



National
Research
Foundation

**ANRF (SPRB)-Sponsored
Two-Day National Seminar on
"Biodiversity Conservation and Sustainable Development:
Addressing Twin Challenges of Desertification and Climate Change (BSACDC-2025)"**

On 10th & 11th JULY-2025



SOUVENIR

Organized by

DEPARTMENT OF BOTANY

Dr LHR GOVERNAMENT DEGREE COLLEGE

MYLAVARAM, NTR DISTRICT, A.P, PIN-521230, INDIA.

**Dr. LAKIREDDY HANIMIREDDY GOVERNMENT DEGREE COLLEGE MYLAVARAM,
NTR DISTRICT, ANDHRA PARDEASH – 521230**

Presents

ANRF-Sponsored

Two-Day National Seminar on

**"Biodiversity Conservation and Sustainable Development:
Addressing Twin Challenges of Desertification and Climate Change (BSACDC-2025)",**

On 10th & 11th JULY-2025



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DEPARTMENT OF BOTANY

Dr LHR GOVERNMENT DEGREE COLLEGE

MYLAVARAM, NTR DISTRICT, A.P, PIN-521230, INDIA.

Dedicated to
Dr. LAKIREDDY HANIMIREDDY, MD (USA)



*We are highly grateful
to*

Dr. Lakireddy Hanimireddy
MD (USA)

*the Founder Donor
of Our College,
whose continuous support
has been inspiring and
guiding us all along.*

*With love we dedicate
this Souvenir to him !*

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ABOUT THE COLLEGE

Dr. Lakireddy Hanimireddy Govt. Degree College, Mylavaram is a rural college striving to provide quality higher education to the youth of this of this region, in order to empower them by transforming them into highly proficient nation builders equipped with rationality and values. The college aims at delivering holistic education by creating opportunities of learning to all, especially the under-privileged. The college promotes continuous learning and encourages the students to think innovatively. The college is creating a wide resource base for learning with external linkages, ICT enabled ecosystem, enhancing skill propensity for employability and creating a value based interaction in the campus community. Spread over 6 Acres of Land with a highly enchanting premises, the college harbors sophisticated equipment and learning resources, thanks to munificence of Dr. Lakireddy Hanimireddy. The college is making endeavours to build better ambience for learning and create better future for the students. With committed academicians on its faculty and sophisticated learning resources, the college is making strides towards excellence.

ABOUT THE DEPARTMENT

In view of lively rural surroundings with rich plant diversity and bio-culture, there has been a candid demand for opening of Biological Science department in Dr. Lakireddy & Hanimireddy Government Degree College and therefore in 2008 formally the Bioscience Group BSc., (B.Z.C) Botany, Zoology & chemistry was opened. Since then the Department of Botany has been enrolled for the general stream of course. The Department of Botany is known for its academic excellence, high calibre faculty, and greatly enriching co-curricular activities. Plinth area of the department – 140 sq mts. The Botanical Garden was developed in 2018 and has been maintained till date. Herbal medicinal garden was developed in 2019 .Parental education is also lacking and majority is from Working class(Daily wages, farmer oriented). The percentage of admitted strength has been on the increase during 2017-21. The pattern of teaching in this Institution reflects the admissions, though there are many Educational Institutions are there in the Mylavaram.Dr. Lakireddy Hanimireddy Government Degree College started B.Sc Honours Course from 2023-24.

VISION: To develop Botany as integral part of the every human existence not only as an academic discipline.

MISSION:

To train up students to self expertise in frontier areas of plant sciences

To involve students to participate in biodiversity conservation activities



KRISHNA UNIVERSITY

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Prof. K. Ramji

Vice-chancellor

MESSAGE

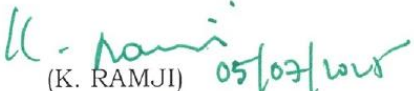
I congratulate all the participants, organizers, and delegates of the **ANRF-Sponsored Two-Day National Seminar on "Biodiversity Conservation and Sustainable Development: Addressing Twin Challenges of Desertification and Climate Change (BSACDC-2025)"**, organized by the Department of Botany, Dr. LHR Government Degree College, Mylavaram, NTR district, A.P, an outstanding institution of higher education catering to the needs of rural students, affiliated to Krishna University.

At a time when the world is facing the impending peril of escalating global environmental crises, this seminar brings much-needed academic and policy focus on the twin challenges of **biodiversity loss and climate change**, particularly in the context of **desertification and ecosystem degradation**. These interconnected issues demand urgent interdisciplinary engagement, scientific innovation, and community intervention to ensure a sustainable future.

I commend the organizers heart fully, for choosing a theme that resonates deeply with the United Nations Sustainable Development Goals (SDGs) and national priorities for environmental conservation. I am confident that this academic platform will foster meaningful discussions, encourage collaborative research, and contribute to actionable solutions that benefit both local ecosystems and global environmental sustainability.

Krishna University remains committed to promoting excellence in education, and research, eventually contributing to societal welfare, which have always been its distinguishing hall marks. I wish BSACDC-2025 great success and encourage all participants to engage actively and contribute their valuable insights, thereby upholding the legacy of Krishna University.

With best wishes,


(K. RAMJI) 05/02/2025
Vice-Chancellor
Krishna University

KRISHNA UNIVERSITY

Prof. M.V. Basaveswara Rao
Rector
Krishna University
Machilipatnam-521 004
Phone No's: 9618446677
E-mail : rector@kru.ac.in



Message from the Rector Krishna University, Machilipatnam

I, extend my warm greetings to all the experts, delegates, participants and organizers of the **ANRF-Sponsored Two-Day National Seminar on "Biodiversity Conservation and Sustainable Development: Addressing Twin Challenges of Desertification and Climate Change (BSACDC-2025)"**, organized by the Department of Botany, Dr. LHR Government Degree College, Mylavaram affiliated to Krishna University.

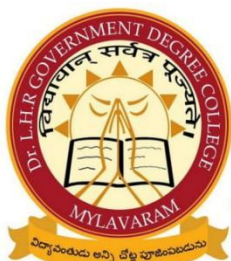
This seminar is both timely and significant, as it addresses two of the most pressing environmental challenges of our time—**Biodiversity Loss** and **Climate Change**, with a focus on desertification and sustainable development. The theme reflects a commendable commitment to fostering awareness, academic exchange, and collaborative research on issues critical to the future of our planet.

I sincerely appreciate the efforts of **Dr. J. Ramudu**, Convener of BSACDC-2025, for his initiative and dedication in organizing this meaningful event. I am confident that the deliberations during the seminar will provide valuable insights and practical recommendations that will contribute to both academic and policy-level solutions.

Wishing the seminar a grand success and the deliberations will be fruitful.

With best regards,

Prof. M.V Basaveswara Rao
Rector, Krishna University, Machilipatnam



Dr. LAKIREDDY HANIMIREDDY
GOVERNMENT DEGREE COLLEGE, MYLAVARAM.
(Affiliated to Krishna University, Machilipatnam)

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Dr. ILLA RAVI, M.A., M.Phil., Ph.D.

PRINCIPAL.

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Message from the Principal
Dr. LHR Government Degree College, Mylavaram

My warm greetings and best wishes to all the participants, organizers, and delegates of the **ANRF-Sponsored Two-Day National Seminar on "Biodiversity Conservation and Sustainable Development: Addressing Twin Challenges of Desertification and Climate Change (BSACDC-2025)"**, organized by the Department of Botany, Dr. LHR Government Degree College, Mylavaram.

This seminar comes at a crucial time when the global community is striving to find sustainable solutions to the growing threats of biodiversity loss and climate change. The integration of environmental conservation with sustainable development is essential for ensuring ecological balance and securing the well-being of future generations.

I appreciate the sincere efforts of the Department of Botany for conceptualizing and organizing this important academic event. I especially acknowledge **Dr. J. Ramudu**, Convener of BSACDC-2025, for his dedication and leadership in bringing together researchers, academicians, and students to deliberate on these vital environmental issues.

I am confident that the seminar will foster meaningful discussions, stimulate innovative ideas, and contribute significantly to academic and policy-level understanding of biodiversity and sustainability.

Wishing the seminar grand success.

With warm regards,

[Dr ILLA RAVI]
Principal

Dr. LHR Government Degree College, Mylavaram





Dr. LAKIREDDY HANIMIREDDY
GOVERNMENT DEGREE COLLEGE, MYLAVARAM.
(Affiliated to Krishna University, Machilipatnam)

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Message from the Convener – BSACDC-2025

Dr. J. Ramudu

Department of Botany, Dr. LHR Government Degree College, Mylavaram

It gives me immense pleasure to extend my heartfelt greetings and best wishes to all the esteemed participants, delegates, academicians, researchers, and guests attending the **ANRF-Sponsored Two-Day National Seminar on "Biodiversity Conservation and Sustainable Development: Addressing Twin Challenges of Desertification and Climate Change (BSACDC-2025)"**, organized by the Department of Botany, Dr. LHR Government Degree College, Mylavaram.

In the face of growing environmental challenges such as desertification, climate change, and biodiversity loss, this seminar serves as a significant academic platform for knowledge exchange, research collaboration, and solution-oriented discussions. The theme of BSACDC-2025 aligns with both global and national priorities, aiming to bridge the gap between scientific understanding and practical action for sustainable development.

As the Convener, I am honored to bring together a distinguished group of environmental scientists, ecologists, policymakers, educators, and students who are committed to ecological restoration and long-term sustainability. I firmly believe that the insights, ideas, and deliberations shared over these two days will contribute meaningfully to shaping future strategies for biodiversity conservation and climate resilience.

I express my sincere gratitude to the college administration, the Anusandhan National Research Foundation (ANRF), invited speakers, paper presenters, participants, and organizing staff for their invaluable contributions to the success of this event.

Wishing everyone a productive, inspiring, and enriching seminar experience.

With warm regards,



Dr. J. Ramudu
Convener, BSACDC-2025
Lecturer in Botany
Dr. LHR Government Degree College, Mylavaram

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Message

I believe that it is my great privilege to convey my best wishes to all the participants, organizers, and delegates of the **ANRF-Sponsored Two-Day National Seminar on "Biodiversity Conservation and Sustainable Development: Addressing Twin Challenges of Desertification and Climate Change (BSACDC-2025)"**, organized by the Department of Botany, Dr. LHR Government Degree College, Mylavaram.

This seminar is highly relevant in the current global context, where the degradation of natural ecosystems and the effects of climate change are posing significant threats to environmental sustainability and human well-being. The chosen theme effectively highlights the need for integrated efforts in conserving biodiversity while ensuring sustainable development.

I commend the Department of Botany for taking the initiative and particularly appreciate the dedicated efforts of **Dr. J. Ramudu**, Convener of BSACDC-2025, for organizing this meaningful academic event. I am confident that the seminar will foster productive dialogue, encourage research collaborations, and inspire actionable strategies to address these urgent environmental challenges.

I wish the seminar a grand success and all participants an enriching and impactful experience.

With best wishes,

Prof. Dr. Kanchit Thammasiri

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10	Sri D. D. Konda Babu	Student Member

**Two day National Seminar on “Biodiversity
Conservation and Sustainable Development: Addressing the Twin Challenges
of Desertification and Climate Change” (BSACDC-2025)**

Jointly organized by
Dr Lakireddy Hanimireddy Govt. Degree College, Mylavaram,
& Anusandhan National Research Foundation (ANRF)

On

10 & 11th July, 2025

PROGRAMME SCHEDULE

Day 1	10 th July 2025		
	Venue: Vikram Siddhartha Seminar hall, Dr LHR Govt Degree College, Mylavaram, NTR District		
09:00-10:00	Registration		
10:00 -10:50	Inaugural function Chief Guest: Sri. G Srinivasa Reddy, President, LBRCE, Mylavaram Guest of Honor: Prof.K. Appa Rao, Principal, LBRCE, Mylavaram Dr S . Jagan Mohan Rao , Principal, GDC, Bantumilli, Krishna Dt.		
10:50-11:00	HIGHTEA		
	Events	Speakers	Topic
11:00-12:00	Keynote Address	Prof.N.Mathivanan	Present status of biodiversity: Importance and strategies for its conservation
12:00-13:00	Keynote Address	Prof.A.Madhusudan Reddy	Ex-situ conservation and propagation of endangered and endemic plants from Eastern Ghats in sustainable management.
13:00-14:00	LUNCH		
14:00-16:00	Invited Lecture	Prof.. S.B PADAL	Plant Diversity and Endemism in the Southern Eastern Ghats: Insights from a Quarter-Century of Inventories
	Invited Lecture	Prof. P. Brahmaji Rao	<i>Environmental management systems (EMS) for sustainable biodiversity conservation</i>
	Invited Lecture	Prof. S.M.Khasim	Biodiversity of orchids with special reference to Molecular and Morphological characterization in some Indian Bulbophyllinae (Orchidaceae)
16:00-16:15	TEA		

16:15-17:30	Theme: Biodiversity Conservation and Ecosystem Services Venue: Seminar Hall		Oral presentations OP4,OP8;OP 20;OP24;OP28, OP 32,OP36 ,OP 40,OP 44, OP 48, OP 52.OP 56, OP 60
16:15-17:30	Theme: Environment Management, Pollution and Livelihoods Venue: Room No: 106, Shannon Computer Lab		Oral presentations OP1;OP5;OP9;OP13;OP17,OP 21, OP 25,OP 29,OP 33,OP45, OP 49, OP 53,OP 57.OP 61
16:15-17:30	Theme: Climate change and Sustainable Development Venue:Roomno:109, Sprout Botany Lab		Oral presentations OP2;OP;6OP10;OP14;OP18;OP 22;OP26;OP30,OP 34, OP 38, OP 50,OP54,OP58,OP 62,OP 67
16:15-17:30	Theme: Waste Management Venue: Room No : 111, Genesis Zoology Lab		Oral presentations OP3;OP7;OP11;OP15;OP19;OP 23;OP27;OP31,OP 35,OP 39,OP 43,OP 47,OP 51, OP 55,OP 66
Day 2	11th July 2025 Venue: Vikram Siddhartha Seminar hall ,Dr LHR Govt Degree College, Mylavaram, NTR District		
	Events	Speakers	Topic
10:00-11:00	Invited Lecture	Dr. M. SANKARARAO	Phytodiversity Conservation and Sustainable Development: Addressing the Challenges of Lesser-Known Sacred Groves of Andhra Pradesh, India
11:00-12:00	Invited Lecture	Dr. Pradeep Madhamanchi,	Elemental, Molecular, Cellular And Organismal Diversity For Sustainable Nature
12:00-12:15	TEA BREAK		
12.15-13:00	Oral presentations OP12,OP16, OP 37,OP 41, OP 42		
13:00-14:00	LUNCH		
14:00-15:00	Oral presentations OP 46, OP 59,OP 63,OP 64,OP 65,OP 66,OP 67, OP 68, OP, 69, OP 70		
	Poster presentations PP 1- 20		
15:00-15:15	TEA		

15:15-16:45	Valedictory Session Chief Guest: Dr Illa Ravi Guest of Honour: Sri. P. Ranga Rao Concluding remarks and vote of thanks Dr J RAMUDU (Convener)
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KEYNOTE LECTURE

Present status of biodiversity: Importance and strategies for its conservation

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Today's biodiversity on our earth is the constant evolution of life forms for billions of years. Biodiversity structures the web of life, in which, every individual organism or species is an integral part and also depending on each other, one way or other. Among the estimated range from 3 to 100 million, only about 1.75 million species have been identified so far and hence, there is a tremendous scope for identification of huge numbers of novel organisms. A vast numbers of microorganisms, plants and animal species are part of the biodiversity. Importantly, a clear dependency exists among the species for the survival of large numbers of microorganisms, plants and animals, which are living on the Earth. This phenomenon is wholly responsible for maintaining the biological equilibrium, particularly in a given ecological niche. Importantly, if any one of species of the ecosystem disappears, then the biological system will be collapsed in due course. It is a hard reality that considerable numbers of species have already been disappeared from our Earth and many have been declared as threatened and endangered.

It is evident that global warming is becoming the biggest challenge in all the life forms in the earth to cope up, adapt and adjust to the changing climatic conditions. All the species in biodiversity are undergoing tremendous pressure for their existence, multiplication and colonization in the climate change and global warming scenario. The climate change could affect the biodiversity either positively or negatively, in which not much investigation is made and hence the available information on this issue is scanty. Global warming might have adverse effect on the survival, growth, reproduction and normal functions of all the species in biodiversity. These effects could be at physiological, biochemical or at genetic levels. Under the sudden change of weather conditions, loss of biodiversity is imminent. The species, which could not have adaptation mechanisms, unable to withstand under the adverse conditions as a result will slowly become rare in their population, subsequently endanger and

eventually extinct. Thousands of plants and animal species have already been listed under RET data and a significant numbers of species became extinct. In addition to climate change and global warming, over exploitation of bioresources, habitat loss, mono-cropping under intensive cultivation, indiscriminate emission of greenhouse gases, etc. are the other factors leading to biodiversity losses. In this scenario, biodiversity conservation is the foremost research innovation and implementation topic for which, several strategic plans have been prepared with clear vision, mission and goals at global and local levels. In addition, awareness programmes, mitigation measures, appropriate action plans and implementation activities with people participation are to be taken up on massive scale both at global and local levels for protection and conservation of biodiversity, so as to each species in biodiversity could be living in harmony with Nature.

INVITED LECTURES

Ex-situ conservation and propagation of endangered and endemic plants from Eastern Ghats in sustainable management.

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ABSTRACT

A significant loss of biological diversity has resulted from the recent global devastation of the natural environment. This concerning circumstance has made it necessary to do extensive research on the present state of various life forms. In this context, special consideration should be given to two crucial aspects of biodiversity: species richness and endemism. Since human activity is predicted to put species in ecosystems at the greatest risk over the next few decades (Caldecott et al., 1996), a critical taxonomic assessment of living forms ought to be given top attention. With reference to Article 7 of the Convention of Biological Diversity (WRI, 1994), there is an urgent need to conduct biodiversity inventories and surveys and develop a system for organising and maintaining this information.

Biodiversity refers to the variability among living organisms from all sources; including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems (United Nations, 1992). Biodiversity has emerged as a scientific discipline in the recent past basically in response to fast extinction of wild species due to human activity. The 6th mass extinction of life of earth (Ceballos *et al.*, [2015](#)), with extinction rates 1000 times greater than background rates (De Vos *et al.*, [2015](#)), has galvanized attempts to collate and consolidate existing knowledge of the world's plants. In the last 500 million years already five mass extinctions have been occurred it caused more than 50 percent of species extinction (Myers, 1997; Erwin, 1998). Nevertheless, we are in the starting stage of sixth mass extinction (Myers 1993) which is anticipated by the human affected (Eldredge, 2008).

In the other hand, the unparalleled human effect has already disrupted the speciation process it posing a significant threat to future biodiversity, which is being seriously affected by the elimination of adjacent biotic habitats (Erwin, 1991). Natural habitat disturbances, over utilization of natural resources, exotic species and environmental alteration by the human beings to create the damage to biodiversity at an unusual rate according to current

Global Biodiversity Outlook (CBD, 2014). Based on above negative impacts, conservation of endemic and threatened species are most urgent need, with *in-situ* and *ex-situ* strategies. *Ex-situ* conservation is playing important roles that are not fulfilled by *in-situ* conservation and such goals include conservation of species extinct in the wild (Oldfield, 2009; O'Donnell & Sharrock, 2017).

