Mathematical modeling has emerged as a fundamental tool for analyzing, understanding, and predicting climate behavior over time. This paper provides a comprehensive discussion of mathematical approaches used in climate science, including differential equations, statistical modeling, and computational simulations. It further examines various climate models such as Energy Balance Models, General Circulation Models, and Earth System Models. The study also highlights the importance of feedback mechanisms, uncertainty analysis, and modern advancements like machine learning integration. By expanding the theoretical and applied aspects, this paper demonstrates how mathematical modeling supports climate policy, environmental planning, and global sustainability efforts.

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Abstract No. 31

DIVERSITY, DISTRIBUTION AND BEHAVIOURAL PATTERNS OF NATIVE AND EXOTIC BIRDS OF INDIRA GANDHI ZOOLOGICAL PARK, VISAKHAPATNAM

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ABSTRACT

The present study examines the diversity, distribution, and behavioural patterns of native and exotic bird species in Indira Gandhi Zoological Park, Visakhapatnam, an important ex-situ conservation center situated in the ecologically significant Eastern Ghats region. Zoological parks play a crucial role in biodiversity conservation, environmental education, and scientific research, particularly in the management and preservation of avian fauna. The diverse habitat structure of the zoo, characterized by varied vegetation, topography, and microclimatic conditions, supports a rich assemblage of bird species. The avian diversity of the zoological park comprises both native (indigenous) and exotic (non-native) species, representing different ecological niches and taxonomic groups. Native species are well adapted to the local environmental conditions and exhibit natural behavioural traits, while exotic species are maintained under controlled conditions with appropriate habitat simulation, nutrition, and care. The coexistence of native and exotic species enhances the conservation and educational value of the zoological park. The distribution of bird species within the park is influenced by multiple ecological factors, including enclosure design, vegetation density, availability of water resources, and human activity. Aquatic species are predominantly associated with water bodies, whereas arboreal species occupy enclosures with dense vegetation. Ground-dwelling birds are distributed in open habitats that replicate their natural ecosystems. This spatial distribution reflects species-specific ecological requirements and adaptive strategies within a managed environment. Behavioural observations reveal patterns related to feeding, nesting, breeding, territoriality, and social interactions. Native birds generally display natural foraging and reproductive behaviours, while exotic species exhibit adaptive behavioural modifications influenced by captive conditions. Environmental enrichment, feeding regimes, and seasonal variations play a significant role in shaping behavioural responses. Seasonal changes particularly influence breeding cycles, activity levels, and physiological adaptations. The study underscores the importance of effective habitat management, environmental enrichment, and scientific monitoring in maintaining avian diversity and ensuring the welfare of bird species in zoological settings. It further highlights the role of zoological parks in conservation biology, species preservation, and public awareness. Such studies contribute to a better understanding of avian ecology in controlled environments and support sustainable conservation practices.

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Abstract No. 32

CLIMATE-SMART STRATEGIES FOR ENHANCING SUSTAINABILITY AND RESILIENCE IN BRINJAL CULTIVATION

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ABSTRACT

Brinjal (*Solanum melongena* L.), an important solanaceous vegetable crop widely cultivated in tropical and subtropical regions, faces significant challenges under changing climatic conditions. Increasing temperature variability, irregular rainfall patterns, and emerging pest and disease pressures threaten its productivity and sustainability. Developing a climate-resilient and sustainable ecosystem for brinjal cultivation is therefore essential to ensure food and nutritional security. This study emphasizes integrated approaches involving climate-smart agricultural practices, including the use of drought-tolerant and heat-resistant varieties, efficient water management techniques such as drip irrigation and mulching, and adoption of organic and conservation-based farming systems. Enhancing soil health through organic amendments, crop diversification, and integrated nutrient management plays a crucial role in sustaining productivity. Additionally, integrated pest and disease management strategies, including biological control and reduced reliance on chemical pesticides, contribute to ecological balance and environmental safety. The incorporation of modern technologies such as precision farming, protected cultivation, and decision-support systems further strengthens resilience against climatic uncertainties. Promoting farmer awareness, capacity building, and policy support is also vital for large-scale adoption of sustainable practices. Overall, the development of a sustainable and climate-resilient brinjal production system requires a holistic approach that integrates ecological, technological, and socio-economic components to mitigate climate risks and enhance long-term agricultural sustainability.

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Abstract No. 33

IN-VITRO PROPAGATION AT TOXIC CONCENTRATIONS OF CADMIUM IN PEARL MILLET (*PENNISETUM TYPHOIDES* S. & H.)

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ABSTRACT

Heavy metals are of great interest for research purpose with respect to toxicological importance to human health, plants and animals due to rapid industrialization, urbanization and intensive agricultural practices increasing contamination of heavy metals in soil has become a major concern. In the present research work a millet crop *Pennisetum typhoides* has been selected and exposed to various heavy metal (Cd) treatments. The main attempt of the present work was to raise plants in high Cd concentrations so that they may be grown in Cd rich soils. The control and treated seedlings of the accessions P_1 P_2 P_3 of *Pennisetum typhoides* were subjected to dedifferentiation and redifferentiation attempts using combination of auxins and cytokinins with MS medium. Various seedling parts like hypocotyls and cotyledons, root or whole seedlings were taken from pre culturedcondition. The callus induction was found on 6th day from the inoculation date. The callus was observed in all treatments except 10^{-1}M Cd concentration in all 3 accessions. The callus obtained from above experiments was further subjected to shoot and root induction experiments. For shoot induction two cytokinins were used in solid medium. Maximum shoots were observed in all concentrations except 10^{-1}M Cd in P_1 P_2 P_3,for root formation two auxins were used in different concentrations. Maximum roots were observed in control and lower concentrations in P_1 P_2 P_3. No root formation was observed in 10^{-1}M Cd. On the basis of results we can conclude that the high concentrations of Cd in crops retard plant growth, reduce crop production and even promote severe Cd contamination in agricultural products. The development and combination of these various in-vitro techniques will contribute to the sustainable propagation of crops in Cd-contaminated soils.

Abstract No. 34

SUSTAINABLE APPROACHES FOR BIODIVERSITY CONSERVATION

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ABSTRACT

Biodiversity, encompassing the variety of life at genetic, species, and ecosystem levels, is the foundation of ecological resilience and human well-being, yet it is under severe threat due to habitat destruction, climate change, overexploitation, pollution, and invasion by alien species. India, one of the world's seventeen mega diverse nations, harbours an extraordinary wealth of flora and fauna, much of which remains inadequately documented and increasingly endangered. Sustainable approaches to biodiversity conservation integrate scientific knowledge, traditional ecological wisdom, and community participation to ensure the long-term protection of species and ecosystems without compromising the developmental needs of present and future generations. In situ conservation through the strengthening of protected areas, biosphere reserves, wildlife sanctuaries, and ecological corridors remains central to safeguarding natural habitats, while ex situ strategies including botanical gardens, zoological parks, seed banks, and captive breeding programmes provide vital supplementary support for critically threatened species. The application of advanced tools such as geographic information systems, remote sensing, environmental DNA analysis, and molecular phylogenetics has greatly enhanced our capacity for biodiversity assessment, monitoring, and adaptive management. Community based conservation models, eco restoration of degraded landscapes; sustainable agriculture, agroforestry, and green infrastructure have demonstrated significant success in reconciling human livelihoods with conservation objectives. Policy frameworks including the Convention on Biological Diversity, the Kunming Montreal Global Biodiversity Framework, and national legislation such as the Wildlife Protection Act provide the necessary regulatory foundation for coordinated conservation action. A transdisciplinary, inclusive, and culturally sensitive approach is essential for achieving meaningful and lasting biodiversity conservation in the twenty first century.

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Abstract No. 35

SUSTAINABLE AND CLIMATE-RESILIENT ECOSYSTEM: ENVIRONMENTAL ETHICS, ANTHROPOGENIC IMPACTS AND IMPLICATIONS FOR NATIONAL SECURITY

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ABSTRACT

The growing challenges of climate change have brought environmental sustainability and national security into a closely interconnected framework. The concept of a sustainable and climate-resilient ecosystem is no longer limited to environmental discourse but has become a strategic necessity. This paper examines the role of environmental ethics and anthropogenic activities in shaping climate change and their implications for national security. Environmental ethics emphasizes human responsibility toward nature and promotes sustainable resource use. However, rapid industrialization, deforestation, urbanization, and overexploitation of natural resources have disrupted ecological balance. These human-induced activities have accelerated global warming, intensified extreme weather events, caused biodiversity loss, and increased resource scarcity, thereby weakening environmental stability and socio-economic systems. Climate change acts as a "threat multiplier" by aggravating existing vulnerabilities such as food insecurity, water scarcity, health crises, and forced migration. In India, irregular monsoon patterns, rising sea levels, and frequent natural disasters directly impact agriculture, livelihoods, and economic stability. These conditions may lead to migration, resource conflicts, and social unrest, placing additional pressure on governance and internal security. Furthermore, environmental degradation in ecologically sensitive and conflict-prone regions can intensify instability. Weakening livelihoods and governance capacity create opportunities for non-state actors to exploit vulnerabilities, posing serious challenges to internal security. The study highlights the need for an integrated and interdisciplinary approach combining environmental ethics, sustainable development policies, and climate adaptation strategies. It emphasizes policy reform, technological innovation, community participation, and international cooperation as key pillars for building resilience. Ultimately, achieving a sustainable ecosystem is essential for ensuring long-term peace, stability, and national security in an era of escalating climate risks.

Abstract No. 36

BIODIVERSITY AND WILDLIFE MANAGEMENT

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ABSTRACT

Wildlife means the flourishing of plants and animals in their natural environment. Any disturbance of the natural environment will ultimately lead to the detriment of humanity. Without knowing the importance of natural environment, man has been indiscriminately destroying wildlife and reducing the area of wildlife. Wildlife management is an interesting branch, wherein several parameters have to be taken into account. This involves the study of the ecosystem in relation to their productivity, balance of nature and interrelationship among the organisms of the ecosystem. Various trophic are studied and care is taken that the balance of nature is maintained by looking after the health of organism, to make them free from parasites etc. Periodic checking of the population level of different organisms is undertaken to maintain the balance. Wild life management requires a comprehensive understanding of the organism, their need and their dangers. These are the factors to be looked into the wild life management.

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Abstract No. 37

HUMAN INDUCED IMPACT ON ECOSYSTEM SUSTAINABILITY: CHALLENGES AND FUTURE DIRECTION - EVIDENCE FROM THE PURBA MEDINIPUR COASTAL BELT

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ABSTRACT

The Purba Medinipur coastal belt in West Bengal is Physiographically dynamic, environmentally responsive, and naturally very attractive area. This coastal area represents a fragile ecosystem increasingly affected by human induced pressures. Coastal urbanization, Unregulated tourism, aquaculture expansion, over exploitation of natural resources, and climate-induced hazards have intensified environmental degradation in the region.Despite existing regulatory frameworks, inadequate enforcement and lack of unified planning have aggravated these challenges, making it crucial to examine sustainable pathways for ecosystem management.This study focuses to investigate the major human -induced pressures on ecosystem sustainability in the Purba Medinipur coastal belt, to identify key challenges affecting ecosystems sustainability, assess their socio-ecological impacts and propose future directions for sustainable ecosystem management. Through the both primary and secondary data sources have been used. Primary insights were derived from field observation and survey. Secondary data were collected from government reports, academic journals, policy documents.For analysis and interpretation use both quantitative and qualitative methods. The research work finds that in Purba Medinipur coastal belt human-induced pressures have significantly destroyed the coastal ecosystem. Unregulated tourism has resulted habitat destruction and increased pollution, intensive aquaculture has contributed to soil degradation. Urban expansion near coastal zones has disrupted natural geomorphological processes. The findings highlightthat current development is unsustainable and short-term economic gains rather than long-term ecological thought. The study concludes that a shift in human perspective towards nature ethics is pivotal for achieving a sustainable coastal ecosystem.

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Abstract No. 38

IN SILICO EVALUATION OF BIOACTIVE COMPOUNDS FROM ANTARCTIC SPONGE (*SUBERITES* SP.) AGAINST SARS-COV-2 MAIN PROTEASE (MPRO)

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ABSTRACT

Building on prior research by Joe Bracegirdle and colleagues, who isolated sesterterpene compounds (1–11) from the Antarctic sponge *Suberites* sp.—including Suberitenones A, B, and F, which exhibited antiviral activity against RSV—this study explored the potential of these compounds as inhibitors of the SARS-CoV-2 main proteases (PDB IDs: 6LU7 and 6W63) utilizing *in-silico* drug design approaches. All the ligands were subjected to molecular docking with the SARS-CoV-2 main protease. The results indicated significant binding affinities, ranging from -6.1 to -7.6 kcal/mol for 6LU7 and -6.8 to -8.2 kcal/mol for 6W63. Further assessment of their ADMET (absorption, distribution, metabolism, excretion, and toxicity) properties and drug-likeness revealed favorable pharmacokinetic characteristics for these compounds. Among them, Suberitenone E (2) and Suberitenone I (6) stood out as the most promising. Compound 2 exhibited a strong binding affinity of -8.2 kcal/mol with 6W63, while compound 6 showed an affinity of -7.6 kcal/mol with 6LU7, both demonstrating robust interactions with the SARS-CoV-2 main protease receptor and acceptable ADMET profiles. The stability and binding strength of these ligand-protease complexes were further confirmed through molecular dynamics simulations. The collective findings suggest that these compounds possess strong potential as natural antiviral agents. This study highlights compounds 2 and 6 as particularly promising drug leads, warranting further experimental validation through *in-vitro* and *in-vivo* studies to confirm their antiviral activity.

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Abstract No. 39

ANTHROPOCENTRIC EXTINCTION: A CASE STUDY OF PINK HEADED DUCK

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ABSTRACT

Anthropocentric extinction is accelerating loss of biodiversity caused by human activityspecially after the introduction of Industrial revolution. A scientific report says that Anthropocene should be declared as a separate Epoch due to its peculiar characteristics. The fossils of this period is defined as techno-fossils due to the presence of concrete, plastics or some other human made material and radioactive isotopes in the fossil record. Anthropogenic extinction began, when human migrated to Africa approximately 60,000 years ago. The species are vanishing at very fast pace during this period and it has been defined as 'Sixth Mass Extinction'. All the five classes of vertebrates have noted significant loss in biodiversity. Not only terrestrial ecosystem is adversely affected rather aquatic wild lives are prone to danger equally due to acidification of water bodies. Although extinction is a natural phenomenon but still it is a general consensus that during Anthropocene period human led activity is the prime driver for the accelerated rate of extinction of species. Since 1950 the rate of extinction had accelerated drastically. The data on monitored species reveals that 48% of the monitored species are facing threat of extinction. At the same time millions of species are present in the nature which is becoming extinct even before their documentation. Habitat destruction; intense hunting, trade and collection are few major anthropocentric drivers of decline of a species. Massive conversion of grasslands, riverine swamps, and forest areas into cultivated land and human habitation has led to the loss of habitat for a species like Pink headed duck. During 19th and early 20th century it was one of the most demanded game bird, hunted at large for the collection of its striking pink plumage. The bird was considered as an ornamental bird due to its prominent pink head, and had a great demand in private aviaries. It caused trapping of the bird at an unprecedented rate. All these reasons had pushed the species at the verge of extinction and finally it was declared extant in India and Nepal during 1940-1950, as there is no confirmed sighting is recorded after this period. In this research paper the probable causes for the extinction of the Pink Headed Duck will be analyzed. The taxidermy skins both cabinet skin and mounted specimen, eggs, skeletons preserved in different Museums of India and world will also be discussed. Their origin will be analyzedon the basis of their provenance and date of acquisition. It will give detailed information about the human led extinction of a species. Extensive research about the extinction of a particular species gives a complete ecological insight of the region. It can be used for a comparative study for such other species, reflecting declining population trend. Such species are quite important for the analysis of anthropocentric extinction at a particular realm of time.

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Abstract No. 40

DIVERSITY, SEASONAL DYNAMICS AND ECOLOGICAL SIGNIFICANCE OF PHYTOPLANKTON IN THE POND WATER ECOSYSTEM OF BHIMSEN VILLAGE, KANPUR, UTTAR PRADESH

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ABSTRACT

Phytoplankton, the microscopic photosynthetic organisms inhabiting the water column of lentic and lotic ecosystems, serve as the primary producers and fundamental indicators of aquatic health, making their systematic study essential for the ecological assessment and management of freshwater bodies. The present investigation was undertaken to document the diversity, abundance, seasonal distribution, and ecological significance of phytoplankton communities in the pond water ecosystem of Bhimsen Village, Kanpur, Uttar Pradesh, a rural freshwater body of considerable local importance supporting agriculture, livestock, and community livelihoods. Water samples were collected seasonally across pre monsoon, monsoon, and post monsoon periods from multiple sampling stations within the pond, and phytoplankton were identified, enumerated, and analysed using standard taxonomic and microscopic methods. The study recorded a diverse assemblage of phytoplankton belonging to major algal groups including Chlorophyceae, Bacillariophyceae, Cyanophyceae, Euglenophyceae, and Dinophyceae, with Chlorophyceae and Cyanophyceae showing highest species richness and numerical dominance. Seasonal fluctuations in phytoplankton density and composition were found to be significantly correlated with physicochemical parameters of water including temperature, pH, dissolved oxygen, total dissolved solids, nitrates, and phosphates. The Shannon diversity index and species richness values indicated moderate to good biodiversity in certain seasons, while the proliferation of Cyanophyceae during summer months indicated early signs of eutrophication attributable to agricultural runoff and organic loading. Phytoplankton was found to play pivotal roles in oxygen production, nutrient cycling, carbon fixation, and serving as food for zooplankton and fish larvae, thereby sustaining the aquatic food web. The findings highlight the need for regular biomonitoring, nutrient management, and conservation of the Bhimsen pond ecosystem to maintain its ecological integrity and socio-economic.

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Abstract No. 41

ECOSYSTEM SERVICE MULTIFUNCTIONALITY AND TRADE-OFFS IN THE SIKKIM-DARJEELING HIMALAYA

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ABSTRACT

The socio-ecological landscape of the Sikkim–Darjeeling Himalaya plays a crucial role in balancing ecological health with local livelihood needs. This mountainous region, characterized by steep slopes and elevational gradients, supports a mosaic of forests, agricultural systems, and tree-based land uses that provide diverse ecosystem services. Understanding the spatial interactions among these services is essential for sustainable management in fragile mountain ecosystems.This study aims to assess multiple ecosystem services, including carbon storage, potential pollination, erosion control, nutrient retention, water recharge, crop production, and recreation, and to examine their spatial variability across the Sikkim–Darjeeling Himalaya. It further seeks to evaluate ecosystem service multifunctionality and identify trade-offs and synergies among services. Land use/land cover (LULC) and elevation data will be analyzed within a GIS framework, using the In VEST (Integrated Valuation of Ecosystem Services and Trade-offs) model to estimate and map ecosystem services. Spatial and statistical analyses will be applied to examine service distribution, relationships, and areas of high multifunctionality.The results are expected to reveal clear spatial patterns in ecosystem service distribution. Trade-offs and synergies among services are anticipated, with some land-use types supporting multiple services, while others exhibit competing dynamics. Areas of high multifunctionality are likely to emerge as priorities for conservation and management. This study highlights the importance of moving beyond single-service assessments toward an integrated, multi-service perspective. The findings are expected to provide insights into spatial patterns, trade-offs, and synergies, supporting evidence-based decision-making and sustainable landscape planning in the Sikkim–Darjeeling region.

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Abstract No. 42

ENDOPHYTIC FUNGI AS SUSTAINABLE BIORESOURCES FOR PLANT-DERIVED ALKALOIDS: A CASE STUDY FROM *CATHARANTHUS ROSEUS* (L.) G. DON

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ABSTRACT

The production of plant-derived anticancer alkaloids remains a major challenge due to their low natural abundance and complex biosynthesis. Moreover, the continued reliance on plant sources limits scalability, and global accessibility of these life-saving anticancer drugs. Unlocking alternative biological systems for alkaloid production is emerging as a key frontier in sustainable cancer therapeutics. In this study, we report an endophytic *Xylaria* sp. KR-3U isolated from *Catharanthus roseus* for the first time as a potential alternative microbial source of the high-value anticancer compound vinblastine. A robust multi-analytical approach involving RP-HPLC, ESI-LC-MS, and 1H NMR confirmed the production of vinblastine by the fungal isolate, demonstrating chemical equivalence with the standard molecule. The fungal extract exhibited significant dose-dependent cytotoxicity against A20 and RAJI lymphoma cell lines. Notably, combination studies revealed a synergistic interaction with doxorubicin, while an antagonistic interaction with vinblastine suggested a possible overlap in mode of action, indicating functional similarity of the fungal-derived compound. Genome-level insights further strengthened these findings, with the detection of key biosynthetic genes such as tryptophan decarboxylase (TDC) and genes associated with geraniol degradation. Complementary QTOF LC-MS analysis confirmed the presence of secologanin, cathenamine, tabersonine, and vindoline, indicating that critical intermediates of the vinblastine biosynthetic pathway are also produced. Collectively, this study highlights a rare plant-endophyte metabolic convergence and proposes endophytic *Xylaria* sp. KR-3U as a sustainable and scalable biofactory for vinca alkaloids, offering a promising alternative to plant-based extraction and advancing future biotechnological applications.

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Abstract No. 43

UTILIZATION OF BOTANICAL BIOPESTICIDES FOR SUSTAINABLE PEST MANAGEMENT AND FOOD SECURITY STRENGTHENING

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ABSTRACT

Sustainable agriculture plays a vital role in maintaining global food security while reducing environmental harm. However, the overreliance on synthetic pesticides has led to serious concerns, including negative impacts on human health, deterioration of soil quality, and disruption of ecological balance. In this context, plant-based biopesticides have emerged as an effective and environmentally friendly alternative for managing agricultural pests. These biopesticides are derived from plants that naturally possess pesticidal properties. For example, *Azadirachta indica* produces bioactive compounds such as azadirachtin, known for their strong insecticidal and antifeedant effects. Likewise, *Acorus calamus*, *Moringa oleifera* extracts obtained have shown considerable effectiveness against a variety of crop pests. Compared to chemical pesticides, these natural products are biodegradable, pose minimal risk to non-target organisms, and help in lowering the chances of pest resistance development. The present study aims to assess the effectiveness of plant-based biopesticides in managing key agricultural pests and enhancing crop productivity. Both field and laboratory experiments will be carried out to compare pest incidence, crop yield, and soil health in treated versus untreated conditions. In addition, the study will evaluate the cost-effectiveness and acceptance of these biopesticides among farmers. Moreover, the research investigates the role of botanical biopesticides in supporting climate-resilient agriculture by minimizing chemical residues and promoting biodiversity. It also addresses existing limitations such as inconsistent performance, limited shelf life, and lack of standardization, while suggesting solutions including improved formulations and farmer awareness programs. Overall, the findings are expected to encourage the adoption of plant-based biopesticides in sustainable agricultural practices. By offering safer pest control options, this research contributes to strengthening food security and maintaining ecological balance in an era of increasing agricultural challenges.

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Abstract No. 44

ENVIRONMENTAL MODULATION OF GUT MICROBIOTA AND HEMATO-BIOCHEMICAL PROFILES UNDER VARIABLE WATER QUALITY CONDITIONS IN AQUATIC SYSTEMS

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ABSTRACT

Environmental conditions, particularly water quality, play a decisive role in regulating the health and physiological status of aquatic organisms. The present study explores how variations in physicochemical water parameters modulate gut microbiota composition and hemato-biochemical profiles in aquatic systems. Key environmental variables, including temperature, pH, dissolved oxygen, alkalinity, and ammonia, were evaluated for their influence on microbial and physiological responses. Findings indicate that fluctuations in water quality significantly alter the structure and diversity of gut microbiota, leading to a decline in beneficial microbial populations and a concurrent rise in opportunistic pathogens. These microbial shifts are closely associated with changes in hematological parameters, such as reduced hemoglobin levels and erythrocyte counts, along with elevated leukocyte counts, reflecting stress-induced immune responses. Furthermore, serum biochemical analyses revealed increased levels of glucose, cholesterol, and hepatic enzymes, suggesting metabolic disturbances and potential tissue damage. In contrast, total protein levels showed a declining trend under suboptimal environmental conditions, indicating compromised nutritional and physiological health. Overall, the study demonstrates a strong linkage between environmental quality, microbial homeostasis, and physiological functioning in aquatic organisms. The integrated assessment of gut microbiota and hemato-biochemical indicators provides a comprehensive framework for evaluating fish health under changing environmental conditions. These findings highlight the importance of maintaining optimal water quality to support microbial balance, enhance disease resistance, and improve overall productivity in aquaculture systems.

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Abstract No. 45

LEAD (PB^{2+}) SEQUESTRATION BY *ENTEROBACTER* SP. DGI-2 INTEGRATING BIOSORPTION, BIOACCUMULATION, AND MECHANISTIC INSIGHTS FOR BIOREMEDIATION

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ABSTRACT

The global escalation of lead (Pb^{2+}) contamination in arable soils—driven by industrialization, urbanization, mining, and untreated effluents from industrial and agricultural sources—severely impairs crop productivity, food security, ecosystem integrity, and human health via food chains. Conventional physicochemical remediation methods are costly and environmentally disruptive, necessitating eco-friendly, in situ alternatives. Bacterial biosorbents, leveraging cell-surface functional groups and extracellular polymers, offer a promising approach for heavy-metal immobilization. This study evaluates the Pb^{2+} sequestration efficiency and resistance mechanisms of *Enterobacter chuandaensis* DGI-2, a heavy metal-resistant rhizobacterium isolated from a contaminated crop rhizosphere. Under controlled conditions (pH 7, 30 ± 2 °C, 96 h), DGI-2 achieved Pb^{2} removal efficiencies of 94.73%–69.09% at 100–750 µg/mL. Sequestration occurred predominantly via metabolism-independent biosorption involving cell surface binding (50.92–329.57 µg/mL) and exopolysaccharides (EPS) (34.17–154.21 µg/mL). Living biomass exhibited higher uptake (102.95 mg/g, 68.63%) than heat-killed biomass (98.61 mg/g, 65.74%) at 0.5 g/L (pH 6.5, 720 min). Adsorption followed the Freundlich isotherm (R^{2} = 0.993 live; 0.983 dead), indicating heterogeneous multilayer sorption, while kinetics conformed to a pseudo-second-order model (R^{2} > 0.99), suggesting chemisorption-controlled uptake. Desorption reached 85–97% with 0.1 M EDTA or HCl via ion-exchange and chelation, enabling reuse with sustained performance over four cycles. FTIR and EDX confirmed –OH, –COOH, and $–PO_4^{3-}$ involvement in Pb^{2+} coordination, while XRD identified $Pb_{10}(PO_4)_3Cl$ and $Pb_{10}(PO_4)_6(OH)_2$ formation, supported by a 210.66% increase in phosphatase activity. Soil microcosms exhibited an 11.7–13.1% reduction in bio available Pb following DGI-2 inoculation, with enhanced stabilization in non-sterile systems, indicating synergistic interactions with indigenous microbiota. These findings establish DGI-2 as a regenerable bio agent for sustainable Pb^{2} immobilization, advancing microbial bioremediation for contaminated agro ecosystems.

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Abstract No. 46

GLACIAL LAKE OUTBURST FLOOD (GLOF) MONITORING IN THE HIMALAYAS: A COMPREHENSIVE REVIEW OF REMOTE SENSING AND DEEP LEARNING APPROACHES

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ABSTRACT

Rising glaciers melt due to climate change is rapidly increasing the number, size, and instability of high-altitude glacial lakes, this leads to the rise in the frequency and severity of Glacial Lake Outburst Flood (GLOF). One such incident was recently observed during October 2023 South Lhonak Lake outburst in Sikkim, which triggered a devastating flood along the Teesta valley, causing widespread destruction and significant loss of life. Addressing these events requires robust system and research in this domain has expanded, from traditional satellite-based lake mapping toward deep learning-based methods for automated lake detection and delineation. Studies using multi-temporal Landsat and Sentinel imagery have successfully created glacial lake inventories and monitored changes in these areas over time. Advancements in deep learning-based image segmentation architectures, including U-Net, CNN-based models, and transformer-based approaches, have been applied to optical, SAR, and multi-source satellite imagery for glacial lake boundary extraction which automates a process that previously demanded extensive manual effort from trained GIS analysts, reducing mapping time from days to minutes. However, existing works largely address these problems in isolation- lake mapping, deep learning detection, and risk assessment are rarely combined into a single cohesive framework. This review systematically examines these efforts, identifies the key limitations, and highlights the need for an integrated approach to GLOF monitoring.

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Abstract No. 47

AHP BASED AGROFORESTRY SUITABILITY ANALYSIS FOR SUSTAINABLE LAND USE IN SIKKIM HIMALAYA, INDIA

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ABSTRACT

Agricultural production systems in Sikkim have been impacted by quick changes in production costs, consumer demands, and growing concerns about food security. Rapid rise in population has immense pressure on land and soil requiring the need for conservation measures in the Sikkim Himalaya, India. This study presents an extensive analysis of Agroforestry Suitability Analysis for sustainable land use in Sikkim Himalaya using AHP Technique. To analyse and prepare the land suitability classes seven parameters (slope, elevation, temperature, rainfall, organic carbon, pH, NDVI) were taken using the FAO land suitability criteria which also assigned rank to the individual parameters. The parameters were assigned certain weights by using AHP calculation. Four suitability classes were identified as highly suitable (S1) represents 5% of area (354 km^2) which was largely found along the southern part of the study area. Moderately suitable (S2) represents 49% (3,461km^2) mostly found in the southern and central part of the study area. Whereas, the share of low suitable (S3) and unsuitable (S4) classes cover 42% (2971km^2) and 4% (283km^2) mostly representing the northern parts of the study area.