Furthermore, a cost of *ex-situ* conservation is very low and species can be conserved for hundreds of years in a relatively small place (Li & Pritchard, 2009; Mounce, 2017). In this contest, Botanical gardens offer the opportunity to conserve and manage a wide range of plant diversity including endemic, threatened, medicinal, ornamental and edible species in *ex-situ*. The Botanical gardens maintains scientifically planned collections of plant species for conservation, educational, scientific and public awareness.

Despite being older than the Himalayas and the Western Ghats, the Eastern Ghats, an ancient discontinuous low mountain range that spreads along the East coast of the Indian Peninsula, never got its due. The geographical extent of the Eastern Ghats is about 75,000 kilometres, spread over the states of Odisha (25 %), Andhra Pradesh (40%), Telangana (5%), Karnataka (5%) and Tamil Nadu (25%). Though it is bestowed with rich bio-diversity and is home to different tribal communities, there has never been a clear policy in place for its conservation. The vegetation is a unique mix of the dry deciduous, semi-evergreen deciduous and moist deciduous types, *Cycas beddomei*, *Hildegardia populifolia*, *Pterocarpus santalinus*, *Terminalia pallida*, *Syzygium alternifolium*, *Shorea tumbugaia* and *Boswellia ovalifoliolata* are endemic plants to Eastern Ghats. These are the richest floristic hot spot harbouring many endemic and rare plants.

Eastern Ghats Face mass extinction: Eastern Ghats has decreased by almost 32,200 sq km between 1920 and 2015. The overall forest cover, spread over 43.4 per cent of Eastern Ghats in 1920, reduced to 27.5 per cent by 2015. The areas to have lost maximum green cover are Mahabubnagar of Telangana and Gajapati in Odisha. It's not just loss of green cover. Plants and trees endemic to the Eastern Ghats (native to the region and not found elsewhere) are now facing mass extinction. These Rare, Endangered and Threatened (RET) species have already lost 11.4 per cent of their primary. Eastern Ghats forest land being diverted for agriculture — 1,407 sq km was lost between 1920 and 2015. Conversion of forest land to scrub/grassland, rise in mining area — by 340 sq km — and increase in settlements have also contributed to this.

In this region, endemic and threatened species are at present great danger of depletion and erosion due to following factors. Known natural threats are climate change (unusual-rains, floods, temperature, and soil erosion), natural competition between species (native species and invasive species), lack of pollination (effect on seed formation) and natural degeneration *etc.* Man made threats includes forest encroachment, mining activity, developmental activities, annual forest fires, grazing, illegal trade. Several gaps in the earlier works on the study area are being minimized in the present study with the intervention of Lead Botanical Garden (LBG), Ministry of Environment & Forest and Climate Change (MoEF), Government of India. LBG, a comprehensive programme has been initiated in 1991 to promote *ex-situ* conservation and propagation of endemic and threatened plants in Eastern Ghats along with other parts of India. The present work is possible out of this programme and the investigator is part of research group working in Eastern Ghats.

The present work is aimed to providing a sampled inventory of endemic and threatened species of Eastern Ghats carried out for a period of 15 years during 2009-24 and to study their current distribution pattern and conservation status, to analyze the threats, propagation, *ex-situ* conservation in YVU botanic garden and reintroduction of propagated seedlings. The present investigation has revealed enthusiastic results and brought out valuable information to light. The present study on the endemic and threatened plants of Eastern Ghats revealed that the occurrence of 150 taxa belonging to 75 genera under 65 families. All the collected endemic and threatened plants were systematically enumerated in alphabetical order of families. Species citation includes protologue reference followed by technical description, their flowering and fruiting and habitat information are presented. Their distributed pattern at different levels like, strict endemics to study area or endemic to South India, Peninsular India, India and outside India information are provided. The collected specimens are prepared herbarium by following standard methodology and notes on introduced plants at YVU BG are also provided. Macro-propagation studies of selected species and graphical representation (distribution information, seed germination percentage and seedlings survival percentage) also provided.

"Plant Diversity and Endemism in the Southern Eastern Ghats: Insights from a Quarter-Century of Inventories"

PROF. S.B PADAL

Professor

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Eastern Ghats are broken hills with discontinuous ranges, and there are species-rich zones with plains in between, which explains the high diversity of wild and cultivated plants. 3,417 species of seed plants have been recorded in the area. Among them Dicotyledons are dominant (1172 genera and 2433 species). Monocotyledons occur in 34 families (304 genera and 978 species). Gymnosperms occur in two families with 2 genera with 6 species. Of the 178 families of Angiosperms, about 14 families have more than 40 species, contributing to 53.6 % of the total plant species. Among them Poaceae has the maximum number of species (365 in 112 genera), followed by Leguminosae (346 species in 72 genera). In recent years, many new species and genera have been described from the Eastern Ghats. For example, species in the genera *Huberantha*, *Xylopia*, *Calopogonium*, *Centrosema*, *Clidemia*, *Diodella*, *Asechynanthus* and *Monotheceium* have been added to the Flora of Eastern Ghats by many authors. Genus *Odisha* is exclusively endemic to the Eastern Ghats. Today, a total of 188 endemic species in 120 genera belonging to 46 families are known to occur in the Eastern Ghats. These include 135 dicots and 50 monocots with 3 Gymnosperms. Poaceae have the highest representation with 27 endemics, followed by Acanthaceae (18 species), Asclepiadaceae (19 species) and Orchidaceae (15 species). In this talk, we will elaborate on details of patterns seen with species, genera and families across the landscape.

This presentation will be a brief on plant diversity inventories carried out in southern Eastern Ghats, and from this baseline, I suggest promising areas of future research. Plant diversity inventories undertaken at various spatial scales covering different forest types and

elevational gradient over a quarter-century yielded data useful to science and also contributed to Global Tree and Liana Database. Results of alpha diversity of trees, lianas, and understory species in Kolli hills, Shervarayan and Kalrayan hills will be briefed. Large-scale (60-ha) tree diversity (272 species in 27,412 individuals) and liana diversity (175 climbers including 143 lianas in 32,033 individuals) bespeak the extent of biodiversity of the southern Eastern Ghats region and underline the need to check bio-invasion and human impacts (ore mining, plantations, roads, dams, etc.) to save biodiversity. Promising areas of future research (3–10-yr program) may include: 1) Long-term research plots to determine biodiversity changes and carbon sequestration potential in relation to climate change and other drivers 2) Community-level study of phenology, pollination, and seed dispersal systems comparison across forest types, as part of indepth study on plant-animal interactions and 3) Intensive species biology/population study of selected resourceful (ecological/economically valuable) species for sustainable resource utilization ultimately aiming at conservation of Eastern Ghats biodiversity.

Environmental management systems (EMS) for sustainable biodiversity conservation

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An Environmental Management System (EMS) is a structured approach that organizations use to manage their environmental impacts and improve their environmental performance. The advantages of using an environmental management system include: Ensuring a holistic approach to environmental impacts. Making use of time-tested, mature approaches recognized worldwide.

Desertification and climate change are two of the most pressing environmental challenges facing global wise and they are intrinsically linked, forming a vicious cycle that exacerbates their individual impacts. Desertification is the process of land degradation in arid, semi-arid, and dry sub-humid areas, resulting in the loss of biological productivity and ecosystem sustainability.

It doesn't necessarily mean the expansion of existing deserts, but rather the transformation of once f Desertification is the process of land degradation in arid, semi-arid, and dry sub-humid areas, resulting in the loss of biological productivity and ecological value. It doesn't necessarily mean the expansion of existing deserts, but rather the transformation of once fertile land into barren, arid land.

Causes of Desertification:

Deforestation: Removal of trees and vegetation exposes soil to erosion by wind and water.

Unsustainable Agricultural Practices: Over-cultivation, monoculture, excessive tillage, and inappropriate use of fertilizers deplete soil nutrients and structure, leading to soil erosion and degradation.

Overgrazing: Too many livestock on a given area of land can remove vegetation cover, compact the soil, and prevent plant regeneration.

Overexploitation of Water Resources: Inefficient irrigation methods and excessive withdrawal of groundwater can lead to salinization and depletion of water sources, making land unsuitable for agriculture.

Urbanization and Industrial Development: Expansion of urban areas, infrastructure, and mining activities convert productive land to non-productive uses.

Climatic Variations:

Droughts: Prolonged periods of below-average rainfall reduce soil moisture and hinder plant growth.

Changes in Rainfall Patterns: More erratic rainfall, with intense but infrequent downpours, can increase surface runoff and erosion, while reducing water infiltration.

Increased Temperatures: Higher temperatures lead to increased evaporation from soil and water bodies, reducing water availability for plants.

Rising Global Temperatures: Leads to more frequent and intense heatwaves.

Altered Precipitation Patterns: Some regions experience more extreme droughts, while others face increased flooding.

Increased Frequency and Intensity of Extreme Weather Events: Such as droughts, floods, and wildfires.

Sea Level Rise: Though not directly linked to desertification, it contributes to overall environmental stress.

The combined effects of desertification and climate change have severe consequences:

Food Insecurity: Reduced agricultural productivity due to degraded land and water scarcity.

Loss of Biodiversity: Destruction of habitats and ecosystems, leading to species extinction.

Poverty and Economic Losses: Communities relying on agriculture and natural resources suffer from reduced livelihoods.

Forced Migration: People are displaced from degraded areas due to lack of resources and opportunities.

Increased Conflicts: Competition over dwindling resources can lead to social unrest and conflict.

Reduced Resilience: Degraded land and ecosystems are less able to adapt to and recover from environmental shocks.

Addressing these twin challenges requires integrated and long-term strategies:

Sustainable Land Management (SLM):

Reforestation and Afforestation: Planting trees helps restore vegetation cover, improve soil health, and sequester carbon.

Conservation Agriculture: Practices like reduced tillage, crop rotation, and maintaining soil cover enhance soil fertility and water retention.

Sustainable Rangeland Management: Controlling grazing intensity and promoting rotational grazing to allow vegetation to recover.

Water Conservation: Implementing efficient irrigation methods (e.g., drip irrigation), rainwater harvesting, and managing water resources sustainably.

Climate Change Mitigation and Adaptation:

Reducing Greenhouse Gas Emissions: Transitioning to renewable energy, improving energy efficiency, and reducing industrial emissions.

Carbon Sequestration: Enhancing natural carbon sinks through sustainable land management, forest restoration, and wetland conservation.

Climate-Smart Agriculture: Adopting agricultural practices that are resilient to climate change, reduce emissions, and increase productivity.

Policy and Governance: International Cooperation: Implementing and strengthening international conventions like the UN Convention to Combat Desertification (UNCCD) and the UN Framework Convention on Climate Change (UNFCCC).

National Policies: Developing and enforcing policies that promote sustainable land use, discourage deforestation, and support climate change adaptation.

Community Engagement: Empowering local communities and indigenous peoples in land management and conservation efforts, as their traditional knowledge often offers effective solutions.

Research and Innovation: Developing drought-resistant crops and innovative irrigation technologies. Monitoring land degradation and climate impacts using remote sensing and other advanced tools. By addressing desertification and climate change in a coordinated manner, societies can build more resilient landscapes, enhance food and water security, and mitigate the broader impacts of a changing climate.

Biodiversity of orchids with special reference to Molecular and Morphological characterization in some Indian Bulbophyllinae (Orchidaceae)

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The family Orchidaceae with 1229 species spread over the 184 genera represents second largest flowering family in India and contributes about 10% of Indian flora. Orchids are concentrated in Western and Eastern Himalayas, similarly in Western and Eastern ghats. They show a remarkable diversity in morphological and molecular characters; and they grow as epiphytic, terrestrial and saprophytic. The Indian orchid flora shows some relationship with orchid floras of other parts of the world; while the Western Himalayan orchids show some affinity with Mediterranean and Eurasian species, Eastern Himalayan orchid flora exhibits a predominance of Indo-Malayan elements. On the other hand, orchid flora of Southern India shows African as well as South-east Asian affinities. Orchids with their attractive range of varied flowers make them excellent ornamental plants and, they are rich source of medicines and aesthetic pleasure. The orchid wealth of is rapidly disappearing due to various anthropogenic activities. In this paper, an attempt has been made to reveal the present status of the family Orchidaceae in South-east Asia and studied the morphological and molecular characterization of some Indian Bulbophyllinae, and finally conservation strategies have been discussed.

The plant materials of genus Bulbophyllum were collected from Arunachal Pradesh, Darjeeling & Sikkim Himalayas, Karnataka and Kerala at various altitudes. Leaves and roots were collected and fixed in FAA. The usual procedure of dehydration and embedding were followed. Microtome and free-hand sections were cut at thickness of 10-15µm and stained with safranin-fast green double stain. For RAPD marker studies, modified CTAB technique has been employed for the extraction of genomic DNA. Six RAPD primers were employed in this study. PCR was performed and amplified products were resolved electrophoretically. The UPGMA dendrogram was constructed using the NTSYS PC version 2.11.

Adaxial epidermal cells in leaf were 2-3 times larger in their size than abaxial ones. Absorbing trichomes were reported from all the investigated taxa. Velamen roots were associated with tilosomes especially in single layered velamen taxa. The high diversification of vegetative characters is also exemplified by adaptation to various habitats. Plants collected from Darjeeling Himalaya were showing more xeric characters than that of Arunachal Pradesh. However, with respect to velamen, plants collected from Arunachal habitat showed some xeric characters. From the anatomical data it is evident that not only the geographical conditions and type of habitat but also nutrient supply of host-tree on which orchid growing, is playing vital role in survivability of epiphytic orchids.

The UPGMA dendrogram based on RAPD analysis showed that all taxa of Bulbophyllum section Cirrhopetalum are scattered among all clusters in the dendrogram. This indicates that the characters possessed by the section Cirrhopetalum are shared by other sections of the

subtribe Bulbophyllinae. This strengthens the view of Schlechter that other sections of Bulbophyllum must have evolved from the section Cirrhopetallum.

Some of the Conservation strategies to be taken is as follows: 1. Natural orchid habitat should be protected; check deforestation; 2. Establishment of Orchid sanctuaries; 3. More molecular and morphological studies are needed; 4. Identify endemic and threatened Taxa & conserve them on priority basis; 5. Establishment of orchid societies and clubs; 6. Involvement of local people in the conservation and management; and finally, 7. Preparation of database on orchid germplasm.

Phytodiversity Conservation and Sustainable Development: Addressing the Challenges of Lesser-Known Sacred Groves of Andhra Pradesh, India

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Abstract:

Sacred Groves are small forest patches conserved by local people through religious beliefs, traditional sentiments, and cultural taboos (Ramakrishna 1997). These groves, which are widespread throughout India and other parts of the world, are essential to reaching a number of Sustainable Development Goals (SDGs). They specifically support SDG 6 (Clean Water and Sanitation) by protecting water sources, SDG 11 (Sustainable Cities and Communities) by promoting community involvement and conserving cultural heritage, SDG 13 (Climate Action) by conserving forests, and SDG 15 (Life on Land) by promoting sustainable forest management and preserving ecosystems. In India, about 14,000 Sacred Groves have been enumerated from different states. In Andhra Pradesh Sacred Groves are locally called *Pavitra vanalu*, *Rakshita vanalu*, *Devata vanalu* (Rao et al. 2011) due to diverse ecosystems and the hill ranges mostly above 750 -1500 m in elevation. These groves are essential for biodiversity conservation because of their deep cultural and spiritual significance in addition to their ecological significance as habitats for a variety of plants and animals. The majority of these lesser-known groves are home to a variety of significant plant species, according to field surveys carried out in May 2023 and May 2024 throughout several Andhra Pradesh forest circles (Rajahmundry, Kurnool, Ananthpuram, Guntur, Tirupathi, Project Tiger, Visakhapatnam, etc.). These include traditional species like *Pterocarpus santalinus*, *Boswellia ovalifoliolata*, and *Bombax ceiba*, as well as valuable timber and medicinal plants like *Rauvolfia serpentina*, *Andrographis paniculata*, and *Catharanthus*

roseus. These vital biodiversity hotspots are increasingly under threat from development projects, intensifying human disturbances, and climate change and deforestation which are leading to fast deterioration in the sacred groves' ecological condition and floral composition, thereby ultimately threatening their unique flora. Thus, there is an immediate requirement to implementing all-inclusive conservation awareness efforts in tribal communities and management action plans to curtail these threats for the long-term conservation of sacred groves in Andhra Pradesh.

Key words: Sacred Groves, Andhra Pradesh, Medicinal plants, Conservation, Sustainable Development Goals (SDGs).

Invited Talk on
**ELEMENTAL, MOLECULAR, CELLULAR AND ORGANISMAL
DIVERSITY FOR SUSTAINABLE NATURE**

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Sustainable nature relies on the balance and interactions of various biological and non-biological components at multiple levels of organization. From the chemical elements that form life to the complexity of ecosystems formed by diverse organisms, every level of biodiversity contributes to the stability and resilience of nature. The four primary levels of elemental, molecular, cellular, and organismal diversity form a foundational framework to understand and conserve biodiversity for sustainable development and ecological balance. Elemental diversity refers to the variety and relative abundance of chemical elements (e.g., carbon, nitrogen, phosphorus, sulphur, iron, zinc) that are essential for biological processes. Elements cycle through biogeochemical processes such as the carbon cycle, nitrogen cycle, and water cycle. The availability and balance of elements determine the productivity of ecosystems. Trace elements (e.g., magnesium, copper) play crucial roles in enzymatic and metabolic activities. Elemental imbalances due to pollution or climate change can disrupt ecosystems (e.g., eutrophication caused by excess nitrogen and phosphorus). Recycling of elements through decomposers helps sustain soil fertility. Monitoring elemental balance aids in precision agriculture and environmental protection. Supports clean energy innovations (e.g., biofuels, green chemistry).

Molecular diversity involves the range of biomolecules such as DNA, RNA, proteins, lipids, and secondary metabolites present in living organisms. Genetic diversity at the DNA level enables evolution and adaptation. Diversity in enzymes and proteins determines how organisms respond to environmental stimuli. Secondary metabolites (like alkaloids, flavonoids) provide defense, attract pollinators, and aid in inter-species interactions. Genetic

variation in crops leads to disease-resistant and climate-resilient varieties. Diverse microbial enzymes used in biotechnology and waste management. Molecular diversity provides bioprospecting opportunities (e.g., medicine, agriculture). Maintains genetic health of populations, reducing vulnerability to diseases and environmental changes.

Cellular diversity refers to the existence of different cell types and structures in unicellular and multicellular organisms. In multicellular organisms, cell specialization (e.g., nerve cells, muscle cells, xylem) allows efficient functioning. Cell communication and regulation are essential for organismal development and response to the environment. In microbes, diverse cellular adaptations enable survival in extreme environments. Plant cells like guard cells regulate transpiration. White blood cells protect organisms through immune responses. Prokaryotic cells exhibit unique survival mechanisms like biofilm formation. Understanding cellular functions aids in regenerative medicine and crop improvement. Enhances bioremediation strategies through engineered microbes or cells.

Organismal diversity encompasses the variety of species across all domains of life—bacteria, archaea, protists, fungi, plants, and animals. Species contribute to ecosystem services: pollination, seed dispersal, nutrient cycling and climate regulation. Predator-prey and mutualistic relationships create food web stability. Genetic and behavioural diversity within species improves ecosystem resilience. Habitat destruction, climate change, overexploitation, pollution, and invasive species. Loss of keystone species may trigger ecosystem collapse. Conserving species ensures long-term availability of resources like food, medicine, and raw materials. Eco-tourism, traditional medicine, and cultural identity rely on diverse species.

The diversity at elemental, molecular, cellular, and organismal levels forms a continuous and interlinked spectrum essential for sustaining life and the environment. Each level contributes uniquely to the stability, adaptability, and productivity of ecosystems. To ensure a sustainable future, it is crucial to understand, conserve, and integrate biodiversity considerations into policy-making, education, agriculture, and industry. Protection of biodiversity is not merely an ecological concern but a necessity for human survival and sustainable development.

ORAL PRESENTATIONS

Computational Examination of Therapeutic Drug Potential of Mediterranean diet (MedDiet) against Microglial TREM2 Receptor: Implications for Alzheimer’s disease (AD)

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Abstract:

Alzheimer’s disease (AD) is the leading cause of Dementia, based on the timing of onset, two forms of AD emerge: Early - onset Alzheimer’s disease (EOAD) and Late - onset Alzheimer’s disease (LOAD). Notwithstanding the development in therapeutics, effective targeting of AD pathology remains elusive. Growing research suggests that, Triggering Receptor Expressed on Myeloid Cells 2 (**TREM2**) is one of the predominant attributes of LOAD, which is the prevalent form of AD. TREM2 are the transmembrane microglial receptors, which facilitates key physiological functions like phagocytosis of toxic A β peptides. Number of studies supported various health benefits of polyphenols of Mediterranean diet (MedDiet) including enhancing cognitive functions with implications in Neurodegenerative disorders. **MedDiet** is significant for its anti – oxidant applications. Under this background, the current work hypothesizes that polyphenolic binding of TREM2 may enhance the phagocytosis of A β peptides by microglial cells. TREM2 model structure generated by AlphaFold data base was utilized as receptor, different polyphenolic ligands have been derived from PubChem data base. EDock web server was used for protein – ligand docking. EDock utilizes XSCORE for docking poses ranking. Docking results suggests that Flavanone has highest XSCORE of 4.333 followed by Phenolic acid with 4.297 (comparison of rank 1 docking poses of different polyphenolic ligands). The current work, which is a part of the major work suggests that Flavanone and Phenolic acid exhibited highest binding affinity with TREM2, and therefore have therapeutic drug potential against AD, requiring further experimental validation.

Keywords: Alzheimer’s disease (AD), TREM2 and MedDiet.

Nanomaterial-Based Devices for Arid Land Sustainability: A Physics Perspective

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Abstract

Being the two environmental stressors, desertification and climate change constitute major threats to ecosystems and human communities in arid and semi-arid regions. With rising temperatures, increasingly sporadic precipitations, and constant land degradation, the need for sustainable technologies endowed with resilience becomes more critical. Nanotechnology, from the applied physics point of view, has a great potential to address the core issues of desertification by offering efficient energy conversion, passive thermal control, and environmental sensing technologies of a sort never before imagined. In this paper, we present a physics-based framework and evaluation of three advanced nanomaterials deemed appropriate for optical and thermal devices oriented towards desert and drought-prone environments: perovskite quantum dots (QDs), titanium dioxide (TiO₂) nanorods, and graphene-based composites. Criteria for selecting these nanomaterials are based on fundamental physical aspects such as absorption coefficient within a specific wavelength range, charge carrier mobility, and thermal stability, all critical to the operation of high-performance devices subjected to extreme climates. Through graphic schematics and comparative data showing .The paper also addresses the possible applications such as water pumping, building insulation, and energy storage while discussing some of the inherent material limitations such as degradation by the environment and toxicity. Eventually, the paper marks the importance of an interdisciplinary approach for nanomaterials in enhancing climate resilience and advancing sustainable development goals in vulnerable arid landscapes.

Key words: Nanomaterials, Desertification, Solar Energy, Thermal Regulation, Climate Resilience

Nanotechnology and Nano-Food- A Promising Choice for Future Food Security

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Abstract:

Nanotechnology concerns with the manipulation of materials at the nano scale. It paves a way for the novel approach in sustainable farming to enhance food production. Nano-food is the one that is cultivated, produced, processed and packaged using nanotechnology. Nanotechnology helps to maintain healthy soil -plant system fostered with the usage of nano fertilizers. Nanoengineering addresses the scarcity of water resources, soil erosion and pest management. Nanoparticle carriers increase the soil fertility, plant growth and yield production. Nanosensors help the plants to absorb optimum quantity of fertilizers, water, sunlight resulting to the huge harvest. Nanoparticles of metal oxides like ZnO₂, Alumina Silicates play the role of intelligent biocides for effective pest control with less damage to the soil fertility. DNA sequencing using nanotechnology with nanoparticles like 3nm mesoporous silica nano particles, graphene nanoribbon for crop improvement. The nanoparticles like Ag, Zn, Cu, Silica particles are effectively used for crop protection. Smart Dust nanosensors work for precision agriculture. Nano Graphene used in food packaging increases the shelf life of food product and protects the nutrient quality. The efficient use of nanotechnology in cultivating, harvesting, processing and packaging agricultural goods ensures the quality and durability of nano food. This paper outlines the applications of nanotechnology in cultivating and producing nano-based food. This paper discusses about the challenges of nanotechnology and accumulation of nanoparticles in soil, water, plants. So, nanotechnology and nano-food can be the best promising choice for the future food security.

Keywords: Nanotechnology, nano-food, nano engineering, nano sensors,

Green Chemistry—Current and Future Issues

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****Abstract****

The beginning of green chemistry is frequently considered as a response to the need to reduce the damage of the environment by man-made materials and the processes used to produce them. A quick view of green chemistry issues in the past decade demonstrates many methodologies that protect human health and the environment in an economically beneficial manner. This article presents selected examples of the implementation of green chemistry principles in everyday life in industry, the laboratory and in education. A brief history of green chemistry and future challenges are also mentioned.

****Keywords: **** green chemistry, green analytical chemistry, clean chemistry, atom economy, sustainable development.

Plant based nanomaterials to mitigate environmental pollution

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Abstract

The depletion of biotic and abiotic components of different forms of ecosystem due to natural and anthropogenic activities brought search light to reduce the threat to of natural resources. The increase of pollutants in the surroundings of urban and rural habitats turn to risk to mankind and biodiversity. The efforts to curb burden of pollutants and protect the nature from the clutches of harmful compounds turn need of the hour. The physical, chemical and biological approaches are being exploited to rescue the planet and maintain the hygienic environment. The approaches utilized in field with less expenses and prolong application are need of the day.

The particles of invisible sizes are quite very old but the improvement in technology brought these components as nanomaterials. These materials of different metal origin being utilized in broad spectrum applications in current global community. These nanoscale materials are prepared with variety of approaches. The biogenic synthesis of nanoparticles using bacteria, fungi and plant-based approaches brought the technology to low cost and efficient to solve the issues in various walks of life. There is need to discuss the applications of nanoparticles in remediation of pollutants. This is an attempt to present the application of phyto-genic metal nanoparticles in the reduce the burden of pollutants (dyes, wastewater, heavy metals, and pesticides).

Keywords: plant extracts, green synthesis, Phyto nanoparticles, pollutants

Rhodium (III) Estimation by Spectrophotometric Extraction Using a Novel Analytical Reagent

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Abstract:

In the current study, a novel analytical reagent called 2, 4-dimethyl-3H-1, 5-benzodiazepine (DBA) is developed for extractive spectrophotometric analysis to determine the amount of rhodium (III) in an alloy mixture. In this study, a novel analytical reagent was investigated, and its characterisation using NMR, IR, and mass spectrometer techniques was also described. When subjected to an extraction using n-butanol as the selected solvent at a constant pH of 8.9, the red-colored product produced by the reaction of Rhodium (III) and analytical reagent (DBA) provides exceptional results. Rhodium (III) ion concentrations between 1 mg L⁻¹ and 10 mg L⁻¹ completely satisfy the Beers law. Maximum and average molar absorption coefficient values for the coloured compound were noted to yet Sandell's sensitivity was recorded as 0.01205 g cm⁻². be 510 nm, 4863L mol⁻¹ cm⁻².Rhodium (III) metal traces in alloy mixtures can be determined utilising DBA analytical reagent in a more efficient, cost-effective, and superior manner than with prior spectrophotometric extraction techniques.

Biodiversity conservation and sustainable development are crucial for addressing desertification and climate change

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Biodiversity conservation and sustainable development are two inter-related branches focusing on social progress, economic growth and environmental protection as well as ecosystem conservation. Climate change is the most serious threat, biggest environmental, socioeconomic, and political issues of our day that is linked to the causes of desertification. Climate change caused by the emission of greenhouse gases into the atmosphere which have an impact on our environment resulting biodiversity loss. The main causes of desertification include: climatic factors and human activities such as overexploitation and inappropriate agricultural practices, deforestation, high population growth, land and rights unsafe access. Desertification refers to the genetic erosion of plants, animals, and microorganisms that make up the living components of arid environments. Most plants and animals as well as soil microorganisms that have adapted to favorable condition are most likely extinct due to desertification. The reduction of forests, wildlife ecosystems, and total biodiversity has clearly under severe condition. Desertification is the persistent degradation of dry-land environments and the one among the environmental challenges in the world resulting reduced biological productivity, and this raises the decline of plant biomass, reduced land productivity for livestock, crop yields and social welfare. It's caused by social, political, and climatic factors that subsidize to an un-sustainable use of natural resources. The vegetation within the ecosystems is often extremely threatened by global CC led desertification. The degradation of land in dry environments, is referred as desertification, resulting decline in vegetation cover or in one sort of plant being replaced with other and fewer productive species and causes deterioration of ecosystems. However, the impacts of desertification due to global CC and human factors are challenging issues for today's environment. The Ecosystem services in dry lands are vulnerable to the impacts of global CC due to high variability of temperature, precipitation. In order to solve the impacts of global CC or desertification, some potential measures recognized which is named CC adaptation and mitigation. It includes the utilization of carbon capture & storage technology and trading plants for carbon, breeding crops and irrigation techniques for cooling the atmosphere. Thus, ecosystem management approaches targeting to combat desertification are interlinked, to global CC mitigation, and conservation of biodiversity. Thus, the combined implementations of major environmental agreements can result to increased cooperation and effectiveness, that helping dryland population.

Key words: Climate change (CC), Desertification, Ecosystem

Flora and Fauna Diversity, Sustainable Development, and the Challenge of Climate Change

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Abstract

Flora and fauna are the twin pillars of biodiversity, supporting ecological balance, cultural values, and sustainable development. However, the increasing pressures of climate change, habitat degradation, and unsustainable land use threaten global biodiversity. Biodiversity and climate change are interconnected crises threatening planetary stability. Biodiverse ecosystems contribute to climate regulation through carbon sequestration, while climate change drives habitat loss, phenological shifts, and species extinctions. This paper explores the interdependence between biological diversity (flora and fauna), sustainable development goals (SDGs), and the escalating challenge of climate change. It examines the relationship between biodiversity conservation and sustainable development, analyzing global trends, policies, and integrated strategies such as nature-based solutions (NbS) emphasizes the ecological and socio-economic importance of conserving biodiversity, evaluates current threats, and outlines integrated strategies for resilience. The paper argues for a holistic, ecosystem-based approach to development that safeguards both biodiversity and climate stability.

Keywords

Biodiversity, Flora, Fauna, Climate Change, Sustainable Development, Ecosystem Services, SDGs, Resilience.

Carbon Sequestration Potential of Trees in and around Government college campus of Rajamahendravaram city in Andhra Pradesh, India: A case Study

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Objective: Cities are the main places of anthropogenic activities and sources of “greenhouse” gases and climate change. Consumption based point of view Trees are chief sinkers for carbon reduction and storage. Hence, current study focused on contribution tree vegetation within Government college campus towards carbon sequestration, storage and climate regulation.

Methodology: Study was conducted in the Government College campus, Rajamahendravaram, Andhra Pradesh, India during May 2024 to June 2025. Biomass estimation was done by Non-destructive method through the measure of GBH of the individual tree species. Carbon equivalent was calculated by using scientific formula.

Results: A total 63 tree species were assessed for carbon sequestration through the biomass estimation and quantification. For the estimation of total CO₂ sequestration DBH and height measured. It is found that highest CO₂ 3216.81 kg/tree captured by *Swietenia mahagoni* followed by *Mangifera indica*, *Ficus religiosa* & *Samanea saman*, *Syzijum cumini* which are captured 2325.18 kg of CO₂ per tree. Total tree count is 625 out of which *Tectona grandis* found 206 tree counts which is maximum. It is found that total CO₂ sequestered by the selected area is 565.32 tonnes. Carbon sequestration is a way to mitigate the accumulation of greenhouse gases in the atmosphere released by the burning of fossil fuels and other anthropogenic activities.

Conclusion: Ideal atmosphere in the campus that is pollution free environment have a wider impact on nature conservation. Species richness is important parameter for carbon storage and biomass accumulation generation. The amount of carbon storage is positively influence biomass potential.

Keywords: Carbon sequestration, Biomass

From Emissions to Equity:

The Global Governance of Carbon Credit Trading

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Abstract

Carbon credit trading has become a key component of global climate policy, offering a market-based approach to reducing greenhouse gas emissions. This paper explores the evolution, governance, and equity implications of carbon markets, with a particular focus on India’s experience and emerging domestic frameworks. While international mechanisms like the Kyoto Protocol and Paris Agreement have provided structural foundations, challenges such as fragmented markets, weak verification, and inequitable benefit-sharing persist. The study highlights the need for stronger governance, digital innovation, and inclusive policies to ensure that carbon credit systems contribute not only to emissions reduction but also to climate justice and sustainable development.

Exploring Ecosystem Dynamics and Sustainable Conservation Strategies

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Abstract

The field of Environmental Ecology serves as a vital multidisciplinary science that explores how living organisms interact with their environment. This research examines both the structure and function of ecosystems, focusing particularly on species diversity, the cycling of nutrients, energy transfer processes, and how ecosystems change over time. The study emphasizes how human activities including forest clearing, industrial development, and global warming affect the stability and ability of ecosystems to recover from disturbances. By examining environmental indicators and studying examples from different ecological regions worldwide, this research demonstrates the critical need for sustainable approaches to managing natural resources and protecting biodiversity. The results support the use of comprehensive ecological strategies to reduce environmental damage and maintain ecological stability over time. This research enhances our knowledge of ecosystem well-being and provides practical recommendations for creating environmental protection policies.

Keywords: Environmental ecology, Anthropogenic impact, Ecosystem resilience, Ecological indicators

Climate Change and Sustainable Development: Challenges and Opportunities in Andhra Pradesh

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Abstract

Located on India’s southeastern coastline, Andhra Pradesh is particularly vulnerable to climate change due to its ecological fragility, socio-economic profile, and dependence on agriculture and natural ecosystems. This paper explores the complex interplay between climate change challenges and sustainable development goals within the state. It examines major environmental issues—including rising temperatures, shifting rainfall patterns, coastal inundation, and resource depletion—and their socio-economic consequences. In response, the study outlines several opportunities for resilience, such as expanding renewable energy adoption, promoting climate-resilient farming, advancing policy reforms, encouraging grassroots participation, and enhancing green infrastructure. Highlighting the necessity of coordinated and inclusive strategies, the paper proposes a comprehensive development pathway that balances environmental sustainability with equitable economic progress. The suggested road map aims to steer Andhra Pradesh toward a more climate-resilient and innovation-driven future.

Key words: Andhra pradesh, sustainable development goals, climate change.

A Study On Algal Mediated Bio Plastic Production

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The surge in global demand for plastics has exacerbated plastic waste pollution, particularly in marine ecosystems, where micro plastics infiltrate the food web and pose growing risks to marine organisms and human health. Traditional waste management methods—such as recycling, chemical treatments, incineration, and landfills—have proven insufficient. In response, this review explores two innovative and sustainable strategies: algal-mediated plastic biodegradation and algae-derived bio plastic production. Recent studies have highlighted the biodegradation potential of microalgae species (e.g., *Chlamydomonas reinhardtii*, *Scenedesmus dimorphus*, *Oscillatoria*, *Chlorella vulgaris*), which utilize enzymes such as ligninolytic and exopolysaccharidic hydrolases to decompose polymer chains, even employing them as carbon sources. Advances include genetically engineering algae to express PETase and MHETase enzyme systems—originally from *Ideonellasakaiensis*—to target PET breakdown. The review assesses these mechanisms and examines the impacts of micro plastic exposure on algal physiology and biodegradation efficiency. Complementing degradation, algae-based bio plastics are emerging as a sustainable alternative. Market analyses estimate the sector at USD 106 million in 2024, with projected growth to USD 146 million by 2030 (CAGR ~5.5%). These bio plastics are being developed to match the mechanical properties of petroleum-based plastics through blending with polymers (PE, PP, PLA, PHA), incorporation of plasticizers, fillers, and additives, or via genetic/metabolic engineering. Applications now extend beyond packaging into agriculture, textiles, medical devices, and construction. Seaweed-derived biomaterials such as MarinaTex—made from red algae can biodegrade in home compost within 4–6 weeks, highlighting the feasibility of commercial alternative. This review integrates the latest findings on algal plastic biodegradation and bio plastic production, offering a comprehensive outlook on mechanisms, technological advances, market dynamics, and research priorities to advance algae-based solutions for plastic pollution.

Key Words : PETase, MHETase , Seaweed, microalgae

Phytoaccumulation of heavy metals by *Azolla pinnata* in untreated mine water

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ABSTRACT

The issues of climate change, greenhouse gas emissions, water pollution, and environmental quality degradation have deepened the necessities for ecological sustainability, lower operating expenses, and nature-based solutions. Heavy-metal polluting of ground water poses a major threat to life and aquatic atmosphere. Conventional treatment methods are generally inefficient, expensive, time-consuming, and unsafe to the environment when recycled to remove pollutants from wastewater. An affordable, eco-friendly, and long-lasting technique is phytoremediation. The most significant factor in a successful phytoremediation method is the choice of aquatic plant species. *Azolla pinnata* is highly recommended to apply in bioremediation process as an ecological treatment method. The Present study aims to examine the potential of *Azolla pinnata* in phytoremediation of untreated mine water. This water poses potential threats to local ecosystems, agriculture, and public health. We collected water samples from locations in the area of the granite mine at Chimakurthy. The experiment was conducted by culturing *Azolla* in the two effluent concentrations in a greenhouse on a completely randomized design. A full examination of the physicochemical parameters was undertaken, including pH, turbidity, electrical conductivity (EC), total dissolved solids (TDS), and dissolved oxygen (DO), and an Atomic Absorption Spectrometer to measure the heavy metal levels, specifically Ni, Zn, Fe, Pb, Cu, and Cr. Significant results were obtained but need to be statistically evaluated. The *Azolla* plant accumulates heavy metals through various processes such as phytoextraction, rhizofiltration and phytostabilization. Studies have reliably shown *Azolla*'s ability to significantly reduce concentrations of various heavy metals, including lead, cadmium, chromium, nickel, copper, and zinc, from contaminated water and industrial effluents. The aquatic fern *Azolla pinnata* has established distinctive potential for heavy metal phytoremediation.