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Abstract No. 48

TOURISM AND ECOSYSTEM FRAGILITY IN RISHAP, A HAMLET OF NORTH BENGAL

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ABSTRACT

Rishap /Reshap is situated within the extended range of Neora Valley National Park and serves as a significant site for ecotourism. The area's rich biodiversity, encompassing a variety of flora and fauna, enhances its uniqueness. The notable species diversity is indeed a valuable asset to the region; however, the rapid growth of tourism and unplanned infrastructural development has contributed to biodiversity depletion over the past decade. The conservation of biodiversity and the adoption of sustainable ecotourism practices are essential to ensure that both biodiversity and tourism benefit mutually. Consequently, ecotourism, when aligned with biodiversity preservation, can facilitate a promising future for the region, benefiting not only the local community but also researchers across various disciplines. This paper provides comprehensive information on the causes of biodiversity degradation and explores remedial approaches to promote a better future.

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Abstract No. 49

ROLE OF ENVIRONMENTAL ETHICS IN BUILDING CLIMATE RESILIENT ECOSYSTEMS UNDER ANTHROPOGENIC PRESSURE

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ABSTRACT

Climate change and environmental degradation are increasingly driven by anthropogenic activities such as deforestation, industrialization, urbanization, and over-exploitation of natural resources. These activities have severely disrupted ecosystem balance, reduced biodiversity, and increased vulnerability to climate-induced disasters. In this context, the concept of environmental ethics has emerged as a crucial framework for promoting sustainable and climate-resilient ecosystems. This study examines the role of environmental ethics in mitigating anthropogenic impacts and enhancing ecosystem resilience. It emphasizes ethical principles such as intergenerational equity, conservation of biodiversity, sustainable resource use, and respect for all life forms. By integrating ethical values into environmental governance, policy-making, and individual behaviour, societies can reduce ecological footprints and foster long-term sustainability. The research highlights that climate resilience is not only a technological or policy challenge but also a moral responsibility. Case studies of community-based conservation, sustainable agriculture, and indigenous ecological knowledge demonstrate how ethical practices contribute to ecosystem stability and adaptive capacity. Furthermore, the study underlines the importance of education, awareness, and legal frameworks in promoting environmentally responsible behaviour. In conclusion, environmental ethics plays a vital role in addressing anthropogenic impacts and ensuring the sustainability of ecosystems in the face of climate change. A shift towards ethical and sustainable practices is essential for building resilient ecosystems and securing the future of both human and non-human life.

Abstract No. 50

eDNA-BASED MONITORING OF FRESHWATER BIODIVERSITY

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ABSTRACT

Environmental DNA (eDNA) has emerged as a transformational, non-invasive method for accurately and efficiently measuring freshwater biodiversity. Organisms continually shed genetic material into aquatic habitats via skin cells, mucous, feces, and gametes, making them detectable without direct observation or capture. This work focuses on the use of eDNA tools to monitor species richness, discover uncommon and invasive species, and assess ecosystem health in freshwater systems. Compared to traditional survey methods, eDNA provides faster sampling, less labor, and the capacity to discover cryptic or low-abundance species. Advances in high-throughput sequencing and metabarcoding have improved its accuracy and scalability, allowing many species to be identified from a single water sample. However, problems such as DNA degradation, contamination hazards, and limits in reference databases can all have an impact on data interpretation. Standardization of protocols and integration with traditional monitoring systems are critical for increasing dependability. Overall, eDNA-based monitoring is an effective method to biodiversity conservation, informing management techniques, and promoting sustainable water resource planning in the face of environmental change.

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Abstract No. 51

STUDY ON AQUATIC INSECTS AS BIOINDICATORS OF FRESHWATER ECOSYSTEM IN THE SARYU RIVER, AYODHYA, UTTAR PRADESH, INDIA

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ABSTRACT

The present study evaluates the role of aquatic insects as bioindicators for assessing the ecological health of a freshwater ecosystem, with specific reference to the Saryu River. Freshwater ecosystems are highly dynamic and sensitive to environmental disturbances, making biological monitoring an effective approach for water quality assessment. Among various biological indicators, aquatic insects are considered reliable due to their differential sensitivity to pollution, relatively long life cycles, and ease of sampling. Systematic sampling was conducted across multiple sites along the river stretch, representing varying degrees of anthropogenic influence, including upstream (less disturbed), midstream (moderately impacted), and downstream (highly impacted) zones. Aquatic insects were collected using standard methods such as kick-net sampling, hand picking, and dredging, and were preserved and identified up to family or genus level using standard taxonomic keys. Simultaneously, physicochemical parameters including temperature, pH, dissolved oxygen (DO), biochemical oxygen demand (BOD), turbidity, and nutrient concentrations were analyzed following standard protocols. The diversity and distribution of aquatic insect communities were assessed using ecological indices such as the Shannon-Wiener Index and Simpson Index. The results indicated a clear spatial variation in water quality, with upstream sites exhibiting higher dissolved oxygen levels, lower BOD, and greater diversity of sensitive taxa such as Ephemeroptera, Plecoptera, and Trichoptera (EPT group). In contrast, downstream sites showed reduced diversity, dominance of pollution-tolerant taxa such as Chironomidae, and elevated levels of organic pollution. A strong correlation was observed between physicochemical parameters and biological indices, confirming that aquatic insect diversity decreases with increasing pollution levels. The findings highlight that the Saryu River is experiencing varying degrees of ecological stress, primarily due to anthropogenic activities such as domestic sewage discharge, agricultural runoff, and religious practices along the riverbanks. This study demonstrates that aquatic insects serve as effective, low-cost, and reliable bioindicators for monitoring freshwater ecosystems. The integration of biological assessment with physicochemical analysis provides a comprehensive understanding of river health. The outcomes of this research can contribute to sustainable river management strategies and policy formulation aimed at conserving the ecological integrity of the Saryu River and similar freshwater systems.

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Abstract No. 52

IMPACT OF ANTHROPOGENIC STRESS ON GROUNDWATER RESOURCES

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ABSTRACT

Global climate change and regional human activities have considerable impacts on the environment and water resources, including changes to the hydrological cycle, surface energy budget, and water yield. Climate change is considered one of the main drivers of changes in water availability, necessitating the adaptation of water resources management, allocation, and operation policies to minimise economic ramifications. Moreover, dramatic global population growth has contributed to an overall increase in water demand worldwide, causing additional anthropogenic stress on water supplies. This phenomenon, along with other related factors such as economic and industrial development, land use/cover change, greenhouse gas emissions, and environmental degradation, has contributed to the anthropogenic drought. This is the human-induced water stress intensified by unsustainable water use relative to the available renewable water. Nearly one-third of the world's population lives under water stress, mainly due to unsustainable development. Conjunctive use of surface water and groundwater is commonly practised around the world to compensate for surface water deficit. It is imperative to evaluate the sustainability of groundwater management because of its crucial importance in providing resilience to buffer the impacts of droughts through relaxing water resource constraints. Groundwater overdraft can trigger radical changes in future water management practices to cope with water shortages, such as increasing pressure on diminishing resources or pursuing additional resource development. This paper presents sustainable groundwater management solutions that aim to minimise the groundwater footprint and to maintain a balance between water withdrawal from the aquifer and aquifer recharge.

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Abstract No. 53

CLIMATE-SMART AGRICULTURE AS A SUSTAINABLE PATHWAY FOR ENHANCING FOOD SECURITY AND ENVIRONMENTAL RESILIENCE

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ABSTRACT

Climate change poses a serious threat to global food systems, particularly in developing countries where agriculture is highly climate-dependent. Rising temperatures, irregular rainfall patterns, and increased frequency of extreme weather events are negatively impacting crop productivity and farmer livelihoods. In this context, climate-smart agriculture (CSA) has emerged as an integrated approach aimed at improving agricultural sustainability while addressing climate challenges. This paper explores the principles, practices, and outcomes of climate-smart agriculture, focusing on its three core objectives are enhancing agricultural productivity, improving resilience to climate variability, and reducing greenhouse gas emissions. Key strategies such as conservation agriculture, agroforestry, efficient irrigation systems, and the use of climate-resilient crop varieties are critically examined. The study also highlights the role of modern technologies, including remote sensing, precision farming, and data-driven decision-making, in strengthening CSA implementation. Furthermore, the paper discusses barriers to adoption, including limited awareness, financial constraints, and policy gaps, particularly in rural regions. Case-based insights are used to demonstrate successful CSA applications and their socio-economic and environmental benefits. The findings suggest that with appropriate policy support, farmer training, and technological integration, climate-smart agriculture can significantly contribute to sustainable food production and climate adaptation.

Abstract No. 54

ASSESSMENT OF THE PHYTOCHEMICAL COMPONENTS OF CUCUMIS PUBESCENS WILLD

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ABSTRACT

Cucumis pubescens Willd is a wild species found in India. is a weed that belongs to the Cucurbitaceae family, which grows wild in India's arid and shadowy areas. In the current study, the fruits and leaves were extracted using a hot extraction method with a soxhlet equipment to create aqueous, ethanolic, and acetone extracts. The process of qualitative phytochemical screening was applied to every extract. The extracts contained proteins, carbohydrates, tannins, flavonoids, alkaloids, saponins, and phenolic substances, according to phytochemical analysis. Through the current study, which will help identify dried crude samples of fruits and leaves physiochemically, an effort has been made to emphasize this folk herbal medication. The plant has several therapeutic benefits in addition to being used in fruits, vegetables, and pickles. Additionally, kidney stones and other urinary problems can be treated with the fruit. It can help with improved bowel movements and relieve constipation. It relieves upset stomachs since it has analgesic and anti-inflammatory properties. It helps with ear pain, bedsores, and prickly heat, among other conditions. A tonic is another usage for the fruit juice.

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Abstract No. 55

IN VITRO ANALYSIS OF SALINITY STRESS ADAPTATION IN *BRUGUIERA GYMNORHIZA*

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ABSTRACT

The growth, survival, and distribution of mangrove species are significantly influenced by salinity. *Bruguiera gymnorhiza* (L.) Savigny, a non-secretory (non-recretohalophytic) true mangrove, primarily relies on root-level salt exclusion and intracellular ion compartmentalization rather than salt secretion. Its responses to varying salt levels remain poorly understood, despite its ecological significance. To close this gap, saplings were grown for 240 days in five different salinity treatments: T1 (5.64 mg salt/g soil), T2 (7.08 mg salt/g soil), T3 (9.6 mg salt/g soil), T4 (12.6 mg salt/g soil), and T5 (20.55 mg salt/g soil), representing a range of salinity-graded soil from hyposaline to hypersaline. Growth, leaf succulence, leaf chlorophyll content, total soluble protein in leaves, total salt content, and concentrations of Na, K, and Ca were assessed in the leaf, stem, and root. Growth and other physiological parameters peaked in hyposaline circumstances (T1 and T2) and decreased as salinity increased. While plants at the maximum salinity (T5) did not survive for more than 30 days, those under hypersaline treatments (T4) showed reduced growth and physiological performance. Along the salinity gradient, leaf thickness and succulence both increased, suggesting greater succulence in response to salt stress. A slow drop in salt concentration from the root to the leaf indicates effective salt storage in the roots, which lowers the amount of salt in the foliage. Results indicate that *Bruguiera gymnorhiza* responds to increasing salt stress with coordinated structural and physiological changes and thrives at low to moderate salinity. The findings offer a scientific foundation for mangrove biodiversity conservation and restoration plans in the context of rising sea levels and climate change.

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Abstract No. 56

ECOSYSTEM RESILIENCE, THE SUSTAINABLE DEVELOPMENT GOALS AND HUMAN SOCIETY

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ABSTRACT

In the pursuit of global progress, as human civilization strives to embrace the ideals of sustainable development, climate change has emerged as an invisible yet formidable challenge. One may envision a world in which the three interdependent dimensions of economic prosperity, social equity, and environmental sustainability enshrined within the United Nations Sustainable Development Goals (SDGs) are increasingly disrupted by the intensifying frequency of floods, droughts, and extreme weather events. The climate crisis is not merely an environmental concern; rather, it represents a complex and multifaceted global challenge that deepens economic inequalities and threatens social stability. While rapid urbanization, industrialization, population growth, and technological advancement have significantly enhanced human convenience and productivity, they have simultaneously accelerated the overexploitation of natural resources, thereby placing severe stress on ecosystems worldwide. Continuous human interference with nature has further intensified environmental degradation and exacerbated the impacts of climate change. A healthy and resilient ecosystem is fundamental to the realization of sustainable development goals, whereas an imbalanced and degraded ecosystem acts as a major constraint to developmental progress. For instance, deforestation not only leads to a decline in biodiversity but also contributes significantly to climate change, which in turn adversely affects agricultural productivity, water security, and human health outcomes. In this context, it becomes imperative to conceptualize the notion of development by integrating it with ecological sustainability. Approaches such as ecosystem-based management, the transition towards renewable energy sources, the adoption of sustainable agricultural practices, and large-scale afforestation initiatives can play a crucial role in mitigating environmental degradation. Therefore, if human society is to progress toward a secure, equitable, and sustainable future, it must cultivate a harmonious balance between development and nature. Integrating environmental considerations into development frameworks is no longer optional but an essential requirement for ensuring long-term global resilience.

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Abstract No. 57

ROLE OF WILDLIFE INTERFERENCE AND MONOCROPPING TRANSITION IN EASTERN HIMALAYAN AGRICULTURE

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ABSTRACT

Traditional farming systems support resilient agricultural landscapes; however increasing wildlife crop raiding is causing substantial losses driving a shift from mixed cropping to monocropping and consequently reducing agrobiodiversity and sustainability. This study examines the role of wildlife interference in influencing farmer's transition from mixed cropping to monocropping practices .The study sites were selected based on dominant agricultural practices using a 2 km × 2 km grid below 2000m altitude stratified across low, mid and high elevations. Data were collected through field surveys and structured questionnaires in selected villages. A rank-order method was applied to identify dominant crop-raiding wildlife and the most susceptible cropsa commonly used approach in agricultural and participatory research. Rank-order analysis identified rhesus monkey (*Macaca mulatta*) and Indian peafowl (*Pavo cristatus*) as the dominant crop raiders (Rank 1–2), followed by porcupine and deer. AHP weighting showed that rhesus monkey and peacock accounted for over 40% of total wildlife interference. Maize was the most affected crop (37%), followed by ginger (17%), vegetables (15%), and large cardamom (11%)while other crops experienced moderate to low damage. High wildlife pressure increased crop risk and contributed to a shift toward monocropping. Socio-economic data from 120 farmers showed 2.5–3acre landholdings with 45–50% land underutilization and rising abandonment due to rural outmigration intensifying human–wildlife interactions. Wildlife interference is driving significant crop losses. Along with land underutilization and rural outmigration this is accelerating a shift from mixed cropping to monocropping leading to reduced agrobiodiversity and increased agricultural vulnerability. The study highlights the need for sustainable strategies that balance agricultural productivity with biodiversity conservation.

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Abstract No. 58

SILK REINFORCED WITH GRAPHENE FOR ENHANCED PROPERTIES

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ABSTRACT

Graphene has become a useful nano-material due to its exceptional high tensile strength. Aim of this study was to enhanced the properties of Tarar silk with the reinforcement of graphene. In this, we report mechanically enhanced silk directly collected by feeding *Antheraeae mylitta* D. larval silkworms with graphene. Raman spectroscopy confirmed that fed graphene were incorporated into the silk fibers, whereas the others went into the excrement of silkworms. FTIR spectroscopy study indicated that addition of graphene hindered the conformation transition of silk fibroin from random coil and α-helix to β-sheet, which may contribute to increased elongation. The successful production of these graphene-incorporated Tasar silks by feeding graphene coated leaves may open up possibilities for the large-scale production of high-strength silk fibers.

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Abstract No. 59

BIODIVERSITY CONSERVATION AND ECOSYSTEM DYNAMICS: INTERLINKAGES FOR SUSTAINABLE ENVIRONMENTAL MANAGEMENT

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ABSTRACT

Biodiversity conservation and ecosystem dynamics are intrinsically interconnected processes that underpin the stability and resilience of natural systems. Biodiversity, encompassing genetic, species, and ecosystem diversity, plays a crucial role in maintaining ecological balance, supporting ecosystem services, and enhancing adaptability to environmental changes. Ecosystem dynamics, characterized by interactions among biotic and abiotic components, determine the structure, function, and productivity of ecosystems over time. However, anthropogenic pressures such as habitat destruction, climate change, pollution, and overexploitation have significantly disrupted these dynamics, leading to loss of biodiversity and ecosystem degradation. This study explores the relationship between biodiversity and ecosystem functioning, emphasizing how species diversity contributes to ecological stability, nutrient cycling, and resilience against disturbances. It highlights the importance of conservation strategies such as habitat restoration, community-based resource management, and integration of traditional ecological knowledge with modern scientific approaches. Furthermore, the paper examines the role of policy frameworks and sustainable practices in mitigating biodiversity loss and restoring ecosystem integrity. By analyzing case studies and current conservation models, the study underscores the need for a holistic and interdisciplinary approach to biodiversity conservation. Strengthening ecosystem dynamics through adaptive management and conservation planning is essential for ensuring long-term environmental sustainability and human well-being. The findings advocate for proactive measures to protect biodiversity as a foundation for resilient ecosystems in the face of global environmental challenges.

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Abstract No. 60

GEO-ENVIRONMENTAL DIVERSITY AND BIO HERITAGE SIGNIFICANCE OF THE PURBA MEDINIPUR COASTAL REGIONS, WEST BENGAL: A SPECIAL FOCUS ON THE BAGURAN JALPAI INTERTIDAL ZONE

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ABSTRACT

The coastal tract of Purba Medinipur in West Bengal represents a dynamic geo-ecological interface shaped by the interaction of marine, fluvial, and climatic processes. This study explores the region's geo-environmental diversity and its bio-heritage significance through an integrated geodiversity–biodiversity framework. Key geomorphic units such as dunes, estuaries, mudflats, and intertidal zones sustain rich ecological assemblages, including salt-tolerant vegetation and diverse estuarine fauna. Special focus is given to the Birampur–Baguran Jalpai sector and the Rasulpur–Haldi estuarine complex, recognized under the Biological Diversity Act, 2002. Using GIS mapping and field-based observations, the study identifies spatial patterns of ecological sensitivity and geomorphic evolution. Increasing anthropogenic pressure and climate-induced hazards threaten these fragile systems. The paper advocates recognition of the region as a geo-bio heritage landscape to promote ecosystem-based adaptation, sustainable geotourism, and resilience-oriented coastal management.

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Abstract No. 61

PLANT GROWTH PROMOTING RHIZOBACTERIA (PGPR) MEDIATED ENHANCEMENT OF BIOMASS AND STEVIOL GLYCOSIDE PRODUCTION IN *STEVIA REBAUDIANA*

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ABSTRACT

In this post-globalised ultra-consumerist world, consumption of sugary eatables posing worldwide threat to human health. Natural sweetening agents are preferred over synthetic sweetening agents since they are low calorific, nontoxic and do not have any adverse impact on health. Natural sweeteners are useful sugar substitutes for diabetic and obese patients. So, to livehealthy life, population must be switch from conventional sugar to natural based sugar. *Stevia rebaudiana* Bertoni can be a good option as a novel sweetener which belongs to the Asteraceae family. The leaves of this unique medicinal plant contain about 34 steviol glycosides (SGs), of those, stevioside, rebaudioside A are the major steviol glycosides, which is 200-300 times sweeter than sucrose and mostly utilised as a sugary substitute. For the purpose of enhancing the biomass and steviol glycoside content of *Stevia rebaudiana*, application of PGPR (Plant growth promoting rhizobacteria) proved to be more effective in both micropropagated seed grown (in vitro) and tissue culture-regenerated soilrite (in vivo) condition. PGPR enhance plant growth through multiple mechanisms, including the production of growth-promoting phytohormones, phosphate solubilization, nitrogen (N_2) fixation, and gibberellic acid production. The results showed, in comparison to control, inoculation with PGPR (3E) sharply increase the shoot length, root length and leaf biomass in 90days old plant. Furthermore, high-performance liquid chromatography (HPLC) chromatograms revealed a marked enhancement of Stevioside and rebaudioside A content have been produced with the inoculation of 3E bacterial strain both *in vitro* and tissue culture regenerated in vivo plantlets of stevia.

Abstract No. 62

PARADOX OF PURITY AND POLLUTION IN INDIA DUE TO UNETHICAL PRACTICES

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ABSTRACT

In India, the River Ganga is considered a deity, and devotees offer prayers and worship to it. Despite our deep respect for the river, its condition continues to deteriorate, and we indigenous people are unable to preserve its purity. The Ganga is a river of devotion, faith, and worship. Indians revere the water as "holy," attributing its "curative" properties to its purity. The river is not confined to these beliefs but is also a vital water source, serving as the life-sustaining system for indigenous communities since ancient times. The Ganga river and its tributaries originate from pristine, glacier-fed springs, ensuring their purity and lack of pollution. However, when the river moves downstream, it encounters densely populated urban areas before finally joining the Bay of Bengal. From its beginning to its end, its water transforms from pristine and transparent to contaminate with trash and sewage. For thousands of years, the river Ganga and its tributaries have been a vital source of sustenance, spiritual nourishment, and cultural significance for millions of people residing in the basin. In the present era, as urbanization continues to rise, the Ganges basin supports over 40 percent of the population. The pollution level of river Ganga has reached alarming proportions due to the rapid growth of its population and industrialization along its banks.

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Abstract No. 63

CLIMATE STRESS AND THE PLANT DISEASE TRIANGLE: SHIFTING DYNAMICS IN HOST-PATHOGEN-ENVIRONMENT INTERACTIONS

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ABSTRACT

The "Plant Disease Triangle"-which describes the essential relationship between a vulnerable host, an aggressive pathogen, and favourable environmental conditions, continues to be central to plant pathology. Yet, with ongoing changes in global climate, this classic triad is facing considerable disturbance. The study offers an in-depth analysis of how abiotic stresses, particularly variable temperatures and extreme moisture conditions, influence plant infection processes and defense responses. The review starts by outlining the traditional physiological steps of disease development, from the initial infection to the spread within the host. Next, we summarize new findings on how environmental stress can increase susceptibility by compromising plant structural defenses and dampening critical hormonal signaling systems like the salicylic acid (SA) and jasmonic acid (JA) pathways. Additionally, we discuss how rising temperatures are enabling soil-borne and airborne fungi to expand into regions that were once considered temperate.Through examination of case studies involving key cereal and legume diseases, this review underscores the urgent necessity for developing crop varieties that can withstand climate variability. The review concludes with a discussion of integrated disease management approaches, blending time-tested agricultural practices with efforts to restore soil health, to reduce the risk of disease outbreaks amid growing climate unpredictability.

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Abstract No. 64

GROWTH KINETICS, PHYSIO-BIOCHEMICAL PROFILING AND SPERMIDINE-MEDIATED ENHANCEMENT OF SOLASODINE BIOSYNTHESIS IN OPTIMIZED CALLUS CULTURES OF *SOLANUM TRILOBATUM* L.

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ABSTRACT

Plant secondary metabolites are gaining increasing importance due to their extensive applications in pharmaceutical, nutraceutical, and agro-industrial sectors. However, their large-scale utilization is often limited by low natural yield and environmental variability. Solasodine, a key glycoalkaloid derived from Solanum species, serves as an important precursor for steroidal drugs and holds significant medicinal and industrial value. In vitro callus culture offers a sustainable alternative for the production of such secondary metabolites, as their biosynthesis is closely associated with growth stages and the physiological and biochemical status of the cells. In this study, age-dependent changes in solasodine accumulation were examined in callus tissues of *Solanum trilobatum* L., alongside an assessment of their physio-biochemical characteristics. Callus was successfully induced from young leaf explants using MS medium supplemented with NAA (5 mg/L) and BAP (1 mg/L). Growth kinetics, biochemical parameters, cell viability, and solasodine content were evaluated in callus tissues at different ages (6, 8, 10, 12, 14, and 16 weeks). HPLC analysis revealed that 8-week-old callus exhibited the highest solasodine content. This stage also showed elevated levels of soluble sugars, chlorophyll, total protein, and total alkaloids, along with lower levels of malondialdehyde (MDA), proline, and insoluble sugars. Cell viability assays revealed that early- to mid-stage callus cultures exhibited higher viability and metabolic activity compared to older tissues. Based on these observations, 8-week-old callus—identified as the optimal growth stage—was treated with spermidine, a polyamine, at varying concentrations (0.1, 0.25, 0.5, and 1 mM). The results showed that intermediate concentrations of spermidine significantly enhanced solasodine accumulation. Overall, the findings indicate that the early to mid-growth phase represents a critical metabolic window for solasodine biosynthesis, and that spermidine effectively stimulates this pathway, thereby enhancing its production potential.

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Abstract No. 65

PLANTS USED FOR THE TREATMENT OF SKIN DISEASES BY THE TRIBALS OF BUNDELKHAND REGION (U.P.)

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ABSTRACT

The present paper deals with traditional knowledge of the tribals of Bundelkhand region (U.P.) for the treatment of skin diseases viz ;; abscesses, boil, cutscracks of feet, eczema, itch, leprosy, leucoderma, ring worm, scabies, skin cracks, sores, swelling. tumors, ulcer, urticaria, wounds etc. A total all about 41 plant species belonging to 30 families were recorded to be use by the tribals for the purpose during the ethnobotanical survey.

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Abstract No. 66

ZOOLOGICAL PARKS AS A PLATFORM FOR BIODIVERSITY CONSERVATION: COMMUNITY PARTICIPATION AND POLICY INTERVENTIONS

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ABSTRACT

Many Zoological parks have evolved from being mere recreational spaces to important institutions for biodiversity conservation, public education, research and species management. This paper examines the role of zoological parks as a platform for biodiversity conservation, with particular emphasis on community participation and policy interventions. Zoological parks contribute to the conservation of threatened species through captive breeding, rescue, rehabilitation, and public awareness initiatives. They also serve as centres for environmental education, aiding in instilling a love of nature, knowledge on the importance of wildlife protection and habitat conservation not only among children but also members of the community. Active involvement from communities is vital for the long-term success of conservation initiatives. Residents, students, researchers and visitors can all play meaningful roles by participating in awareness programs, citizen science efforts, volunteer work, and conservation campaigns. Such engagement fosters a shared sense of responsibility for protecting biodiversity and strengthens overall conservation outcomes. At the same time, strong policy measures are crucial, as they establish the legal, administrative and institutional foundations necessary for effective zoo management, ethical treatment of birds and animals, species preservation and environmental sustainability. This paper highlights the bird diversity and conservation significance of the government through the mini zoo in Kalaburagi district of Karnataka. This zoo features a well-maintained bird section that shows a variety of avian species such as peacocks, white-necked storks, kites, emus, grey jungle fowl, silver and golden pheasants, Alexandrine parakeets, and guinea fowl. This section allows visitors to closely observe both ornamental and wild birds within a managed environment. Zoo management often faces a range of challenges that affect welfare, conservation goals, and day-to-day operations, like difficult-to-maintain enclosures and providing high-quality nutrition. Ensuring proper healthcare for diverse species is complex. Due to the limited funding, lack of adequately trained staff also affects the animal care, hygiene, and visitor irresponsible behaviour can stress animals and damage zoo property. Maintaining cleanliness is essential but often challenging.

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Abstract No. 67

RADIOFREQUENCY COLD PLASMA SEED TREATMENT EFFECT ON YIELD AND QUALITY ATTRIBUTES IN LEMON BASIL PLANTS (*OCIMUM AFRICANUM* LOUR.)

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ABSTRACT

Ocimum africanum Lour. cv. CIM-Jyoti is a citral-rich aromatic crop whose seed germination is hindered by a mucilaginous seed coat that restricts water and oxygen uptake. However, existing treatments improve germination but raise environmental concerns. The present investigation assesses the influence of RF-CP seed treatment with O_2, Ar, and Ar + O_2 on growth-related economic traits, essential oil content and chemical profile of lemon basilvar. CIM-Jyoti under field conditions. Seeds were treated with different combinations of power (60–240 W), pressure (0.2–0.6 mbar) and time (5–15 min) and the growth yield and biochemical characterstics of the treated seedlings were then evaluated. The results revealed significant variation among treatments, with the combined gas treatment (Ar + O_2) showing superior performance over individual gases. Treatment P2W3T2 recorded maximum improvement in plant height (60.33 cm), number of nodes (15.0), branches per plant (26.67), inflorescences per plant (106.67), plant canopy (67.0 cm), and herb yield per plant (936.67 g), along with the highest percentage increase over control. The results demonstrated a substantial increase in essential oil content and secondary metabolites, including linalool, geraniol, nerol, and α-caryophyllene, under optimized plasma conditions. Microscopic observations revealed improved oil gland structure and expansion in treated plants, correlating with higher oil accumulation. However, excessive treatment exposure reduced oil content, highlighting the importance of controlled application. Thus, RF-CP seed treatment using combined gases offers an effective and eco-friendly method for enhancing growth, yield, and phytochemical attributes in aromatic crops.

Abstract No. 68

MANGROVE ECOSYSTEM RESILIENCE: IMPLICATIONS FOR SUSTAINABLE DEVELOPMENT GOALS

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ABSTRACT

Ecosystem resilience is the ability of an ecosystem to withstand and recover from natural or anthropogenic interruptions. The mangrove ecosystem is an astonishing example of resilience. In fluctuating environmental conditions, ecosystem resilience is the means by which homeostasis is maintained. Mangroves, adapted to dynamic environmental conditions, are resilient to flooded saline soils, varied soil physiochemistry, climatic change, hydrologic regimes, and anthropogenic stressors, underscoring their significance in the context of global environmental change. Beyond various biotic and abiotic factors, mangrove resilience is also dependent on functional composition and structural diversity. The mangrove ecosystem provides numerous ecosystem services at both local and global scales. The Sustainable Development Goals (SDGs) acknowledge the development of humans, society, and the environment. Mangroves contribute significantly to achieving the Sustainable Development Goals (SDGs) like SDG 1 (no poverty), SDG 2 (zero hunger), SDG 6 (clean water and sanitation), SDG 8 (decent work and economic growth), SDG 13 (climate action), SDG 14 (life below water), and SDG 15 (life on land) for the well-being of humankind.Prolonged exposure to stressors brought on by climate change, habitat alteration, and environmental degradation can drive these systems above their recovery thresholds. Mangrove cover has significantly decreased in recent decades, making conservation and regeneration essential. Maintaining ecological balance, enhancing climate resilience, and securing a sustainable future for both nature and human societies depend on the protection of mangroves.