Keywords: Phytoremediation, Heavy metal, Mine water, Total dissolved solids, *Azolla pinnata*.

CARBON DIOXIDE SEQUESTRATION BY MICROBES: MECHANISMS, POTENTIAL, AND ENVIRONMENTAL SIGNIFICANCE

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Abstract

The increasing concentration of atmospheric carbon dioxide (CO₂) is a major cause of global climate change (Falkowski et al., 2008). The metabolic versatility and ecological ubiquity of microorganisms play a central role in natural carbon cycling and offer promising eco-friendly solutions for CO₂ sequestration (Falkowski et al., 2008; Lal, 2008). This article explores the various microbial mechanisms involved in CO₂ capture and storage, including photoautotrophy, chemolithoautotrophy, carbonate mineralization, and the formation of stable soil organic matter through microbial biomass turnover (Liang et al., 2017; De Muynck et al., 2010).

Photoautotrophic microorganisms such as cyanobacteria and microalgae fix atmospheric CO₂ using light energy, forming the base of aquatic food webs and contributing significantly to oceanic and freshwater carbon sinks (Raven & Beardall, 2016). In contrast, chemolithoautotrophic bacteria like *Nitrosomonas* and *Thiobacillus* utilize energy from the oxidation of inorganic compounds to assimilate CO₂, functioning effectively in subsurface and extreme environments (Canfield et al., 2010). Another significant pathway involves microbially induced carbonate precipitation (MICP), where microbes facilitate the conversion of CO₂ into stable mineral forms such as calcium carbonate (De Muynck et al., 2010). Additionally, heterotrophic microbes contribute to carbon stabilization by producing necromass that binds with soil minerals, forming long-lived soil organic carbon (Liang et al., 2017; Schmidt et al., 2011).

The potential of microbial CO₂ sequestration is vast, especially in enhancing soil carbon stocks and supporting ecosystem services such as nutrient cycling and water retention (Lal, 2008; Schmidt et al., 2011). However, environmental variability, microbial respiration, and challenges in measuring long-term sequestration remain major limitations (Schmidt et al., 2011). This paper reviews current knowledge, practical applications, and future directions in utilizing microbial systems for climate mitigation.

Keywords:

Carbon sequestration, Microbial CO₂ fixation, Climate change mitigation, Autotrophic microbes, Biogeochemical cycles, Microbial-induced carbonate precipitation

From Genes to Ecosystems: The Link Between Genomic Diversity and Ecological Stability: A Research Review

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ABSTRACT: Genomic diversity, which encompasses the genetic variation within and among species, plays a pivotal role in maintaining ecological stability. This review synthesizes findings from research conducted between 2010 and 2024 to explore how genomic diversity supports key ecosystem functions, such as nutrient cycling, primary productivity, and carbon sequestration. These functions are vital for ecosystem resilience, especially in the face of disturbances and environmental changes. Studies indicate that ecosystems with higher genetic diversity tend to be more productive and adaptable, offering a buffer against environmental stressors.

The review also examines how genetic diversity influences species interactions, including competition, predation, and mutualism. Diverse populations tend to experience reduced interspecies competition and enhanced mutualistic relationships, which in turn contribute to overall ecosystem stability. Additionally, genetic diversity within species enhances resilience to climate change, enabling populations to adapt to shifts in temperature, precipitation, and other environmental variables.

Conservation strategies are discussed with a focus on preserving genomic diversity as a means to sustain ecological stability. Innovative approaches, such as genetic rescue and assisted gene flow, are highlighted as essential tools for enhancing genetic variation in vulnerable populations. The review also explores the potential of emerging technologies like CRISPR for increasing genetic diversity in endangered species.

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A Study on Algal mediated Bio Plastic Production

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ABSTRACT

The surge in global demand for plastics has exacerbated plastic waste pollution, particularly in marine ecosystems, where micro plastics infiltrate the food web and pose growing risks to marine organisms and human health. Traditional waste management methods—such as recycling, chemical treatments, incineration, and landfills—have proven insufficient. In response, this review explores two innovative and sustainable strategies: algal-mediated plastic biodegradation and algae-derived bio plastic production. Recent studies have highlighted the biodegradation potential of microalgae species (e.g., *Chlamydomonas reinhardtii*, *Scenedesmus dimorphus*, *Oscillatoria*, *Chlorella vulgaris*), which utilize enzymes such as ligninolytic and exopolysaccharidic hydrolases to decompose polymer chains, even employing them as carbon sources. Advances include genetically engineering algae to express PETase and MHETase enzyme systems—originally from *Ideonellasakaiensis*—to target PET breakdown. The review assesses these mechanisms and examines the impacts of micro plastic exposure on algal physiology and biodegradation efficiency. Complementing degradation, algae-based bio plastics are emerging as a sustainable alternative. Market analyses estimate the sector at USD 106 million in 2024, with projected growth to USD 146 million by 2030 (CAGR ~5.5%). These bio plastics are being developed to match the mechanical properties of petroleum-based plastics through blending with polymers (PE, PP, PLA, PHA), incorporation of plasticizers, fillers, and additives, or via genetic/metabolic engineering. Applications now extend beyond packaging into agriculture, textiles, medical devices, and construction. Seaweed-derived biomaterials such as MarinaTex—made from red algae can biodegrade in home compost within 4–6 weeks, highlighting the feasibility of commercial alternative. This review integrates the latest findings on algal plastic biodegradation and bio plastic production, offering a comprehensive outlook on mechanisms, technological advances, market dynamics, and research priorities to advance algae-based solutions for plastic pollution.

Key Words : PETase, MHETase , Seaweed, microalgae

Applying Machine Learning Techniques to Biodiversity Research: A Review of Current Methods and Future Directions

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ABSTRACT:

The value of biodiversity continues to decline worldwide due to habitat degradation, climate change, pollution, non-sustainable extraction of resources and recent days unpredictable wars, all of which threaten ecosystem health and human wellbeing as a whole. In this context, Artificial Intelligence (AI) has taken a prominent role in transforming biodiversity conservation by developing innovative means to better monitor, anticipate, and respond to the threats posed to natural ecosystems. This paper will discuss the various ways AI informs biodiversity conservation with a focus on ways it has been used, its benefits and challenges. AI technologies, with an emphasis on machine learning (ML), computer vision, and natural language processing (NLP), have been transformative for conservation science because of the methods that are now possible for collecting and analyzing voluminous data, which were unable through conventional methods. Automated methods such as AI have accelerated and improved the processing of very large and often complex datasets (e.g., satellite images, acoustic recordings, camera trap images, and ecological field data). AI can speed up species population monitoring, habitat condition monitoring, and ecological change monitoring. For example, convolutional neural networks (CNNs) can learn to identify species from current images or videos (e.g., species identification from camera trap images and videos). Real-time acoustic AI systems can detect and classify animal calls and identities, which is useful in monitoring elusive or nocturnal species.

AI is crucial for forecasting environmental conditions, identifying biodiversity hotspots, and predicting extinction likelihood. It also aids in controlling illegal activities like poaching and logging by automating detection and alerting law enforcement. AI uses natural language programming to extract insights from academic literature and social media, proactively planning for emerging threats. However, challenges like data quality, algorithmic bias, and digital divide may impact AI's effectiveness. Ethical considerations include surveillance technology ownership and suppression of traditional ecological knowledge.

AI's potential to enhance biodiversity conservation requires an interdisciplinary approach, focusing on ethics and inclusion to sustain the health of the planet for generations to come through careful consideration of its deployment and on-going evaluation.

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Transforming Keratin Waste: A Sustainable Way to Water Treatment

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Abstract:

Keratin, is one of the most prevalent strong-structural, non-food protein and is being produced as a byproduct of the poultry, wool, and livestock industries worldwide. While biodegradable, its high sulfur content poses environmental risks, complicating direct disposal due to pollution concerns. Thus, treatment is necessary before keratin waste can be managed. A sustainable solution is to repurpose keratin-rich waste as a biosorbent for water purification. Keratin's potential for adsorption is well-documented, due to its high surface area and functional groups such as hydroxyl, thiol, amino, and carboxyl that facilitate contaminant binding. However, the native form of keratin has limitations, including low regeneration capability, poor stability, and limited adsorption capacity. Recent studies have explored the extraction of keratin from biomass and its application as a bioadsorbent in various keratin-based nanocomposites, including biofilms, crosslinked polymers, hydrogels, sponges, and membranes. These advancements have enhanced the stability, reusability, and binding efficiency of keratin materials. This review highlights the latest progress in keratin-based adsorbents in developing sustainable and efficient keratin-based materials for water treatment applications.

Keywords: Keratin, biosorbent, wastewater treatment, nano-sponges, hydrogels

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Nature-Based Solutions for a Changing World: Biodiversity, Desertification, and Climate Resilience

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Climate resilience can be enhanced through practices such as agroforestry, reforestation, and sustainable agricultural techniques, which not only restore degraded landscapes but also improve soil health and water retention. By fostering collaboration among governments, communities, and organisations, we can develop innovative solutions that ensure the long-term viability of our ecosystems and livelihoods. Carbon sequestration is crucial in mitigating climate change, and its disruption can lead to increased greenhouse gas emissions, further exacerbating global warming. To combat these challenges, it is essential to implement sustainable land management practices that restore degraded ecosystems and promote biodiversity, ultimately ensuring the resilience of both the environment and human communities. It is crucial to use sustainable development strategies that combine land restoration, climate action, and biodiversity conservation. By encouraging sustainable land management, ecosystem restoration, and better land-use practices, the UN's Land Degradation Neutrality (LDN) initiative serves as an example of initiatives to stop and reverse desertification. These initiatives boost livelihoods, improve food security, lower poverty, and maintain biodiversity as well as all of which are in line with several Sustainable Development Goals (SDGs). Multidisciplinary research and integrated governance frameworks are necessary to address the intricate feedbacks between climate change, biodiversity loss, and desertification. This analysis highlights the interconnectedness between desertification and climate change, the importance of biodiversity conservation, and the need for integrated sustainable development solutions.

Keywords: desertification, climate change, biodiversity conservation

Impact of Climate Chaos on Biodiversity and Sustainable Development

Methods for Conservation

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ABSTRACT

Climate change and environmental pollution are among the most pressing global challenges of the 21st century. The intensifying and unpredictable disruptions in weather patterns poses a severe threat to global biodiversity and the goals of sustainable development. Shifting climate patterns, and increasing pollution levels are causing habitat loss, species extinction, and disruption of vital ecosystem services. Rising temperatures, erratic rainfall, severe droughts, floods, and extreme weather events are pushing many species beyond their capacity to adapt. Habitats are shrinking or shifting, leading to species extinction and loss of genetic diversity. These impacts directly affect food and water security, human health, economic stability, and efforts to achieve global sustainable development goals (SDGs). Coral reefs are bleaching due to warming seas, forests are facing increased wildfires and pest outbreaks, wetlands are drying up or flooding unpredictably, disrupting breeding grounds for many birds and aquatic species. Such ecological imbalances also threaten food security, clean water supply, and the livelihoods of millions, especially indigenous and rural communities who depend directly on natural resources. Sustainable development, which aims to balance economic growth, social well-being, and environmental protection, is undermined by biodiversity loss. When ecosystems degrade, they provide fewer services like carbon sequestration, soil fertility, pollination, and climate regulation all of which are critical to human well-being and climate resilience. Addressing these challenges requires integrated strategies, including reducing greenhouse gas emissions, transitioning to renewable energy, enforcing pollution control measures, conserving and restoring ecosystems, and promoting sustainable resource use. Community participation, environmental education, and international cooperation are essential to ensure effective action. Protecting biodiversity and minimizing pollution are fundamental to building resilient ecosystems and societies capable of withstanding future environmental and socio-economic pressures. Climate change and environmental pollution are deeply interconnected and require urgent, coordinated action. Protecting biodiversity and combating climate change and pollution are crucial for a healthy planet and human well-being. Effective solutions need global cooperation, strong policies, community involvement, and sustainable lifestyles.

Keywords: Environmental pollution, Climate change, sustainable development goals (SDGs), strong policies, community involvement.

Recent Advances in Management of Basal Stem Rot of Coconut in Coastal Agro Ecosystem of Andhra Pradesh

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Abstract

Basal stem rot (Ganoderma wilt) disease caused by *Ganoderma* spp is the most destructive disease of coconut. Described detailed basal stem rot (BSR) disease symptoms on coconut palm. BSR pathogens *Ganoderma applanatum* (Pers) Pat and *G.lucidum* (Leys.) Karst was isolated from brackets and tissues of root and stem of coconut. Different management practices including cultural methods, chemical control and also biological control of the basal stem rot disease induced by *Ganoderma* spp, were reviewed in this chapter. Detailed investigations in the biological control of this disease were carried out. In vitro studies revealed that the native biocontrol agents viz., *Trichoderma viride*, *T.harzianum* and *T.hamatum* were very effective in checking the radial growth of both the *Ganoderma* spp as well as in the production specific volatile and non-volatile metabolites that are antagonistic to the basal stem rot disease pathogens. All the three *Trichoderma* spp, were found to check the basal stem rot disease of coconut at field level effectively when applied at the rate of 50 gms of talc powder formulation in conjunction with 5 kg neem cake per palm/year. Based on the results, an integrated disease management with biological control as key component was formulated to combat the disease at field level. The formulated IDM strategy against BSR of coconut include application of 50g of talc powder formulation of *T.viride* along with 5 kg neem cake /tree/ annum for a continuous period of over three years besides other cultural practices.

Key words: Basal stem rot, *Ganoderma* spp., Fungicides, Biocontrol, *Trichoderma* spp & Coconut.

Botanical Gardens at the Forefront of Biodiversity Conservation and Sustainable Development: Addressing Climate Change Challenges at the Botanical Garden of Government College for Men (Autonomous), Kadapa, Andhra Pradesh.

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ABSTRACT

Biodiversity conservation and sustainable development are fundamentally interconnected and have emerged as global imperatives in the context of accelerating climate change. Botanical gardens play a pivotal role in ex situ conservation, environmental education, and research on plant diversity and resilience. This study examines the Botanical Garden at Government College for Men (Autonomous), Kadapa situated in the semi-arid region of the Eastern Ghats as a living laboratory and conservation center addressing the twin challenges of biodiversity loss and climate change.

A comprehensive floristic inventory documented over 320 plant species spanning 80 families, including several endemic, threatened, and medicinally important species native to the Eastern Ghats. Field observations indicated shifts in phenological patterns, shortened flowering and fruiting periods, and heightened susceptibility of sensitive taxa resulting from increased temperatures, erratic rainfall, and prolonged droughts. Sustainable management interventions such as rainwater harvesting, soil moisture conservation, microclimate enhancement, and prioritization of drought-tolerant native species were implemented and evaluated for their effectiveness in bolstering ecosystem resilience.

Moreover, community outreach and environmental education initiatives were integrated to raise conservation awareness and foster sustainable livelihoods among local populations. The findings demonstrate that botanical gardens, when managed with a focus on sustainability, adaptive strategies, and community engagement, can function as effective microcosms for climate adaptation and biodiversity conservation. This research underscores the vital role of botanical gardens as key contributors to achieving sustainable development goals, offering a replicable model for conserving plant diversity and enhancing resilience in other semi-arid regions threatened by climate change.

Keywords: *Biodiversity conservation, Sustainable development, Semi-arid region, Threatened species and Climate change.*

Biodiversity Conservation in Kancha Gachibowli: Challenges, Opportunities and Future Directions

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Abstract:

KanchaGachibowli, a rapidly urbanizing locality in Hyderabad, India, is home to remnants of diverse ecological habitats that support a wide range of flora and fauna. However, the region faces significant biodiversity loss due to urban expansion, habitat fragmentation, pollution, and encroachment. This paper explores the current challenges in conserving biodiversity in KanchaGachibowli, including insufficient ecological planning, limited public awareness, and lack of enforcement of environmental regulations. Despite these issues, the area presents notable opportunities for conservation through the integration of green infrastructure, community-led ecological restoration, and policy-driven biodiversity corridors. The study also outlines future directions, emphasizing the need for multidisciplinary approaches involving local governance, scientific research, and citizen participation to ensure sustainable urban development while preserving biodiversity. Strategic planning, ecological monitoring, and habitat restoration are proposed as key pillars for the long-term conservation of KanchaGachibowli's ecological integrity.

Key points: Sustainable development, urban development, Ecological monitoring.

The impacts of climate change on the life style of birds

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Abstract

Organisms living today are descended from ancestors that experienced considerable climate change in the past. However, they are currently presented with many new, man-made challenges, including rapid climate change. Weather is of major importance for the population dynamics of birds, but the implications of climate change have only recently begun to be addressed. There is already compelling evidence that birds have been affected by recent climate changes. Migration and reproduction of many avian species are controlled by endogenous mechanisms that have been under intense selection over time to ensure that arrival to and departure from breeding grounds is synchronized with moderate temperatures, peak food availability and availability of nesting sites. The timing of egg laying is determined, usually by both endogenous clocks and local factors, so that food availability is near optimal for raising young. Climate change is causing mismatches in food supplies, snow cover and other factors that could severely impact successful migration and reproduction of avian populations unless they are able to adjust to new conditions. Resident (non-migratory) birds also face challenges if precipitation and/or temperature patterns vary in ways that result in mismatches of food and breeding. Predictions that many existing climates will disappear and novel climates will appear in the future suggest that communities will be dramatically restructured by extinctions and changes in range distributions. Species that persist into future climates may be able to do so in part owing to the genetic heritage passed down from ancestors who survived climate changes in the past. The study of climatically induced distributional change is currently at a predictive modeling stage, and will need to develop methods for testing these predictions. Overall, there is a range of intrinsic and extrinsic factors that could potentially inhibit adaptation to climate change and these are a high priority for research

Keywords: bird, climate change, avian reproduction, bird migration, penology, egg laying

"Harmonizing Nature and Technology: Green Synthesis of Nanoparticles from Mangroves for Sustainable Living"

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Abstract

The convergence of nature and technology offers a promising path toward sustainable development. The rising demand for sustainable and eco-friendly technologies has accelerated the advancement of green nanotechnology, especially in synthesizing silver (Ag) and gold (Au) nanoparticles. Mangroves, with their rich phytochemical profile and unique adaptation to harsh environments, serve as powerful bioreactors for producing metallic nanoparticles. These biologically synthesized nanoparticles demonstrate notable antimicrobial, catalytic, and environmental remediation properties, aligning well with the principles of green chemistry and the circular economy. Traditional methods for nanoparticle synthesis often involve toxic chemicals and energy-intensive processes, raising environmental concerns. Green synthesis, which uses plant extracts, microorganisms, and biopolymers, provides an eco-friendly and sustainable alternative. The green synthesis of nanoparticles from bioresources derived from mangroves is explored in this review as an economical and environmentally friendly substitute for traditional chemical and physical methods. This study reviews the fundamentals, benefits, and latest developments in eco-friendly methods for producing gold and silver nanoparticles. It also highlights their potential applications in medicine, agriculture, water treatment, environmental engineering, and sustainable industrial practices, demonstrating their role in harmonizing technology with nature for a healthier environment.

Keywords: Medicinal plants, Metal Nanoparticles, Green Synthesis, Environmental sustainability, Biomedical applications.