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Abstract No. 69

ETHNOZOOLOGICAL STUDY OF MEDICINAL ANIMALS UTILIZED BY THE LOCALS RESIDING NEARBY BARSHEY RHODODENDRON SANCTUARY, WEST SIKKIM, INDIA

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ABSTRACT

This ethno-zoological study focuses on the traditional zoo-therapeutic knowledge among the Sherpa communities inhabiting villages adjacent to the Barshey Rhododendron Sanctuary, Sikkim, India. The methodology comprised of purposive random sampling with semi-structured household questionnaire survey and open-ended interview across 70 households from December 2025-February 2026. Quantitative ethnozoological indices were applied for systematic analysis of the recorded data. A total of 44 species were documented being used for traditional ethnozoological practices by the local people in the study area. Mammalia (45%) accounted the highest number of species that were being used for the ethnozoological practices followed by Aves (27%), Insecta (9%) and other taxonomical groups. Among the different parts used, meat (36%) accounted the predominant faunal derivative followed by animal products (24%). The documented remedies primarily addressed conditions pertaining to general health (20%) followed by respiratory system diseases (17%) and infectious or parasitic diseases (13%). Most of the documented animals were consumed orally (72%) with topical application accounting for 24% and nasal delivery comprising 4% of recorded practices. Preparation method involved cooking as the most preferred method (33%) in the study area. *Macaca mulatta* (0.38) recorded the highest Relative Frequency of Citation (RFC = 0.38), while *Ursus thibetanus* yielded the greatest Use Value (UV = 0.42). Enforcement of ban on hunting practices by the Forest and Environment Department, Government of Sikkim, has led to the discontinuation of several zootherapeutic practices; however, the erosion of indigenous knowledge necessitates urgent documentation. These findings underscore a substantive repository of traditional zootherapeutic knowledge within the community. The documentation of such ethnozoological practices will serve both as a conservation instrument for threatened faunal species and as a preliminary framework for the bioprospecting of novel animal-derived pharmacological agents.

Abstract No. 70

THE IMPACT OF CLIMATE CHANGE ON GLOBAL CROP PRODUCTION

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ABSTRACT

Climate change represents an existential threat to global agricultural productivity, fundamentally disrupting crop growth cycles and destabilizing food security. Rising temperatures, altered precipitation patterns, and the increased frequency of extreme weather events—such as droughts and floods—collectively exacerbate physiological stress in staple cereal crops, including wheat, rice, and maize. While elevated carbon dioxide levels can theoretically provide a fertilization effect for certain plant types, this benefit is frequently offset by heat-induced damage and limited water availability, particularly in lower latitudes where adaptive capacity is lowest. Crops such as wheat, rice, and maize are cornerstones of India's food system. According to projections, a 2.5 to 4.9°C increase in temperature across the country could decrease the wheat yield by 41–52 percent and rice yield by 32–40 percent. These yield losses are compounded by soil degradation and water stress. Years of intensive monoculture and chemical fertiliser use, encouraged by the Green Revolution, have depleted micronutrients and organic matter in soil. In addition, studies have indicated that increased carbon dioxide levels are decreasing the concentrations of protein, iron, and zinc in crops such as rice, maize, and wheat.

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Abstract No. 71

BACTERIAL PROFILING OF GUNDRUK, A MUSTARD GREEN LEAFY VEGETABLE OF INDIA

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ABSTRACT

Endemic fermented vegetables play a crucial role in local cuisine and culture in North Bengal and Sikkim, India. Traditionally fermented raw green vegetables such as *gundruk and sinki* being a popular one, however, there is a gap in the microbial profiling of these vegetables. This study aimed to explore the diversity of dominant bacterial populations in fermented leafy vegetables using both culture-dependent and culture-independent methods. A new approach in bioinformatics analysis: reverse ecology, which analyzes complementation and competition among participant microbes was used. In conventional culture-dependent techniques, LAB genera such as *Lactobacillus*, *Enterococcus*, *Leuconostoc*, and *Pediococcus* have been identified as predominant consortia, whereas metagenomic analysis revealed that the microbiome of fermented dried leafy vegetables was mainly composed of Firmicutes, Proteobacteria, Actinobacteria, Bacteroides, and Planctomycetes at the phylum level. Within the Lactobacillaceae family, predominant types included *Lactobacillus*, *Lactococcus*, *Pediococcus*, *Leuconostoc*, *Enterococcus*, *Vagococcus*, *Weissella*, and *Carnobacterium*. The microbial metabolism revealed key pathways, such as carbon metabolism, glycolysis, gluconeogenesis, and glyoxylate. Aromatic amino acid degradation, fatty acid metabolism, amino sugar metabolism, nucleotide sugar metabolism, and biosynthesis of nucleotide sugar pathways were also active. The competition index among microbes and human metabolic data was low (0.32–0.44), indicating minimal competition for nutrition. Complementation indices between bacteria and humans were high (0.76–0.88), suggesting a beneficial impact of *gundruk* microbial populations on human health.

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Abstract No. 72

ENVIRONMENTAL AND HUMAN HEALTH IMPACTS OF PLASTIC WASTE: RISKS, CHALLENGES, AND SUSTAINABLE SOLUTIONS

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ABSTRACT

Plastic is a widely used material in modern life due to its versatility, durability, and low cost. However, its excessive use and improper disposal have led to severe environmental and health concerns worldwide. Plastic pollution occurs when plastic accumulates in the environment, adversely affecting ecosystems, wildlife, and human populations. It contributes significantly to soil, water, and air pollution, disrupting natural processes and ecological balance. Plastics contain hazardous chemicals such as Bisphenol A (BPA), phthalates, antimony compounds, brominated flame retardants, and per- and poly fluorinated substances, which pose serious risks to living organisms. Exposure to these toxic substances is associated with a wide range of health issues, including eye irritation, respiratory disorders, liver dysfunction, cancers, skin diseases, neurological problems, reproductive and developmental abnormalities, cardiovascular complications, and gastrointestinal disorders. The continuous rise in plastic production and consumption has intensified its negative impact, making it a global environmental challenge. Evidence indicates that plastic pollution not only degrades environmental quality but also threatens long-term human health and biodiversity. Without effective intervention, the burden of plastic waste will increase for future generations. To mitigate these impacts, strict regulations on plastic production and usage, along with improved waste management practices, are essential. Public awareness regarding the harmful effects of plastics must be enhanced to encourage responsible consumption. Furthermore, the development and adoption of biodegradable alternatives and sustainable policies are urgently needed to reduce plastic pollution and safeguard environmental and human health.

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Abstract No. 73

ENVIRONMENTAL ETHICS AND THE BIOCENTRIC PERSPECTIVE: LINKING NATURE'S VALUE WITH HUMAN WELL-BEING

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ABSTRACT

Environmental ethics is an important field of study that explores the moral relationship between humans and the natural environment. It emphasizes the responsibility of humans to protect and preserve nature, recognizing that environmental health is directly connected to human well-being. Human well-being encompasses physical health, mental stability, social harmony, and economic security, all of which depend on a clean and stable environment. Environmental ethics challenges the view that nature exists solely for human use and instead promotes the idea that the natural world possesses intrinsic value. Within this framework, different perspectives emerge. The anthropocentric view places humans at the center, valuing nature primarily for its utility in supporting human life and development. In contrast, the biocentric perspective argues that all living organisms, whether human or non-human, deserve moral consideration and respect. Extending further, the ecocentric or ecosystem-centered approach recognizes the inherent value of entire ecosystems, including both living and non-living components such as forests, rivers, soil, and mountains, and advocates for maintaining ecological balance. A healthy environment plays a critical role in sustaining human life by providing clean air, safe drinking water, nutritious food, and a stable climate. It also supports mental and emotional well-being by offering peaceful surroundings and reducing stress. Additionally, environmental stability ensures economic security through sustainable livelihoods and fosters social and cultural well-being by maintaining community harmony and traditional ecological connections. The conservation of natural resources such as forests, wetlands, and biodiversity is essential for ensuring long-term access to water and food resources. Responsible environmental behavior not only protects ecosystems but also safeguards human health and future generations. Thus, caring for nature is not merely an ethical obligation but a fundamental requirement for achieving sustainable development and a high quality of life.

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Abstract No. 74

BIODIVERSITY-CLIMATE CHANGE INTERACTIONS: IMPACTS, VULNERABILITY, AND ADAPTIVE STRATEGIES

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ABSTRACT

Biodiversity, defined as the variety of life on Earth, underpins ecosystem functioning and provides essential goods and services that sustain human well-being. However, increasing anthropogenic pressures have led to unprecedented rates of biodiversity loss and ecosystem degradation. Climate change has emerged as a critical driver of these changes, intensifying stress on natural systems through rising temperatures, altered precipitation patterns, and increased frequency of extreme weather events. The relationship between biodiversity and climate change is complex and reciprocal. Climate change threatens biodiversity by altering species distribution, disrupting reproductive cycles, extending or shortening growing seasons, and increasing extinction risks—particularly among already vulnerable species. At the same time, biodiversity loss weakens ecosystem resilience and reduces the capacity of natural systems, such as forests and wetlands, to sequester carbon, thereby accelerating climate change. Biodiversity plays a pivotal role in climate change mitigation and adaptation. Healthy ecosystems enhance carbon storage and support adaptive responses by stabilizing ecological processes. Mitigation involves human interventions aimed at reducing greenhouse gas emissions or enhancing carbon sinks, while adaptation refers to adjustments in ecological or human systems that minimize harm or exploit emerging opportunities under changing climatic conditions. Global frameworks such as the Convention on Biological Diversity recognize both the threats posed by climate change and the opportunities for synergistic actions that promote biodiversity conservation alongside climate goals. Evidence from global assessments, including the Millennium Ecosystem Assessment, highlights climate change as a major driver of ecosystem transformation. Therefore, conserving and restoring biodiversity is essential for strengthening ecosystem resilience, reducing climate risks, and ensuring sustainable development. Integrating biodiversity-based strategies into climate policies offers a comprehensive pathway to address the dual challenges of biodiversity loss and climate change.

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Abstract No. 75

ASSESSING GLOBAL DIVERSITY OF SENGA (CESTODA: PTYCHOBOTHRIIDAE) IN FRESHWATER FISHES: A COMPREHENSIVE CHECKLIST INTEGRATING MORPHOLOGICAL-MOLECULAR DATA AND ARTIFICIAL INTELLIGENCE

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ABSTRACT

The genus *Senga* (Dollfus, 1934), under the order *Pseudophyllidea* and family *Ptychobothriidae*, comprises intestinal cestode parasites of freshwater teleost fishes. It was first described with *Senga besnardi* from *Betta splendens* in France. Species of *Senga* are characterized by a dorsoventrally flattened, segmented body, a specialized scolex for attachment, and hermaphroditic proglottids, facilitating adaptation to the host intestine. Members of this genus have been reported from diverse fish hosts, including *Mastacembelus armatus*, *Channa punctatus*, *Channa striatus*, *Mystus vittatus*, *Rita rita*, *Puntius ticto*, and *Labeorohita*, across India and other regions, particularly tropical Asia.Traditional morphology-based taxonomy often faces challenges due to subtle interspecific variations. Therefore the integrative taxonomy, Artificial Intelligence (AI) driven image analysis and machine learning enable rapid, accurate identification by detecting fine morphological traits. The integration of molecular data with AI facilitates precise species delimitation, phylogenetic reconstruction, and discovery of cryptic diversity. Moreover, AI supports large-scale data management, digital taxonomy, and analysis of host–parasite associations and biogeographic patterns. Predictive modeling further improves understanding of ecological dynamics. Overall, AI significantly advances taxonomic resolution, efficiency, and evolutionary insights in *Senga* research. This comprehensive research presents a critically evaluated checklist of 68 valid *Senga* species from various geographical locations and hosts. The compilation highlights significant host diversity and distribution patterns, providing a useful baseline for future studies in parasitology, taxonomy, and freshwater ecology.

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Abstract No. 76

EVALUATION OF MECHANICAL PROPERTIES AND STRUCTURAL CHARACTERISTICS OF *BOMBYX MORI* SILK FILAMENT

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ABSTRACT

Silk filamentthat is produced by *Bombyx mori* is considered a high-performance natural fiber, which is defined by its mechanical properties such as high tensile strength, high elasticity and high structural integrity. This study evaluates the mechanical properties of silk filament in relation to its physicochemical characteristics using Fourier Transform Infrared Spectroscopy (FTIR), X-ray Diffraction (XRD), real density and Thermogravimetric Analysis (TGA).FTIR analysis of the silk filament revealed the presence of bands that were characteristic of amide I, II and III, and that the silk filaments were formed mainly from beta-sheet structures of fibroin, the structural polysaccharide matrix from which textile silk is made. In addition, the XRD patterns of the silk filaments demonstrated a semi-crystalline nature, with both crystalline and amorphous regions greatly affecting the ability of the fibres to be strong and flexible. In measuring the real density of the silk filament, further insights were gained into the molecular interactions and structuring of the silk filaments. TGA analysis of the silk filament revealed thermal stability at temperatures of 280-350°C, and demonstrated the moisture content of the filament as the main source of initial weight loss. The testing of the mechanical properties of the silk filament indicated that they possess a high tensile strength, moderate extensibility, which corresponds to a high degree of crystallinity and molecular alignment of fibroin molecules in the 2D plane of the silk filament. The integration of the mechanical, structural and thermal properties of the silk fibre provides a comprehensive understanding of the structural integrity and quality of silk filament for determining the relationship between silk filament properties and silk filament structure.

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Abstract No. 77

URBAN GREEN SPACES AND THEIR ROLE IN CLIMATE RESILIENCE

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ABSTRACT

Rapid urbanization and climate change have significantly increased environmental challenges in cities, including rising temperatures, air pollution, water logging, biodiversity loss, and heat stress. Urban green spaces such as parks, gardens, urban forests, roadside plantations, wetlands, green roofs, and community lawns are increasingly recognized as essential components of climate-resilient cities. These green infrastructures help mitigate climate-related risks while improving urban environmental quality and human well-being. This study examines the ecological and socio-economic role of urban green spaces in strengthening climate resilience. Vegetation cover reduces the urban heat island effect through shading, evaporation and transpiration thereby lowering ambient temperatures by approximately 2–5°C in densely built areas. Trees and shrubs absorb carbon dioxide, filter harmful air pollutants, and release oxygen, thereby improving air quality. Green spaces also enhance rainwater infiltration, reduce storm water runoff, and minimize urban flooding during heavy rainfall events. Wetlands and vegetated drainage systems further support groundwater recharge and water conservation. In addition to environmental benefits, urban green spaces contribute to biodiversity conservation by providing habitats for birds, pollinators, and small mammals. They also promote physical activity, mental health, and social interaction among urban populations. Studies indicate that neighborhoods with higher tree cover experience lower energy consumption due to reduced cooling demand during summer seasons. However, challenges such as land scarcity, poor maintenance, fragmented planning, and unequal access to green areas reduce their effectiveness, particularly in developing cities. Strategic urban planning, public participation, rooftop gardening, vertical greening, and expansion of green corridors are recommended to maximize resilience benefits. The study concludes that urban green spaces are cost-effective, nature-based solutions for climate adaptation and sustainable city development. Their integration into urban planning policies is vital for creating healthier, cooler, and more resilient cities in the face of future climate change.

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Abstract No. 78

TRADITIONAL INDIAN KNOWLEDGE SYSTEMS (IKS) PROVIDE INSIGHTS INTO HERBAL REMEDIES, WHICH MODERN BIOLOGY CAN TEST AND VALIDATE FOR BROADER USE

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ABSTRACT

Traditional Indian Knowledge Systems (IKS) encompass centuries of accumulated wisdom on the medicinal properties of plants, forming the foundation of practices such as Ayurveda and Siddha. These systems emphasize holistic healing, preventive care, and the interconnectedness of human health with nature. Modern biology, with its emphasis on empirical validation, molecular analysis, and pharmacological testing, provides tools to scientifically evaluate and authenticate the efficacy of herbal remedies preserved in IKS. Integrating these two knowledge streams offers a pathway toward sustainable healthcare models that are culturally rooted yet scientifically robust. Such collaboration can lead to the discovery of novel bioactive compounds, the preservation of biodiversity through responsible use of medicinal plants, and the development of affordable, accessible treatments for global health challenges. However, this integration requires careful attention to intellectual property rights, ethical considerations, and the need to respect indigenous knowledge holders. By bridging traditional wisdom and modern science, a holistic framework for healthcare can be established—one that honors cultural heritage while advancing evidence-based medicine.

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Abstract No. 79

URBAN EXPANSION AND AGRICULTURAL INTENSIFICATION THREATEN LOCAL BIODIVERSITY. INTEGRATING COMMUNITY-BASED CONSERVATION WITH REMOTE SENSING MONITORING CAN HELP BALANCE DEVELOPMENT AND ECOSYSTEM HEALTH

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ABSTRACT

Urban expansion and agricultural intensification are among the most pressing drivers of biodiversity loss worldwide. As landscapes transform to meet human demands, ecosystems face fragmentation, habitat degradation, and declining species richness. This study explores the integration of community-based conservation practices with remote sensing monitoring as a strategy to balance development and ecosystem health. Remote sensing technologies provide scalable, real-time data on land-use change, vegetation cover, and habitat quality, while community participation ensures local knowledge, stewardship, and adaptive management. Together, these approaches create a synergistic framework that enhances ecological resilience and supports sustainable livelihoods. The objective of this research is to evaluate how combining remote sensing tools with community driven conservation initiatives can mitigate biodiversity loss in rapidly developing regions. Specifically, the study aims to identify patterns of land-use change, assess ecological impacts, and design participatory conservation models that align with local socio-economic needs. I hypothesize that integrating remote sensing monitoring with community based conservation will result in more effective biodiversity protection compared to either approach alone. Remote sensing will provide accurate, large-scale ecological data, while community engagement will foster localized action and compliance. The combined framework is expected to reduce habitat fragmentation, improve species diversity indices, and promote sustainable resource management.

Abstract No. 80

RISK OF REDUCING TRADITIONAL WISDOM TO MERE DATA POINTS WITHOUT RESPECTING ITS SPIRITUAL AND CULTURAL CONTEXT

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ABSTRACT

The integration of traditional knowledge systems with modern scientific frameworks presents both opportunities and challenges. While empirical validation can enhance the credibility and applicability of indigenous practices, there is a significant risk of oversimplifying traditional wisdom into quantifiable data points. Such reductionism neglects the spiritual, cultural, and community-based dimensions that give these practices meaning and resilience. Traditional Indian Knowledge Systems (IKS), for instance, are not merely repositories of herbal remedies but embody holistic worldviews that connect human health, environment, and spirituality. Treating them solely as datasets for scientific extraction risks eroding their cultural integrity and alienating the communities that sustain them. A balanced approach requires methodologies that respect indigenous epistemologies, safeguard cultural heritage, and foster equitable collaboration between knowledge holders and scientific institutions. By acknowledging the non-material dimensions of traditional wisdom, integration can move beyond data assimilation toward genuine dialogue, ensuring that holistic development remains both scientifically robust and culturally respectful.

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Abstract No. 81

CONCEPT OF ECOSYSTEM RESILIENCE

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ABSTRACT

Ecosystem resilience is defined as the capacity of natural ecosystems to absorb disturbances, reorganise and adapt to changing environmental conditions while maintaining their essential structure, functions and biodiversity. An ecosystem comprises interaction between biotic components and abiotic factors, linked through fundamental ecological processes such as nutrient cycling, pollination and habitat formation. These processes play a crucial role in sustaining biodiversity and enhancing the ability of ecosystems to recover from disturbances. The need for ecosystem resilience lies in safeguarding ecosystems against increasing environmental uncertainties, while its purpose is to ensure the persistence of ecological integrity, biodiversity and ecosystem services. The concept of ecosystem resilience, introduced by C. S. Holling (1973), emphasizes not only resistance to environmental shocks, such as fires, floods and pollution, but also the ability of systems to recover, reorganize and transition into stable states without functional degradation. Species richness, functional redundancy and habitat connectivity are considered key determinants of resilience, which collectively facilitate rapid recovery, adaptation and recolonisation. Furthermore, biodiversity and ecological connectivity across landscapes act as foundational elements that strengthen resilience and ensure the sustained provision of ecosystem goods and services. In this context, ecosystem resilience functions as a natural safeguard, supporting long-term ecological stability, biodiversity conservation and climate change mitigation.

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Abstract No. 82

MITIGATING CLIMATE CHANGE FOR HUMAN WELLBEING

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ABSTRACT

Climate change poses an escalating threat to planetary systems and human wellbeing, driven by anthropogenic greenhouse gas emissions from fossil fuels, deforestation, and industrial activities. This study examines key mitigation strategies and their implications for human welfare. This study indicates that transitioning to renewable energy sources reduces carbon emissions by up to 70% while simultaneously improving air quality and public health outcomes. Nature-based solutions, including reforestation and wetland restoration, and planning cities with minimal carbon footprints, have shown promising results in reducing carbon emissions and improving water and food security for populations at risk. Carbon pricing mechanisms and green fiscal policies proved effective in accelerating low-carbon transitions while generating socioeconomic co-benefits. Transitioning to renewable energy mitigates respiratory ailments associated with fossil fuel pollution, while sustainable agriculture enhances nutrition and rural livelihoods. Afforestation enhances mental health and resilience by establishing green spaces. Overall, the advantages of mitigating climate change extend beyond environmental preservation. They also work to make society fair and the economy stable in the long run. Assessing people's happiness when making climate policies ensures that efforts to slow climate change are good for both people and the planet.

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Abstract No. 83

ADRENAL HORMONES AS MODULATORS OF CARDIAC DYSFUNCTION: FROM MECHANISMS TO THERAPEUTIC TARGETS

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ABSTRACT

Cardiovascular diseases (CVDs) remain the leading cause of morbidity and mortality worldwide, with complex pathophysiological mechanisms involving both neural and endocrine regulatory systems. Among endocrine organs, the adrenal gland plays a pivotal role in maintaining cardiovascular homeostasis through the secretion of several bioactive hormones, including catecholamines, glucocorticoids, and mineralocorticoids. These hormones regulate critical physiological processes such as vascular tone, electrolyte balance, metabolic homeostasis, and cardiac contractility. However, dysregulation of adrenal hormone secretion has been increasingly implicated in the development and progression of various cardiac disorders. Catecholamines, primarily epinephrine and norepinephrine released from the adrenal medulla, influence cardiac output and heart rate through β-adrenergic receptor signaling. Chronic elevation of these hormones can lead to sustained sympathetic stimulation, myocardial hypertrophy, arrhythmogenesis, and cardiomyocyte apoptosis. Similarly, aldosterone produced by the adrenal cortex contributes to sodium retention, hypertension, and pathological cardiac remodeling through mineralocorticoid receptor activation, oxidative stress, and fibrosis. Cortisol, another major adrenal hormone, modulates metabolic and inflammatory pathways that may indirectly contribute to endothelial dysfunction, insulin resistance, and cardiovascular risk. Growing evidence from clinical and experimental studies suggests that excessive or prolonged adrenal hormone activity is closely associated with conditions such as hypertension, heart failure, arrhythmias, myocardial infarction, and stress-induced cardiomyopathy. Furthermore, targeting adrenal hormone signaling pathways has emerged as an important therapeutic strategy in cardiovascular medicine, with drugs such as β-adrenergic blockers and mineralocorticoid receptor antagonists demonstrating significant clinical benefits. This review summarizes the current understanding of adrenal gland secretions and their mechanistic roles in cardiac physiology and pathology. It also highlights recent advances in the adrenal-cardiac axis, clinical evidence linking adrenal dysfunction with cardiovascular disease, and emerging therapeutic approaches targeting adrenal hormone pathways. Understanding the complex interactions between adrenal hormones and cardiac function may provide novel insights into the prevention, diagnosis, and treatment of cardiovascular disorders.

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Abstract No. 84

INNOVATIONS IN BIODIVERSITY CONSERVATION RESEARCH

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ABSTRACT

Innovations in biodiversity conservation research have transformed the way scientists understand, monitor, and protect life on Earth, especially in the face of accelerating climate change, habitat destruction, and species extinction. One of the most significant developments is the integration of advanced digital technologies such as artificial intelligence (AI), machine learning, and big data analytics, which enable researchers to process vast ecological datasets, identify species automatically from images or sounds, and predict biodiversity loss patterns with high accuracy. These tools are increasingly combined with remote sensing technologies—such as satellites and drones—that provide real-time, large-scale monitoring of ecosystems, allowing scientists to detect deforestation, habitat fragmentation, and wildlife movements even in inaccessible regions. Another major innovation is the use of molecular and genetic techniques, particularly environmental DNA (eDNA) and conservation genomics. eDNA allows scientists to detect species by analyzing traces of genetic material found in soil, water, or air, making it possible to monitor rare or elusive organisms without physically capturing them. At the same time, genomic tools such as DNA barcoding, next-generation sequencing, and CRISPR-based gene editing are opening new possibilities for genetic rescue, improving population diversity, and even exploring controversial ideas like de-extinction. These approaches have significantly enhanced the precision and scope of biodiversity assessments while also raising important ethical and ecological considerations. Recent research also highlights the emergence of interdisciplinary and technology-driven monitoring systems, where innovations such as drone-based thermal imaging, acoustic sensors, and automated species recognition systems are combined to improve detection accuracy. Community-driven and socially inclusive approaches are also gaining importance as innovative conservation strategies. Modern research increasingly integrates indigenous knowledge, citizen science, and local participation with scientific tools, recognizing that long-term conservation success depends on human–nature coexistence. Overall, innovations in biodiversity conservation research are characterized by a shift toward integrative, data-driven, and interdisciplinary approaches that combine cutting-edge technologies with social, economic, and policy frameworks. These innovations not only enhance the ability to monitor and protect biodiversity but also enable proactive and adaptive management strategies, ensuring that conservation efforts are more efficient, inclusive, and sustainable in the long term.

Abstract No. 85

INTEGRATION OF TRADITIONAL KNOWLEDGE AND NATURAL SCIENCE: CASSIA FISTULA POD EXTRACT AS A NATURAL IMMUNOSTIMULANT IN FRESHWATER FISH AQUACULTURE

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ABSTRACT

Traditional knowledge systems have long valued medicinal plants for their healing potential, while natural science offers empirical methods to validate and apply this wisdom for modern challenges. Integrating these approaches can foster holistic development in health and agriculture. This study explores such integration by evaluating Cassia fistula, a plant documented in traditional medicine for its antioxidant, antimicrobial, and anti-inflammatory properties, as a natural immunostimulant in freshwater fish aquaculture. Methanolic pod extracts of C. fistula were analyzed using GC-MS, identifying 29 phytochemicals, with 10 compounds exhibiting bioactivities relevant to immunity and disease resistance. Feeding trials assessed the impact of dietary supplementation on fish health, focusing on histopathological changes in immune organs including spleen, thymus, ovary, and kidney after pathogen exposure. Fish receiving the supplemented diet demonstrated enhanced immune responses, stronger antioxidant defense, and reduced tissue damage compared to controls. The results highlight C. fistula as a promising eco-friendly feed additive that aligns traditional ethnobotanical knowledge with scientific validation. This work illustrates how merging natural science and traditional wisdom can advance sustainable aquaculture, reduce antibiotic dependence, and contribute to holistic approaches for animal health and environmental well-being.

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Abstract No. 86

GREEN GROWTH STRATEGIES: BALANCING ECONOMIC EXPANSION AND ENVIRONMENTAL PROTECTION

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ABSTRACT

The pursuit of sustained economic growth has often been accompanied by environmental degradation, raising concerns about the long-term viability of conventional development models. This paper examines the concept of green growth as a strategic framework for achieving economic expansion while ensuring environmental protection. It explores the theoretical foundations of sustainable development and analyzes the dynamic relationship between economic growth, resource utilization, and ecological sustainability. Using a combination of cross-country data and case-based evidence, the study evaluates the effectiveness of green growth policies such as renewable energy adoption, carbon pricing, energy efficiency improvements, and sustainable agricultural practices. The paper also investigates the applicability of the Environmental Kuznets Curve hypothesis in the context of developing economies, with a particular focus on structural transformation and policy interventions. Special attention is given to the role of institutional quality, technological innovation, and environmental education in facilitating a transition towards a low-carbon economy. Empirical findings suggest that while economic growth initially exerts pressure on environmental resources, well-designed policy measures can decouple growth from environmental degradation over time. Furthermore, the study highlights the challenges faced by emerging economies, including financial constraints, policy implementation gaps, and trade-offs between short-term growth and long-term sustainability. The paper concludes that green growth strategies, when supported by robust governance frameworks and inclusive policy design, can provide a viable pathway for balancing economic and environmental objectives. It recommends integrated policy approaches that align economic incentives with environmental goals, thereby promoting sustainable and resilient development in the long run.

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Abstract No. 87

CLIMATE-RESILIENT ERICULTURE: ERI SILKWORM (*SAMIA RICINI* DONOVAN) ADAPTATION STRATEGIES UNDER CHANGING THERMAL REGIMES

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ABSTRACT

Ericulture, the rearing of the Eri silkworm (*Samia ricini* Donovan), is one of the oldest ecologically embedded sericulture systems, practiced predominantly across Northeast India, Southeast Asia, and sub-Saharan Africa. As a non-violent, vanya silk system interwoven with indigenous agrarian livelihoods, Eri culture uniquely bridges biodiversity conservation, sustainable textile production, and rural food security. Yet, accelerating anthropogenic climate change marked by rising temperatures, erratic monsoons, and shifting seasonal boundaries critically threatens the thermal stability upon which Samia ricini development, feeding efficiency, and cocoon yield depend. This study investigates the physiological and behavioral adaptation strategies of the Eri silkworm under changing thermal regimes, integrating evidence from laboratory thermotolerance studies, field rearing trials, and agro-ecological observations. It examines heat stress impacts on larval growth, spinning behavior, silk gland morphology, and pupal viability, alongside phenological disruptions of host plants (Ricinus communis and Heteropanax fragrans) driven by climate variability. Farmer-led adaptive strategies including microclimate management, host plant diversification, and seasonal rearing adjustments are consider as embedded climate-resilience responses. While Samia ricini exhibits moderate thermal plasticity, sustained temperature anomalies beyond critical thresholds undermine production sustainability and cultural continuity. The study advocates for integrated climate-adaptive Ericulture policies combining indigenous ecological knowledge, scientific breeding programs, and ecosystem-based management to safeguard this heritage textile system.

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Abstract No. 88

ADVANCING SUSTAINABLE AGRICULTURE THROUGH LASER-BASED REMOTE SENSING TECHNOLOGIES

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ABSTRACT

Laser-based remote sensing has emerged as a powerful tool for promoting sustainable agriculture by enabling precision farming practices. It facilitates the efficient use of critical resources such as water, fertilizers, and pesticides, thereby enhancing crop productivity while minimizing environmental impacts. By integrating data from satellites, drones, and ground-based sensors, farmers can make informed, data-driven decisions tailored to specific field conditions. This technology provides detailed insights into crop health, soil moisture, and nutrient status by analyzing different spectral signatures. It allows early detection of stress factors, including nutrient deficiencies, diseases, and pest infestations, enabling timely intervention before significant crop damage occurs. Consequently, it reduces input costs and prevents excessive chemical use and environmental pollution. Continuous monitoring of crop growth throughout the season improves yield prediction and supports better planning for harvesting, storage, and marketing. In addition, remote sensing plays a crucial role in assessing climate-related risks such as drought, land degradation, and changing weather patterns, helping farmers and policymakers develop adaptive strategies. The integration of advanced analytical tools, including artificial intelligence and machine learning, further enhances the interpretation of large datasets generated by remote sensing systems. This enables site-specific management practices instead of uniform field treatments, improving efficiency and sustainability. Overall, laser remote sensing technology contributes significantly to resilient agricultural systems and supports global efforts toward food security and sustainable development.

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Abstract No. 89

POLYSACCHARIDE-DERIVED HYDROGELS: A GREEN STRATEGY FOR HEAVY METAL REMOVAL FROM WASTEWATER

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ABSTRACT

The contamination of water resources by heavy metal poses a persistent threat to environmental and public health due to the non-biodegradable and toxic nature of metals such as Lead, Nickel, Cadmium, and Chromium. Conventional treatment methods usually suffer from limitations such as high operational cost, secondary pollution, and limited efficiency at low metal concentrations. In this context, the present study deals with biodegradable polysaccharide-based hydrogels as a sustainable and efficient platform for heavy metal removal. Naturally derived polymers such as *Fenugreek* and *Coccinia indica* were used to synthesize the hydrogels using environmentally benign cross linking approaches. The prepared hydrogels were characterized for their structural and physicochemical properties using standard analytical techniques to understand porosity, swelling behavior, and functional group interactions. Batch adsorption studies were then performed to evaluate the removal efficiency under varying pH, contact time, and initial metal ion concentration. High adsorption capacity, rapid uptake kinetics, and good reusability over multiple cycles were some of the results that were observed. The presence of abundant functional groups such as hydroxyl and amino groups facilitates strong binding interactions with heavy metal ions, contributing to enhanced removal performance. Furthermore, since these materials are biodegradable, they cause less environmental impact, making them well aligned with green chemistry principles. Overall, this study highlights the potential of polysaccharide-based hydrogels as cost-effective, eco-friendly, and scalable materials for wastewater treatment. The results also provide useful insights for developing sustainable technologies to tackle heavy metal pollution and support their practical use in real-world water purification systems.

Abstract No. 90

SYNTHESIS OF MICROBIALLY-DERIVED BIO-SURFACTANTS FROM INDUSTRIAL WASTE: A CIRCULAR APPROACH TO SUSTAINABLE WASTEWATER REMEDIATION

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ABSTRACT

Traditional wastewater treatment relies heavily on synthetic surfactants, which, despite their efficacy, pose significant ecological risks due to their toxicity and poor biodegradability. As the global shift toward a circular economy intensifies, Nature-Based Solutions (NbS), specifically bio-surfactants emerging as a superior alternative. These amphiphilic molecules offer high surface activity, low critical micelle concentration (CMC), and environmental compatibility. This study investigates the green synthesis of bio-surfactants (e.g., Rhamnolipids or Surfactins) utilizing agro-industrial waste as a cost-effective carbon source, evaluating their efficiency in removing complex pollutants from industrial effluents. Using microbial strains such as Pseudomonas aeruginosa or Bacillus subtilis, synthesis is optimized through submerged fermentation. To enhance the "green" profile, conventional glucose is replaced with low-cost substrates like waste cooking oil, whey, or lignocellulosic hydrolysates. The synthesized bio-surfactants are then applied to wastewater samples to measure the reduction in Chemical Oxygen Demand (COD) and the sequestration of heavy metals (Pb^{2+} ,Cd^{2+}) via micellar-enhanced ultrafiltration. Preliminary findings suggest that waste-derived bio-surfactants achieve surface tension reduction comparable to synthetic counterparts (down to 25–30 mN/m) while maintaining stability across extreme pH and salinity gradients. Furthermore, the use of waste substrates reduces production costs by approximately 40%, significantly improving the techno-economic viability of the process. The synthesis of bio-surfactants from waste not only provides an eco-friendly tool for wastewater decontamination but also addresses the challenge of industrial byproduct management. This "green solution" integrates waste valorization with advanced environmental remediation, offering a scalable path toward zero-toxic discharge in water treatment facilities.

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Abstract No. 91

THE PARADOX OF PERPETUAL VITALITY: ENVIRONMENTAL ETHICS AND THE ANTHROPOGENIC IMPACT OF HUMAN LONGEVITY

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ABSTRACT

The "Paradox of Perpetual Vitality" explores the growing ethical and ecological tension between the pursuit of radical human longevity and the finite carrying capacity of the Earth. As biomedical breakthroughs bring us closer to significantly extending the human lifespan, we face a critical contradiction: the triumph of individual biological preservation versus the potential acceleration of planetary degradation. This paper examines the Anthropogenic Impact of Human Longevity through three primary lenses: Resource Intensification: An analysis of how extended life cycles exacerbate cumulative consumption patterns, placing unprecedented strain on carbon budgets, freshwater supplies, and arable land. Intergenerational Justice: The ethical dilemma of "demographic stagnation," where a nonrotating population may stifle the social and biological succession necessary for evolutionary and cultural adaptation. Eco-Ethical Responsibility: A critique of anthropocentric bioethics that prioritizes individual "vitality" over the stability of the biosphere. Ultimately, this study argues that without a concurrent shift toward circular economies and radical sustainability frameworks, the quest for immortality may inadvertently catalyze the very environmental collapse that threatens human survival. We propose a new "Longevity Ethics" that integrates individual health span with planetary homeostasis, suggesting that the right to live longer must be decoupled from the right to consume more.

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Abstract No. 92

ECOLOGICAL WISDOM IN THE PURANAS: TOWARDS SUSTAINABILITY

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ABSTRACT

Nature is conceived by the Purāṇas as the Divine's creative act, implying that preserving nature constitutes an essential dharma. They describe the world as an intricate web of interconnected components comprising living beings such as humans, animals, flora, and the workings of the cosmos. Air, according to the Vāyu Purāṇa, is considered the breath of all living beings, reinforcing the significance of maintaining a pollution-free atmosphere. As per these religious texts, the equilibrium between humans and nature is critical to sustaining life on earth. For instance, in the Vāyu Purāṇa, ethical behavior ensures the proper functioning of the ecosystem as indicated by rainfall during appropriate seasons. In the Matsya Purāṇa, tree plantation is emphasized as an extremely virtuous deed due to their importance in supporting life and maintaining ecological balance; however, unnecessary felling of trees invites calamity. The Padma Purāṇa emphasizes the need to preserve water by constructing ponds, wells, and reservoirs. Finally, the Bhāgavata Purāṇa depicts earth as a nurturing mother, encouraging humanity to be moderate and respectful in their consumption of natural resources. The Purāṇas caution against the exploitation of Mother Nature, which causes pain and imbalances in nature's cycles. Rivers are presented as deities in such religious texts as the Agni Purāṇa, urging us to preserve our aquatic resources. Ahimsa is emphasized as an approach for ensuring biodiversity and reducing damage to living organisms. The Purāṇas emphasize sustainability by using actions similar to yajñas as a demonstration of proper, symbiotic relationships with nature. They assert that rainfall, food crops, and human prosperity depend on ecological harmony. Indeed, the Purāṇas provide a comprehensive ecological perspective, demanding that we must be mindful of nature and live sustainably for the benefit of all creation and future generations.

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Abstract No. 93

TRAPA SPP. ; CLIMATE RESILIENCE, ANTHROPOGENIC IMPACT, WETLAND ECOLOGY

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ABSTRACT

The pursuit of sustainable and climate-resilient ecosystems necessitates a deeper understanding of underutilized aquatic plant species and their ecological functions. Trapa spp. (water chestnut), a floating macrophyte commonly found in freshwater wetlands, plays a multifaceted role in maintaining ecosystem integrity while supporting human livelihoods. Several studies emphasized the contribution of Trapa to biodiversity conservation and its relevance within the framework of environmental ethics and anthropogenic impacts. *Trapa* spp. enhance ecosystem resilience by improving water quality through nutrient uptake, mitigating eutrophication, and providing critical habitat and refuge for aquatic fauna, including fish, macroinvertebrates, and avifauna. Its presence contributes to carbon sequestration and sediment stabilization, both of which are essential in the context of climate change adaptation. From an ethical perspective, the sustainable utilization of *Trapa* reflects a balance between human needs and ecological preservation, particularly in rural communities where it serves as a source of nutrition, income, and traditional knowledge systems. However, increasing anthropogenic pressures such as overexploitation, habitat alteration, pollution, and unregulated spread of *Trapa* in certain ecosystems pose significant challenges to biodiversity. Dense growth can disrupt native species composition and alter ecological processes if not managed sustainably. There is a need for integrative management approaches that combine ecological science, community participation, and ethical stewardship to regulate *Trapa* populations. Several research findings indicate that Trapa species act as a key species in promoting sustainable and climate-resilient wetland ecosystems when guided by informed environmental ethics and adaptive management strategies.

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Abstract No. 94

INTERDISCIPLINARY APPROACHES IN ENVIRONMENTAL EDUCATION FOR SUSTAINABLE ECOSYSTEMS

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ABSTRACT

Environmental sustainability demands a reimagining of how ecological knowledge is taught, communicated, and applied across disciplinary boundaries. Traditional subject-specific approaches to environmental education have proven insufficient in addressing the complexity of ecosystem challenges that are inherently multidimensional, spanning biology, chemistry, social sciences, economics, and ethics. Interdisciplinary environmental education offers a transformative pedagogical framework that integrates perspectives from natural sciences, humanities, and social sciences to cultivate holistic ecological literacy among learners at all levels. By weaving together concepts from ecology, geography, environmental law, economics, and cultural studies, this approach enables students to understand ecosystems not merely as biological systems but as dynamic socio-ecological networks shaped by human values, governance structures, and economic pressures. Experiential learning strategies, including field-based investigations, community engagement projects, and problem-based inquiry, serve as critical tools in embedding interdisciplinary thinking within environmental curricula. Such methodologies encourage learners to critically evaluate environmental issues from multiple vantage points, fostering adaptive thinking and collaborative problem-solving skills essential for sustainable development. Furthermore, the integration of indigenous ecological knowledge alongside contemporary scientific frameworks enriches learners' appreciation of biodiversity and ecosystem services, promoting culturally sensitive conservation practices. Teacher training programs must equally reflect interdisciplinary values, equipping educators with the pedagogical competence to design and deliver cross-curricular environmental content effectively. Policy-level support through curriculum reform and institutional collaboration is indispensable for mainstreaming such integrative approaches in formal and non-formal education systems. Ultimately, interdisciplinary environmental education holds the potential to nurture a generation of ecologically conscious, socially responsible citizens capable of contributing meaningfully to the preservation and sustainable management of ecosystems for future generations.

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Abstract No. 95

ROLE OF ENVIRONMENTAL EDUCATION IN PROMOTING ECOLOGICAL AWARENESS AMONG STUDENTS

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ABSTRACT

The escalating environmental crisis, marked by climate change, biodiversity loss, pollution, and unsustainable resource consumption, necessitates a well-informed and ecologically conscious citizenry. Environmental Education (EE) serves as a foundational instrument in cultivating ecological awareness, responsible behaviour, and sustainability-oriented thinking among students at all levels of formal education. The present study investigates the role of Environmental Education in shaping ecological knowledge, attitudes, and pro-environmental practices among students in the Prayagraj region of Uttar Pradesh. A mixed-method research design was employed, incorporating structured questionnaires, observational assessments, and focused group discussions among students of secondary and higher secondary levels drawn from selected institutions affiliated with Nehru Gram Bharti University. Pre- and post-intervention data were collected to assess the impact of structured EE modules on students' ecological awareness, environmental sensitivity, and behavioural intentions toward conservation. The EE interventions included nature walks, waste management workshops, documentary screenings, and community-based ecological activities designed to bridge theoretical understanding with experiential learning. Results revealed a significant improvement in ecological awareness scores and positive attitudinal shifts following EE interventions. Students demonstrated enhanced understanding of local ecosystems, biodiversity conservation, and the consequences of anthropogenic activities on the natural environment. Gender and institutional background were found to moderately influence baseline awareness levels, whereas consistent EE exposure yielded comparable gains across diverse student groups. The study concludes that integrating comprehensive Environmental Education into mainstream curricula, supported by activity-based pedagogy and community engagement, is essential for fostering a generation of ecologically responsible citizens aligned with the goals of India's National Environment Policy and the UN Sustainable Development Goals.

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Abstract No. 96

INTEGRATING INDIGENOUS TRADITIONAL KNOWLEDGE WITH SCIENTIFIC APPROACHES FOR ENVIRONMENTAL SUSTAINABILITY

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ABSTRACT

Indigenous Traditional Knowledge (ITKs) represents a cumulative body of knowledge, practices, and beliefs developed by indigenous communities through long-term interaction with their natural environments. Rooted in cultural traditions and transmitted orally across generations, ITKs encompass areas such as agriculture, medicine, biodiversity conservation, and resource management. This knowledge system is holistic, adaptive, and closely tied to local ecosystems, making it highly relevant in addressing contemporary challenges like climate change, environmental degradation, and sustainable development. Despite its value, ITKs often remain under recognized and are increasingly threatened by globalization, cultural homogenization, and loss of indigenous languages. Integrating ITKs with modern scientific approaches offers a promising pathway for creating resilient and context-specific solutions. Therefore, safeguarding, documenting, and promoting Indigenous Traditional Knowledge is essential not only for preserving cultural heritage but also for enhancing global sustainability efforts. Indigenous Traditional Knowledge (ITKs) in agriculture comprises time-tested practices and skills developed by local communities through generations of interaction with their environment. These include crop diversification, soil fertility management, water conservation, and natural pest control methods that are adapted to specific ecological conditions. ITKs promote sustainability, low external input use, and resilience to climate variability. In the context of modern agricultural challenges such as soil degradation, declining biodiversity, and climate change, integrating ITKs with scientific innovations can enhance productivity while maintaining ecological balance. Recognizing and preserving this knowledge is essential for achieving sustainable and climate-resilient farming systems.

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Abstract No. 97

MICROPLASTICS IN FRESHWATER SYSTEMS: IMPLICATIONS FOR BIODIVERSITY AND TROPHIC DYNAMICS

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ABSTRACT

Microplastics are emerging environmental threat that affects freshwater biodiversity and food chains. Microplastics (MPs) are very tiny plastic particles less than 5 mm in size, that are now commonly found in rivers, lakes and wetlands. These particles come from different sources like plastic waste, synthetic cloths, cosmetics, industrial discharge etc. Due to their small size, they do not easily breakdown and remain in the environment for a long time and spread easily through freshwater systems. Aquatic organisms including planktons, small invertebrates and fish intake microplastic as food by mistake and ingest them. These can cause serious problems such as blockage in the digestive system, reduced feeding, slower growth and even death. In addition microplastics can carry harmful chemicals such as pesticides and heavy metals, which enter the body of organisms along with the plastic particles. This increases toxicity and affects overall health and reproduction. Microplastics can also move through the food chain. When smaller organisms that have consumed microplastics are eaten by larger animals, these particles transferred from one trophic level to another. This process is known as trophic transfer, can disturb the balance of food chains and affect predator prey relationships. This may lead to decline in biodiversity and changes in ecosystem functioning. Apart from direct effects on animals microplastics can also influence microorganisms and nutrient cycle in water bodies which are essential for maintaining ecosystem productivity. The combined impact of these changes can reduce the stability and resilience of freshwater ecosystems. To manage growing problem, it is important to reduce plastic pollution at its source. Better waste management, improved wastewater treatment and increased public awareness can help limit the entry of microplastic into the aquatic system. Effective management and sustainable practices are necessary to protect aquatic life and maintain ecological balance.

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Abstract No. 98

EVALUATING ANTHROPOGENIC IMPACTS ON GROUNDWATER QUALITY THROUGH A COMPARATIVE STUDY OF INDUSTRIAL AND RESIDENTIAL ZONES IN KANPUR NAGAR

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ABSTRACT

Groundwater is expected to remain a critical freshwater resource for rapidly urbanizing regions, particularly in cities like Kanpur Nagar where industrial expansion and dense residential settlements are likely to exert increasing pressure on subsurface water systems. This proposed study will aim to evaluate and compare groundwater quality across selected industrial and residential zones to understand the extent and nature of anthropogenic influences. The research is expected to focus on key physico-chemical parameters such as pH, Temperature, Total dissolved solids, Hardness, and selected heavy metals, which are commonly associated with industrial discharge and domestic waste infiltration. Sampling is planned to be conducted systematically from representative locations in both industrial and residential areas, followed by laboratory analysis using standard methods. The study will likely aim to know spatial variations and overall suitability of groundwater for drinking and domestic purposes. The findings are expected to highlight significant differences in groundwater quality between industrial and residential zones, with industrial areas potentially showing elevated levels of pollutants due to untreated or partially treated effluents. Residential zones, on the other hand, may reflect moderate contamination linked to sewage leakage, septic systems, and urban runoff. The outcomes may support policymakers and local authorities in designing effective monitoring frameworks, pollution control strategies, and sustainable water resource management practices.

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Abstract No. 99

MORPHO-TAXONOMICAL BIODIVERSITY OF HELMINTH PARASITES FROM BARUASAGAR TAAL, BUNDELKHAND REGION OF UTTAR PRADESH

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ABSTRACT

The morpho-taxonomical biodiversity of fish tapeworm parasites in Barua Sagar taal, Bundelkhand region of Uttar Pradesh, represents a critical area of aquatic parasitology. It is an important site for studying the biodiversity of helminth parasites in freshwater fish. These parasites significantly impact the physiological health, hematological profile and growth of the host ultimately reducing the commercial and nutritional value of edible fish species. In this study, we collected 50 catfish with the help of local fishermen to examine them for Parasitic Biodiversity. After a careful examination of the fish intestines, four live tapeworm parasites were recovered. These specimens were preserved in 5% formalin for further laboratory work. A detailed morphotaxonomic study was carried out to identify the parasites based on their Morpho-taxonomic characteristics. The results showed that all the recovered tapeworms belong to the family Capingentidae (Hunter, 1930). Finding these parasites in Baruasagar Tal provides important information about the Parasitic Infestation and health of fishes in this specific region. This research contributes to the documentation of helminth biodiversity in the Bundelkhand region and provides essential data for aquatic health management and the study of the impact of parasitism on local pisciculture.

Abstract No. 100

RESILIENCE IN THE AFTERMATH OF DISASTER: THE ROLE OF SOCIAL SUPPORT

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ABSTRACT

Natural disasters constitute profound disruptions that reconfigure individual lives, social structures and psychological well-being. The state of Sikkim experienced such a disaster in the form of a Glacial Lake Outburst Flood (GLOF) on 4th October 2023 that caused extensive destruction in the state and adjoining area of Darjeeling. In the aftermath of this disaster the present study examined the interrelationship between social support, death anxiety and post trauma on resilience, among individuals directly or indirectly affected by the floods. A quantitative survey was conducted on a sample of 110 participants, aged between 18-50 years using different psychological tools that were affected by flash floods from Sikkim and Darjeeling. Results indicated a positive correlation between resilience and social support ($r=0.36$; $p=<.001$).In contrast the findings showed a negative correlation ($r= -0.050$) between resilience and death anxiety and post trauma ($r= -0.053$). However, the correlation was not significant. The results also showcased that individuals with higher levels of disaster exposure experienced more severe mental health issues. However, the presence of strong social support was found to play a protective role, helping to reduce psychological distress and improve coping among survivors. The study highlighted an urgent need for development of structured, evidence-based intervention programs tailored to disaster affected population. Such interventions should not only aim to address immediate psychological distress but also to strengthen the resilience and recovery process. There is also a growing need for increased awareness, effective policies, and strong support systems to address and manage the psychological consequences of disasters.

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Abstract No. 101

ANTIMICROBIAL PEPTIDES COMBATING THE 'ONE HEALTH' CRISIS OF ANTIMICROBIAL RESISTANCE IN ENVIRONMENT

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ABSTRACT

The accelerating rise of antimicrobial resistance (AMR) has evolved into a global One Health crisis, driven by interconnected human, animal, and environmental factors. Environmental compartments such as wastewater systems, agricultural soils, and aquaculture settings serve as critical reservoirs for resistant microorganisms and resistance genes, facilitating their persistence and dissemination across ecological boundaries. The declining efficacy of conventional antibiotics in these environments underscores the urgent need for alternative antimicrobial strategies. While much attention has historically been focused on clinical stewardship, the environment-acting as a conduit for antibioticresidues and resistance genes from agricultural runoff and untreated wastewater-plays acritical role in the selection and dissemination of multidrug-resistant (MDR) pathogens. Traditional antibiotic pipelines are currently failing to keep pace with evolving resistance mechanisms, necessitating a paradigm shift toward alternative therapeutic agents. Antimicrobial peptides (AMPs), key effectors of innate immunity found across diverse organisms, have emerged as promising candidates to combat AMR. These peptides exhibit broad-spectrum activity against bacteria, and fungi, primarily through microbialmembrane disruption, intracellular targeting, and immunomodulatory functions. Their rapid mode of action and reduced likelihood of resistance development make them attractive alternatives to traditional antibiotics. Recent advances in transcriptomics, bioinformatics, and peptide engineering have accelerated the discovery and optimization of novel AMPs with improved stability, specificity, and reduced cytotoxicity. Importantly, AMPs hold significant potential for environmental applications, including wastewater treatment, biofilm inhibition, and disease control in aquaculture and livestock systems-key interfaces in the One Health continuum. However, challenges such as susceptibility to enzymatic degradation, production costs, and potential ecological impacts must be addressed for large-scale deployment.

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Abstract No. 102

STUDIES ON MICROBIAL DIVERSITY OF AMYLOLYTIC/ALCOHOLIC STARTERS OF NORTH BENGAL

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ABSTRACT

Fermentation is an integral part of ethnic people of North Bengal for the preservation of raw substrate from spoilage as well as to preserve the viable forms of microbial consortia for the desired food development. Ethnic communities prepare different types of fermented foods, alcoholic beverages and amylolytic starters by using their traditional knowledge. These fermented foods they consume and sell for their sustainable livelihood. There are different types of fermented foods and alcoholic beverages in North Bengal region prepared by these ethnic populations from ancient times. There are various types of alcoholic starters in the North Bengal region, prepared by using glutinous rice as raw substrate and old starter culture which contains the microbial inocula for fermentation and final product development. These amylolytic starters contain yeasts, molds and lactic acid bacteria, their microbial consortia and dominance of yeasts and molds have been observed. All eight districts of North Bengal contain different types of alcoholic starters with different microbial diversity. The molds play an important role in the breakdown of polysaccharides to disaccharides and yeasts play an important role in the fermentation of monosaccharides thereby producing alcohol and carbon di-oxide as final products and so the name alcoholic fermentation. Marcha, dabai, chot, and ranugoti, are traditionally prepared dried amylolytic starters used to produce various ethnic alcoholic beverages in this region. In the present study the phenotypic characterization gives the metabolic fingerprints of yeasts present in all alcoholic starters of North Bengal samples which showed major dominance of (yeasts). Scanning electron microscope (SEM) has been performed to reveal the surface structures of yeast isolates. The alcohol content of the fermented product ranges between 6-6.5 %, and the alcohol tolerance is up to 17 % (v/v), pH ranges between 3.9 and 4.0. The present study reveals the microbial diversity among diverse variety of all eight types of alcoholic starters from eight districts of North Bengal as well as the traditional production process of alcoholic starters in all eight districts and how it promotes sustainable livelihood of ethnic people in this region.

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Abstract No. 103

HOME GARDENING FOR FOOD SECURITY: A REVIEW OF PRACTICES AND BENEFITS

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ABSTRACT

Amid escalating concerns over food insecurity, climate change, and rapid urbanization, home gardening has re-emerged as a sustainable and decentralized approach to enhancing household food and nutritional security. This review synthesizes global evidence on the practices, benefits, and socio-economic implications of home gardening as a resilient food production system. The paper examines diverse cultivation practices—including container gardening, vertical farming, mixed cropping, and organic nutrient management—that enable efficient use of limited space and resources. It highlights the role of locally available inputs, composting techniques, and water-efficient irrigation methods in sustaining productivity under constrained conditions. The selection of diverse, nutrient-rich crops is emphasized for improving dietary quality and resilience against supply chain disruptions. Drawing on empirical studies, the review underscores that home gardens can supply a substantial proportion of household fruits, vegetables, and essential micronutrients, significantly enhancing nutritional intake and dietary diversity. Additionally, home gardening contributes to supplementary income generation, reduces food expenditure, and serves as a critical buffer during periods of economic or environmental stress. Moreover, it encourages the adoption of pure, natural, and organic practices, promoting a healthier and more sustainable lifestyle. Home gardening is also recognized as a multifunctional system that promotes biodiversity, strengthens ecological sustainability, and supports physical and mental well-being. The integration of indigenous knowledge with modern horticultural practices is identified as a key factor in ensuring long-term sustainability and cultural relevance. The review also discusses policy frameworks, community participation, and extension strategies necessary for scaling up home gardening initiatives. In conclusion, home gardening represents a cost-effective, environmentally sustainable, and socially empowering strategy for strengthening food security at the grassroots level, thereby contributing to resilient communities and sustainable development in an increasingly uncertain global food landscape.

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Abstract No. 104

CULTIVATION OF TRAPA (AQUATIC PLANT) IN FISHPOND AND ITS ROLE IN NATURAL FISH FOOD ORGANISMS PRODUCTION

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ABSTRACT

The aquatic plant has common name Singhara and also known as water chestnut, its botanical name is *Trapa bispinosa*. The plants are very ancient origin having quality of wide spreading in water. The plants are partly sloping and partly submerged. It accurse most part of Uttar Pradesh, Bihar, West Bengal, Madhya Pradesh, Assam and small level in all over India, in pond, tank, lake and paddy fields. Its fruits eaten either raw or cooked, used in fasting day and also used for different dices like kheer, halwa etc.The plant has contained two types of roots, one near the base of stem which fixed the plant into the muddy zone. The second type roots are free floating fibrous and borne ion pairs below the leaf bases. The flower appears after pollination dense down and submerged in water column for fruits formation. The fruit are one seeded, triangular in shape with two well developed spines from the seed court. Cultivable fish species with trapa farming in 4 to 5 feet water depth are Bhakur (*Catla catla*), Rohu (*Labeo rohita*), Mrigal (*Cirrhinus mrigala*) and in shallow water cultivable fish species are Mangur (*Clarias batrachus*), Singhi (*Heteropneustes fossilis*), Snack head fish *(Channa Sp.)* Kawai (*Anabas testudineus*).

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Abstract No. 105

ECOSYSTEM RESILIENCE AND THE SUSTAINABLE DEVELOPMENT GOALS

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ABSTRACT

Ecosystem resiliencethe capacity of natural systems to absorb disturbances, adapt to environmental changes, and sustain essential functionsplays a pivotal role in achieving the Sustainable Development Goals (SDGs). In the face of accelerating climate change, biodiversity degradation, pollution, and unsustainable resource use, ecosystems are increasingly vulnerable, threatening the provision of critical ecosystem services such as food security, water availability, and climate regulation. This paper explores the dynamic relationship between ecosystem resilience and key SDGs, particularly those related to climate action, life below water, and life on land, while also addressing their broader implications for human health, poverty reduction, and sustainable livelihood. The study highlights the importance of integrated and adaptive management strategies, including ecological restoration, conservation planning, and community participation, in strengthening ecosystem resilience. Nature-based solutions, such as afforestation, wetland conservation, and sustainable agricultural practices, are identified as effective and economically viable approaches that contribute simultaneously to environmental sustainability and socio-economic development. The paper further underscores the role of indigenous knowledge systems, policy integration, and technological advancements in enhancing resilience at multiple scales. Despite these opportunities, challenges such as policy fragmentation, financial constraints, and limited stakeholder engagement continue to impede progress. The paper advocates for a holistic, interdisciplinary framework that aligns ecological resilience with development priorities. It concludes that fostering resilient ecosystems is fundamental not only for biodiversity conservation but also for ensuring long-term human well-being and achieving the SDGs by 2030.