PHYSICO-CHEMICAL ASSESSMENT OF SOIL AND WATER SAMPLES OBTAINED FROM GILAKALADINDI MANGROVE REGION IN MACHILIPATNAM COAST, A.P., INDIA

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ABSTRACT

Background: The study evaluated the physico-chemical properties of soil and water samples from the Gilakaladindi Mangrove region in the Machilipatnam coastal region of India. The physico-chemical characteristics analysis provided baseline information on these coastal biotopes.

Methods: The study has identified variations in soil and water quality parameters of 4 classified mangrove zones viz., AM zone (*Avicennia marina*), RA zone (*Rhizophora apiculata*), AC zone (*Aegiceras corniculatum*), and AI zone (*Acanthus ilicifolius*) as follows. The soil and water samples were collected according to mangrove vegetation that spread into four different patches in the mentioned mangrove region to provide baseline information on the physico-chemical characteristics.

Results: For **soil samples**, the results range between- pH (7.62-8.34), EC in ms/cm (8.57-18.90), Nitrogen as N in g/100g (0.10- 0.17), Phosphorous as P in mg/kg (175.21- 565.86), potassium as K in g/100g (0.53-0.84), organic carbon in g/100g (0.81-6.62). For **water samples**, the results range between- Air temperature in °C (32°C to 35°C), Water temperature in °C (25°C to 28.8°C), pH (7.4- 8.1), salinity in ppt (50.71-66.43), EC in ms/cm (73.56-.92.71), DO in mg/L (1.99-4.45), BOD in mg/L (70- 250), total alkalinity in mg/L (153.75-225.5), total hardness in mg/L (4636-6042), total solids in mg/L (28,688-37,324), TSS in mg/L (1.1-36.3), total ammonia in mg/L (<0.10), nitrite in mg/L (<0.01), nitrate in mg/L (4.37-7.72), phosphate in mg/L (0.52-3.36).

Keywords:

Machilipatnam coast, Gilakaladindi Mangrove region, Mangrove vegetation, soil and water samples, Physico-chemical characteristics.

THE USE OF CLIMBER PLANTS WILL BE VERY IMPORTANT IN THE FUTURE

THESE PLANTS HAVE MANY MEDICINE PROPERTIES.

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Abstract:

The present article deals with the documentation of plant species used by local tribes one of the bheel tribes jhabua districts madhyapradesh region of India climbing plants are groups of plants that often have unique Imparting features .they are plants that develop upright and depend on other plants or structures for growth and development. Several families, such as Dioscoreaceae, cucurbitaceae, Convolvulaceae, Mimosaceae are exclusively climbers. Therefore, an estimated approach is needed to raise awareness of the ecological and medicinal importance of climbers in order to preserve them for sustainable future uses.our investigation revealed that the whole plantleaves,bark,roots,flowers,fruits has medicinal climber plantsthe information regarding medicinal values was collecting from local people .A Total of 30 different climbingplantsspecies were studied, along with their botanical names, significance and medicinal uses.

Transforming Our World: The 2030 Agenda for Sustainable Development

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Abstract

The Sustainable Development Goals (SDGs) are a set of 17 global objectives adopted by the United Nations in 2015 to achieve a sustainable and equitable world by 2030. These goals aim to end poverty, protect the planet, and ensure peace and prosperity for all people. The SDGs are interconnected, recognizing that economic, social, and environmental aspects are linked and essential for achieving sustainable development. The 17 SDGs include goals such as ensuring quality education, promoting sustainable economic growth, and protecting the environment. Some specific targets include ending hunger, achieving food security, and promoting sustainable agriculture. Other goals focus on providing clean water and sanitation, affordable and clean energy, and decent work and economic growth. The SDGs also emphasize the importance of reducing inequalities, promoting sustainable cities and communities, and taking action to combat climate change. Implementing the SDGs requires a collaborative effort from governments, businesses, and individuals. This can involve promoting sustainable practices, investing in renewable energy, and supporting initiatives that contribute to achieving the SDGs. For instance, artists are using their talents to raise awareness about the SDGs, such as creating abstract paintings that represent each goal. Such initiatives not only promote awareness but also inspire others to contribute to achieving the SDGs. The SDGs are crucial for creating a more equitable and sustainable world. By addressing these goals, we can ensure that all people enjoy peace and prosperity, now and in the future. This involves working together to protect the planet, end poverty, and promote sustainable development.

Key words: Sustainable Development Goals (SDGs), United Nations, Poverty, Environment, Peace, Prosperity, Quality Education, Sustainable Economic Growth, Climate Change, Equality, Renewable Energy.

HEAVY METAL POLLUTION IN KOLLERU LAKE LINKING FROM MINING TO ELURU ILLNESS AND BIODIVERSITY CHALLENGES

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ABSTRACT

Kolleru Lake, a Ramsar wetland in Andhra Pradesh, India (16°32'–16°47' N, 81°05'–81°21' E), is vital for biodiversity and livelihoods through fishing and agriculture but is threatened by heavy metal pollution, undermining biodiversity conservation and sustainable development. The Budameru and Tammileru rivers channel trace heavy metals (Pb, Cd, Cr, Cu, Zn) from Eastern Ghats mining, with bauxite extraction in Jerrala Block, Araku, Anantagiri, Gudem, and Kataraju Konda (Visakhapatnam and East Godavari districts) feeding Tammileru via runoff, and limestone mining in Kadapa supplying Budameru through tributaries. Perhaps this pollution, potentially linked to the 2020 Eluru illness causing over 500 to 600 and above cases of seizures and unconsciousness, with lead and nickel in blood samples, is exacerbated by desertification and climate change, which intensify runoff and sediment transport through altered rainfall patterns. The present study quantifies heavy metal concentrations, identifies mining contributions, and maps transport pathways to Kolleru Lake. Samples from 20 sites were collected in 2024 during monsoon and post-monsoon seasons. Concentrations were analyzed using ICP-MS and AAS. Results show higher levels in Tammileru with Lead (Pb) 15.7 ± 4.0 µg/L water, Chromium (Cr) 15.1 ± 6.1 µg/L water, than Budameru with Lead (Pb) 10.2 ± 3.1 µg/L water, Chromium (Cr) 10.4 ± 5.2 µg/L water, reflecting proximity to bauxite mines. Climate-driven intense monsoons and desertification enhance pollutant transport, threatening aquatic biodiversity via fish bioaccumulation and human health through carcinogenic Cd and Pb, as seen in Eluru. Mitigation includes stricter mining effluent regulations, riverine monitoring, phytoremediation, and community awareness to promote sustainable practices, aligning with biodiversity conservation and sustainable development goals. These findings highlight the urgent need for integrated management to protect Kolleru Lake, mitigate desertification impacts, and adapt to climate change, with future research needed to monitor trends and assess mitigation efficacy.

Keywords: Heavy Metal Pollution, Kolleru Lake, Mining Activities, Biodiversity Conservation, Sustainable Development, Desertification, Climate Change, Eluru Illness.

CLIMATE CHANGE EFFECTS ON MIGRATORY BIRD POPULATIONS IN KOLLERU LAKE WILDLIFE SANCTUARY

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Kolleru Lake Wildlife Sanctuary, a critical Ramsar site in Andhra Pradesh, India, spanning approximately 308 km², is a pivotal stopover for over 200 migratory bird species along the Central Asian Flyway, including globally threatened species such as the Siberian crane (*Leucogeranus leucogeranus*), spoon-billed sandpiper (*Calidris pygmaea*), and spot-billed pelican (*Pelecanus philippensis*). This study provides a comprehensive analysis of climate change impacts on these avian populations, focusing on disruptions in migration phenology, habitat degradation, and population dynamics. These changes have significantly altered food availability, particularly fish and plankton, critical for species like the northern pintail (*Anas acuta*) and bar-headed goose (*Anser indicus*), resulting in misaligned migration timing and reduced breeding success. Notable observations, such as the 2024 migration of greater flamingos (*Phoenicopterus roseus*) from Pulicat Lake to Kolleru due to declining water levels, exemplify climate-driven habitat shifts. These impacts are compounded by anthropogenic pressures, including aquaculture expansion, agricultural encroachment, and pollution, which have reduced the lake’s ecological capacity and intensified resource competition among migratory species. Recent surveys indicate significant declines in waterfowl abundance, with some species, like the black-tailed godwit (*Limosalimosa*), exhibiting altered migration patterns, such as prolonged stays due to warmer winters. To address these challenges, adaptive conservation strategies are imperative, including habitat restoration through reestablishment of native vegetation, enhanced monitoring via citizen science and satellite tracking, and stricter enforcement of wetland protection policies under India’s National Action Plan for Migratory Birds. However, the complex interplay of climate-induced stressors and human activities underscores the urgent need for interdisciplinary research to develop robust, sustainable conservation frameworks to preserve Kolleru Lake’s ecological integrity and ensure the survival of its migratory bird populations.

Keywords: Climate change, migratory birds, Kolleru Lake, habitat degradation, migration phenology, population declines, conservation strategies, Ramsar site

POLICY FRAMEWORKS FOR INTEGRATING CLIMATE CHANGE AND BIODIVERSITY CONSERVATION IN KOLLERU LAKE

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ABSTRACT

Kolleru Lake Wildlife Sanctuary, a designated Ramsar site in Andhra Pradesh, India, spanning approximately 308 km², is a globally significant wetland supporting over 200 migratory bird species along the Central Asian Flyway, including critically endangered species such as the Siberian crane (*Leucogeranus leucogeranus*) and spoon-billed sandpiper (*Calidris pygmaea*). This study comprehensively evaluates the effectiveness of existing policy frameworks, including India’s National Action Plan for Migratory Birds, the Ramsar Convention protections, and regional environmental regulations, in addressing the intertwined challenges of climate change and anthropogenic pressures on Kolleru Lake’s biodiversity. Climate change, characterized by a 1.2°C regional temperature increase over the past three decades, erratic precipitation patterns, and a 20% reduction in the lake’s open water area, has led to habitat degradation, increased salinity, and disrupted food chains, adversely affecting migratory bird populations. Human activities like aquaculture expansion, agricultural encroachment, and pollution exacerbate climate-driven impacts on Kolleru Lake, intensifying resource competition and threatening ecosystem resilience, while this study analyzes enforcement, stakeholder engagement, and compliance in India’s policies, comparing them with global wetland conservation models like the Convention on Biological Diversity and the African-Eurasian Migratory Waterbird Agreement. Findings reveal significant policy gaps, including insufficient integration of climate adaptation strategies, limited coordination between national and state-level authorities, and weak enforcement of wetland protection laws, which hinder effective mitigation of climate-driven threats like habitat loss and population declines. The study proposes a robust, adaptive policy framework integrating climate-resilient conservation, enhanced monitoring via citizen science and remote sensing, and inclusive stakeholder collaboration to strengthen long-term biodiversity conservation and sustainable development in Kolleru Lake, with scalable insights for other critical wetland ecosystems facing climate and anthropogenic challenges.

Keywords: Policy frameworks, biodiversity conservation, climate change, Kolleru Lake, Ramsar site, wetland protection, adaptive management, stakeholder collaboration

THE INTERFACE BETWEEN ECOLOGY AND EVOLUTION: INTEGRATING INSIGHTS FOR CONSERVATION

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ABSTRACT:

The interface between ecology and evolution represents a crucial area of study that has profound implications for biodiversity conservation. This research review synthesizes insights from studies conducted between 2010 and 2024, examining how evolutionary processes shape ecological dynamics and, conversely, how ecological factors influence evolutionary trajectories. We explore the integration of evolutionary theory into conservation practices, focusing on the importance of adaptive traits, genetic diversity, and species interactions. Additionally, the review delves into the role of contemporary evolution in shaping ecological patterns, the challenges associated with conserving evolutionary potential amidst rapid environmental changes, and the need for interdisciplinary approaches that combine both ecological and evolutionary perspectives. Our findings suggest that incorporating evolutionary insights into conservation strategies can enhance the resilience and effectiveness of efforts to preserve biodiversity, particularly in the face of accelerating global change.

Pterocarpus santalinus L.f. (Fabaceae) Associated Tree Diversity in Seshachalam Biosphere Reserve, Southern Eastern Ghats of Andhra Pradesh, India.

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ABSTRACT

The present data is the outcome of the study carried out to assess the tree diversity associated with Red Sanders in the Seshachalam Biosphere Reserve, Southern Eastern Ghats of Andhra Pradesh, India. A total of 118 tree species (≥ 10 cm GBH) belongs to 88 genera and 41 families were enumerated. K-Means clustering analysis of tree species revealed varying levels of association with red sanders based on the silhouette scores. Cluster 1 comprises *Anogeissus latifolia* and *Chloroxylon swietenia*, which exhibit the strongest association with red sanders. Cluster 2 includes species such as *Gardenia gummifera*, *Syzygium alternifolium*, *Dolichandrone atrovirens*, *Grewia orbiculata*, *Croton scabiosus*, *Hardwickia binata*, *Buchanania axillaris*, *Terminalia pallida*, *Ochna obtusata*, and *Ziziphus xylopyrus*, which also share a notable but slightly weaker connection to red sanders. Finally, Cluster 3 contains all remaining tree species that are least associated with red sanders. The clustering highlights the varying degrees of ecological relationships between red sanders and its associated tree species. Among 118 species, 92 are Deciduous, 23 are Evergreen, and 3 are Semi-Evergreen. The Family Fabaceae is dominant with 20 species, followed by Rubiaceae with 12 species, Combretaceae and Rutaceae with each 6 species, and Anacardiaceae and Malvaceae with each 5 species. Of the total, 12 species are IUCN Red-listed and 16 are Endemic, which highlights the need for Biodiversity Conservation in the study area.

Key words: Red sanders, Tree diversity, Eastern Ghats, Biosphere Reserve, IUCN Red-list, Endemic.

ESG: A Strategic Framework for Sustainable and Responsible Business

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Abstract:

Environmental, Social, and Governance (ESG) has emerged as a cornerstone of sustainable business practices globally. ESG offers a comprehensive framework for evaluating a firm’s ethical conduct, environmental stewardship, and governance transparency. This article explores the evolution, components, and application of ESG, highlighting its strategic relevance in enhancing corporate resilience, stakeholder trust, and long-term value creation. Drawing on global standards, investor behavior, corporate best practices, and policy developments, especially in India, the article examines how ESG has transitioned from a voluntary initiative to a compliance imperative. Key challenges, implementation strategies, and future trends are analyzed to guide businesses on their ESG journey.

Keywords:

ESG, Environmental Sustainability, Corporate Governance, Social Responsibility, Sustainable Investment, Green Finance, Business Ethics, Corporate Compliance, Stakeholder Engagement, India ESG Policy.

Impacts of Climate Change on Water Resources with Special Reference to River Krishna, Andhra Pradesh

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Abstract

Climate change is increasingly impacting freshwater ecosystems, particularly in semi-arid regions like Andhra Pradesh, where the Krishna River serves as a critical source of water for agriculture, drinking, and industrial use. This study explores the effects of climate change on the hydrology of the Krishna River Basin, with a focus on shifting rainfall patterns, altered river flow regimes, increased evapotranspiration, and the growing intensity of extreme weather events such as floods and prolonged droughts. Rising greenhouse gas emissions have led to temperature increases and unpredictable monsoons, which in turn affect surface runoff, groundwater recharge, and seasonal water availability. These impacts threaten water security in the basin and challenge existing water management systems. The paper emphasizes the need for integrated watershed management, climate-resilient agricultural planning, and sustainable water-use strategies to ensure the long-term viability of the Krishna River as a water resource under changing climatic conditions.

Keywords: Climate change, Water resources, Krishna River, Greenhouse gas, Floods, River hydrology

Climata Change, Famine Of 1876-78 And Dislocation Of People In South India

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ABSTRACT

From 1875 to 1878 continuous drought in Asia, Africa and Brazil led to widespread crop failure intensifying the so called Global Famine. This famine led to 50 million deaths, dislocation of much more people in the affected areas and also great migrations. Famines are generally caused by two reasons- climate change and manmade. The 1876-78 famine is the result of both. This famine occurred in tropical regions and most of these areas were under the control of European colonialists. The twin phenomenon of El Nino in tropical Pacific ocean and high surface sea temperature in Indian ocean led to this disastrous Global Famine.

The most important feature of these regions has been a naturally built mechanism of seasonal rainfall. This mechanism is called MONSOON. The monsoon brings seasonal rainfall in these regions and thus these areas became good agrarian regions in the world before coming of irrigation and other technologies related to irrigation. That is why the people of these regions did not develop any permanent and alternative sources of living. The occasional failure of monsoons usually led to famines and drought and death of millions of people and dislocation of thousands of villages and hamlets. This paper is confined to South India where nearly 6 million people died and consequent socio-economic impact.

Phytochemical And Pharmacological Analysis of *Syzygiumcumini*:

A Comprehensive Study

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Abstract

Syzygiumcumini, commonly known as black plum or jamun, is a traditional medicinal plant native to the Indian and Asian subcontinent. This review aims to provide insight into the botany, phytochemical constituents, traditional uses, and pharmacological actions of *S. cumini* (L.). The various parts of the Jamun tree, especially its fruits, have been utilized for ethnomedicinal purposes and the preparation of health drinks. Its active phytochemical compounds include flavonoids, terpenes, and anthocyanins. Scientific studies have highlighted the diverse medicinal properties of Jamun, demonstrating its antioxidant, anti-allergic, antiretinitis, antipyretic, antidiarrheal, antinociceptive, anticancer, antidiabetic, anti-obesity, antihyperlipidemic, anti-inflammatory, antimicrobial, diuretic, cardioprotective, chemo preventive, gastroprotective, immunomodulatory, hepatoprotective, wound healing, anthelmintic, and radioprotective effects. The presence of alkaloids, anthraquinones, catechins, cardiac glycosides, flavonoids, glycosides, steroids, phenols, tannins, and saponins in Jamun further underscores its therapeutic potential. Isolation of active phytochemicals from different parts of the Jamun plant has enhanced its scientific evaluation, validating its traditional medicinal uses in tackling various ailments. Continued research to identify and isolate key compounds responsible for its pharmacological actions is crucial in unlocking the full therapeutic potential of Jamun and advancing its medicinal applications.

Keywords: *Syzygiumcumini*, cardiac glycosides, Antioxidant, antidiabetic, medicinal applications

Ecological Studies on the Flora and Fauna of Ahobilam Reserved Forests within the Nallamala Biosphere Reserve

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Abstract : The Ahobilam Reserved Forests, part of the Nallamala Biosphere Reserve in the Eastern Ghats, support a diverse array of flora and fauna. This study assessed species diversity through ecological surveys across varied habitats, including dry deciduous, moist deciduous and riparian zones. Vegetation analysis recorded dominant tree species such as *Anogeissus latifolia*, *Tectona grandis*, and *Cochlospermum religiosum*, along with several medicinal understory plants vital to local ethnomedicine. Faunal diversity was studied using line transects and camera traps, revealing the presence of ecologically significant species including Bengal tigers (*Panthera tigris*), leopards (*Panthera pardus*), sambar deer (*Rusa unicorn*), Indian pangolins (*Manis crassicaudata*) and numerous bird and insect species. Species diversity indices (Shannon–Wiener and Simpson's) indicated moderate to high biodiversity. Wildlife presence was strongly associated with riparian and mixed-deciduous habitats offering complex canopy and understory structure. The findings emphasize the ecological importance of Ahobilam as a biodiversity hotspot and a functional wildlife corridor within the NSTR landscape. However, the region faces threats from pilgrim influx and habitat encroachment. Conservation strategies such as regulated tourism, habitat protection, and biodiversity monitoring are recommended to sustain the region's floral and faunal diversity. **Keywords:** Ahobilam, Nallamala, Flora, Fauna, Biodiversity, Habitat, Conservation.

"Impact of Climate Change on Floristic Diversity in Kondapalli Reserve Forest, Andhra Pradesh"

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Abstract

The Kondapalli Reserve Forest, located in Andhra Pradesh, is known for its rich floristic diversity and ecological significance within the Eastern Ghats. However, this biodiversity hotspot is increasingly vulnerable to the impacts of climate change, including rising temperatures, altered precipitation patterns, and increased frequency of extreme weather events. This study investigates the effects of climate change on plant diversity, species composition, and ecosystem stability in the region. Through a combination of field surveys, vegetation analysis, and climate data interpretation, notable shifts in phenology, habitat range, and species richness have been observed. Several endemic and medicinal plant species are showing signs of population decline and habitat fragmentation, while invasive species are gaining ground, further threatening native flora. The findings underscore the urgent need for adaptive forest management, biodiversity conservation strategies, and continuous ecological monitoring to mitigate climate-driven risks. The study highlights Kondapalli Reserve Forest as a sensitive indicator of climate-induced biodiversity changes in semi-arid tropical ecosystems.

Keywords: Climate change, Floristic diversity, Kondapalli Reserve Forest, Eastern Ghats, Biodiversity loss, Plant ecology, Andhra Pradesh

"Status, Conservation and Threats to Tella Poniki (*Givotia moluccana* Miq.) in Kondapalli Forest, Andhra Pradesh, India"

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Abstract

Tella Poniki (*Givotia moluccana* Miq.), a rare and ecologically significant tree species native to the Eastern Ghats, is found predominantly in the Kondapalli Forest of Andhra Pradesh. Known for its lightweight, durable wood traditionally used in local crafts and toy-making, this endemic species is facing increasing threats due to habitat degradation, overexploitation, invasive species, and the impacts of climate change. This study assesses the current population status, distribution patterns, and ecological characteristics of *Givotia moluccana* within the Kondapalli Forest region. Field surveys, GIS mapping, and interactions with local communities reveal a declining trend in natural regeneration and population density. Anthropogenic pressures such as illegal logging, land-use changes, and forest fragmentation are contributing to its vulnerability. The study highlights the urgent need for in-situ and ex-situ conservation strategies, community-based forest management, and habitat restoration to ensure the long-term survival of *Tella Poniki*. The findings also underline the importance of integrating traditional ecological knowledge with scientific conservation practices for preserving this culturally and economically valuable species.

Keywords: *Givotia moluccana* Miq., Tella Poniki, Kondapalli forest, Endemic species, Conservation, Habitat degradation, Andhra Pradesh.

Lichen as Bioindicators: Their Mechanisms and Role in Biomonitoring

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Abstract

Lichens, the symbiotic associations between fungi and photosynthetic organisms (algae or cyanobacteria), serve as effective bio indicators due to their high sensitivity to environmental changes, particularly air pollution and ecological disturbances. This article examines the physiological, biochemical, and ecological mechanisms that enable lichens to detect and accumulate airborne pollutants, including sulfur dioxide, nitrogen oxides, heavy metals, and persistent organic pollutants. Their unique poikilohydric nature, lack of a protective cuticle, and slow growth rates make them especially suitable for long-term environmental monitoring. The study also discusses various biomonitoring methodologies, such as passive observation of species diversity and distribution, and active bioaccumulation using transplanted thalli. Through case studies across urban, industrial, and natural ecosystems, the role of lichens in detecting environmental stress and guiding pollution control strategies is emphasized. Overall, lichens provide a cost-effective, sensitive, and integrative tool for biomonitoring, highlighting their importance in environmental assessment and conservation planning.

Keywords: Lichens, Bioindicators, Air pollution, Biomonitoring, Heavy metals, Ecological monitoring.

"Solid Waste Management in Urban Vijayawada City Areas, Andhra Pradesh"

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Abstract

The rapid urbanization of Vijayawada, a major city in Andhra Pradesh, has led to an alarming increase in the generation of solid waste, posing significant challenges to urban sanitation, public health, and environmental sustainability. This study investigates the current status, practices, and challenges of solid waste management (SWM) in urban areas of Vijayawada. Using field surveys, municipal data analysis, and stakeholder interviews, the study evaluates key aspects such as waste generation rates, segregation efficiency, collection systems, transportation logistics, and disposal practices. Findings reveal that although the Vijayawada Municipal Corporation has adopted some modern techniques—including door-to-door collection, composting units, and waste-to-energy initiatives—issues like inadequate segregation at source, informal handling, insufficient infrastructure, and lack of public awareness continue to hinder effective waste management. The study recommends integrated solid waste management (ISWM) approaches, enhanced community participation, capacity building, and the adoption of circular economy principles to improve sustainability and urban hygiene. These measures are essential for transforming Vijayawada into a cleaner and more resilient urban center.

Keywords: Solid Waste Management, Vijayawada, Urban sanitation, Waste segregation, Municipal waste, Sustainable cities, Andhra Pradesh

Vanamahotsavam : An Ecological Service In Generating Green Economy For Green India

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“The one who plants trees, knowing that he will never sit in their shade, has at least started to understand the meaning of life. The highest education is that which does not merely give us information but makes our life in harmony with all existence.”

-Rabindranath Tagore

Abstract:

Trees act as a bioresource in providing ecological services to generate Green economy for sustainable development. India cannot afford to lose its rich biological heritage. Conservation must evolve from protecting iconic animals to preserving the web of life that sustains them. A biodiversity approach, rooted in science, community wisdom, and ecological ethics, is the need of the hour. Only then can India ensure a future where nature and people thrive together. Not just confining it to a weeklong plantation from 1st to 7th July, Vanamahotsavam, as a festival has to continue all through the monsoon. It is an act of eco-patriotism and a mission to regain and sustain the green cover of the country to a minimum of 33 %. Beyond this is a form of planetary responsibility to restore ecological balance, the climate change, ensuring the well-being of present and future generations. The festival's primary goal is to increase the green cover of India through mass tree-planting drives. Planting trees helps combat deforestation and its negative impacts on the environment. Increased tree cover leads to carbon sequestration, helping mitigate climate change. Van Mahotsav helps create habitats for various flora and fauna, supporting biodiversity. Planting trees can help restore degraded ecosystems and maintain ecological balance. The festival aims to educate people about the crucial role of trees in maintaining ecological balance and ensuring environmental stability. It highlights the importance of trees in providing clean air and water, preventing soil erosion, and promoting biodiversity. It encourages people to adopt sustainable practices and conserve natural resources. This article highlights the need of the Plantation festival, Vanamahotsavam by showing the figurative value of a tree.

Key Words: Vanamahotsavam, Ecosystem service, Green economy

Biodiversity as Nature’s Equilibrium

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ABSTRACT

The paper focuses on a profound truth about the intricate balance and harmony that exists within natural ecosystems. Biodiversity encompasses the variety of life forms; including animals, plants, fungi, and microorganisms, as well as the genetic diversity within species and the ecosystems they form is the foundation upon which ecological balance is built. Tampering of any natural form systemically affects environment and consequently turns the life on the earth into chaotic conditions.

In a healthy ecosystem, each organism, no matter how big or small, plays a role. Predators control herbivore populations, pollinators help in plant reproduction, decomposers recycle nutrients—these interactions form a web of life. Biodiversity ensures that no single species dominates to the detriment of others, maintaining ecological equilibrium. Ecosystems rich in biodiversity are more resilient to changes and disruptions, such as climate fluctuations, diseases, or natural disasters. Diverse species can adapt and compensate for losses or changes in population, maintaining ecosystem stability and function. Humans too depend on biodiversity for food, medicine, clean air and water, and climate regulation. Disrupting this equilibrium through deforestation, pollution, and overexploitation not only endangers wildlife but also threatens our own survival.

Nature regulates itself through a dynamic balance of birth, death, competition, cooperation, and adaptation. Biodiversity acts as a natural regulator, preventing ecological collapse. For instance, in a rainforest, the wide variety of species ensures that pests or diseases affecting one plant do not destroy the entire forest.

Biodiversity in the natural world is not merely aesthetic or academic. It is the most essential perspective for survival and sustainability of Humans. When biodiversity thrives, ecosystems function optimally, life is sustained, and balance is maintained. To protect biodiversity is to safeguard the delicate equilibrium of life itself.

Key Words: Biodiversity, Nature, Equilibrium, Ecosystem, Climate, Life and Survival

Biodiversity Conservation and Sustainable Development with Reference to Mangroves in Andhra Pradesh: A Case Study of Aquaculture

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Chemistry Dr. M. Rajanikanth, Lecturer in Computer Science SB Rafiah,
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Abstract

Mangrove ecosystems are essential for coastal biodiversity conservation and play a pivotal role in ensuring sustainable development. In Andhra Pradesh, rapid urbanization, climate change, and aquaculture practices pose serious threats to these ecologically significant habitats. This study examines the current status of mangrove forests in the region, particularly focusing on the Coringa Wildlife Sanctuary. It highlights the key ecological functions of mangroves, including carbon sequestration, shoreline protection, and supporting local livelihoods. The paper further evaluates anthropogenic pressures and ongoing conservation efforts, including community-based management, policy initiatives, and technological interventions such as GIS monitoring. The findings underline the urgent need for integrated and participatory conservation strategies to safeguard the long-term health and functionality of mangrove ecosystems in Andhra Pradesh.

Keywords

Mangroves, Biodiversity Conservation, Sustainable Development,
Aquaculture, Andhra Pradesh, Coringa Wildlife Sanctuary

Floristic assessment of lichens in Tirumala hills of Seshachalam Biosphere Reserve, Andhra Pradesh, India

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ABSTRACT

Tirumala is one of the major pilgrim centres in Chittoor district of Andhra Pradesh. Surrounding the hills are seven peaks of Seshachalam Biosphere Reserve in Eastern Ghats of India located 3,200 feet (980 m) above sea level and covers an area of approximately 10.33 sq. miles. The area has been extensively explored for lichens. The study area reveals that the occurrence of 45 lichens species belonging to 22 genera and 9 families. Among the different growth forms the foliose lichens exhibited the maximum diversity represented by 29 species followed by 15 crustose, 2 fruticose and a single species of leprose lichens. Based on their habitat preferences the corticolous lichens exhibited the maximum diversity represented 35 species followed by 23 species of saxicolous lichens in which 11 species were found growing both on bark of trees and rocks. The members of lichen families Parmeliaceae and Physciaceae are the most dominant taxa in Tirumala hills with 22 and 10 species respectively. The lichen genus *Parmotrema* exhibited their maximum diversity represented by 17 species followed by *Heterodermia* with 5 species. Two foliose lichens *Heterodermia isidiophora* (Vain.) D.D. Awasthi and *Parmotrema praesorediosum* (Nyl.) Hale are the most dominant species in the area which were found from 6 localities each followed by *Parmotremareticulatum* (Taylor) Choisy and *Parmotrematinctorum* (Despr. ex Nyl.) Hale from 5 localities each. Out of the 8 localities surveyed in Tirumala hills, the Shilathoranam and Japali areas exhibited maximum diversity of lichens represented by 22 and 16 species followed by 13 species from Vedapathshala, 10 species each from on the way to Tirumala hills and Srivari Padalu while 4 species each from Srivarimettlu and Dharmagiri, 2 species from Papavinasanam. In earlier studies, lichens from Tirumala hills already reported as a new distributional record for the state of Andhra Pradesh. The present investigation on lichens is still in progress and it is expected that more species would be added to the present work. The present data on lichens from the Tirumala hills will be useful for future biomonitoring studies and to know the status of lichen diversity in Andhra Pradesh.

Key words: Taxonomy, Diversity, Lichen mycota, Eastern Ghats.

"Eco-Rescue by Microbes: Bacterial Bioremediation Approaches for Oil-Impacted Soils"

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Abstract

Contamination of soils with oil poses a long-term environmental problem because of the intricate blend of hydrocarbons, which has a negative impact on soil health, ecosystem function, and human health. To address this, the current research investigates the feasibility of bacterial bioremediation as a cost-efficient, sustainable methodology for decontaminating oil-contaminated substrates. Isolating and identifying native bacterial strains from contaminated areas, our studies examined their ability to biodegrade a wide range of hydrocarbon compounds under controlled laboratory and field conditions. Particular interest was given to synergistic interactions between combined bacterial consortia and single-strain treatments, emphasizing how metabolic cooperation augments the efficiency and stability of degradation under fluctuating environmental conditions.

Experimental trials showed that improved nutrient amendments and bio-stimulation regimes greatly enhanced bacterial activity, leading to a considerable decline in the total petroleum hydrocarbons in the treated soils. Molecular analyses showed upregulation of major catabolic genes, highlighting adaptive processes in the response of bacterial communities to high hydrocarbon loading. Additionally, ongoing monitoring of soil physico-chemical parameters showed a gradual recovery of soil quality and microbial diversity towards initial values.

In sum, this research reiterates the feasibility of using indigenous bacterial populations for oil-polluted soil bioremediation and delivers crucial details on scaling-up operational parameters for field application. Our results support the implementation of bacterial bioremediation as a component of large-scale environmental management measures aimed at healthier soil ecosystems and the remediation of polluted landscapes.

Keywords: Bioremediation, Soil, oil, bacteria, biodegrade etc.

Emerging Green Finance Instruments and ESG Integration: Driving Sustainable Investment in the Post-Pandemic Era

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ABSTRACT

This paper discusses the evolving geography of green finance and ESG (Environmental, Social and Governance) integration in the post-pandemic fiscal system. Drawing from primary data collected from 100 Indian investors and secondary perceptivity from global ESG marks and regulatory bodies, the study aims to assess mindfulness, perceptions, relinquishment situations and walls to sustainable investing. Findings reveal that while investor mindfulness is adding, factual participation in ESG finances and green bonds remains limited due to information asymmetry, lack of fiscal knowledge and enterprises about returns. Young investors are more inclined toward sustainable instruments and institutional support from SEBI, RBI and the Government of India has started to shape policy. The study concludes with practicable recommendations for controllers and investors to strengthen ESG integration and green fiscal development.

KEYWORDS

Green Finance, ESG Investing, Sustainable Development, Post-Pandemic Economy, Green Bonds.

"Restoring Balance: Wetland Biology and Flood Regulation in a Rapidly Urbanizing Vijayawada"

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Abstract

Vijayawada, a fast-growing city at the Krishna River, has witnessed rising flood frequency and intensity over the past decades. This study explores the ecological role of wetlands in mitigating flood impacts, with specific emphasis on the modified wetland processes of the region. Wetlands like Kolleru and surrounding marshlands traditionally acted as hydrological buffers, controlling water levels and soaking up surplus rain [1]. The destruction and encroachment of these wetlands have severely impaired their ability to contain floodwaters [3]. This study, based on an examination of wetland biology—focusing on aquatic vegetation, benthic microbes, and faunal interactions—identifies the biological processes which facilitate flood resilience. The results emphasize the importance of incorporating wetland conservation and restoration into urban flood management plans. The study promotes a nature-based strategy that integrates wetland ecosystem services into the urban planning of Vijayawada in a bid to improve climate resilience and ecological sustainability [4,5].

Keywords:

Vijayawada, Wetlands, Floods, Wetland biology, Urban planning, Ecosystem services, Nature-based solutions, Krishna River etc.,

Assessing the Impact of Habitat Fragmentation on Biodiversity in Andhra Pradesh

Authors:

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Abstract

Habitat fragmentation stands as a critical factor contributing to the ongoing decline in biodiversity, particularly in ecologically fragile zones such as Andhra Pradesh, India. This study investigates the scope and ecological impact of fragmented habitats across diverse landscapes within the state. Through the integration of satellite-based remote sensing, GIS tools, and direct field assessments, the research measures habitat deterioration, diminishing patch sizes, and the disruption of ecological corridors over a 25-year span. Indicators like species richness, population abundance, and habitat continuity are analyzed within forested, coastal, and agrarian ecosystems. The findings reveal a pronounced reduction in native biodiversity, especially within the Eastern Ghats and wetland areas of the Krishna-Godavari delta. Key drivers include urbanization, infrastructural development, and deforestation. The study underscores the urgency for holistic land-use strategies, ecological restoration, and participatory conservation initiatives. The insights offered are intended to guide regional policy formulation and contribute to global biodiversity and climate resilience objectives outlined in the Sustainable Development Goals.

Keywords:

Habitat fragmentation, biodiversity loss, Andhra Pradesh, Eastern Ghats, Krishna-Godavari delta, remote sensing, GIS, ecological corridors, land-use change, species richness, urbanization, deforestation, ecological restoration, climate resilience, Sustainable Development Goals (SDGs)

Applications of Nanomaterials for Environmental Monitoring and Remediation

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Abstract

The escalating pollution of air, water, and soil poses a significant threat to human health and ecological stability. Nanotechnology, the manipulation of matter at the atomic and molecular scale, offers a promising array of tools for environmental monitoring and remediation. This article explores the diverse applications of nanomaterials in sensing and detecting contaminants, removing pollutants from contaminated sites, and enhancing the efficiency of traditional remediation methods.

Keywords: nanomaterials, environmental monitoring, remediation, pollutants, air, water, soil.

Biodiversity Conservation and Sustainable Development: Addressing Desertification and Climate Change Challenges

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ABSTRACT

The intricate relationship between biodiversity conservation and sustainable development is becoming increasingly apparent, especially in the face of escalating desertification and climate change ([Neugarten et al., 2024](#)). A comprehensive understanding of this nexus is critical for formulating effective strategies to mitigate environmental degradation and ensure long-term ecological and socio-economic resilience ([Niesenbaum, 2019](#)). The interdependence of human well-being and ecological health has gained considerable recognition, prompting critical discussions on nature conservation solutions that mutually reinforce both aspects ([Foggin et al., 2021](#)). Desertification, characterized by land degradation in arid, semi-arid, and dry sub-humid areas, poses a significant threat to biodiversity and ecosystem services, exacerbating the impacts of climate change ([Dimopoulos&Kokkoris, 2021](#)). Biodiversity, encompassing the variability of life at all levels, plays a pivotal role in providing essential ecosystem services such as clean water, pollination, and climate regulation ([Silvestro et al., 2022](#)). Effective biodiversity conservation strategies are therefore vital for promoting sustainable development, particularly in regions vulnerable to desertification and climate change ([Díaz et al., 2006](#)). The conservation of biodiversity, sustainable economic and human development, and logistical support for research, monitoring, education, and training are all intertwined ([Richard et al., 2012](#)).