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Abstract No. 106

MORPHOLOGICAL AND ECOLOGICAL STUDY OF DIGENETIC TREMATODES IN CHANNA SPP. FROM RIVER KUANO (UTTAR PRADESH, INDIA): IMPLICATIONS FOR ECOSYSTEM RESILIENCE AND SUSTAINABLE DEVELOPMENT GOALS

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ABSTRACT

The present study investigates the morphological and ecological aspects of digenetic trematode parasites infecting *Channa* spp. from the River Kuano, Uttar Pradesh, India, with special reference to ecosystem resilience and the Sustainable Development Goals (SDGs). Freshwater ecosystems are highly dynamic and sensitive to environmental fluctuations, making host-parasite interactions valuable indicators of ecological health. Fish samples were collected monthly over an annual cycle and examined for trematode infections using standard parasitological techniques. Isolated parasites were processed through fixation, staining, and mounting for detailed morphological identification. Ecological indices such as prevalence, mean intensity, relative density, and abundance were calculated to assess infection dynamics. The results revealed a marked seasonal variation in infection patterns, with higher prevalence and intensity during warmer and more humid months, while lower values were recorded during winter. Principal Component Analysis (PCA) indicated temperature as the primary factor influencing infection dynamics, whereas humidity exhibited a secondary yet significant role. Morphological observations confirmed species diversity among digenetic trematodes, highlighting their adaptive strategies in response to environmental conditions. The study emphasizes the importance of environmental parameters in shaping parasite distribution and host susceptibility, thereby reflecting ecosystem stability. These findings align with SDG goals related to life below water, biodiversity conservation, and sustainable resource management. The research contributes to a better understanding of fish health management and provides a scientific basis for monitoring aquatic ecosystems under changing climatic conditions.

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Abstract No. 107

SUSTAINABLE AND CLIMATE RESILIENT ECOSYSTEMS: ANTHROPOGENIC IMPACTS AND ETHNOBOTANICAL SIGNIFICANCE OF AVIAN DIVERSITY ALONG THE GOMTI RIVER, LUCKNOW

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ABSTRACT

Rapid urbanization and beautification of the Gomti River front in Lucknow pose significant anthropogenic impacts on local ecosystems, altering avian habitats and threatening species like the house sparrow. This study examines avian diversity through the framework of sustainable and climate-resilient ecosystems and environmental ethics, assessing impacts of riverfront development on bird species richness and habitat use, documenting linkages between native vegetation, insect populations, and avian food resources critical for species such as house sparrows, and exploring the ethnobotanical significance of plants selected by birds through 'smart herb hunting' behavior for potential safe phytomedicine. Field surveys, behavioral observations, and botanical analysis will be conducted along the Gomti River. Findings will contribute to conservation strategies that integrate avian ecology, native flora restoration, and environmental ethics, promoting climate-resilient habitat management. This interdisciplinary approach highlights the role of avian diversity as a bioindicator of ecosystem health and a guide for sustainable urban planning.

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Abstract No. 108

ROLE OF MASS MEDIA IN ACHIEVING SUSTAINABLE DEVELOPMENT GOALS (SDGS): AN ANALYTICAL REVIEW

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ABSTRACT

The Sustainable Development Goals (SDGs), adopted by the United Nations in 2015 as part of the 2030 Agenda, represent a universal call to action addressing poverty, inequality, climate change, environmental degradation, peace, and justice. Mass media, encompassing print, broadcast, digital, and social media platforms, has emerged as a powerful catalyst in advancing public awareness, behavioral change, and policy advocacy essential for SDG implementation. Mass media serves as a primary conduit for disseminating information on SDG-related issues, including environmental conservation, public health, gender equality, quality education, and climate action. Through investigative journalism, documentary filmmaking, and digital campaigns, media platforms hold governments and corporations accountable, thereby strengthening SDG 16 (Peace, Justice, and Strong Institutions) and SDG 17 (Partnerships for the Goals). Furthermore, social media networks amplify grassroots movements; democratize information access, and foster inclusive public discourse, particularly among marginalized and rural communities who are central to achieving SDG 1 (No Poverty) and SDG 10 (Reduced Inequalities). However, challenges such as misinformation, media commercialization, digital divide, and political bias significantly hinder the constructive role of media in SDG communication. Sensationalism and inadequate science reporting further distort public understanding of complex sustainability issues, necessitating media literacy programs, ethical journalism standards, and collaborative frameworks between media organizations, governments, and civil society. In addition, mass media plays a significant role in promoting community participation and encouraging sustainable lifestyles through educational programs, public service advertisements, and awareness campaigns. Television debates, radio broadcasts, podcasts, and online platforms help people understand their social and environmental responsibilities while motivating collective action toward sustainable development. Media coverage of successful sustainability initiatives, renewable energy projects, waste management practices, and climate resilience strategies inspires communities and policymakers to adopt innovative and eco-friendly solutions. By creating informed citizens and facilitating global dialogue on sustainability concerns, mass media contributes substantially to building a socially responsible, environmentally conscious, and development-oriented society committed to achieving the SDGs. In conclusion, mass media is an indispensable instrument in the global sustainability agenda, and strategic, responsible, and inclusive media engagement is imperative for accelerating progress toward the 2030 SDG targets.

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Abstract No. 109

ROLE OF ARTIFICIAL INTELLIGENCE IN BIODIVERSITY CONSERVATION AND ECOSYSTEM DYNAMICS

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ABSTRACT

Biodiversity loss is a major problem for our planet. It is driven by climate change, habitat destruction, invasive species and human activities.Traditional ways of monitoring biodiversity and analyzing ecosystems are helpful. But have some big limitations. They are often not scalable, not accurate and take much time. Artificial Intelligence or AI has become a game-changer for research and conservation. This paper looks at how AI's used in biodiversity conservation and ecosystem dynamics. It focuses on the methods, applications, outcomes and limitations of AI. AI technologies like Machine Learning, Deep Learning, Natural Language Processing and computer vision help process ecological datasets. These tools make it possible to automatically identify species classify habitats, forecast changes and map biodiversity. When AI is combined with sensing, Geographic Information Systems and environmental sensors it revolutionizes ecological monitoring. This is because it allows for real-time data collection and analysis. AI models also help us understand ecosystem dynamics by simulating interactions between living and nonliving things. They can predict how ecosystems will respond to changes. This study reviews existing research case studies and compares AI-based approaches. The findings show that AI greatly improves efficiency, accuracy and predictive capabilities in biodiversity conservation. However there are challenges like data bias, lack of transparency ethical concerns and the environmental impact of AI systems. In conclusion AI is not a replacement for ecological methods. It is a tool that enhances decision-making and conservation outcomes. Future research should focus on making AI models more transparent. It should also combine insights from fields and ensure that AI technologies are implemented sustainably in ecological systems. Biodiversity conservation and AI are crucial, for our planets future. We need to use AI and traditional methods to protect the environment.

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Abstract No. 110

MODERN THERAPEUTIC STRATEGIES IN ENDOMETRIAL CANCER INTEGRATING MOLECULAR PROFILING AND IMMUNOTHERAPY

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ABSTRACT

Endometrial cancer remains one of the most common gynecologic malignancies, and for decades we relied almost exclusively on histologic appearance to guide treatment. While this approach served us reasonably well, we now know it falls short in capturing the true biological diversity of these tumors. What has changed everything is our growing understanding of the tumor's underlying molecular landscape. Today, routine molecular profiling has become central to decision-making. In particular, the identification of mismatch repair deficiency (dMMR) or microsatellite instability-high (MSI-H) status has emerged as a critical biomarker. Tumors with these alterations have a high mutational burden and generate neoantigens that make them especially vulnerable to immune attack. Rather than reaching straight for traditional chemotherapy, we can now offer more precise and often better-tolerated options for these patients. This molecular insight has opened the door to immunotherapy, particularly PD-1 checkpoint inhibitors. These agents don't kill cancer cells directly; instead, they release the brakes on the patient's own immune system, allowing T-cells to recognize and destroy the tumor. The results in dMMR/MSI-H endometrial cancers have been impressive, leading to meaningful improvements in response rates and survival compared with chemotherapy alone in both frontline and recurrent settings. We are still learning how best to combine these approaches and how to manage the remaining molecular subgroups (such as p53-aberrant or POLE-mutated tumors), but the direction is clear. The integration of molecular testing and immunotherapy has moved us away from a one-size-fits-all strategy toward truly personalized care. For patients with advanced or recurrent endometrial cancer, this shift is already translating into longer survival and better quality of life.

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Abstract No. 111

TRADITIONAL INDIAN KNOWLEDGE AND MODERN BIOLOGY FOR A GREENER FUTURE: A REVIEW

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ABSTRACT

The search for sustainable, scalable solutions has grown crucial as the world community deals with major ecological issues, such as biodiversity loss and climate change. The synergistic potential of combining the cutting-edge capabilities of contemporary biological sciences with Traditional Indian Knowledge (TIK) systems, such as Vrikshayurveda (traditional plant science), indigenous agricultural methods, and ethnomedicine, is examined in this paper. We comprehensively investigate how innovation in three important fields—sustainable agriculture, environmental conservation, and eco-friendly therapies—can be stimulated by bridging the ontological divide between reductionist modern biology and holistic traditional wisdom. Traditional ecological techniques can be extensively validated, optimized, and scaled by researchers using contemporary biotechnological tools like genomes, metabolomics, and bioinformatics. The review covers successful case studies, such as the use of native microbial consortia for soil bioremediation and the improvement of climate-resilient heirloom crop varieties by marker-assisted selection. We also talk about how bioprospecting, using old pharmacopeias as a guide, speeds up the development of sustainable treatments while actively reducing the overuse of natural resources. In the end, this research suggests a multidisciplinary paradigm that combines the accuracy of contemporary biotechnology with the ecological ethos of Indian traditions. We contend that this integrative approach is not only essential for protecting bio-cultural heritage but also a very practical and successful tactic for building a more resilient and "greener" world.

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Abstract No. 112

EDUCATIONAL INTERVENTIONS FOR BIODIVERSITY CONSERVATION AND SUSTAINABLE ECOSYSTEM MANAGEMENT

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ABSTRACT

The rapid decline in biodiversity and the increasing imbalance in ecosystem functioning have become major global challenges, primarily resulting from human-induced pressures and unsustainable exploitation of natural resources. In response to these concerns, education has emerged as a key mechanism for advancing biodiversity conservation and promoting sustainable ecosystem management. This paper investigates how educational initiatives influence environmental knowledge, attitudes, and behaviors across various learning environments. The analysis focuses on the contribution of well-designed curricula, hands-on learning experiences, and community-based programs in building ecological understanding and encouraging environmentally responsible actions. It also examines the importance of interdisciplinary perspectives that combine ecological principles with social, economic, and cultural contexts, enabling a more comprehensive interpretation of ecosystem processes. Particular emphasis is placed on how environmental education can equip learners with critical thinking skills and motivate their active involvement in conservation efforts and sustainable decision-making.In addition, the paper suggests forward-looking strategies such as the integration of digital technologies, learner-centered approaches, and supportive policy frameworks to enhance the effectiveness of educational practices in this domain. Overall, the study aims to develop a conceptual framework that highlights the transformative potential of education in achieving ecological sustainability, thereby contributing to the protection of biodiversity and the stability of ecosystems over time.

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Abstract No. 113

DENSITY AND FREQUENCY OF RUST DISEASE IN JABALPUR REGION

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ABSTRACT

The rust fungi were observed in almost all seasons except summer. They were found in monsoon season when temperature ranges from 19° to 30°C and the relative humidity from 60 to 95%, in winter season, when temperature was 15°C with low relative humidity. In summer season, when temperature reaches beyond 42°C with relative humidity 10-12%, the rust was not observed in any of the host plant. During the study period, 12 different types of rust species were observed in 10 different host trees. The maximum density (0.5) was recorded in *Puccinia allii* Castagne and minimum density (0.16) was recorded in *Dasturella divina* Syd. and *Ravenelia* sp. During the study period, all the 12 different rust species had equal frequency (8.3%). The yearly frequency in this year was 50.0%.

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Abstract No. 114

MULTIDIMENSIONAL EFFECTS OF HUMAN ACTIVITIES ON FRESHWATER SYSTEMS: A BIODIVERSITY AND WILDLIFE PERSPECTIVE

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ABSTRACT

Water is one of the most essential resources on the Earth. It sustains ecosystems, supports agriculture and industry and forms the foundation of healthy communities. The quality of this life-giving resource is increasingly under threat not just from climate change or geographic scarcity, but from us. Human activity plays a leading role in degrading the safety and sustainability of our planet's freshwater systems. Freshwater ecosystems are threatened by human activities, leading to environmental degradation. Anthropogenic activities are exerting profound and multifarious pressures on freshwater ecosystems, leading to biodiversity loss, decline in wildlife population and ecological integrity. The responses of biodiversity are species displacement, loss of genetic diversity, and increased susceptibility of endemic taxa. Wildlife that is dependent on freshwater, especially amphibians, birds, and mammals, is characterized by changes in distribution, reproductive success and survival patterns. This study seeks to evaluate the effects of human activities on different aspects of freshwater fish diversity, decline on terrestrial biodiversity and ecosystem services, including water purification, nutrient cycling, and climate regulation. The study will also suggest a series of impacts to ecosystem services including the purification of water, nutrient cycle, and climate regulation. Hence, this study summarizes the efforts made by various researchers regarding policy formulation, stakeholder engagement, and long-term ecological monitoring to mitigate anthropogenic impacts towards the sustainable conservation of freshwater biodiversity and the ecological stability of associated wildlife systems.

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Abstract No. 115

WATER QUALITY ANALYSIS OF RIVER NARMADA AT DINDORI

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ABSTRACT

A comprehensive study was undertaken to analyze the physico-chemical and bacteriological characteristics of river Narmadaat Dindori (M.P.), India from April to May, 2025, in order to assess its pollution status water sample were collected from five sampling stations and their physico-chemical and microbiological variables like pH, temperature were determined as per BIS,2012 and APHA,1998. A total of 52 bacteria were isolated and tentatively identified. The virulence factors of these isolated bacteria quantitatively measured by plate assay method and their antibiotic resistance pattern was studied by standard disc diffusion method. However, physico- chemical variables did not indicate any pollution of river Narmada as they were well within limits but analysis of bacteriological variables indicate the high organic pollution of river Narmada. Analysis of virulence of environmental bacterial isolates revealed their potential to cause opportunistic infections these environmental isolates also exhibited the phenomena of multiple drug resistance against commonly used antibiotics from the present study it was inferred that Shankar ghat was the most polluted station of river Narmada and its water could be considered unsafe for drinking purpose due to high bacterial load. The physico-chemical and bacteriological quality of water needs to be carefully assessed for checking and solving the problem of pollution and such data would also be helpful in phylogenetic diversity study.

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Abstract No. 116

THE PROSPECT OF UN-SOLD BETEL-LEAF IN AGRICULTURAL WASTE MANAGEMENT AND MITIGATION OF FOOD DECAY

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ABSTRACT

Abstract: Betel-leaf is a well-known plantation crop of India. The crop is very perishable in nature and could be stored for 2-3 days in ambient condition. The leaves start decaying after 3-4 days and invites several pathogens to feed on them. The infected leaves of the vines, adjacent areas and betel-market becomes breeding place for plethora of deadly pathogens. One of the significant pathogen is *Salmonella* that causes severe health hazard for human population and a strict ban on betel-leaf export. In monsoon, the demand of betel-leaf reduces due to abundance of supply and the amount of un-sold betel-leaf load increases in vines of Northern India and agro-forest systems of North-Eastern states and Southern India. This excess leaves could be used for extraction of high quality leaf essential oil. The LEO has multi-faceted applications in food sector due to its anti-microbial properties. The Leo could be used for preservation of milk, curd, shrikhand, beverages, juice, meat, tomato-paste, sweets, noodles, fruits. The LEO could be extracted by simple, low-cost hydro-distillation process by the farmers and the most advantageous aspect the LEO is the shelf-life of 2-3 years in normal room temperature. The quantity and quality of leaf essential oil varies in different genotypes of betel-leaf. The oil extraction process additionally yields hydrolysate for important for food industries and de-oiled leaves for utilization in composting process or as raw material for bio-gas plants. The comparative analysis of the recovery of LEO from different genotypes of betel-leaf could help the farmers and rural workers to initiate a side-business for additional income generation. This model will assist in agricultural waste management, secure additional income for rural workers and help in food preservation with indigenous food preservative.

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Abstract No. 117

BIOGENIC NANOPARTICLES: BRIDGING NATURAL SCIENCES AND NANOTECHNOLOGY

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ABSTRACT

Biogenic nanoparticles have emerged as a promising class of nanomaterials synthesized using biological systems such as plants, microorganisms, and biomolecules. These nanoparticles offer an environmentally friendly alternative to conventional physical and chemical synthesis methods, which often involve toxic reagents and high energy consumption. The integration of natural sciences—including biology, chemistry, and environmental science—with nanotechnology has facilitated the development of sustainable synthesis routes, commonly referred to as green nanotechnology. Biological entities act as reducing and stabilizing agents, enabling controlled synthesis of nanoparticles with diverse morphologies, sizes, and functional properties. Biogenic nanoparticles exhibit unique physicochemical characteristics, including high surface area-to-volume ratios, enhanced reactivity, and biocompatibility, making them suitable for a wide range of applications. In medicine, they are utilized for drug delivery, antimicrobial treatments, imaging, and cancer therapy. In environmental science, they contribute to pollutant degradation, water purification, and sensing of toxic substances. This study highlights the synthesis mechanisms, characterization techniques, and interdisciplinary applications of biogenic nanoparticles. It emphasizes their role as a bridge between natural sciences and nanotechnology, promoting sustainable innovation.

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Abstract No. 118

GREEN SYMBOLS OF FAITH: AESTHETIC ROLES OF PLANTS IN INDIAN RITUAL CULTURE

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ABSTRACT

Plants have occupied a central position in Indian ritual practices since antiquity, serving not only as sacred offerings but also as carriers of profound aesthetic, symbolic, and cultural meanings. This study explores the aesthetic roles of selected ritual plants in India, with special reference to species such as *Nelumbo nucifera* (lotus), *Ocimum tenuiflorum* (tulsi), *Tagetes* spp. (marigold), *Mangifera indica* (mango), and *Ficus religiosa* (peepal). By integrating ethnobotanical approaches with cultural analysis, the paper highlights how visual attributes-such as color, form, fragrance, and seasonal availability-enhance the ritualistic significance of these plants. The research is based on a combination of literature review and field observations, focusing on the use of plants in festivals, rituals, and life-cycle ceremonies across different regions of India. It argues that the aesthetic appeal of ritual plants is not merely decorative but deeply intertwined with spiritual symbolism, reinforcing concepts such as purity, prosperity, fertility, and divine presence. Furthermore, the study examines how traditional knowledge systems have preserved the selection and use of these plants, thereby contributing to biodiversity conservation and cultural continuity. The findings reveal that ritual plants function as "green symbols of faith," bridging the natural and spiritual worlds while shaping collective cultural identity. The paper concludes that understanding the aesthetic dimensions of ritual plants provides valuable insights into the interdisciplinary connections between botany, anthropology, and religious studies, and emphasizes the need to document and conserve this rich bio cultural heritage in the face of rapid modernization.

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Abstract No. 119

UNRAVELING *BERBERIS ASIATICA'S* ANTIHYPERTENSIVE ACTION VIA PHYTOCHEMICAL-TARGET NETWORKS

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ABSTRACT

This study uses an integrative computational strategy that combines molecular docking, network pharmacology, target gene prediction, and phytochemical screening to investigate the antihypertensive potential of *Berberis asiatica.* Out of the 32 phytochemicals found in databases like IMPPAT and TCMSP, five bioactive compounds namely, oxyberberine, tetrahydropalmatine, acacetin, β-sitosterol, and berberine were chosen based on criteria for oral bioavailability and drug-likeness. 276 possible target genes relevant to antihypertensive action were connected to these drugs. When a network of compound-target interactions was built, it showed intricate connection, especially with important proteins like SRC, EGFR, HSP90AA1, ESR1, and PPARG. The bioactive substances influence a variety of biological processes, such as signal transmission, metabolic pathways, and cardiovascular control, according to Gene Ontology (GO) and KEGG pathway enrichment analyses. Hub genes implicated in the pathophysiology of hypertension were identified via protein–protein interaction (PPI) networks. Strong binding affinities (≤ -9.9 kcal/mol) between specific drugs and important targets, namely berberine and β-sitosterol with HSP90AA1 and ESR1, were further validated by molecular docking. These results confirm *B. asiatica's* potential as a natural therapy candidate by indicating that it contains a variety of bioactive compounds with encouraging multi-target effects against hypertension.

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Abstract No. 120

NATURE-BASED SOLUTIONS FOR RESTORING SOIL HEALTH: A STUDY ON MITIGATING PESTICIDE CONTAMINATION FOR SUSTAINABLE AGRO-ECOSYSTEMS

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ABSTRACT

The escalating threat of soil contamination due to indiscriminate pesticide use poses a significant risk to the long-term sustainability of global agro-ecosystems. This study investigates the critical impact of chemical residues on soil health, specifically focusing on the degradation of physicochemical properties, loss of microbial diversity, and the disruption of essential enzymatic activities that sustain soil fertility. To address these challenges, the research emphasizes a transition toward a sustainable ecosystem through nature-based remediation strategies. By integrating eco-friendly approaches—such as the application of biofertilizers, biopesticides, phytoremediation, and microbial degradation—this work evaluate the potential to restore ecological balance and enhance nutrient cycling. Through a systematic experimental approach involving soil residue analysis and controlled biological assessments, the study demonstrates that natural-based solutions not only mitigate the toxic effects of pesticides but also improve soil organic matter and resilience. Ultimately, this research advocates for the integration of sustainable remediation practices into conventional farming to ensure environmental health, food security, and the development of a truly resilient agricultural framework.

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Abstract No. 121

BIOTECHNOLOGICAL APPROACHES FOR CONSERVATION OF ENDANGERED ETHNOMEDICINAL AND ETHNOVETERINARY PLANTS AND EVALUATION OF THEIR POSSIBLE THERAPEUTIC APPLICATIONS: PROMOTION OF INDIGENOUS KNOWLEDGE THROUGH LOCAL HEALTH TRADITIONS AMONG RURAL TRIBES OF RAJASTHAN

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ABSTRACT

In medicinal plant research, botanical documentation plays a potential role in the present scenario and is the need of hour. Therefore; the management of traditional medicinal plant resources has become a matter of urgency. Now a day's screening of the medicinal herbs as potential sources of new bioactive compounds of therapeutic value has increased many folds. Several species of endangered ethno medicinal and ethno veterinary plants used in traditional medicine by indigenous people as well as for their cattle in Rajasthan and facing danger of extinction were subjected to in vitro cultures, phytochemical analysis and antimicrobial assays in present study. The present study deals with the futuristic view on the said subject restricted to the important endangered ethno medicinal plants.

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Abstract No. 122

BRIDGING KNOWLEDGE SYSTEMS: A COMPREHENSIVE REVIEW OF NATURAL SCIENCE AND TRADITIONAL KNOWLEDGE INTEGRATION

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ABSTRACT

This review examines the complementary relationship between natural science methodologies and traditional ecological knowledge (TEK) systems in addressing contemporary environmental and sustainability challenges. Drawing on case studies from diverse geographical and cultural contexts, we demonstrate how integrated knowledge approaches enhance biodiversity conservation, agricultural resilience, and climate adaptation outcomes. The article explores epistemological frameworks underlying both systems, identifying their respective strengths and limitations: natural science's precision and reductionist mechanistic understanding alongside traditional knowledge's holistic perspective and millennial scale temporal scope. We present evidence from agricultural biodiversity in the Andes, Indigenous forest management in the Amazon and Southeast Asia, and climate adaptation strategies among pastoralist and Pacific Island communities, demonstrating that integrated approaches consistently outperform single-knowledge-system interventions. We identify significant barriers to integration, including institutional hierarchies that privilege Western science, intellectual property concerns, and epistemological in commensurabilities. Drawing on frameworks including 'TwoEyed Seeing,' participatory research models, and international benefit sharing protocols, we propose mechanisms for equitable collaboration that maintain the integrity of distinct epistemologies while enabling genuine complementarity. We conclude that advancing global sustainability requires fundamentally reconceiving the relationship between natural science and traditional knowledge legitimizing traditional systems as rigorous science, establishing equitable power relations in collaborative research, devolving decision-making authority to knowledge holding communities, and creating institutional structures that reward integration rather than penalizing it. Future research must prioritize long term collaborative studies, develop frameworks protecting community intellectual property rights, and center Indigenous and local voices in all aspects of knowledge integration efforts.

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Abstract No. 123

CLIMATE CHANGE AND ITS INFLUENCE ON BEHAVIORAL ECOLOGY OF RHINOCEROS (*RHINOCEROS UNICORNIS*)

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ABSTRACT

Climate change is emerging as a major threat to wildlife globally, influencing habitat quality, food availability, water resources, and animal behavior. Rhinoceroses, being large herbivorous mammals with specialized habitat requirements, are particularly vulnerable to these environmental changes. Rising temperatures, irregular rainfall patterns, prolonged droughts, floods, and habitat degradation directly and indirectly affect the daily activities and survival strategies of rhinoceros species. This study explores the effects of climate change on the behavior of rhinoceros, with emphasis on feeding, movement, social interaction, reproduction, and thermoregulation. Increased ambient temperatures have altered the activity patterns of rhinoceroses, leading them to become more nocturnal or crepuscular to avoid daytime heat stress. Extended periods of drought reduce the availability of water bodies and quality forage, forcing rhinoceroses to expand their home ranges and spend more time searching for food and water. Such changes may increase energy expenditure and raise the risk of human-wildlife conflict as rhinos move closer to agricultural lands and settlements. Climate-induced habitat modification also influences social behavior. Limited resources may intensify competition among individuals, affecting territoriality and interactions between dominant and subordinate animals. Changes in vegetation structure can reduce browsing and grazing opportunities, impacting nutritional intake and body condition. Poor nutrition further influences reproductive behavior by delaying sexual maturity, reducing fertility, and affecting maternal care. Additionally, mud wallowing, an important behavioral adaptation in rhinoceroses for thermoregulation and parasite control, is significantly impacted by drying wetlands and reduced mud availability. Lack of suitable wallowing sites can increase physiological stress and susceptibility to diseases and ectoparasites. Understanding behavioral responses of rhinoceroses to climate change is essential for developing effective conservation strategies. Habitat restoration, water management, climate-resilient protected areas, and long-term behavioral monitoring are necessary to mitigate these impacts. This review highlights the urgent need to integrate climate adaptation measures into rhinoceros conservation planning to ensure the survival of these endangered mega herbivores in rapidly changing ecosystems.

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Abstract No. 124

MICROPLASTIC POLLUTION AS AN EMERGING ANTHROPOGENIC STRESSOR: IMPACTS ON AQUATIC BIODIVERSITY, ECOSYSTEM RESILIENCE, AND THE SUSTAINABLE DEVELOPMENT GOALS

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ABSTRACT

Microplastics (MPs), defined as plastic particles smaller than 5 mm, have emerged as pervasive contaminants in terrestrial and aquatic environments, posing significant threats to ecosystem integrity and biodiversity. This study synthesizes current knowledge on the sources, distribution, and ecological impacts of microplastics in freshwater and marine systems, with particular emphasis on their interaction with anthropogenic stressors such as urbanization, industrial discharge, agricultural runoff, and climate change. MPs act as vectors for toxic pollutants and pathogenic microorganisms, facilitating their bioavailability and trophic transfer across multiple levels of the food web. Their accumulation in aquatic biota disrupts physiological functions, induces oxidative stress, and alters reproductive and behavioral responses, thereby compromising ecosystem resilience.The combined effects of microplastic pollution and other human-induced stressors exacerbate habitat degradation, reduce species diversity, and threaten the stability of ecosystem services. This review further explores the implications of microplastic contamination for biodiversity conservation, highlighting the vulnerability of keystone and economically important species. In the context of global sustainability frameworks, the study critically examines how microplastic pollution intersects with the United Nations Sustainable Development Goals (SDGs), particularly SDG 6 (Clean Water and Sanitation), SDG 13 (Climate Action), SDG 14 (Life Below Water), and SDG 15 (Life on Land).The findings underscore the urgent need for integrated management strategies, including improved waste management systems, policy interventions, and public awareness initiatives, to mitigate microplastic pollution. Strengthening ecosystem resilience through adaptive conservation approaches and sustainable resource use is essential for safeguarding biodiversity and ensuring long-term ecological balance. This work contributes to a comprehensive understanding of microplastics as a critical environmental challenge within the broader framework of anthropogenic impacts and sustainable development.

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Abstract No. 125

STUDY ON THE RUST OF *FICUS CARICA* INFECTED BY *CEROTELIUM FICI* FROM BAHRAICH, U.P.

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ABSTRACT

Ficus carica (fig) is an important fruit crop with significant ethnomedicinal value in Uttar Pradesh. The crop is susceptible to several pathogens, including fungi, bacteria, and viruses. Among these, fig rust caused by *Cerotelium fici* is considered one of the most serious diseases limiting its successful cultivation. The disease adversely affects the medicinal importance, fruit quality, and overall productivity of the plant. Field surveys conducted in different parts of Bahraich district revealed that the period between July and November is the most critical, during which the highest disease incidence and intensity were observed. Symptoms were recorded on leaves, petioles, and fruits, with leaves being the most severely affected. The disease is characterized by the presence of circular to elongated pustules. Microscopic studies showed that the urediospores of *Cerotelium fici* are orange in color, unicellular, double-walled, echinulate, and oval in shape. Evaluation of fungicides indicated that azoxystrobin (0.05%) was the most effective in controlling the disease under field conditions. The findings confirm that fig rust caused by *Cerotelium fici* poses a significant challenge to fig cultivation in Bahraich district, especially during the monsoon season. Proper disease monitoring and timely application of effective fungicides such as azoxystrobin can help in minimizing losses and improving both yield and fruit quality.

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Abstract No. 126

CLIMATE CHANGE MITIGATION STRATEGIES AND THEIR IMPLICATIONS FOR HUMAN WELLBEING

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ABSTRACT

Climate change has emerged as a major environmental and socio-economic concern in the contemporary world, particularly in developing countries like India where livelihoods are closely linked with natural resources. The increasing concentration of greenhouse gases has resulted in global warming, erratic rainfall, and frequent extreme weather events, thereby affecting agriculture, biodiversity, and public health. In this context, mitigation strategies play a crucial role in reducing the intensity of climate change and ensuring sustainable human wellbeing. Mitigation strategies primarily focus on reducing greenhouse gas emissions and enhancing carbon sinks. The promotion of renewable energy sources such as solar, wind, and bioenergy has gained significant importance in India, supported by various national policies and missions. Afforestation and reforestation programmes contribute not only to carbon sequestration but also to biodiversity conservation and ecosystem stability. Sustainable agricultural practices, including organic farming and efficient water management, further help in reducing environmental stress while maintaining productivity. From the perspective of human wellbeing, effective mitigation strategies provide multiple co-benefits. Reduction in air pollution due to decreased reliance on fossil fuels leads to improved respiratory and cardiovascular health. Sustainable urban planning, including green infrastructure and efficient public transport systems, enhances the quality of life in rapidly growing cities. Moreover, community participation and awareness programmes strengthen resilience and adaptive capacity at the grassroots level. In conclusion, climate change mitigation is not merely an environmental necessity but also a pathway to achieving holistic human wellbeing. An integrated approach involving policy support, scientific innovation, and public engagement is essential to address this global challenge effectively.

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Abstract No. 127

FROM SENTINEL SCIENCE TO REAL-WORLD IMPACT: DEPLOYING AI-DRIVEN FRESHWATER SNAIL SURVEILLANCE SYSTEMS FOR MICROPLASTIC-LINKED DISEASE RISK MANAGEMENT

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ABSTRACT

Microplastic contamination has emerged as a pervasive anthropogenic stressor in freshwater ecosystems, with increasing evidence of its role in altering ecological processes and influencing host–pathogen interactions. Freshwater snails, which act as intermediate hosts for parasitic diseases such as Schistosomiasis, are highly sensitive to environmental perturbations and therefore serve as effective bioindicators of ecosystem health. However, conventional monitoring approaches remain fragmented and lack predictive integration across ecological and epidemiological domains. This study proposes an AI-driven sentinel surveillance framework that integrates freshwater snail ecology with machine learning and geospatial analytics to assess microplastic-linked disease risks. Field-based datasets, including microplastic load (polymer type and size distribution), snail population dynamics, and infection prevalence, are analyzed using ensemble learning techniques such as Random Forest and Gradient Boosting to capture complex, non-linear relationships between environmental stressors and disease emergence. Spatial risk assessment is conducted using GIS-based hotspot analysis to identify vulnerable regions, while temporal forecasting models are employed to predict outbreak probabilities under varying environmental and anthropogenic scenarios, including climate variability and land-use change. Model robustness is ensured through cross-validation and sensitivity analysis, enhancing reliability and applicability across diverse freshwater systems. By coupling sentinel species monitoring with artificial intelligence, the proposed framework offers a scalable and cost-effective early warning system for microplastic-driven disease risks. This approach supports climate-resilient ecosystem management by bridging biodiversity conservation, pollution monitoring, and public health surveillance. The study provides actionable insights for targeted interventions and policy formulation, contributing to sustainable freshwater ecosystem governance in the context of increasing anthropogenic pressures.

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Abstract No. 128

STUDY ON SIKKIM'S MANDARIN PRODUCTION UNDER PRESSURE: CLIMATE CHANGE, POLLINATOR ROLES AND FARMER'S PERCEPTION

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ABSTRACT

Mandarin (*Citrus reticulata*) cultivation in the Sikkim Himalayas currently faces a convergence of environmental and ecological pressures that threaten rural livelihoods. Analysis of 108 farmers across 28 villages reveals a significant knowledge-practice gap; while 95.4% of respondents recognize the general importance of bees, only 43.5% understand their specific contribution to mandarin fruit set. This disconnect is further evidenced by low beekeeping adoption (29.6%), hindered by technical resource gaps and gendered psychological barriers, such as a significantly higher prevalence of fear of bees among women ($p < .001$), which negatively impacts pollinator recognition. Climate change awareness is acutely tied to occupational experience, with full-time farmers reporting statistically significant observations of erratic rainfall ($p = 0.001$), rising temperatures ($p = 0.003$), and extreme weather ($p = 0.015$). These climatic stressors are perceived to exacerbate destructive diseases, with farmers ranking root/foot rot (mean score of 0.75) and citrus dieback (mean score of 0.73) as the primary drivers of declining yields. Notably, 87.5% of farmers with over 20 years of experience reported a decrease in yield, compared to 58.3% of those with 6–20 years of experience ($p = 0.001$). Despite these challenges, management remains largely reactive, with only 4% of farmers seeking assistance from agricultural extension services. Effective restoration of mandarin productivity requires gender-inclusive, field-based training and climate-smart extension services. Bridging the gap between traditional observations and scientific ecological literacy is essential for building adaptive capacity and ensuring the long-term sustainability of Sikkim's organic mandarin orchards.

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Abstract No. 129

PHYTOSOCIOLOGICAL ANALYSIS OF SACRED GROVE ALONG ALTITUDINAL GRADIENTS IN TENDONG FOREST, SOUTH SIKKIM

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ABSTRACT

Sacred Groves (SGs) represent a traditional community-based conservation model that preserves remnants of pristine forests through religious and cultural taboos. This study provides a comprehensive phytosociological analysis and conservation assessment of sacred groves along an altitudinal gradient from 2080 m to 2635 m in the Tendong Forest of South Sikkim. Using a stratified quadrat-based sampling method, plant communities were analyzed across three elevation segments: Lower (2080–2265m), Middle (2265–2450m), and Upper (2450–2635m) Hill Forest. The results demonstrate a distinct shift in community structure and diversity patterns along the altitudinal gradient. Total species richness of all life forms was highest at the lowest elevation, with 74 unique species identified, and decreased progressively to 50 species at the highest elevation. Phytosociological analysis revealed that Symplocos lucida is the dominant tree species at lower altitudes, whereas dominance shifts toward Lithocarpus sp. at middle and upper elevations. Interestingly, while overall species richness declined with altitude, the Shannon-Wiener diversity index (H') for the tree layer remained relatively consistent across the gradient, ranging from 2.55 to 2.72, indicating a high degree of evenness and complexity in these protected forests. The study highlights the critical role of these sacred sites as biodiversity refugia, particularly for ecologically significant species like *Quercus lamellosa* and *Viburnum erubescens*. Despite their ecological and cultural significance, these groves face contemporary challenges from anthropogenic pressures and shifting belief systems. This research provides essential baseline data for the long-term monitoring of Himalayan forest dynamics and emphasizes the need to integrate traditional ecological knowledge with formal conservation strategies to maintain the ecological integrity of the Tendong landscape.

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Abstract No. 130

ETHNOMEDICINAL KNOWLEDGE OF TRIBAL COMMUNITIES IN THE SIKKIMHIMALAYA WITH SPECIAL REFERENCE TO RAI COMMUNITY OF WEST SIKKIM

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ABSTRACT

The present study documents and quantitatively evaluates the ethnomedicinal knowledge of the Rai community in West Sikkim, Eastern Himalaya, using Relative Frequency of Citation (RFC), Use Value (UV), Informant Consensus Factor (ICF), and Fidelity Level (FL). A total of 104 informants participated in semi-structured interviews, leading to the documentation of 55 medicinal plant species across diverse families. High RFC and UV values identified culturally significant and multipurpose species such as *Swertia chirayita* (RFC = 0.19; UV = 0.42), *Drymaria cordata* (RFC = 0.18; UV = 0.43), *Zingiber officinale* (RFC = 0.11; UV = 0.23), and *Artemisia vulgaris* (RFC = 0.10; UV = 0.33). Informant Consensus Factor (ICF) indicated strong agreement for infectious and febrile illnesses (0.86), circulatory disorders (0.78), and musculoskeletal disorders (0.76), reflecting well-established traditional therapeutic practices. Fidelity Level (FL) analysis further highlighted species with high ailment-specific reliability, including *Swertia chirayita* (100% for cough and cold), *Drymaria cordata* (94.7% for tonsillitis), *Tagetes erecta* (100% for pneumonia), *Ageratina adenophora* (100% for wound healing), and *Aloe barbadensis* (100% for burns and skin diseases). Several species also exhibited 100% FL for specialized conditions, indicating strong informant agreement despite limited citation frequency. The integration of RFC, UV, ICF, and FL reveals a well-structured and quantitatively consistent traditional healthcare system, where widely used species coexist with highly specialized remedies. These findings underscore the biocultural significance of Rai ethnomedicine and highlight priority species for pharmacological validation and conservation

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Abstract No. 131

HYDROLOGY AND SOIL-WATER CONSERVATION FOR THE BETTERMENT OF HUMANITY

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ABSTRACT

Hydrology and soil-water conservation are fundamental to sustaining ecosystems, securing water resources, and improving human well-being. Effective management of soil and water not only mitigates erosion and enhances groundwater recharge but also strengthens agricultural productivity, biodiversity conservation, and climate resilience. Scientific approaches such as hydrological modelling, Geographic Information Systems (GIS), and watershed analysis provide critical insights into runoff dynamics, sediment transport, and aquifer sustainability. Conservation practices including contour bunding, check dams, vegetative cover, and agroforestryplay a pivotal role in stabilizing landscapes, reducing land degradation, and ensuring long-term ecological balance. Beyond ecological benefits, soil–water conservation directly supports livelihoods, food security, and public health, making it a cornerstone of sustainable development. By integrating hydrological science with community participation and policy frameworks, this field contributes to the holistic betterment of humanity, ensuring that natural resources are equitably managed and resilient to future challenges.

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Abstract No. 132

A SURVEY REPORT ON HAIR COSMETIC PLANT OF NORTH EASTERN PART OF UTTAR PRADESH, INDIA

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ABSTRACT

Present communication deals with morphotaxonomic studies of hair cosmetics plants of North easternUttar Pradesh. During survey offorest/ remote area of Balrampur, Shrawasti, Bahraichand Gonda district, hair Cosmatophytes are collected These hair Cosmatophytes are *Acacia concinna* (Shikakai), *Sapindus mukoross*i (Reetha), *Eclipta alba* (Bringraj), *Phyllanthis emblica* (Amla), *Aloe vera* (Ghrit Kumari). These Cosmatophytes belong to family Fabacese, Sapindaceae, Asteraceae, Euphorbiaceae, Asphodelaceae and Lytheraceae from the collected plant specimen, herbarium has been prepared; characteristic features are unique with its quality products. Asthese area is transition zone of two agro-climatic zone Tarai and North eastern plain zone. These natural plant products provided hair shining, strength, length and dandruff free properties. The hair loss is controlled.

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Abstract No. 133

ASSESSMENT OF AQUATIC INSECT BIODIVERSITY AS BIOINDICATORS OF ECOLOGICAL HEALTH IN RANI TALAAB POND, BALRAMPUR DISTRICT, UTTAR PRADESH

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ABSTRACT

Freshwater ecosystems are among the most productive and biologically diverse ecosystems on Earth, supporting a wide range of aquatic flora and fauna. Aquatic insects constitute an important component of freshwater biodiversity and play a crucial role in nutrient cycling, energy flow, decomposition, and maintenance of ecological balance. Due to their sensitivity to environmental changes, aquatic insects are widely recognized as reliable bioindicators of water quality and ecosystem health. The present study was conducted to assess the aquatic insect biodiversity of Rani Talaab pond located in Balrampur district of Uttar Pradesh and to evaluate the ecological condition of the pond ecosystem using aquatic insects as bioindicators. The study was carried out over a period of eleven months from July 2025 to May 2026. Aquatic insects were collected monthly from different ecological zones of the pond, including littoral, open water, and muddy margin areas, using dip nets and standard sampling techniques. The collected specimens were preserved and identified using standard taxonomic keys. Four major insect orders, namely Hemiptera, Coleoptera, Odonata, and Diptera, were recorded during the study period. The results revealed considerable variation in the abundance and distribution of aquatic insects across seasons. Diptera was found to be the dominant order throughout the study period, followed by Hemiptera, Coleoptera, and Odonata. Maximum abundance and diversity of aquatic insects were recorded during the post-monsoon season, particularly in October, whereas minimum abundance was observed during winter months, especially in January. The dominance of Diptera, particularly pollution-tolerant taxa, indicated moderate organic pollution and nutrient enrichment in the pond ecosystem. However, the presence of moderately sensitive groups such as Odonata and Coleoptera suggested that the pond still maintains ecological stability and supports diverse aquatic life.The study highlights the ecological importance of aquatic insects in freshwater ecosystems and demonstrates their usefulness as effective bioindicators for ecological assessment and biomonitoring. The findings indicate that Rani Talaab pond is moderately impacted by anthropogenic activities such as agricultural runoff and domestic waste disposal, but it continues to support significant aquatic biodiversity. Conservation and management strategies, including pollution control, habitat protection, and regular ecological monitoring, are recommended to preserve the biodiversity and ecological integrity of the pond ecosystem.

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Abstract No. 134

FLORISTIC DIVERSITY AND ETHNOBOTANICAL ASSESSMENT OF VASCULAR PLANTS IN KATARNIAGHAT WILDLIFE SANCTUARY: IMPLICATIONS FOR BIODIVERSITY, WATER, AND WILDLIFE MANAGEMENT

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ABSTRACT

This study evaluates the floristic diversity and ethnobotanical knowledge of vascular plants in Katarniaghat Wildlife Sanctuary, focusing on their roles in biodiversity conservation, water regulation, and wildlife support. Field surveys across varied habitats documented species composition, taxonomic diversity, and ecological interactions, while ethnobotanical data were collected through structured interviews with local communities. The results indicate high species richness contributing significantly to ecosystem services such as soil stabilization, water retention, nutrient cycling, and provision of habitat and food for wildlife. Several plant species were identified as culturally and economically important, supporting medicinal and livelihood needs. Indigenous knowledge highlights sustainable resource use and adaptive management practices. The study emphasizes integrating traditional ecological knowledge with scientific approaches to improve conservation outcomes. This integration can enhance habitat restoration, strengthen water management, and support long-term ecological resilience. The findings also provide a baseline for monitoring vegetation changes and addressing anthropogenic pressures. Community participation is essential for sustainable resource management and maintaining biodiversity under changing environmental conditions.

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Abstract No. 135

HUMAN-WILD ANIMAL CONFLICT IN UTTAR PRADESH: RECENT STATUS, CAUSES AND REMEDIES

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ABSTRACT

Human-wild animal conflict refers to the collision between humans and wild animals leading to injury or loss of human lives, damage to crops, and property. In response, there is a negative impacts on wild animals and their habitats from the human side as a consequence of such negative interactions. Human-wild animal conflict is an alarming state in Uttar Pradesh. This issue has emerged as a growing concern for the conservationists and the State Government. The Forest Department of Uttar Pradesh has also recognized that the issues related to Human-wild animal conflict have been increasing manifolds in the state in the recent past. Significant casualties have been reported, including injuries and deaths from wolf attacks, as seen in "Operation Bhediya" in Bahraich where a pack of wolf killed several people. Uttar Pradesh is the first state to classify human-wild animal conflict as a disaster to expedite compensation to victims. This review study presents the recent status and key causes of Human-wild animal conflict in Uttar Pradesh. This study also assesses present strategy of human-wild animal conflict management and makes necessary recommendations and suggestions to use of modern technology and equipment for the prevention of Human-wildlife conflict.

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Abstract No. 136

MILLETS AND WILD EDIBLES: CLIMATE-RESILIENT CROPS FOR INDIA'S FOOD SECURITY

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ABSTRACT

India faces the dual challenge of ensuring food and nutritional security for over 1.4 billion people while mitigating the adverse impacts of climate change on agriculture. Global warming, erratic rainfall, and increasing frequency of droughts threaten conventional cereal production, particularly in rainfed agro-ecosystems that constitute 60% of India's cultivated area. In this context, millets and wild edible plants are re-emerging as climate-resilient crops with significant potential to strengthen national food security. Millets, including sorghum, pearl millet, finger millet, and minor millets belongs to Poaceae family are characterized by short growing cycles, low water requirements, and exceptional tolerance to heat, drought, and poor soils. Recognized as 'nutri-cereals' under the National Food Security Mission and globally promoted through the International Year of Millets 2023, they offer superior nutritional profiles rich in iron, calcium, dietary fiber, and antioxidants. Simultaneously, India's rich biodiversity includes over 1,000 documented wild edible plantspecies that offer critical micronutrients, dietary diversity, and resilience against crop failures, especially for tribal and rural communities. This paper evaluates the agronomic, nutritional, and adaptive advantages of millets and wild edibles as climate-smart crops for India. It discusses their role in building resilience of farming systems, reducing malnutrition, and enhancing livelihood security under changing climatic conditions. However, challenges such as limited mainstream cultivation, inadequate processing infrastructure, weak market linkages, and erosion of traditional knowledge impede large-scale adoption. It highlights their role in climate-smart agriculture, reduction of malnutrition, and enhancement of rural livelihoods, particularly in rainfed and tribal regions.

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Abstract No. 137

IMPACT OF HOME GARDENING ON HUMAN BEHAVIOUR

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ABSTRACT

The environment is an integral part of human and animal life, affecting all species on Earth in one form or another. In contemporary times, various changes are being observed in the environment globally, largely due to the indiscriminate developmental activities undertaken by different nations. Among these changes, climate change stands out as the most pressing issue of our life. The severe consequences of climate change manifest not only in the form of altered monsoon patterns, food insecurity and natural disasters, but they also exert a significant influence on human behavior—leading to shifts in emotional states, increased aggression, and similar changes in individuals. These alterations in human behavior give rise to a host of psychological, social, and cultural problems. Addressing these challenges necessitates a collective effort spanning individual, governmental, community, environmental, and technological levels. The aim of this article is to examine the role of home gardening plays in influencing human behavior. Furthermore, this article investigates the impact of home gardening on psychological and subjective well-being, mental health, and overall quality of life. The findings suggest that the act of caring for nature enhances human well-being and mental health.

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Abstract No. 138

BIODIVERSITY CONSERVATION AND CLIMATE CHANGE: CHALLENGES AND SUSTAINABLE STRATEGIES

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ABSTRACT

Biodiversity, the variety of life on Earth, is essential for maintaining ecosystem balance and providing vital goods and services that support human survival and well-being. However, increasing human activities such as deforestation, industrialization, urbanization, and pollution are causing rapid and unprecedented changes in ecosystems. Climate change has emerged as a major threat to biodiversity, intensifying environmental stress through rising temperatures, altered rainfall patterns, extreme weather events, and habitat destruction. At the same time, the loss of biodiversity weakens the capacity of ecosystems to absorb carbon dioxide, thereby accelerating climate change. The relationship between biodiversity and climate change is therefore deeply interconnected. Healthy ecosystems such as forests, wetlands, grasslands, and oceans play a crucial role in climate regulation through carbon sequestration and ecological stability. Conserving and restoring these ecosystems can significantly contribute to both climate change mitigation and adaptation strategies. Mitigation involves reducing greenhouse gas emissions and enhancing carbon sinks, while adaptation refers to adjustments in natural and human systems to minimize the harmful impacts of climate change and improve resilience. Scientific evidence indicates that climate change is already affecting biodiversity across the globe. Major impacts include shifts in species distribution, changes in reproductive cycles, altered growing seasons in plants, increased extinction risks, and disruption of ecological interactions. Species that are already endangered or have limited habitats are particularly vulnerable to climatic changes. The Millennium Ecosystem Assessment and the Convention on Biological Diversity (CBD) recognize climate change as one of the primary drivers of biodiversity loss and emphasize the importance of integrating biodiversity conservation into climate policies. Biodiversity-based approaches, including ecosystem restoration, sustainable resource management, and conservation planning, can strengthen ecosystem resilience and support sustainable development. Protecting biodiversity is therefore essential not only for environmental conservation but also for ensuring ecological security, climate stability, and human well-being in the future.

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Abstract No. 139

EFFECTS OF CLIMATE CHANGE ON NUTRITION, FOOD SECURITY AND HUMAN WELLBEING

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ABSTRACT

Climate change has emerged as one of the largest international challenges of the 21st century, posing critical threats to nutrition, food security, and overall human well-being. This research article examines the multifaceted effects of climate change on agricultural productivity, food availability, dietary diversity, and health outcomes. Rising temperatures, erratic rainfall patterns, increased frequency of severe weather events such as floods and droughts, and shifting ecological conditions have adversely affected crop yields and cattle production. These environmental changes disrupt food delivery chains, leading to increased food prices and reduced access to nutritious food, specifically for vulnerable populations in developing nations. The study highlights how climate change contributes to both undernutrition and overnutrition. On one hand, declining agricultural productivity and food insecurity result in insufficient intake of important vitamins, leading to malnutrition, stunting, and weakened immunity. On the other hand, limited availability of diverse and healthy food options regularly forces communities to rely upon low-cost, calorie-dense, and nutrient-poor diets, increasing the risk of obesity and non-communicable diseases. Moreover, climate-sensitive diseases and poor sanitation conditions exacerbate health risks, further impacting nutritional status. This paper additionally explores the social and economic dimensions of food security under changing climatic conditions. Marginalized groups, including small-scale farmers, women, and children, are disproportionately affected due to limited resources, lack of adaptive capacity, and socio-economic inequalities. The psychological stress associated with food insecurity and livelihood loss further undermines human well-being.In response to these challenges, the study emphasizes the importance of sustainable agricultural practices, climate-resilient food systems, and policy interventions aimed at improving food security and nutrition. Strategies such as crop diversification, improved irrigation systems, promotion of traditional and climate-resilient plants, and community-based adaptation measures are discussed. Strengthening public awareness and integrating nutrition-sensitive policies are also critical to mitigate the detrimental impacts of climate change. In conclusion, addressing the interlinkages between climate change, nutrition, food security, and human well-being requires a holistic and multidisciplinary approach. Effective collaboration between governments, communities, and international organizations is essential to ensure sustainable development and protect the health and well-being of present and future generations.

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Abstract No. 140

GC-MS ANALYSIS OF BIOACTIVE COMPOUNDS AND QUANTITATIVE ANALYSIS OF STRYCHNINE IN SEEDS OF STRYCHNOS NUX-VOMICA

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ABSTRACT

Strychnos nux-vomica has useful bio active properties which is used in indigenous medicines for centuries in India. The Phytoconstituents individually or in the combination determine the therapeutic value of medicinal plant. Alkaloids, flavonoids, phenolics, tannins, saponins, steroids, glycosides, terpenes etc. are some of the important Phytochemicals with diverse medicinal properties. In this present work conventional qualitative test has been done for preliminary Phytochemical Screening of Strychnos nux-vomicaand the bio active compound was also identified by gas chromatography-mass spectrophotometry. The plant has wide applications as a herbal medicine. It is widely used as a cardio tonic, nervine, stomachic, chronic dysentery, paralytic, neuralgic disorders and epilepsy. The GC-MS analysis for investigation of the compound present in the hexane, ethyl acetate and methanolic extract of Strychnos nux-vomicaseeds suggested presence of 5-Hydro oxymethylfurfural, Cyclotrisiloxane, Silicic acid, Cyclobarbital, Strychnineand many more have been reported to be responsible for treating various diseases and neurological disorders. The quantitative analysis of strychnine is done by analytical HPLC method.

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Abstract No. 141

ECOSYSTEM SUSTAINABILITY AND CONSERVATION OF BIODIVERSITY

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ABSTRACT

Sustainable biodiversity and sustainable agriculture have a significant role on human wellbeing, ecological resilience, and food security. They are closely related aspects of the future of our planet It promotes the stability and functioning of ecosystems, providing numerous ecosystem services as pollination, pest control, nutrient cycling, and genetic resources for crop breeding. Biodiversity also provides ecosystem services strengthening agricultural productivity and resilience. For instance pollinators like bees and butterflies facilitate the reproduction of many crops, while natural predators help control pest populations, reducing the need for chemical pesticides. Sustainable agriculture, on the other hand, compromises to meet current food needs without compromising the future generation to do the same. However modern agricultural practices have often led to the degradation of ecosystems, loss of biodiversity. Those problems have been exacerbated by deforestation, Overuse of agrochemicals. In the long term these practices harm the environment and endanger food security Sustainable agricultural practices by enhancing farming methods such as crop rotation, organic farming, agroforestry can support and need of collator enhance biodiversity- There is a need of collaboration across all sections of society from intergovernmental agreements down to local community. Action for tackling the biodiversity catastrophe conservation of native species and support for small scale farmers are important steps to words achieving a harmony between agriculture, and biodiversity. People may learn more about local ecosystems and develop a greater regard and for them by re-establishing a connection with the nature and inspiring others to the same. Sustainable development aims to protect the biodiversity by sustainable use of terrestrial ecosystem.

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Abstract No. 142

PARASITIC INFESTATION IN COCKROACHES AND ASSESSMENT OF COMMUNITY AWARENESS: A MIXED-METHOD STUDY HIGHLIGHTING PUBLIC HEALTH RISKS

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ABSTRACT

Cockroaches are important mechanical vectors capable of carrying and transmitting a variety of medically significant parasites, posing potential risks to human health, particularly in environments with poor sanitation and hygiene. Despite their close association with human dwellings, limited data exist on parasitic infestation in cockroaches and community awareness regarding their role in disease transmission in the North-Eastern region of India. The present study aimed to investigate parasitic infestation in cockroaches and assess community awareness regarding cockroach-borne health risks. A mixed-method approach was adopted, combining laboratory-based parasitological examination with a questionnaire-based cross-sectional survey. A total of 50 cockroach specimens were collected from residential environments in South Sikkim and examined through dissection and microscopic analysis using saline and iodine wet mount techniques to detect parasitic forms such as cysts, ova, and larvae. Simultaneously, a structured questionnaire survey was conducted among 130 individuals across Sikkim to evaluate their knowledge, attitudes, and hygiene practices. Laboratory findings revealed that 38 out of 50 specimens (76%) were infested with one or more parasitic forms, indicating a high prevalence of parasite-carrying cockroaches in domestic settings. Survey results showed that although most respondents had basic awareness of cockroach presence and general hygiene, knowledge regarding cockroach-borne parasitic infections was notably low. The coexistence of high parasitic infestation and limited awareness highlights a significant public health concern. The study emphasizes the need for improved sanitation, effective pest control, and targeted health education to reduce the risk of cockroach-mediated transmission of parasitic infections.

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Abstract No. 143

PLANT-BASED TRADITIONAL ETHNOVETERINARY KNOWLEDGE AND ITS QUANTITATIVE EVALUATION FOR SUSTAINABLE LIVESTOCK HEALTHCARE IN SIKKIM, INDIA

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ABSTRACT

For generations, indigenous communities of Sikkim have relied on medicinal plants to maintain livestock health and treat various cattle ailments. However, much of this ethnoveterinary knowledge remains undocumented and is increasingly threatened by socioeconomic and environmental changes, as well as declining interest among younger generations. Systematic documentation is therefore essential for preserving this knowledge and supporting sustainable animal healthcare and plant-based drug discovery. The present study documents ethnoveterinary medicinal plants used by indigenous communities of Sikkim. A total of 79 informants (58 males and 21 females), including traditional healers, livestock owners, and elderly individuals, were purposively selected. Data were collected through questionnaire surveys, semi-structured interviews, group discussions, and field observations. Quantitative ethnobotanical indices such as Relative Frequency of Citation (RFC), Use Value (UV), Informant Consensus Factor (ICF), Fidelity Level (FL), and Family Importance Value (FIV) were calculated, and Pearson's Correlation Coefficient (PCC) was used to assess the relationship between RFC and UV. A total of 45 plant species belonging to 32 families were recorded for treating over 30 cattle diseases. Poaceae was the dominant family, followed by Zingiberaceae and Apiaceae. Herbs were most common (53%), followed by trees (29%), shrubs (11%), and climbers (7%). Leaves were the most frequently used plant part, while decoction and paste were the main preparation methods, with most remedies administered orally. Several species showed high RFC and UV values, while 73.3% exhibited 100% FL, indicating strong agreement among informants. The highest ICF (1.00) was observed for neurological and eye disorders. This study highlights the therapeutic potential of ethnoveterinary plants and underscores the urgent need for their conservation and scientific validation.

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Abstract No. 144

ETHNOBOTANICAL DOCUMENTATION OF RITUAL PLANTS USED BY THE LIMBOO COMMUNITY OF SIKKIM, EASTERN HIMALAYA

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ABSTRACT

Ethnobotanical knowledge forms a vital component of indigenous cultural heritage, particularly in regions like the Eastern Himalayas, where biological and cultural diversity are closely intertwined. The present study documents and analyses the ritualistic use of plants among the Limboo community of Sikkim, India, with an emphasis on their cultural, spiritual, and ecological significance. Field surveys were conducted across all four districts of Sikkim using semi-structured interviews and participatory observations involving 80 informants, including local elders and traditional healers (Phedangma, Yeba/Yema, and Samba). A total of 58 plant species belonging to 33 families were recorded as being used in various rites and rituals such as birth, marriage, death, agricultural festivals, and ancestral worship. The Poaceae family was found to be dominant, reflecting its central role in ceremonial practices. Herbaceous species constituted the largest growth form (46.55%), indicating their accessibility and frequent use. Leaves (31.03%) were the most commonly utilized plant parts, followed by seeds and tubers. Quantitative ethnobotanical indices, including Relative Frequency of Citation (RFC), Use Value (UV), and Informant Consensus Factor (ICF), were employed to evaluate cultural importance. Species such as *Artemisia vulgaris*, *Oroxylum indicum*, and *Selaginella lepidophylla* exhibited the highest RFC values (1.0), indicating universal recognition among informants. The study reveals a strong correlation between cultural practices and ecological knowledge, highlighting the role of plants as symbolic, medicinal, and spiritual resources within the Limboo worldview. However, the findings also indicate a gradual erosion of traditional knowledge due to modernization and declining interest among younger generations. This research underscores the urgent need for documentation and conservation of ethnobotanical knowledge, contributing to the preservation of biocultural diversity and supporting sustainable resource management in the Himalayan region.