KEYWORDS

Biodiversity Conservation, Sustainable Development, Desertification ,Climate Change, Challenges

The function of botanical gardens in sustainable management through plant conservation

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ABSTRACT

By serving as living archives for plant diversity, carrying out research, and educating the public, botanical gardens are essential to sustainable plant conservation. By supporting both in-situ (inside natural habitats) and ex-situ (off-site) conservation, preserving collections of rare and endangered species, and aiding in the restoration of damaged ecosystems, they help conservation efforts. Tropical forests around the world especially in developing countries like India are experiencing heavy biotic interference in terms of habitat destruction, over-exploitation, illegal collection, and unscientific extraction of plant resources. Based on above adverse impacts, conservation of endemic and threatened plants is most urgent need with *in-situ* and *ex-situ* conservation strategies. *In-situ* conservation is the better way to conserve biodiversity, however every area cannot be protected where biodiversity exists and therefore, we need to go for *ex-situ* conservation measures. In this contrast botanical gardens aptly placed for to achieve the objectives of *ex-situ* conservation; they are planned to serve as repositories/gene pools of threatened/ indigenous plant species and disseminate information on plant groups of biological and conservation value. Living collection of plants is most significant asset of botanical gardens. They seem to be most ideal places for conservation of RET and economically important plants of particular region. Establishment of Lead Botanic Garden is a brilliant concept conceived by India and is encouraged by Ministry of Environment, Forest and Climate Change (MoEF& CC). These Lead Botanic Gardens in India will have to shoulder to crucial responsibilities of not only conserving the plant species of the region but also guide to other gardens of neighbouring areas, promoting plantation of indigenous and endemic species, to guide forest department in reintroduction and restoration of species, create awareness among people and provide guidelines to policy makers in sustainable way. The present study narrates about the Botanic Garden of Yogi Vemana University, Kadapa is recognized by MoEF& CC as Lead Botanic Garden for RET species conservation of Eastern Ghats. This garden extends over 25 acres within the university campus and located 15 km away from Kadapa city. This garden is currently harbouring about 900 indigenous and exotic taxa (445 herbs, 89 climbers and lianas, 98 shrubs, and 268 trees) belonging to 118 families (more than 15,000 individual plants), of which includes about 110 endemic and threatened species. The garden maintains a good number of *Victoria amazonica* which was collected from Acharya Jagadish Chandra Bose Indian Botanic Garden, Howrah.

Key words: Botanic Garden, Conservation, Eastern Ghats, RET Species

Turning the Tide: Climate Change, Desertification, and the WMO

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Abstract

Climate change and desertification are pressing global challenges with profound implications for ecosystems and human societies. This paper reviews the human and natural drivers of climate change, summarizes recent direct observations and future projections, explores the connections between climate change and desertification, and details the actions taken by the World Meteorological Organization (WMO) to address these issues through observation, prediction, early warning, risk management, and international cooperation. Climate variability and extreme weather events continue to intensify, threatening food security, water resources, and sustainable development in vulnerable regions. Understanding the interactions between land degradation and climate dynamics is essential for designing effective adaptation and mitigation strategies. Improved monitoring and early warning systems can help communities build resilience and reduce the impacts of droughts and floods. International collaboration and capacity building are critical to managing transboundary climate risks and promoting sustainable land management.

Keywords: Climate Change, Desertification, Early Warning Systems, Sustainable Land Management

Diversity and conservation of plant wealth of Kolleru Lake, Andhra Pradesh, India

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Kolleru lake is a largest fresh water lake and only Ramsar site situated between the Krishna river in the west and Godavari river in the east, which covers, Krishna, Eluru, and West Godavari districts of Andhra Pradesh with an area of 904 km² at +10 counter level. The area lies between longitudes 81° 40' and 80° 20' in the east and latitudes 17° 25' and 16° 28' to the North. Geologically, it is believed to be of recent origin formed by excessive silting of the Krishna and Godavari rivers, of an earlier lagoon separating it completely from the sea. The present investigation on diversity and conservation of plant wealth of Kolleru Lake was carried out as a part of research work conducted from the year 2023-2025. The present study had revealed a total of 230 taxa representing 147 genera and 44 families. Among these 229 are Angiosperms and 1 species belongs to Pteridophyte. 230 specimens were studied morphologically by following recent literatures. Some of the dominant plants in the study area includes *Alternanthera philoxeroides*, *Alternanthera paronychioides*, *Eclipta alba*, *Evolvulus nummularius*, *Ipomea aquatica*, *Ludwigia adscendens*, *Nymphoides hydrophylla*, *Oxystelma esculantum*, *Phylla nodiflora*, *Tridax procumbens*, *Typha angustifolia*.

"Biodiversity Conservation and Climate Change Challenges in Andhra Pradesh: Mitigation Strategies for the vision Vikasit Bharath and swarnandhra Andhra @ 2047"

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Abstract

Andhra Pradesh, one of the most ecologically diverse states in India, is currently experiencing the dual threats of biodiversity loss and climate change. Rapid urbanization, industrialization, deforestation, unsustainable agriculture, and erratic weather patterns are impacting ecosystems and vulnerable communities. This paper explores the current scenario of biodiversity and climate change challenges in Andhra Pradesh, highlighting major drivers, impacts, and interconnections. A comprehensive review of existing conservation efforts, state and national climate strategies, and recent policy interventions is presented. The paper also discusses innovative mitigation and adaptation measures aligned with the visions of **Vikasit Bharat@2047** and **Swarnandhra Andhra**, emphasizing community participation, ecosystem-based approaches, green technologies, and climate-resilient development pathways. Recommendations are made for strengthening institutional mechanisms, promoting nature-based solutions, and integrating biodiversity into all sectors to ensure a sustainable and resilient future.

Keywords

Biodiversity conservation, Climate change, Andhra Pradesh, Vikasit Bharat, Swarnandhra, Sustainable development, Adaptation, Mitigation.

Green Synthesis of Silver Nanoparticles from *Justicia adhatoda*: Green Synthesis - An Eco-Friendly Approach for a Sustainable Environment

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Abstract

The escalating environmental concerns and growing demand for sustainable development have led to the emergence of green nanotechnology as a promising alternative to conventional nanoparticle synthesis methods. Green synthesis utilizes biological resources such as plant extracts, microbes, and natural polymers for the fabrication of nanoparticles, offering a non-toxic, cost-effective, and environmentally benign approach. This paper discusses the principles, methodologies, and advantages of green synthesis of nanoparticles, focusing on their applications in environmental remediation, agriculture, and medicine. A case study involving the synthesis of silver nanoparticles using *Justicia adhatoda* leaf extract is highlighted to demonstrate the feasibility and efficiency of this method. The results confirm the successful formation of nanoparticles with significant antimicrobial activity, indicating the potential of green nanotechnology in promoting environmental sustainability.

Keywords

Green synthesis, Nanoparticles, Plant extracts, Eco-friendly, Sustainable environment, Biogenic synthesis, Silver nanoparticles.

Climate Change and Human Well-being: Interlinked Challenges and Opportunities

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Abstract:

Climate change is not only an environmental concern but also a profound challenge to human well-being across the globe. Rising temperatures, erratic weather patterns, sea-level rise, and increased frequency of extreme climatic events have direct and indirect impacts on health, food security, water availability, livelihoods, and overall quality of life. Vulnerable populations—particularly in developing regions—bear the brunt of these impacts due to limited adaptive capacities and socioeconomic disparities. This paper explores the complex relationship between climate change and human well-being, highlighting key areas such as public health, mental wellness, economic stability, and social resilience. It examines how climate-induced stressors contribute to the spread of vector-borne diseases, malnutrition, displacement, and psychological stress. Furthermore, the paper underscores the importance of sustainable development, climate-smart policies, and community-based adaptation strategies in mitigating these risks. By integrating scientific evidence with policy frameworks, this study emphasizes the urgent need for a holistic approach that places human well-being at the center of climate action. Empowering communities, strengthening health systems, promoting environmental education, and fostering global cooperation are vital to ensuring a resilient and equitable future for all.

Keywords: Climate Change, Human Health, Well-being, Adaptation, Sustainability, Vulnerability

Achieving Sustainable Development and Sustainable Science Education in India

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Abstract:

Sustainable development, as envisioned by the United Nations Sustainable Development Goals (SDGs), requires a transformative shift in societal values, knowledge systems, and education frameworks. In the context of India—a nation marked by vast cultural diversity, a growing population, and dynamic environmental challenges—sustainable science education plays a crucial role in equipping future generations with the skills and awareness needed to address complex socio-environmental issues. This paper explores the interconnection between sustainable development and science education in India, emphasizing the need for an inclusive, interdisciplinary, and action-oriented educational approach. It examines current national policies, curricula, and pedagogical practices in science education, identifying both progress and gaps in promoting environmental awareness, critical thinking, and scientific literacy. The study also highlights innovative models such as experiential learning, community-based projects, and integration of indigenous knowledge systems. To truly achieve sustainable development, education must transcend traditional boundaries and empower learners to become change-makers. This paper advocates for a reimagined science education system that fosters environmental stewardship, social responsibility, and technological innovation aligned with India's national priorities and global commitments.

Keywords: Sustainable Development, Science Education, SDGs, Environmental Awareness, Policy, India, Educational Reform

“A study on Ecosystem services provided by sea weeds: "In the silent forests beneath the waves, seaweeds weave the fabric of ocean life."

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“The sea, once it casts its spell, holds one in its net of wonder forever.”
— **Jacques Cousteau**

Abstract:

The Millennium Ecosystem Assessment (MEA) and the Common International Classification of Ecosystem Services (CICES) are the two main classification schemes that can be used to categorize ecosystem services. The ecosystem services are separated into four main service clusters: providing, cultural, regulating, and sustaining. However, the "MEA supporting services" are viewed by the CICES system as an organism's intrinsic function rather than as an ecosystem service. Therefore, the provisioning, regulating, and cultural CICES ecosystem services that one organism provides are all based on one function. These ecological services can be examined for the species of plants, animals, or environment. The blue-green economy and climate change are making seaweeds, frequently referred to as marine macroalgae, one of the most significant organisms in estuary and seawater habitat ecosystems. Throughout the beginning, seaweeds and humans have been connected, mostly because they provide food, textiles, biochemicals, natural medicine, ornamental materials, inspiration for art, and aesthetic qualities in many coastal communities. These are also being researched as carbon sequestration, green carbon, and potential sources for the pharmaceutical and biomedical industries. The ecological functions that seaweeds offer, their effects on human existence, and the preservation of ecosystem condition are all succinctly reviewed here.

Key words: Millennium Ecosystem Assessment, Ecological services, The blue-green economy, climate change, Carbon sequestration

A Review on Traditional Ecological Knowledge in Biodiversity and Land Conservation.

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Abstract

Through generations of close engagement with their surroundings, Indigenous and local communities have developed cumulative, adaptive, and place-based knowledge known as Traditional Ecological Knowledge (TEK). TEK offers a comprehensive understanding of ecosystems, species behavior, seasonal cycles, and sustainable resource management. It is based on cultural beliefs, practices, and oral traditions. TEK is becoming more widely acknowledged as an essential supplement to scientific approaches in biodiversity and land conservation as contemporary society struggles with the rapid loss of biodiversity, land degradation, and climate change (Hill et al., 2022; Sampson et al., 2024). The importance of TEK in protecting ecological balance and managing natural resources is examined in this review. TEK based methods that demonstrate sustainable land use and biodiversity conservation include community-managed forests, rotational farming, sacred groves, and traditional irrigation systems. Through culturally embedded practices, indigenous communities around the world, including Aboriginal Australians and the Inuit, as well as in India, including the Bishnoi, Apatani, and Khasi-Garo tribes, have successfully conserved ecosystems (Singh & Sharma, 2020). Where scientific data is scarce, TEK is especially useful in community-led species identification and habitat restoration initiatives, like those carried out by Indigenous groups in Australia and Kenya (Goolmeer et al., 2024; Sheppard et al., 2024). Globalization, ecosystem disruption, cultural deterioration, and a lack of adequate legal protection pose major threats to TEK despite its importance. Furthermore, urgent calls for Indigenous data sovereignty and equitable partnerships have been sparked by ethical concerns surrounding TEK exploitation (Werdel, 2024). Future conservation efforts must bridge TEK and contemporary science through ethical collaboration, policy support, and participatory models (Ebhuoma, 2024; UNEP, 2023). This paper advocates for the recognition, preservation, and integration of TEK into national and global conservation strategies. Respecting Indigenous rights and empowering communities will foster biodiversity resilience, cultural continuity, and sustainable development.

Key Words- Traditional Ecological Knowledge (TEK), Biodiversity Conservation, Indigenous Knowledge Systems, Sustainable Land Management, Community-Based Conservation

Ecological Insights into the Mangroves of Andhra Pradesh: Distribution Patterns and Environmental Determinants in the Godavari and Krishna Estuaries.

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Abstract:

Mangrove ecosystems are dynamic and highly productive intertidal wetlands provide critical ecological services, including shoreline stabilization, carbon sequestration, habitat provision, sediment trapping, and nutrient cycling. The study was conducted in the Godavari and Krishna Estuaries distributed across the districts of Konaseema East and West Godavari, and Bapatla, Andhra Pradesh, India during 2022 to 2024. All the plant samples were collected from different mangrove forest regions of Andhra Pradesh, and the species were identified and authenticated. A total of 31 mangroves and mangrove associates belongs to 18 families were identified. Among them *Avicennia marina*, *Avicennia officinalis* are salt-tolerant pioneer species are widely distributed. *Rhizophora mucronata*, *Rhizophora apiculata* are with prominent stilt roots, inhabiting middle tidal zones while *Bruguiera gymnorrhiza*, *B. cylindrica*, *B. sexangula* are tolerant to moderate salinity, often found in deeper creeks. This study synthesizes current understandings of mangrove distribution, floral composition, and environmental influences in these estuarine ecosystems while integrating broader insights from recent global studies and regional assessments, such as those from Brazil and Sri Lanka.

Key words: Mangrove ecosystem, carbon sequestration, sediment trapping, pioneer species etc.

Morphological and anatomical variations between *Cycas circinalis* L. and *Cycas sphaerica* Roxb. (Cycadaceae) an endemic and endangered gymnosperms from India

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The Genus *Cycas* is a type genus of the family Cycadaceae of Gymnosperms. It is native to the old world, with maximum species concentration around the equatorial region- Eastern and South Eastern Asia including Philippines, Eastern Africa, Northern Australia, Polynesia and Micronesia. The first species of *Cycas* described was *Cycas circinalis* L. from India by Linnaeus in 1753. Cycads are one of the most ancient gymnosperms originating in the early Permian period 280 million years ago or possibly in the late carboniferous period (300-325 million years ago) this long evolutionary history makes them of great scientific and conservation value. According to POWO (2025) there are 119 taxa belongs to 117 species of accepted Cycads were reported from different regions of the World. At present India reports 17 species of Cycads. *C. circinalis* and *C. sphaerica* are endemic and endangered gymnosperms from the India and difficulty identify without reproductive characters due to resembles in their morphology. Present study aims to focus on the leaf morphology and leaflet anatomy of these two species. From each species randomly five leaves were selected for the study from the Andhra University Botanical Garden (AUBG). *C. sphaerica* is differs from *C. circinalis* with small leaves, small rachis, glossy leaves, thick cuticle, small sized palisade cells, upper midrib slightly convex and lower cup shaped, round vascular bundle but *C. circinalis* shows long and large leaves, light green leaflets, thin cuticle, large width palisade cells, upper midrib convex and lower flatted and saucer shaped hypodermal layers more on lower midrib than upper, diamond shaped vascular bundle. Morphology and anatomy clearly demonstrate the uniqueness of each species and anatomical investigations will aid in the identification of Cycad species, even if they are in the form of herbaria.

Traditional food source and medicinal importance of the genus *Boerhavia* from Andhra Pradesh, India.

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The genus *Boerhavia* belongs to the family Nyctaginaceae and it was described by Linnaeus in 1753 in honor of a Dutch botanist “Herman Boerhaave” by describing *Boerhavia diffusa* as a type specimen. *Boerhavia* is mainly characterized by its anthocarps and was distributed in tropical and sub-tropical regions of the World. According to Plants of World Online currently, 60 species were reported from the World. In India, the exact number of *Boerhavia* species is still a puzzle due to its taxonomic complexity, plasticity and diverse polymorphism within the species. There are six species *B. crispa* Hyne ex Hooker Filius, *B. coccinea* Miller, *B. diffusa* Linnaeus, *B. erecta* Linnaeus, *B. elegans* Choisy (Syn: *B. rubicunda* Steudel) and *B. procumbens* Banks ex Roxburgh. Medicinally, they are used to treat jaundice, internal inflammations and asthma. The leafy juice is taken for blood purification and roots are used traditionally for their antihelmenthic properties. Traditionally *Boerhavia* leaves are used as a leafy vegetable cooked with dal and tamarind by the tribal people of Andhra Pradesh. During our recent field studies in the Eastern Ghats of Andhra Pradesh we found an interesting species of *Boerhavia* and after critical examination it was identified as a *B. procumbens* a new record from Andhra Pradesh. As of now Andhra Pradesh represents three species, i.e., *B. diffusa*, *B. erecta* and *B. procumbens*. It was also noticed that local people are collecting and utilizing *B. procumbens* along with *B. diffusa* as a wild leafy vegetable treating as a same species but *B. procumbens* differs from *B. diffusa* in having a fusiform tuberos root and puberlous nature on the stem, whereas non tuberos and glabrous in *B. diffusa*. The present study reveals that *B. procumbens* as an additional food source as a wild leafy vegetable. It is suggested that there is a need to investigate its unique medicinal importance and chemical composition.

Integrative Approaches Using Algal-Bacterial Consortia in Wastewater Treatment: A Review of Progress and Challenges"

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Abstract : Algal-bacterial consortia are emerging as a sustainable and multifunctional solution for wastewater treatment. These systems harness the synergistic interactions between algae and bacteria—where algae provide oxygen via photosynthesis and bacteria degrade organic pollutants while supplying carbon dioxide and nutrients. This mutualism enables cost-effective nutrient removal, reduced energy consumption, and opportunities for biomass valorization. The review explores key aspects including the biology and ecology of the consortia, mechanisms of pollutant removal, system configurations, and performance across different wastewater types. Recent innovations such as granular and biofilm-based reactors, quorum-sensing modulation, single-cell encapsulation, and integrated carbon capture systems have greatly enhanced treatment efficiency and stability. Furthermore, full-scale implementations like macroalgal treatment plants demonstrate their real-world viability. Despite these advancements, research gaps persist in understanding microbial interactions, improving biomass harvesting, and scaling up technologies for varied wastewater streams. Integration with anaerobic or electrochemical systems and supportive regulatory frameworks are crucial next steps. This review highlights the advantages of algal-bacterial systems over traditional treatment methods and underscores their potential role in building climate-resilient, circular wastewater solutions. By addressing the current limitations through targeted research and policy support, algal-bacterial consortia can lead the transition toward greener and more efficient water treatment technologies.

Key Words: *Bioremediation, Algal-bacterial systems, Biotreatment, Mutualistic interactions.*

Laccase in the Fight Against Climate Change: Biotechnological Potential for Carbon Neutrality and Pollution Control

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ABSTRACT

Climate change due to greenhouse gas emissions and persistent organic pollutants (degradation resisting chemicals) are the most crucial environmental challenges of the 21st century. Laccase, a blue multicopper oxidase enzyme is widely distributed in fungi, bacteria, and plants. It is a potent enzyme complex with significant potential in reducing climate change. Its broad substrate specificity enables the oxidation of various phenolic and non-phenolic compounds, convert powerful pollutants into less harmful substances and contributing to sustainable bioremediation. Laccase-mediated lignin degradation plays an important role in lignocellulosic biomass conversion, facilitating bioethanol production and reducing use of fossil fuels, thus promoting carbon neutrality (Christopher *et al.*, 2014; Widsten & Kandelbauer, 2008). Laccase contributes to carbon sequestration through its involvement in soil humification processes, enhancing long-term carbon storage in terrestrial ecosystems (Baldrian, 2006).