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Abstract No. 145

ETHNOMEDICINAL PLANTS OF THE SIKKIM HIMALAYA FOR SKIN DISEASE TREATMENT: A QUANTITATIVE APPROACH

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ABSTRACT

Ethnomedicinal plants have long served as a primary source of healthcare for indigenous communities, providing affordable, accessible, and culturally accepted remedies for various ailments. This study documents and evaluates the ethnomedicinal knowledge of indigenous communities in the Sikkim Himalayas regarding the use of medicinal plants for the treatment of skin diseases. Ethnobotanical data were collected through semi-structured interviews with 118 informants, including farmers, village elders, and traditional healers across different districts of Sikkim. A total of 53 plant species belonging to 36 families were recorded as being used to treat various dermatological conditions such as wounds, burns, eczema, scabies, rashes, and fungal infections. Leaves were found to be the most frequently utilized plant part (39.62%), and remedies were mainly prepared as pastes (45%) and juices (25%), with topical application being the dominant mode of administration. Quantitative ethnobotanical indices, including Relative Frequency of Citation (RFC), Use Value (UV), and Informant Consensus Factor (ICF), were applied to assess the cultural importance and usage patterns of the documented species. *Artemisia vulgaris* showed the highest RFC (0.610) and UV (0.924), followed by *Curcuma longa* and *Aloe vera*, indicating their widespread use and therapeutic value. A strong positive correlation ($r = 0.916$; $p < 0.01$) between RFC and UV suggests that frequently cited plants are also the most versatile and trusted within the community. High ICF values for common ailments indicate shared knowledge among informants. The findings highlight the rich traditional knowledge system and its crucial role in primary healthcare. However, this knowledge is threatened by socio-cultural changes, emphasizing the need for documentation, conservation, and scientific validation for sustainable utilization and drug development.

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Abstract No. 146

STUDIES OF ROOT KNOT NEMATODES IN ROSES

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ABSTRACT

Root knot nematodes (Meloidogyne spp.) are among the most destructive soil-borne plant pathogens affecting rose (Rosa spp.) cultivation, causing significant economic losses in ornamental horticulture worldwide. The present investigation was undertaken to assess the prevalence, species diversity, and pathogenic impact of root knot nematodes on rose plants grown in field and greenhouse conditions in the Kanpur region. Soil and root samples collected from rose-growing sites were subjected to standard morphological and molecular characterization techniques, leading to the identification of *Meloidogyne incognita, M. javanica*, and *M. hapla* as the predominant species, with M. incognita recorded at the highest frequency and virulence across susceptible cultivars. Pathogenicity assays revealed a significant inverse correlation between nematode population density and key growth parameters including shoot length, root biomass, and flower bud production, underscoring the considerable agronomic threat posed by these parasites. Histopathological examination of infected root tissues demonstrated characteristic giant cell formation, pronounced cortical hypertrophy, and disruption of vascular tissue integrity, which collectively impair nutrient and water translocation within the host plant. Comparative screening of rose cultivars indicated varying levels of susceptibility and tolerance, with certain hybrid tea varieties exhibiting marked vulnerability while selected rootstock genotypes displayed moderate resistance. Evaluation of eco-friendly management approaches, including the application of biocontrol agents such as *Trichoderma harzianum* and *Paecilomyces lilacinus* alongside organic soil amendments, demonstrated a significant reduction in nematode population densities without adverse effects on plant health or soil ecology. These findings collectively contribute to a comprehensive understanding of root knot nematode biology in rose cultivation systems and provide a scientific basis for the development of integrated, sustainable nematode management strategies aimed at improving crop productivity and ornamental quality.

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Abstract No. 147

NATURE-BASED SOLUTIONS FOR URBAN HEAT MITIGATION AND ENVIRONMENTAL SUSTAINABILITY

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ABSTRACT

Rapid urbanization and unprecedented expansion of impervious built surfaces have intensified the urban heat island (UHI) effect, posing serious threats to public health, biodiversity, and the overall ecological integrity of cities across the globe, including rapidly growing urban centres of Uttar Pradesh such as Kanpur. Nature-based solutions (NbS) have emerged as scientifically robust, cost-effective, and ecologically viable strategies for mitigating urban heat while simultaneously advancing multiple dimensions of environmental sustainability. The present study critically examines the role of diverse nature-based interventions — including urban green infrastructure, street tree canopies, green roofs and walls, urban wetlands, permeable green corridors, and community parks — in reducing surface and ambient air temperatures, moderating microclimate conditions, and enhancing urban resilience to thermal stress. Field-based temperature monitoring, land surface temperature analysis, and vegetation cover assessment were employed to quantify the cooling efficiency of various NbS typologies across different urban land-use zones. Results indicate that well-designed green infrastructure networks can reduce local surface temperatures by 2–8°C and ambient air temperatures by 1–4°C, with the magnitude of cooling dependent on vegetation density, canopy coverage, proximity to water bodies, and spatial configuration within the urban fabric. Beyond thermal regulation, the assessed interventions demonstrated significant co-benefits including improved stormwater management, enhancement of urban biodiversity, carbon sequestration, reduction of air pollutants, and improvement of residents' physical and psychological well-being. The findings underscore the imperative for integrating nature-based solutions into urban planning frameworks, municipal policies, and climate action strategies, advocating for a paradigm shift from conventional grey infrastructure toward ecologically informed, biophilic urban design as a cornerstone of sustainable city development.

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Abstract No. 148

FAUNAL DIVERSITY AND ECOLOGICAL ASSESSMENT OF POND WATER ECOSYSTEMS IN KANPUR, UTTAR PRADESH

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ABSTRACT

Freshwater pond ecosystems serve as critical reservoirs of aquatic biodiversity and play an indispensable role in maintaining regional ecological balance, water purification, nutrient cycling, and the sustenance of diverse faunal communities. The present study was conducted to investigate the faunal diversity, community composition, and seasonal distribution of aquatic fauna inhabiting selected ponds of Kanpur district, Uttar Pradesh, with special reference to the influence of physico-chemical parameters on species richness and abundance. Monthly water samples and biological specimens were collected from five representative pond sites across the Kanpur region over a period of one year, encompassing pre-monsoon, monsoon, and post-monsoon seasons. The faunal survey recorded a diverse assemblage of organisms spanning multiple taxonomic groups including Protozoa, Rotifera, Cladocera, Copepoda, Ostracoda, aquatic insects, annelids, molluscs, and teleost fishes, reflecting the ecological richness of urban and peri-urban freshwater bodies in the Gangetic plain. Species diversity indices including Shannon-Wiener diversity index, Margalef's richness index, and Pielou's evenness index were computed to assess the ecological status of each pond. Significant seasonal variation in faunal composition was recorded, with maximum species richness observed during the post-monsoon period corresponding to optimal temperature, dissolved oxygen, and nutrient availability. Physico-chemical analysis revealed elevated levels of biochemical oxygen demand, total dissolved solids, and nitrate concentrations at sites proximal to residential and agricultural discharge points, which corresponded with reduced diversity and dominance of pollution-tolerant taxa. The study identifies increasing anthropogenic pressure, untreated sewage discharge, and encroachment as primary threats to the ecological integrity of Kanpur's pond ecosystems and strongly recommends implementation of biodiversity conservation measures, regular water quality monitoring, and community-level awareness programmes for the sustainable management of these vital freshwater habitats.

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Abstract No. 149

MODELING MHD TURBULENCE FOR ENERGY TRANSPORT IN CLIMATE-RELEVANT SPACE AND ENVIRONMENTAL SYSTEMS

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ABSTRACT

The energy transfer processes in plasmas, including the Earth's magnetosphere and space weather phenomena affecting climate, are substantially affected by MHD turbulence. Enhancing the modeling of plasma dynamics in order to increase sustainability in the environment and improve climate resilience would benefit from knowledge about the injection, transport, and dissipation of energy in the various scales present in the system. In this study, the main goal is to dig into MHD turbulence and follow energy as it travels across different scales in space and environmental systems tied to climate. Using advanced simulations, we dive deep into how velocity fields and magnetic fields interact—especially how kinetic and magnetic energies twist around and trade off with each other. We look at how energy first enters the system, how it breaks down into smaller bits through turbulent cascades, and where it finally drains away. In order to understand turbulence-driven transport processes, energy spectra are quantified to find scaling rules spanning inertial and dissipative regimes. The findings emphasise how anisotropy and spectrum dynamics control energy redistribution in space plasma settings, especially in space weather variability and magnetosphere–ionosphere connection. The stability of the environment and technological systems are indirectly but significantly impacted by these processes. Bringing together computational models with environmental thinking, this work helps build predictive frameworks for plasma-driven energy transport that actually matter for climate-related systems. It's all part of using cutting-edge modeling to support more stable, sustainable environments on our changing planet.

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Abstract No. 150

LINKING LIVELIHOOD VULNERABILITY AND CONSERVATION BEHAVIOUR: EVIDENCE FROM BOATMEN IN BATESHWAR ALONG THE YAMUNA RIVER

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ABSTRACT

The Yamuna River supports the livelihoods of millions of people in northern India through farming, fishing, boating, and ritualistic pursuits. It is one among the most important rivers in terms of culture, spirituality, and economic activity in the Indian subcontinent. However, the river is becoming increasingly threatened by untreated household sewage, industrial effluents, agricultural runoff, and unsustainable water extraction. As a result, the water quality is seriously declining, aquatic biodiversity is disappearing, and the livelihood security of the communities that rely on the river is declining. Despite initiatives like the Namami Gange Program, local people are still not completely involved in river management. Among these communities, boatmen represent a traditional yet marginalized group whose livelihoods are closely tied to the ecological health of the river. In Bateshwar, their dependence on the river for income, mobility services, and religious tourism makes them highly vulnerable to environmental degradation, seasonal fluctuations, and institutional neglect. At the same time, their continuous interaction with the river positions them as important stakeholders with potential contributions to participatory river basin management. In order to inform inclusive watershed management measures, this study investigates the relationships between livelihood vulnerability and water conservation behaviour among boatmen in Bateshwar. The study combines the Theory of Planned Behaviour to measure attitude, subjective norms, and perceived behavioural control toward river protection with the Sustainable Livelihood Framework to analyse livelihood capital, risks, and adaptive strategies. Based on a pilot survey of 50 boatmen using structured questionnaires, field observations, and informal interviews, findings indicate a positive attitude toward conservation. However, participation is constrained by financial instability, seasonal dependence, and limited institutional support, highlighting a gap between willingness and capacity. The study emphasizes integrated approaches for strengthening livelihoods and enabling inclusive river management.

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Abstract No. 151

ECOLOGICAL AND SOCIO-ECONOMIC CONSEQUENCES OF BAMBOO FLOWERING IN NORTHEAST INDIA

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ABSTRACT

Bamboo, often referred to as the "green gold" of Northeast India, plays a crucial ecological, economic, and cultural role in the region. The phenomenon of bamboo flowering, particularly gregarious flowering followed by mass mortality, has significant consequences on forest ecosystems, biodiversity, agriculture, and rural livelihoods. Northeast India, being one of the richest bamboo biodiversity zones in the world, frequently experiences periodic flowering events in species such as *Melocanna baccifera, Bambusa tulda, Dendrocalamus hamiltonii*, *D. longispathus, D. hookerii* etc. These flowering cycles, occurring after long intervals of 50-120 years or more, result in large-scale seed production, depletion of bamboo resources, and subsequent socio-economic imbalances. One of the most serious consequences is the outbreak of rodent populations due to abundant bamboo seeds, leading to severe crop destruction and famine-like conditions. However, many bamboo species viz. Bambusa balcooa, *B. cacharensis*, Dendrocalamus latiflorus etc. do not produce viable seeds after flowering which pause severe threat for their extinction loss. Ecologically, bamboo death alters forest structure, reduces habitat availability for dependent fauna, increases fire susceptibility, and accelerates soil erosion. Economically, the decline in bamboo availability affects cottage industries, handicrafts, construction materials, and the livelihoods of forest-dependent communities. However, bamboo flowering also offers opportunities for regeneration, scientific research, and strategic management interventions such as seed banking, replantation, and sustainable bamboo resource planning for a few species. This article examines the ecological and socio-economic consequences of bamboo flowering in Northeast India and highlights the need for integrated policy measures, community participation, and scientific management to mitigate adverse impacts while harnessing the regenerative potential of bamboo ecosystems.

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Abstract No. 152

ENVIRONMENTAL STRESS, BIODIVERSITY LOSS, AND CONSERVATION OF MEDICINAL PLANTS IN CHHATTISGARH, INDIA

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ABSTRACT

Chhattisgarh is one of the most biologically rich states of India and is widely recognized for its extensive forest resources, diverse agro-climatic zones, and strong indigenous ethnomedicinal traditions. Forests cover nearly half of the geographical area of the state, and major forest harbor a large diversity of medicinal herbs, shrubs, climbers, and trees used by tribal communities of the state These plant resources form an important component of primary healthcare, rural livelihoods, and local cultural heritage. Field-based studies from different forest divisions of Chhattisgarh have documented substantial medicinal plant richness. However, this biodiversity is increasingly exposed to multiple environmental stressors. Climate variability in the form of increasing temperature, irregular monsoon rainfall, prolonged dry periods, and recurrent drought has begun to alter ecological conditions in forest ecosystems. Prolonged heat and water deficit reduces seed germination, influence plant physiology by reducing photosynthetic efficiency and increasing oxidative stress. The influence of abiotic stress on medicinal plants frequently alter the synthesis of secondary metabolites such as alkaloids, flavonoids, tannins, phenolics, and terpenoids, which directly determine medicinal efficacy and phytochemical quality. Anthropogenic disturbances such as habitat fragmentation, forest fires, uncontrolled grazing, extraction of fuel wood, and unsustainable harvesting of roots, bark, rhizomes, and whole plants further intensify ecological pressure leading to reduced genetic variability and greater vulnerability to local extinction in Chhattisgarh. Environmental stresses also modify community structure and thus have direct social implications. Conservation of medicinal plant biodiversity in Chhattisgarh requires integrated ecological and community-based approaches. In situ conservation should prioritize protection of natural forest habitats, sacred groves, and Medicinal Plant Conservation Areas in biodiversity-rich regions. Ex situ conservation through herbal gardens, seed banks, nurseries, and field gene banks can support threatened and economically important species. Long-term ecological monitoring, climate-adaptation planning, and documentation of ethnobotanical knowledge will be essential to maintain the medicinal plant wealth of Chhattisgarh under increasing environmental stress.

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Abstract No. 153

SPATIAL DISTRIBUTION AND RISK ASSESSMENT OF ARSENIC IN SOIL, WATER AND PLANT SYSTEMS OF THE TARAI REGION, UTTAR PRADESH, INDIA

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ABSTRACT

Arsenic (As) contamination has emerged as a serious environmental and public health issue, particularly in alluvial and floodplain regions such as the Tarai belt of Uttar Pradesh, India. The present study aims to explore the spatial variation in the concentration of arsenic in soils and waters as well as its effect on plant toxicity and human health. Arsenic can be derived from both geogenic and anthropogenic sources. Arsenic is present in inorganic form as arsenate (As^{5+}) and arsenite (As^{3+}) that are extremely toxic and bioavailable. Samples of soil and water have been collected systematically at various sampling points located in Siddharth Nagar district viz. Uska Raja, Mogalha, Mogalha Nala, Belsar Taal, Gangodhar, Pathanpur, Uska Railway Station, Raksail, Madarahna (Bajha Taal), Mahali Tola, and Piprahwa. In addition, samples have been collected from various locations of Lakhimpur Kheri district like Dhaurahara, Ramia Behar, Kailashpuri, Nighasan, Bajan Purwa, Bharatpur, Jhandi (Shardanagar), Ambara Nagar, Sharda Ghat, Mulauvan Purva, and Phool Behar. As a result, spatial analysis has shown significant variation in arsenic concentration at the selected points with some sites showing As exceeding the permissible limit such as Piprahwa, Parsauni, Sharda Ghat, Madarahna. High content of arsenic leads to loss the crop productivity, which also affects seed germination, roots ,and shoots development. Moreover, it accumulates in the crops entering the food chain, which poses serious threats to a health as exposure to arsenic contaminated water and food leads to various diseases such as cancers, cardiovascular, neurological conditions, and reproductive complications. This study shows the urgent need for continuous monitoring, geospatial mapping, and effective remediation strategies to mitigate arsenic contamination and safeguard environmental and human health in the Tarai region.

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Abstract No. 154

IMPACT OF PHYSIC-CHEMICAL PARAMETERS OF DRINKING WATER QUALITY ON GASTROINTESTINAL DISORDERS WITH SPECIAL REFERENCE TO DIST. MORENA (M.P.)

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ABSTRACT

The quality of drinking water is a critical determinant of public health, particularly in regions where physicochemical parameters are influenced by natural geology, agricultural runoff, and anthropogenic activities.Groundwater is the primary source of drinking water in both rural and urban areas of Morena a district in M.P. Hand pumps, tube wells, and bore wells are commonly used, often without adequate treatment.The objective of this study is to see correlation between number of patient suffering from GI disorders and water quality.Water samples were collected regularly and analyzed for various physico-chemical properties (March 2024 to Feb.2026). Physical parameters of water were analysed at the sampling point during the collection of waterwhile chemical parameters of water were analysed in laboratory after collection of water samples as per the standard methods. A survey was also conducted through survey schedule from 20 families of each 18 study areas about different types of diseases they are suffering from.The study revealed that values of some parameters (TDS and hardness) were higher in some areas like Pahadgarh, Kaji Basai, Hingonakhurd, Ratan Basai, Sinhonia and Madanpura, Antri areas. Areas like Banmore, Morena, Bilgaon Chowdhary, Jhundpura, Kailaras, Jourakhurd Sabalgarh, Joura and Dimni have almost all parameters in limit and their water is good for drinking purpose. Correlation is calculated between number of patients suffering from gastro intestinal disorders and water quality and it is observed that there is positive correlation betweenincreased level of Calcium hardness, Magnesium hardness, Sulphate, Total Hardness and pH. Physicochemical parameters directly affect the safety and palatability of drinking water. Elevated TDS and hardness can impair digestion and contribute to gastrointestinal discomfort, are associated with chronic GI irritation and long-term health complications. Similarly, deviations in pH and alkalinity may disrupt the natural balance of gut microbiota, exacerbating conditions such as diarrhoea, dyspepsia, and gastritis. In Morena, where groundwater is the primary source of drinking water, agricultural practices and industrial effluents further alter these parameters, increasing the risk of waterborne diseases. This study emphasizes the urgent need for integrated approaches that combine environmental science, public health, and local governance to mitigate the adverse impacts of poor water quality on gastrointestinal health in Morena.

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Abstract No. 155

IMPACT OF AGRICULTURAL PRACTICES ON ECOSYSTEM HEALTH

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ABSTRACT

The intensification of agriculture, which denotes the use of modern inputs like pesticides and machinery as well as unsustainable resource consumption, has an adverse effect on the environment. All agricultural methods share the domains of water, soil, air, and biodiversity; any environmental impact resulting from agriculture would be reflected in these domains. Since India is a developing nation, it ought to take environmental and agricultural issues more seriously. Policies are required to enhance research and development of new technologies and to improve agricultural infrastructure. It is commonly known that agriculture occupies over one-third of the world's land area. Because agriculture depends on the utilization of natural resources, the environment directly affects its survival and sustainability. Without a question, no single human activity has a bigger environmental impact on Earth than agriculture. The food and fibre required by the growing population in the future will not be supplied by conventional agricultural production methods. The dilemma is whether we can create and implement farming methods that can both sustain our ecosystem over the long term and produce the food required to feed a growing population. It is not a question of whether, but rather when, almost all of the planet's natural habitat will be degraded to the point of being unproductive under the majority of agricultural production systems currently in use. After that, it will be left for future generations to figure out how to restore and rehabilitate. The majority of the new technology and methods that farmers are starting to create, modify, and use is not environmentally friendly. Therefore, this study examines how agriculture and the environment are related, as well as how agricultural affects the environment.

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Abstract No. 156

BIOLOGICAL USE OF BIOCONTROL AGENTS IN SUSTAINABLE AGRICULTURE

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ABSTRACT

The growing demand for sustainable agricultural practices has led to increased interest in biological control as an alternative to chemical pesticides. Biological control involves the use of beneficial microorganisms to suppress plant pathogens and enhance crop productivity. Among these, Trichoderma species have gained significant attention due to their effectiveness and adaptability in diverse agroecosystems. These fungi act through several mechanisms, including mycoparasitism, antibiosis, and competition for nutrients and ecological niches, thereby preventing the growth of harmful pathogens. In addition to disease suppression, Trichoderma spp. contributes to plant growth promotion by improving root architecture, increasing nutrient uptake, and producing growth-regulating substances. They also induce systemic resistance in plants, enhancing the plant's natural defence system against a wide range of biotic stresses. Furthermore, the co-ordination of biocontrol agents into modern agricultural systems reduces dependence on synthetic chemicals, minimizes environmental pollution, and supports long-term soil fertility. The biological use of Trichoderma represents a viable and eco-friendly approach for sustainable crop protection. Therefore, biocontrol strategies play a crucial role in advancing resilient agricultural systems and ensuring global food security.

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Abstract No. 157

ENVIRONMENTAL APPLICATIONS OF BIOCONTROL AGENTS IN SUSTAINABLE AGRICULTURE

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ABSTRACT

The rising environmental concerns allied with excessive use of chemical pesticides have accelerated the adoption of eco-friendly alternatives in modern agriculture. Biological controls, which make use of beneficial microorganisms to suppress plant pathogens, has emerged as a key strategy for reducing environmental pollution and maintaining ecological balance. Among several biocontrol agents, Trichoderma species are widely recognized for their effectiveness, adaptability, and environmental compatibility.Trichoderma species exert their biocontrol activity through multiple mechanisms, including mycoparasitism, antibiosis, enzyme production, and competition for nutrients and space. These actions effectively inhibit soilborne pathogens such as *Fusarium*, *Rhizoctonia*, and *Pythium*, thereby reducing crop losses without harming non-target organisms. In addition to disease repression, Trichoderma enhances soil health by improving microbial diversity and organic matter decomposition. It also promotes plant growth by stimulating root development and inducing systemic resistance against biotic and abiotic stresses. The environmental benefits of biocontrol agents include reduced chemical residues in soil and water, lower greenhouse gas emissions associated with pesticide production, and preservation of beneficial soil microflora. Although challenges such as environmental sensitivity and formulation stability remain, the integration of Trichoderma based biocontrol strategies offers a promising approach to achieving environmentally sustainable agriculture. Thus, the biological use of eco-friendly biocontrol agents plays a crucial role in protecting ecosystems while ensuring agricultural productivity.

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Abstract No. 158

ENVIRONMENTAL EDUCATION AND BEHAVIOURAL STRATEGIES FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

Environmental education plays a vital role in promoting awareness, knowledge, and responsible action toward environmental protection and sustainable development. It is a continuous and interdisciplinary process that helps individuals and communities understand environmental challenges, develop critical thinking and problem-solving skills, and adopt sustainable practices. Through educational programs, people become more aware of ecosystem functioning, the impacts of human activities, and the importance of conserving natural resources for future generations. Environmental awareness encourages individuals to recognize the fragility of the natural environment and their responsibility in protecting it. Educational initiatives such as classroom learning, field activities, environmental campaigns, community outreach programs, and experiential learning strengthen the connection between humans and nature. These approaches foster environmental sensitivity and inspire active participation in conservation and sustainability efforts. However, awareness alone is insufficient unless it leads to meaningful behavioural change. Sustainable environmental improvement depends on transforming knowledge into practical action. Various behavioural strategies have proven effective in encouraging pro-environmental behaviour, including social norms, public commitments, feedback systems, reminders, and incentive-based approaches. Legislative measures, institutional policies, and community-based initiatives also create supportive conditions for sustainable behavioural transformation. Collaboration among governments, educational institutions, non-governmental organizations, and local communities further enhances environmental responsibility and public participation. Environmental education also contributes to the development of environmentally conscious citizens who can make informed decisions and support sustainable lifestyles. By integrating environmental values into education systems and public policies, societies can build resilience against environmental degradation, climate change, pollution, and resource depletion. Educational and behavioural strategies together provide a strong foundation for achieving long-term environmental sustainability. In conclusion, environmental education is essential for increasing ecological awareness and promoting responsible citizenship, while behavioural strategies ensure that awareness is translated into sustainable practices and positive environmental outcomes. Together, they play a crucial role in creating a more sustainable, environmentally responsible, and resilient society.

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Abstract No. 159

INSECTS: OVERLOOKED ENGINES OF RESILIENT ECOSYSTEMS

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ABSTRACT

Wildlife includes not only the large animals in the forests, but also insects, birds, small mammals, fish, other aquatic organisms, and the biota within soil. With an estimated 5.5 million species, insects are the most diverse group of animals on the planet, in fact, insects account for 80% of animal life on Earth. Estimates ranging from 10 to 30 million, of which approximately 1.11–1.7 million are described— and many more are yet to be discovered. Much attention is focused on decline of large, charismatic animals, but recent evidence suggests that insect populations have declined by 75% in less than three decades. Some studies suggest roughly 250,000 to 500,000 species have been lost over the last 150 years. This is troubling, because insects are vitally important. Key roles of insects in ecosystem resilience include pollination, major pollinators include bees, butterflies, moths, and beetles; decomposition & nutrient cycling, detritivores like termites and beetles facilitate this, preventing the buildup of waste; food web support; soil aeration & health, ants and termites improve soil structure, enhancing water infiltration and mixing organic matter; natural/biological pest control, predatory insects, such as ladybugs and lacewings, regulate populations of other herbivores, reducing the need for chemical pesticides; bioindicators; bioremediation, specific insects are used to breakdown organic waste, convert plastic, absorb heavy metals, providing natural waste treatment solutions. Two of the major cause for the many threatened and endangered species of insects globally, is use of pesticides and climate change. Impact of climate change on insects include population collapses and extinctions, geographical range shifts, faster development and more generations, increased overwintering survival, disrupted synchrony, increased crop damage etc. Globally, hundreds of insects face the threat of eventual extinction, according to the International Union for the Conservation of Nature (IUCN). Some suggested sustainable insect pest management strategies are Integrated Pest Management (IPM), use of resistant varieties, employing natural enemies, predators and pathogens (biological control), opting sterilization technique, using sex attractants and pheromones and employing green pesticides (botanicals). Based on Indian Knowledge Tradition, searching for bio-rational pesticides by screening naturally occurring compounds in plants-the Green insecticides could be one alternate not only for better health and safer environment but also for conserving the little creatures-Insects. These have various chemical properties and modes of action and effects on insects viz., toxicants resulting in mortality, repellents, ovipositional deterrents, anti-feedants, sterilants, attractants and growth inhibitors.With this concept, work on screening of certain plants (Green insecticides/ botanicals) for their efficacy as grain protectant against Callosobruchus chinensis Linn. (Coleoptera: Bruchidae), a pest of stored pulses was undertaken. Plants belonging to family Zygophyllaceae, Leguminoseae/ Fabacae, Solanaceae, Lamiaceae and Euphorbiaceae were screened in the laboratory for their efficacy and it could be concluded that certain plants/plant parts/plant products because of their biological activity have a potential and can be used for insect pest management. Using Green insecticides (Botanicals)up to some extent could help in conservation of the much important and the overlooked engines of resilient ecosystems –the Insects!!

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Abstract No. 160

INDIAN TRADITIONAL KNOWLEDGE AND ADAPTIVE STRATEGIES FOR CLIMATE CHANGE RESILIENCE

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ABSTRACT

Environmental resilience helps ecological systems to absorb disturbances, reorganize under stress, and maintain functional integrity amid climate variability and anthropogenic pressures. Indian Traditional Knowledge (ITK)comes from long-term ecological observation and community-based resource management and helps in biodiversity conservation, ecosystem restoration and climate adaptation. Traditional Indian ecological systems substantiate agroecological diversification, circular nutrient cycling, hydrological regulation, and landscape-level conservation. Practices such as rainwater harvesting, agroforestry, mixed cropping, millet-based polycultures, sacred grove preservation and indigenous seed conservation demonstrate high adaptive capacity under ecological stress. These systems enhance soil organic carbon sequestration, microbial diversity, groundwater recharge and ecosystem productivity. Traditional water management systems like johads, tank irrigation networks, and zabo systems, contribute to watershed resilience, aquifer recharge, and drought mitigation under fluctuating precipitation regimes. Sacred groves and community-managed forests function as micro-refugia for endemic flora and fauna supporting *in situ* biodiversity conservation and ecological connectivity. These indigenous systems support modern concepts like ecosystem-based adaptation (EbA), nature-based solutions (NbS)and regenerative sustainability. Rapid urbanization, land-use transformation and industrialization threaten the continuity of traditional ecological systems. It is important to integrate ITK into climate policy, for sustainable agriculture, disaster risk reduction and ecosystem.

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Abstract No. 161

ETHNOMEDICINAL USES OF BHUMI AMLA (*PHYLLANTHUS NIRURI* L.)

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ABSTRACT

Bhumi amla" is a small herbaceous plant belonging to the Phyllanthaceae family. It is widely distributed across tropical and subtropical regions of India, Brazil, Caribbean region, and Southeast Asia. Traditionally, it has significant value in Ayurvedic, Siddha, Unani, and South American folk medicine systems for treating a diverse range of ailments. The plant grows 30-60 cm tall with small, alternate leaves along the branchlets, and bears minute greenish flowers that develop into tiny fruits beneath the leaves. The ethnomedicinal uses of Phyllanthus niruri are extensive and most renowned as "stonebreaker" for its use in managing kidney stones and gallstones. Traditional practitioners use it as a remedy for jaundice and other liver disorders, viral hepatitis, urinary tract infections, diabetes, hypertension, digestive issues, excess uric acid and as a diuretic, while in India it is a key herb for liver health and detoxification.Phytochemical investigations reveal that *P. niruriis* a rich source of bioactive compounds, such as phyllanthin and hypophyllanthin, flavonoids like quercetin, rutin, and kaempferol, tannins including geraniin and corilagin, alkaloids, terpenoids, and phenolic acids. The lignans phyllanthin and hypophyllanthin are considered the primary marker compounds and are often used for standardization of extracts. These constituents vary in concentration depending on geographical origin, harvest time, and plant part used, with the leaves and aerial parts containing the highest levels. Pharmacological studies support many traditional claims. Extracts of *P. niruri* have demonstrated hepatoprotective activity against chemically induced liver damage, likely due to antioxidant and membrane-stabilizing effects of its polyphenols and lignans. Its antilithiatic properties are attributed to the ability to relax urinary tract smooth muscle, reduce urinary calcium excretion, and inhibit calcium oxalate crystal aggregation. The plant also exhibits significant antiviral activity, particularly against Hepatitis B virus, by inhibiting viral DNA polymerase and surface antigen secretion. Additional research indicates anti-inflammatory, analgesic, antidiabetic, hypolipidemic, antimicrobial, and anticancer potential. Antioxidant activity is well documented and is linked to its high flavonoid and tannin content, which scavenge free radicals and upregulate endogenous antioxidant enzymes. Phyllanthus niruri is a pharmacologically very important medicinal plant, its multi-target bioactivity makes it a promising candidate for phytopharmaceutical development, particularly for hepatoprotection, urolithiasis, and metabolic disorders. Further large-scale clinical trials and standardization of extracts are needed to fully establish therapeutic protocols and ensure consistent efficacy.

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Abstract No. 162

MICROBIAL POLYMERS: EMERGING BIOMATERIALS FOR ADVANCED MEDICAL APPLICATIONS

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ABSTRACT

Microbial polymers are biodegradable large molecules produced by microorganisms including bacteria, fungi, and algae. These biopolymers have received considerable interest in the biomedical sector because of their outstanding biocompatibility, non-toxicity, renewable characteristics, and environmentally friendly properties. Typical microbial polymers comprise xanthan gum, dextran, pullulan, alginate, bacterial cellulose, and polyhydroxyalkanoates (PHAs). Their distinctive physicochemical characteristics render them appropriate for various medical uses. Microbial polymers are widely used in drug delivery systems for the controlled and targeted release of therapeutic agents, enhancing drug stability and minimizing side effects. In tissue engineering, these polymers act as frameworks that facilitate cell growth and tissue restoration. Bacterial cellulose and alginate are commonly utilized in wound dressings due to their ability to retain moisture, provide mechanical strength, and possess antimicrobial features. Moreover, microbial polymers are utilized in surgical materials, synthetic implants, biosensors, and regenerative medicine. Although faced with issues like elevated production expenses and purification challenges, recent progress in biotechnology and genetic engineering is improving their commercial and medical prospects. Consequently, microbial polymers are seen as promising eco-friendly biomaterials for creating innovative healthcare products and cutting-edge biomedical technologies.

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Abstract No. 163

ASSESSMENT OF PAPER MILL EFFLUENT TOXICITY THROUGH CONDITION FACTOR AND ORGANOSOMATIC INDICES IN THE FRESHWATER FISH *MYSTUS VITTATUS*

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ABSTRACT

Biomarkers and physiological indices are important tools for assessing environmental stress and determining the impact of pollutants on aquatic organisms. These indicators help in evaluating the ability of fish to grow, reproduce, survive, and adapt under adverse environmental conditions. The present investigation was carried out to evaluate the effect of sublethal concentrations (10%, 20%, and 30%) of paper mill effluent on the health status of the freshwater fish *Mystus vittatus*. The study focused on important biological parameters such as condition factor (CF), hepatosomatic index (HSI) and gonadosomatic index (GSI) after an exposure period of 30 days. The results revealed a significant decline ($P<0.05$) in all the studied parameters in treated fish compared to the control group. The reduction in CF, HSI and GSI indicates physiological and metabolic disturbances caused by the toxic components present in paper mill effluent. These alterations may adversely affect growth performance, reproductive capacity, and overall health of the fish. Industrial effluents released into aquatic ecosystems often contain harmful organic and inorganic substances that can disturb the ecological balance and threaten aquatic biodiversity. Therefore, monitoring physiological responses in fishes can provide valuable information regarding environmental pollution and ecosystem health. The findings of the present study suggest that *Mystus vittatus* can serve as an effective bioindicator species for evaluating industrial effluent toxicity. Changes in condition factor and organosomatic indices may be effectively used as reliable biomarkers for monitoring pollution stress in freshwater ecosystems.

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Abstract No. 164

ENVIRONMENTAL ETHICS AND HUMAN RESPONSIBILITY FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

Environmental ethics is a branch of philosophy that examines the moral relationship between humans and the natural environment. It emphasizes the ethical responsibility of individuals and societies to protect ecosystems, conserve biodiversity, and maintain ecological balance for present and future generations. Environmental ethics challenges anthropocentric attitudes that place human interests above nature and instead promotes respect for all forms of life and the intrinsic value of natural resources. In the context of growing environmental problems such as climate change, pollution, deforestation, habitat destruction, and biodiversity loss, ethical awareness has become essential for achieving sustainable development. Human responsibilities toward the environment include reducing pollution, conserving natural resources, promoting renewable energy, protecting wildlife, and adopting sustainable lifestyles. Ethical environmental behaviour also involves responsible consumption, waste reduction, and participation in conservation activities. Governments, educational institutions, industries, and communities all play an important role in developing environmentally responsible policies and practices that balance economic progress with ecological preservation. Environmental ethics also highlights the importance of intergenerational justice, which ensures that future generations inherit a healthy and sustainable environment. By integrating ethical values into environmental laws, public policies, and daily decision-making, societies can promote harmony between human development and nature. Philosophical approaches such as deep ecology, eco-centrism, and sustainable ethics encourage a broader understanding of humanity's connection with the natural world and the need for collective environmental stewardship. In recent years, environmental education and public awareness campaigns have become important tools for strengthening ethical responsibility toward nature. Educational programs help individuals understand the consequences of environmental degradation and motivate them to adopt eco-friendly practices. Community participation, green technologies, sustainable agriculture, and conservation initiatives further contribute to environmental protection and ecological resilience. International cooperation and global environmental agreements also play a significant role in addressing shared environmental challenges and promoting sustainable resource management. Overall, environmental ethics provides a moral framework for guiding human actions toward environmental sustainability. It encourages individuals and societies to recognize their duty to protect the Earth and to work collectively for a cleaner, healthier, and more sustainable future.

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Abstract No. 165

EVALUATING THE EFFECTIVENESS OF ENVIRONMENTAL EDUCATION IN CLIMATE CHANGE AWARENESS

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ABSTRACT

Environmental education (EE) has emerged as a pivotal instrument in addressing the global climate crisis by fostering ecological literacy, behavioral change, and informed civic participation, and this study evaluates the effectiveness of structured environmental education programs in enhancing climate change awareness among secondary and higher secondary school students in urban and semi-urban settings of Uttar Pradesh, India, employing a mixed-methods research design that combined pre- and post-intervention surveys, focus group discussions, and observational assessments across six educational institutions over a period of six months, with a total of 480 students participating in the study and exposed to a curriculum integrating classroom instruction, field-based learning, documentary screenings, and interactive workshops on climate science, carbon footprints, biodiversity loss, and sustainable practices, wherein quantitative analysis revealed a statistically significant improvement ($p < 0.01$) in climate knowledge scores post-intervention with mean scores rising from 41.3% to 74.6%, while qualitative findings indicated a marked shift in students' attitudes toward environmental responsibility with 78% of participants reporting greater motivation to adopt sustainable behaviors in daily life, and field-based and experiential learning components were identified as the most impactful pedagogical strategies, outperforming conventional didactic methods in both knowledge retention and attitudinal transformation, with the study further highlighting existing gaps in current school curricula including insufficient integration of local ecological contexts and limited teacher training in climate pedagogy, thereby underscoring the need for policy-level reforms that institutionalize comprehensive, context-sensitive environmental education frameworks within the Indian schooling system, and affirming that well-designed environmental education programs significantly enhance climate change awareness and can serve as a foundational strategy for building a climate-resilient generation.

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Abstract No. 166

CLIMATE CHANGE AND HEAT ISLANDS

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ABSTRACT

Climate change causes extreme heat waves, cold spells, storms, floods and droughts and affects human and animal health, causes deleterious effects to plants and environment. Change in climate develops over a long period or decades. Climate change causes upsets hydrological cycles, We know that as cities grows development of roads, railways, buildings infrastructure occurs leading to displacement of natural water like ponds, lakes, trees are cut down to widen the road , build metro corridors, flyover or underpass for fast travelling and decrease distance of travelling, This causes changes in the environment leading to change in the local climate. The roadside trees provide shade and are green belts cause cooling of atmospheric temperatures. The trees also prevent flooding of water leading to increase in ground water level, they cause evaporative cooling, the increase in temperature by man made activity is increasing leading to heat island in urban cities, the use of electrical goods for cooling purpose , air conditioners, automobiles, tall building constructions with narrow lane using dark screens which absorb more sunlight increasing the temperature of the surrounding increases the atmospheric temperature, building of pavement using concrete does not absorb water and absorbs more heat from sunlight causes increase in temperature, so there is a necessary to have more green belts and sustainable growth.

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Abstract No. 167

RECENT ADVANCES IN GREEN TECHNOLOGY, WASTE MANAGEMENT, AND SOCIAL SUSTAINABILITY

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ABSTRACT

The growing challenges of climate change, environmental degradation, and resource depletion have increased the global demand for sustainable development practices. Recent advances in green technology, waste management, and social sustainability provide effective solutions for achieving environmental protection and long-term socio-economic development. Green technologies, also known as environmentally sustainable or clean technologies, focus on reducing pollution, conserving natural resources, and improving energy efficiency. Innovations such as renewable energy systems, green buildings, eco-friendly manufacturing, sustainable transportation, and water purification technologies are supporting the transition toward a low-carbon economy. Modern waste management strategies have also evolved significantly through the adoption of circular economy principles, advanced recycling systems, waste-to-energy technologies, and AI-based waste sorting techniques. These approaches help convert waste into valuable resources, reduce landfill pressure, and minimize environmental pollution. Green chemistry and sustainable material innovations further contribute to safer industrial processes by replacing hazardous substances with eco-friendly alternatives. Social sustainability has emerged as an essential component of sustainable development by promoting social equity, community resilience, environmental justice, and inclusive growth. Current frameworks emphasize participatory planning, sustainable livelihoods, and equal access to resources to ensure that technological and environmental progress also improves human well-being. The integration of social sustainability with green innovation strengthens adaptive capacity against climate change while supporting global sustainability goals. The combined progress in green technology and sustainable waste management plays a crucial role in conserving ecosystems, lowering greenhouse gas emissions, and promoting resource efficiency. Renewable energy technologies such as solar, wind, and geothermal energy are transforming energy systems by reducing dependence on fossil fuels. Similarly, sustainable waste management practices encourage recycling, reuse, and resource recovery, which are vital for the development of a circular economy. Overall, the widespread adoption of green technologies and sustainable practices is essential for building an environmentally secure, socially inclusive, and economically resilient future.

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Abstract No. 168

NETWORK PHARMACOLOGY AND MOLECULAR DOCKING APPROACH TO EXPLORE THE THERAPEUTIC POTENTIAL OF *VITEX NEGUNDO* AGAINST OVARIAN SEROUS CYSTADENOCARCINOMA (OSC)

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ABSTRACT

Ovarian serous cystadenocarcinoma (OSC) is one of the most aggressive forms of ovarian cancer, often associated with late diagnosis, poor prognosis, and resistance to conventional therapies. The complexity of OSC has encouraged the search for multi-target therapeutic agents, particularly from medicinal plants. *Vitex negundo*, a widely used ethnomedicinal plant in Ayurveda and Traditional Chinese Medicine, is known for its anti-inflammatory, antioxidant, and anticancer properties. However, its molecular mechanism against OSC remains insufficiently explored. This study investigated the therapeutic potential of *Vitex negundo* against OSC using an integrated computational approach involving network pharmacology, gene expression analysis, and molecular docking. Ten major phytochemicals were selected based on oral bioavailability and drug-likeness criteria. Potential targets were predicted using Swiss Target Prediction and compared with OSC-associated genes obtained from Gene Cards and DisGeNET databases. The overlapping targets were analysed through Cytoscape, STRING, GO, KEGG, Reactome, and GEPIA platforms, followed by molecular docking using AutoDock Vina. A total of 78 overlapping genes were identified as potential therapeutic targets. Protein–protein interaction analysis highlighted AKT1, EGFR, BCL2, ESR1, and SRC as key hub genes associated with cancer progression and survival pathways. Functional enrichment analyses revealed significant involvement of PI3K/AKT signalling, endocrine resistance, oxidative stress response, and apoptosis regulation. Molecular docking demonstrated strong binding affinities of β-sitosterol, isoorientin, luteolin, and betulinic acid with AKT1 and EGFR, with β-sitosterol showing the highest affinity against AKT1 (–11.0 kcal/mol). These findings suggest that *Vitex negundo* possesses promising multi-target therapeutic potential against OSC and may serve as a valuable source for future plant-based anticancer therapies.

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Abstract No. 169

NATURAL DYES FROM FLORAL AND AGRICULTURAL WASTE

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ABSTRACT

The textile industry's need for sustainable and environmentally friendly substitutes has increased due to growing environmental concerns over synthetic dyes. A possible renewable resource for sustainable textile coloring is natural dyes derived from agricultural and floral waste. Natural pigments that can be successfully used for textile dyeing applications can be found in floral wastes such as marigold petals, rose petals, hibiscus flowers, and parijat flowers, as well as agricultural residues like onion peels, pomegranate rind, turmeric waste, and tea leaves. Compared to traditional synthetic colors, these bio-based dyes are non-toxic, biodegradable, and safe for the environment. The extraction and use of natural dyes from floral and agricultural waste materials on textile substrates like cotton and silk fabrics is the main focus of this work. Colorants are extracted from waste biomass using a variety of processes, such as solvent and aqueous extraction. Additionally assessed is the impact of mordants on wash fastness, colour strength, and dye absorption. In the context of sustainable textile production, the study emphasizes the potential of waste-derived natural dyes in lowering environmental pollution and encouraging waste valorization. Additionally, by turning waste biomass into textile goods with additional value, the use of floral and agricultural waste for color extraction supports circular economy principles. Along with other useful qualities like antibacterial and UV-protective benefits, natural dyes can offer beautiful hues. Thus, the development of sustainable and environmentally friendly textile processing technologies can be greatly aided by the use of natural dyes derived from renewable waste resources.

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Abstract No. 170

A PRELIMINARY SURVEY OF BUTTERFLY DIVERSITY IN AND AROUND SIKKIM ALPINE UNIVERSITY, KAMRANG, SOUTH SIKKIM

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ABSTRACT

Butterflies are ecologically important insects that function as pollinators, environmental indicators, and essential components of terrestrial ecosystems. Owing to their sensitivity to climatic and habitat variations, butterfly diversity studies provide valuable insights into ecosystem health and biodiversity conservation. The present study was conducted in and around Sikkim Alpine University, Kamrang, South Sikkim, situated within the Eastern Himalayan biodiversity hotspot, to assess butterfly diversity, abundance, and seasonal distribution patterns. Field surveys were carried out from November to May across five selected sites using the standardized Pollard Walk transect method. Climatic parameters including temperature, rainfall, cloud cover, atmospheric pressure, wind speed, and gust speed were simultaneously monitored to evaluate their influence on butterfly assemblages. Diversity indices such as Shannon–Weiner, Simpson's Index, Berger–Parker Dominance, Margalef's Richness, and Evenness were calculated using PAST and SPSS software. A total of 41 butterfly species belonging to five major families—Nymphalidae, Pieridae, Lycaenidae, Papilionidae, and Hesperiidae—were documented during the study period. The highest species richness and abundance were recorded during the winter and early spring months (December to March), with January showing peak abundance. Species such as *Dodona durga*, *Aporia agathon*, and *Zemeros flegyas* were more abundant during cooler months, whereas *Pieris canidia* and *Aglais caschmirensis* showed higher abundance during warmer months. Diversity indices revealed a relatively balanced butterfly community during winter, followed by a gradual decline in evenness and increased dominance of a few thermophilic species during late spring. Correlation analysis demonstrated that temperature and cloud cover significantly influenced species occurrence and seasonal distribution. Several cold-adapted species exhibited strong negative correlations with increasing temperature, while a few generalist species showed broader climatic tolerance. The findings highlight the ecological significance of the Kamrang region as a semi-natural refuge supporting rich butterfly diversity despite moderate anthropogenic disturbance. This preliminary study provides baseline data on butterfly diversity in South Sikkim and emphasizes the need for long-term ecological monitoring, habitat conservation, and climate-sensitive biodiversity management strategies in the Eastern Himalayan region.

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Abstract No. 171

NATURE AND SYMBOLISM IN THE UPANISHADS: AN ECOLOGICAL PERSPECTIVE

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ABSTRACT

The Upanishads explain the deep connection between human beings, nature, and the universe through simple yet powerful symbols and philosophical ideas. Nature is not presented only as a physical world but as a sacred expression of Brahman, the ultimate reality. Elements such as fire, air, water, earth, rivers, trees, and space are used as symbols to teach spiritual truths, moral values, and the unity of all living beings. This paper studies how the Upanishads use natural symbols and images to create ecological awareness and ethical understanding. It explains how nature becomes a medium for self-realization and spiritual knowledge. The Upanishadic philosophy teaches harmony between humans and nature and promotes values like balance, self-control, respect, and peaceful coexistence. The study also shows that the Upanishads consider humans as a part of the cosmic order, not separate from nature. Through a philosophical and interpretative method, the paper argues that these ancient teachings are still relevant in today's environmental crisis. The ecological wisdom found in the Upanishads can inspire sustainable living, environmental responsibility, and a deeper respect for the natural world. This research highlights the importance of Indian philosophical traditions in developing modern environmental ethics and ecological consciousness.

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Abstract No. 172

DIVERSITY AND SEASONAL DYNAMICS OF *DROSOPHILA* SPECIES IN SEMI-URBAN AND NATURAL HABITATS OF SOUTH SIKKIM, INDIA

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ABSTRACT

Drosophila species are widely recognized as important model organisms and ecological bioindicators due to their sensitivity to environmental changes and habitat conditions. The present study investigated the diversity, abundance, and seasonal dynamics of *Drosophila* species in semi-urban and natural habitats around the Sikkim Alpine University campus in the Kamrang region of South Sikkim. Sampling was conducted from March to May using bait trap methods with fermented fruit mixtures across six selected microhabitats. Species identification was carried out using standard morphological keys, and biodiversity indices including Shannon, Simpson, Berger–Parker, and Evenness indices were calculated using PAST software. Climatic parameters such as temperature, rainfall, cloud cover, atmospheric pressure, and wind speed were also analyzed to evaluate their influence on species distribution. A total of seven Drosophila species were recorded during the study period. *Drosophila* immigrans and *D. busckii* were the dominant species, with peak abundance observed in April under moderate temperature and low rainfall conditions. Species richness was highest in April, while March and May exhibited greater species evenness. Diversity indices indicated an increase in community heterogeneity and richness over the sampling period. Correlation analysis revealed that *D. busckii* showed significant positive associations with temperature and wind speed, and negative correlations with rainfall and cloud cover, indicating species-specific climatic responses. In contrast, *D. melanogaster* and *D. immigrans* displayed broader ecological tolerance with minimal climatic sensitivity. The findings highlight the ecological significance of *Drosophila* as bioindicators of environmental variation and provide baseline information on drosophilid diversity in the Eastern Himalayan region. The study emphasizes the importance of long-term ecological monitoring to better understand climate-driven changes in insect community dynamics.

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Abstract No. 173

ASSESSMENT OF AIR QUALITY IN AYODHYA CITY, UTTAR PRADESH

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ABSTRACT

Air pollution has become a major environmental issue in rapidly urbanizing cities of India. Ayodhya city of Uttar Pradesh, due to rapid infrastructural development, tourism growth, increasing vehicular traffic, and religious activities, is experiencing gradual deterioration in ambient air quality. The present study evaluates the air quality status of Ayodhya with reference to major atmospheric pollutants and their possible impacts on human health and the urban environment. Air Quality Index (AQI) and concentrations of pollutants such as particulate matter ($PM_{2.5}$ and PM_{10}), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and carbon monoxide (CO) were considered for assessment of the city's atmospheric condition. Observations indicate that the AQI of Ayodhya generally ranges from moderate to poor category, particularly during winter months when pollutant concentration increases because of unfavorable meteorological conditions. Major sources of pollution include vehicular emissions, road dust, construction activities, open waste burning, diesel generators, and seasonal biomass burning in nearby rural areas. Rapid urbanization and increasing inflow of pilgrims and tourists further intensify traffic congestion and fuel combustion, leading to higher emission levels. Fine particulate matter ($PM_{2.5}$) was identified as the major pollutant affecting air quality and posing health risks to sensitive groups such as children, elderly individuals, and respiratory patients. Meteorological factors including temperature, humidity, wind speed, and temperature inversion significantly influence pollutant dispersion and accumulation. During winter, low wind velocity and inversion conditions trap pollutants near the ground surface, resulting in poor air quality. The study emphasizes the need for sustainable urban planning, effective traffic management, and promotion of public transport, plantation drives, dust control measures, and strict enforcement of pollution control regulations. Continuous monitoring and public awareness programs are essential for improving air quality and ensuring environmental sustainability in Ayodhya city.

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Abstract No. 174

ASSESSMENT OF VISIBILITY VARIATION USING PM 2.5 CONCENTRATION AND METEOROLOGICAL PARAMETERS IN NORTHERN PLANE OF INDIA

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ABSTRACT

This study evaluates how atmospheric visibility is influenced by $PM_{2.5}$ concentrations and key meteorological parameters, including temperature, relative humidity (RH), wind speed, and wind direction, while explicitly examining how these relationships vary across different times of the day, namely morning, afternoon, and evening. A comprehensive statistical framework involving both Pearson and Spearman correlation analyses was applied to assess the linear and monotonic relationships between visibility and the controlling variables. $PM_{2.5}$ concentration and visibility data were collected from August 2021 to July 2022. Visibility was estimated using image-based software from captured photographs, and the light extinction coefficient was subsequently determined. To capture temporal variability, the dataset was analysed separately for the three diurnal periods. The results reveal a clear diurnal variation in the factors governing visibility. The strongest inverse relationship between $PM_{2.5}$ and visibility was observed during morning hours (Pearson $r = -0.461$; Spearman $\rho = -0.527$), indicating substantial pollutant accumulation under stable atmospheric conditions. This relationship weakened considerably during the afternoon ($r = -0.139$) and evening ($r = -0.115$), reflecting enhanced atmospheric dispersion due to stronger mixing processes. Relative humidity exhibited a consistently negative but weak association with visibility ($R^2 \leq 0.04$), suggesting that its independent contribution remained limited despite its recognized role in aerosol hygroscopic growth. Temperature and wind speed showed comparatively minor influences, although wind speed demonstrated weak positive contributions ($R^2 \leq 0.07$). Overall, visibility values ranged approximately between 5 km and 10 km, with the highest visibility generally occurring during afternoon periods. The novelty of this study lies in its time-resolved analytical approach, which demonstrates how the influence of $PM_{2.5}$ and meteorological parameters on visibility changes throughout the day. Unlike earlier studies based on averaged datasets, this work captures diurnal shifts in dominant atmospheric processes and identifies the periods during which particulate matter exerts the greatest impact on visibility reduction.

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Abstract No. 175

POTATO (*SOLANUM TUBEROSUM* LINN.) GROWERS' MITIGATION AND ADAPTATION STRATEGIES TO CLIMATE CHANGE: EVIDENCE FROM MANIPUR, INDIA

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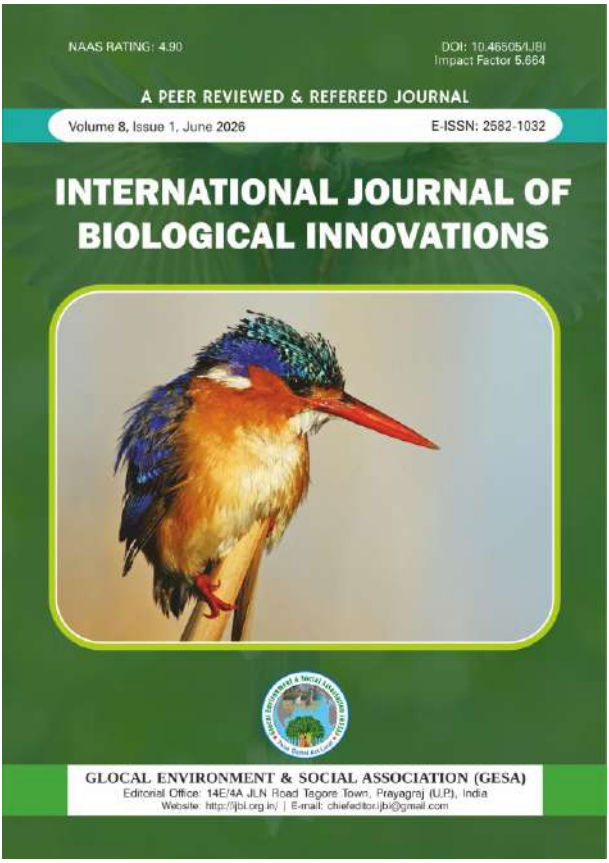
ABSTRACT

Potato (*Solanum tuberosum* Linn.) is highly sensitive to various climatic factors, and cultivation is highly influenced by the changing climatic conditions. This paper attempts to explore the perceived influence of various climatic factors on potato cultivation. Accordingly, the present study was conducted in Manipur, India. Further, two districts, namely, Bishnupur and Thoubal were selected for the study, and 100 potato growers with a minimum of 15 years of experience in continuous cultivation of potato were included as respondents. To document the impact of climate change on potato cultivation, respondents were asked to perceive various negative impacts of each of the climatic factors, namely, temperature, humidity, rainfall, and drought, on different stages of the crop. Subsequently, respondents were asked to report the specific mitigation and adaptation strategies adopted by them against each of the impacts. It was found that potato growers experienced various significant impacts on overall crop growth and productivity. Among other impacts, increasing occurrences of pest infestation and physiological disorders were the most prominent issues. Findings revealed that climate change affected the potato growth, quality, and tuber yield. To reduce these challenges, various mitigation and adaptation strategies such as adjustment of sowing time, mulching, crop rotation, balanced fertilizer application, use of organic manure/compost, and efficient irrigation practices were adopted by potato growers. The study highlights the importance of mitigation and adaptation alternatives for sustainable potato cultivation and improved livelihood of potato growers in Manipur, India.



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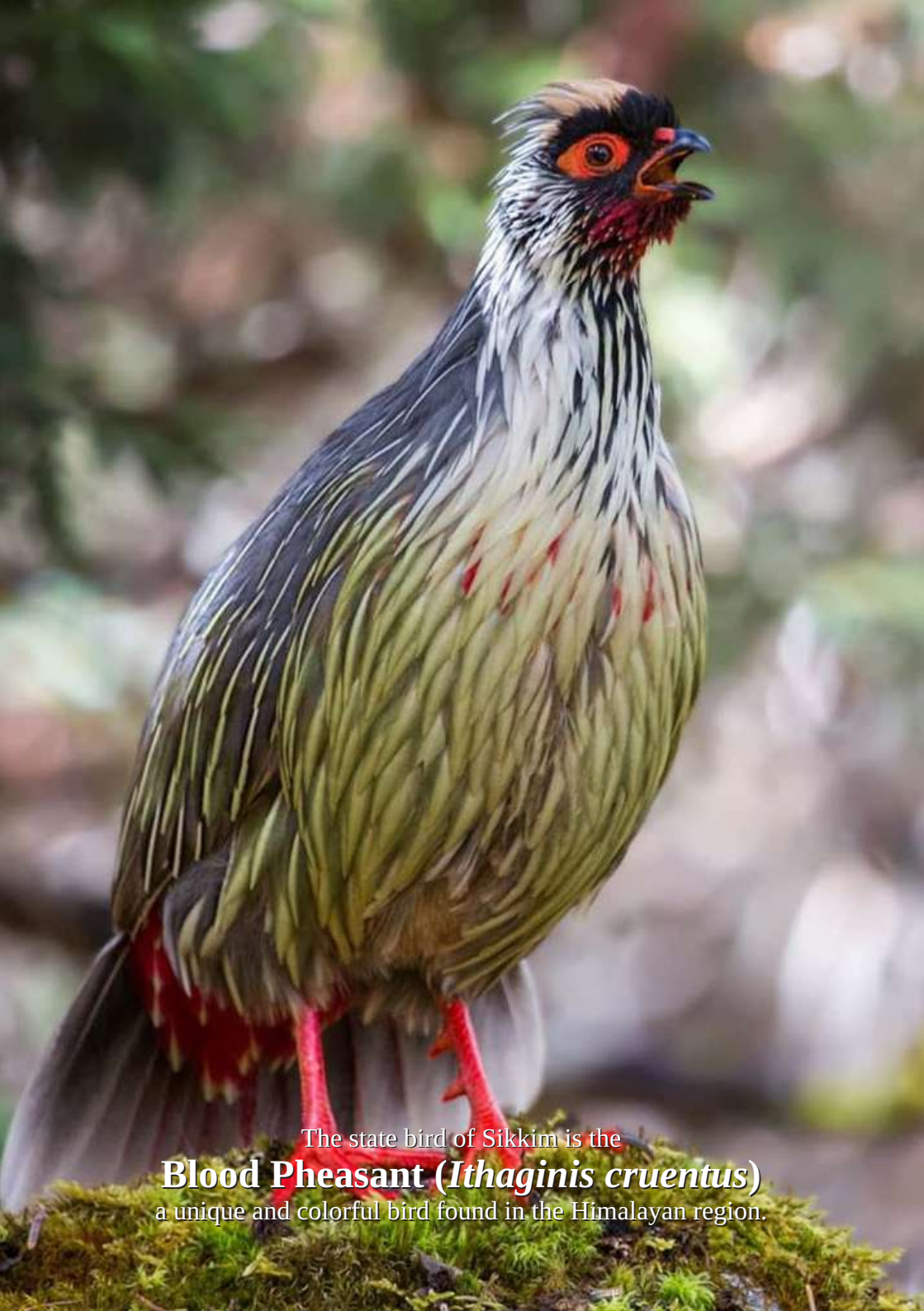

The state bird of Sikkim is the
Blood Pheasant (*Ithaginis cruentus*)
a unique and colorful bird found in the Himalayan region.