Other than carbon management, laccase has demonstrated its effectiveness in the degradation of industrial pollutants. In soil remediation, it degrades persistent organic pollutants such as polycyclic aromatic hydrocarbons (PAHs), while in air pollution control, it oxidizes volatile organic compounds (VOCs) (Majeau *et al.*, 2010; Strong & Claus, 2011). Its application in wastewater treatment effectively removes phenolic compounds, dyes, and endocrine disrupting chemicals, reducing environmental contamination (Rodríguez Couto & Toca Herrera, 2006). Integration of laccase into industrial processes such as pulp and paper bleaching, textile effluent treatment, and bioenergy production enhances its contribution to reducing industrial carbon footprints and increasing bioeconomy.

Optimizing laccase production, operational stability, and flexibility for industrial applications is a tedious process involves several challenges. But advances in microbial fermentation, enzyme engineering, and immobilization techniques promising to overcome these barriers. Future perspectives include the integration of laccase-based systems with carbon capture and storage (CCS) technologies, and bioelectrochemical systems to enhance environmental sustainability.

In conclusion, laccase holds transformative potential in addressing climate change through pollutant degradation, bioenergy facilitation, and carbon cycling enhancement. Interdisciplinary research and industrial innovation are crucial to fully exploit laccase as a key component in sustainable climate action strategies.

Biodiversity and Sustainable Development: A Global Call to Action

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Biodiversity and sustainable development are deeply interrelated issues. In the modern world, especially in the 21st century, many countries — particularly developed nations and BRICS countries — are in pursuit of rare earth minerals for their developmental needs. However, this quest has often led to environmental degradation. Mountains, rivers, forests, oceans, and hills are being exploited relentlessly, leaving little regard for ecological balance.

For example, the United States has signed a \$500 billion agreement with Ukraine for the extraction of rare earth minerals. Furthermore, the U.S. has withdrawn from key global environmental agreements, such as the Paris Climate Accord, undermining global climate action. The “Big and Beautiful Act” passed in the U.S. rolled back subsidies for electric vehicles (EVs) that use renewable energy sources, which further hinders sustainable development goals. Natural disasters are becoming increasingly frequent across the globe. In Japan alone, over 1,000 earthquakes were recorded during June–July 2025, and more tremors are expected. Scientists warn that a major earthquake in the region could trigger a devastating tsunami. Meanwhile, the ongoing conflict between Israel and Iran, along with the 3.5-year-long Russia–Ukraine war, is creating severe economic, humanitarian, and environmental crises. Global warming continues to accelerate at an alarming pace. As per the Glasgow Climate Pact:

- China has pledged to reach net-zero carbon emissions by 2060,
- India by 2070, and
- The United States by 2050.

However, the U.S. has indicated its intention to withdraw from the climate agreement starting in 2025, raising serious concerns about global cooperation on climate action.

Implementing the SDGs for Biodiversity and Sustainability. The Sustainable Development Goals (SDGs), established by the United Nations, should be implemented in a manner that supports biodiversity and ensures sustainable growth. Among these, the SDGs most directly related to biodiversity are:

SDG 14 – Life Below Water, SDG 15 – Life on Land, SDG 2 – Zero Hunger, SDG 6 – Clean Water and Sanitation, SDG 13 – Climate Action for promoting Biodiversity ultimately leads to the sustainable Development.

Key Words: Biodiversity, SDGs, environmental degradation, carbon emissions, Big and Beautiful Act, Natural disasters

NAVIGATING THE CLIMATE CHANGE IN INDIA – CHALLENGES IN ACHIEVING SUSTAINABLE DEVELOPMENT GOALS.

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ABSTRACT

Climate change is one of the main environmental challenges facing the world today. India is facing several problems. Climate change is associated with various adverse impacts on agriculture, water resources, forest and biodiversity, health, coastal management and increase in temperature. Decline in agricultural productivity is the main impact of climate change on India. A majority of population depends on agriculture directly or indirectly. Climate change would represent additional stress on the ecological and socioeconomic systems that are already facing tremendous pressure due to rapid industrialization, urbanization and economic development. . The country experienced severe air pollution problems in several metropolitan cities and was highlighted in the list of the world’s most polluted cities. Additionally, India has become the most populous nation globally, boasting a population of 1.4 billion people, equating to ~18% of the global population, and experiencing an increased rate of consumption of natural resources. Owing to the country’s current scenario, various climate mitigation strategies, including nature-based solutions, must be implemented to reduce such impacts and support India’s target of achieving the Sustainable Development Goals (SDGs). This paper tries to have a holistic understanding of the effects of climate change on different sectors to identify India’s challenges in achieving SDGs. Finally, it also highlighted the future recommendations for climate change-related research from an Indian perspective.

Antioxidant and Antibacterial Potential of Leaf Extracts of the Medicinal Orchid *Luisia trichorrhiza* (Hook.) Blume

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Abstract

Luisia trichorrhiza (Hook.) Blume (Orchidaceae) is a medicinally valuable epiphytic orchid that has been traditionally used by indigenous communities in Andhra Pradesh for treating skin-related ailments and microbial infections. The present study investigates the phytochemical profile and evaluates the antioxidant and antibacterial activities of *L. trichorrhiza* leaf extracts. Fresh leaves were collected from forest habitats, shade-dried, powdered, and extracted using solvents such as methanol, ethyl acetate, and distilled water via cold maceration. Phytochemical screening was performed using standard qualitative and quantitative methods to detect bioactive constituents. Antioxidant potential was assessed using DPPH (2,2-diphenyl-1-picrylhydrazyl) free radical scavenging and FRAP (Ferric Reducing Antioxidant Power) assays. Antibacterial efficacy was evaluated using the agar well diffusion method against two Gram-positive bacteria (*Bacillus subtilis* and *Staphylococcus aureus*) and two Gram-negative bacteria (*Escherichia coli* and *Pseudomonas aeruginosa*). Among the extracts, the methanolic leaf extract exhibited a high concentration of phytochemicals, particularly phenols (312.06 ± 0.14 µg/mg Gallic Acid Equivalent) and flavonoids (69.04 ± 0.04 µg/mg Quercetin Equivalent). This extract also demonstrated strong antioxidant activity, with IC_{50} values of 26.08 ± 0.14 µg/mL in the DPPH assay and 136.21 ± 0.18 µg/mL in the FRAP assay. Furthermore, the methanol extract of *L. trichorrhiza* exhibited notable antibacterial activity, with significant zones of inhibition, particularly against *Bacillus subtilis* (15.09 ± 0.23 mm) and *Escherichia coli* (14.61 ± 0.14 mm). The results highlight the potential of *L. trichorrhiza* leaf extracts as a promising source of natural antioxidants and antimicrobial agents, justifying its traditional use and indicating its applicability in herbal pharmaceutical formulations.

Keywords: Orchidaceae, *Luisia trichorrhiza*, Phytochemicals, Antioxidant, Antibacterial.

POSTER PRESENTATIONS

"Geomorphology and Landscape Evolution: Understanding Earth's Dynamic Surface Processes"

D. BHAGYA LAKSHMI

GROUP: B.SC BIOTECHNOLOGY

YEAR: 3YEAR

GOVERNMENT DEGREE COLLEGE FOR MEN, SRIKAKULAM

Abstract:

Geomorphology, the scientific study of landforms and the processes shaping them, plays a fundamental role in understanding Earth's surface dynamics. This paper explores the mechanisms driving the formation, alteration, and degradation of landforms, including fluvial, glacial, aeolian, coastal, and tectonic processes. By examining both past and present geomorphic systems, the research highlights how climate change, lithology, and human activities influence landscape evolution over time. Modern tools such as remote sensing, GIS mapping, and digital elevation models (DEMs) have revolutionized geomorphological studies, enabling more accurate analysis and prediction of surface changes. Case studies from diverse geographic regions demonstrate how geomorphology contributes to practical applications such as natural hazard assessment, watershed management, soil erosion control, and land-use planning. The study also emphasizes the importance of geomorphological knowledge in interpreting geological history and supporting sustainable development initiatives. As anthropogenic impacts increasingly reshape the Earth's surface, understanding geomorphological processes is crucial for anticipating environmental changes and mitigating natural disasters. This paper advocates for integrated geomorphological research as a key component of Earth system science and sustainable land management.

Keywords:

Geomorphology, Landforms, Earth Surface Processes, Erosion, Tectonics, Climate Change, Remote Sensing, Watershed Management, Landscape Evolution, Environmental Hazards

"Topography and Terrain Analysis: Understanding Earth's Surface Features and Their Impacts on the Environment"

AKASH.P, B.SC BIOTECHNOLOGY, YEAR:- 3YEAR

GOVERNMENT DEGREE COLLEGE FOR MEN, SRIKAKULAM

Abstract:

Topography, the study of the Earth's surface features and landform variations, plays a crucial role in shaping natural ecosystems, influencing human settlements, and guiding environmental planning. This research paper explores the significance of topographic analysis in understanding landscape structure, elevation patterns, slope gradients, and geomorphic processes. Using modern tools such as remote sensing, satellite imagery, and Digital Elevation Models (DEMs), the study analyzes a selected region to map terrain attributes and evaluate their relationship with soil erosion, hydrology, and land use suitability.

The findings reveal that topographic factors such as slope steepness and aspect significantly influence water flow, vegetation patterns, and urban development. High-relief areas show vulnerability to erosion and landslides, whereas low-lying regions are prone to flooding. The study also demonstrates the importance of topographic data in agriculture, disaster risk reduction, and infrastructure design. Integrating topographic information with Geographic Information Systems (GIS) enhances spatial planning and sustainable resource management. This research emphasizes that understanding topography is essential not only for physical geography and geomorphology but also for addressing real-world challenges like climate adaptation, land use planning, and environmental conservation.

Keywords:

Topography, Terrain Analysis, Elevation, Slope, Digital Elevation Model (DEM), GIS, Landform, Watershed, Environmental Planning, Surface Features

“Biodiversity at the Brink: Strategies for a Sustainable Future”

AUTHOR:- S.GANESH

GROUP:- B.SC BIOTECHNOLOGY

YEAR:- 3 YEAR

GOVERNMENT DEGREE COLLEGE FOR MEN, SRIKAKULAM

Abstract:-

Biodiversity forms the foundation of life on Earth, supporting essential ecosystem services such as pollination, climate regulation, and nutrient cycling. However, in recent decades, rapid industrialization, deforestation, pollution, and climate change have led to an alarming decline in global biodiversity. This research paper explores the current status of biodiversity loss, emphasizing the critical importance of species richness, genetic variation, and ecosystem diversity. Through case studies spanning terrestrial, freshwater, and marine ecosystems, the paper identifies key drivers of biodiversity degradation and evaluates the effectiveness of existing conservation policies. Particular focus is given to community-based conservation, restoration ecology, and the role of traditional knowledge systems in preserving ecological balance. Additionally, the study integrates geospatial data and predictive modeling to assess future trends under various climate and land-use scenarios. The findings reveal that integrated, multi-level strategies involving local communities, governments, and international bodies are essential to reverse biodiversity loss. Protecting biodiversity is not only a moral obligation but a practical necessity for ensuring food security, health, and climate resilience. This paper calls for urgent, coordinated global action to foster coexistence between human development and nature, paving the way for a more sustainable and biodiverse planet.

Keywords:-Biodiversity, species, ecosystem, pollution, climate

"Conservation Biology in the Anthropocene: Bridging Science, Policy, and Community Action"

TRILOCHANA.G

GROUP :- B.SC BIOTECHNOLOGY

YEAR :- 3YEAR

Abstract:

Conservation Biology has emerged as a crucial discipline in response to the accelerating loss of biodiversity driven by human activities in the Anthropocene epoch. This paper explores the scientific principles, strategies, and challenges in conserving Earth's biological diversity amidst habitat destruction, climate change, overexploitation, and invasive species. By analyzing case studies from both developing and developed regions, we examine the effectiveness of protected areas, restoration ecology, ex-situ conservation, and species reintroduction programs. The integration of modern tools such as Geographic Information Systems (GIS), genetic analysis, and remote sensing has significantly enhanced conservation planning and monitoring. Additionally, the paper highlights the importance of community involvement and indigenous knowledge in developing sustainable conservation strategies that are locally accepted and ecologically effective. Policy frameworks such as the Convention on Biological Diversity (CBD) and the Sustainable Development Goals (SDGs) are also discussed for their role in shaping global and national conservation agendas. This study advocates for a multidisciplinary, inclusive, and adaptive approach to conservation, recognizing the complex interplay between ecological integrity, human livelihoods, and long-term sustainability.

Keywords:

Conservation Biology, Biodiversity, Ecosystem Restoration, Climate Change, Protected Areas, Community Participation, In-situ and Ex-situ Conservation, Sustainable Development, Anthropocene, Policy Integration

"Achieving the Sustainable Development Goals: A Pathway to a Resilient and Equitable Future"

D.RAJANEE KUMARI

GROUP:- B.SC BIOTECHNOLOGY

YEAR:- 3YEAR

GOVERNMENT DEGREE COLLEGE FOR MEN ,SRIKAKULAM

Abstract:

The Sustainable Development Goals (SDGs), adopted by the United Nations in 2015, serve as a universal blueprint to end poverty, protect the planet, and ensure prosperity for all by 2030. This paper critically examines the progress, challenges, and interlinkages among the 17 SDGs, with a focus on environmental sustainability, social equity, and economic growth. Using a multidisciplinary approach, we explore how integrated actions—such as promoting clean energy (SDG 7), ensuring quality education (SDG 4), conserving biodiversity (SDG 15), and fostering partnerships (SDG 17)—contribute to sustainable development. Case studies from both developing and developed countries demonstrate the importance of community participation, innovation, and governance in achieving these goals. Despite advancements in several areas, the paper highlights persistent gaps, particularly in climate action (SDG 13), reducing inequalities (SDG 10), and responsible consumption (SDG 12). The study emphasizes that achieving the SDGs requires global collaboration, adaptive policy-making, and a commitment to inclusive development. It concludes by advocating for science-driven solutions and cross-sectoral partnerships to ensure long-term sustainability and resilience for both people and the planet.

Keywords:

Sustainable Development Goals, SDGs, Climate Action, Equity, Environmental Sustainability, Inclusive Growth, Global Partnerships, Policy, Innovation, Resilience

"River Systems and Their Geomorphological Significance: Dynamics, Functions, and Human Interactions"

KUSUMA.P

GROUP:-B.SC BIOTECHNOLOGY

YEAR:- 3YEAR

GOVERNMENT DEGREE COLLEGE FOR MEN, SRIKAKULAM

Abstract:

River systems are vital components of the Earth's hydrological and ecological framework, shaping landscapes, supporting biodiversity, and sustaining human civilizations. This research paper explores the structure, classification, and dynamics of river systems, focusing on their geomorphological evolution and ecological significance. Rivers originate from various sources such as glaciers, springs, or rainfall-fed catchments and form intricate drainage patterns, including dendritic, trellis, radial, and parallel systems. These patterns are influenced by topography, geology, and climatic conditions.

The study analyzes how rivers transport sediments, erode valleys, and deposit alluvium, creating diverse landforms like floodplains, deltas, and oxbow lakes. Human activities such as dam construction, deforestation, and unplanned urbanization have significantly altered river flow, sediment load, and water quality. Case studies from major river basins demonstrate the impact of anthropogenic interference on river health and regional hydrology.

Through hydrological modeling and GIS-based mapping, the paper emphasizes the importance of conserving river systems for sustainable water resource management, flood control, and ecological balance. It advocates for integrated river basin management strategies that combine scientific knowledge with local community engagement to protect and restore riverine ecosystems.

Keywords:

River System, Drainage Pattern, Fluvial Processes, Erosion, Sedimentation, River Basin, Floodplain, Delta, Human Impact, River Conservation

"Changing Landscapes: Analyzing the Patterns, Drivers, and Impacts of Land Use Change"

MADHURI .M

GROUP:- B.SC BIOTECHNOLOGY

YEAR:- 3YEAR

GOVERNMENT DEGREE COLLEGE FOR MEN,SRIKAKULAM

Abstract:

Land use change is a significant indicator of human influence on natural environments, driven by urbanization, agricultural expansion, deforestation, and industrial development. This research paper investigates the spatial and temporal dynamics of land use change using geospatial techniques and remote sensing data. The study area—an ecologically sensitive region experiencing rapid developmental pressure—is analyzed over two decades to detect land use transitions and assess their environmental consequences. Results reveal a marked decrease in forest and agricultural lands, with a concurrent increase in built-up and barren areas. The main drivers include population growth, infrastructure development, changing socio-economic patterns, and policy decisions. This transformation has led to critical environmental issues such as habitat fragmentation, soil degradation, reduced agricultural productivity, altered hydrological cycles, and biodiversity loss. The study emphasizes the need for sustainable land management policies that integrate environmental, economic, and social dimensions. Furthermore, participatory land use planning, involving local communities and stakeholders, is recommended to ensure long-term ecological balance and development goals. The findings provide vital insights for planners, conservationists, and policymakers to formulate adaptive strategies that mitigate adverse impacts and promote sustainable land use practices.

Keywords:

Land Use Change, Remote Sensing, Urbanization, Deforestation, Environmental Impact, Sustainable Land Management, GIS, Biodiversity, Policy Planning, Landscape Ecology

"Environmental Sciences in the 21st Century: Integrating Knowledge for a Sustainable Planet"

GEETHANJALI.R

GROUP:-B.SC BIOTECHNOLOGY

YEAR:- 2YEAR

GOVERNMENT DEGREE COLLEGE FOR MEN, SRIKAKULAM

Abstract:

Environmental Science is an interdisciplinary field that examines the interactions between the natural environment and human activities, addressing critical issues such as climate change, pollution, resource depletion, and biodiversity loss. This research paper explores the foundational principles of environmental sciences, emphasizing the integration of biological, chemical, physical, and social sciences to understand and solve environmental challenges. With growing global concerns about environmental degradation, the study highlights key areas including air and water quality, soil conservation, waste management, and ecological restoration.

Using real-world data and case studies, this paper examines the impact of urbanization, industrialization, and agriculture on natural systems. It further discusses the role of environmental monitoring, remote sensing, and Geographic Information Systems (GIS) in assessing and managing environmental risks. Special attention is given to the development of sustainable technologies and policies that aim to balance economic growth with ecological integrity. The research also underscores the importance of environmental education and public awareness in promoting sustainable behavior. Ultimately, the paper advocates for collaborative, science-based approaches to ensure the health of the planet for current and future generations.

Keywords:

Environmental Science, Sustainability, Pollution, Climate Change, Ecosystem, Natural Resources, Conservation, GIS, Environmental Policy, Renewable Energy

Environmental Ecology: Exploring Ecosystem Interactions and Human Impact on Ecological Balance

HARI BABU.G

GROUP:-B.SC BIOTECHNOLOGY

YEAR:- 2YEAR

GOVERNMENT DEGREE COLLEGE FOR MEN, SRIKAKULAM

Abstract:

Environmental ecology is the study of interactions among organisms and their environment, emphasizing the structure, function, and dynamics of ecosystems. This research paper explores how ecological principles can be applied to understand and address environmental challenges arising from human activities such as deforestation, pollution, habitat fragmentation, and climate change. It examines the relationships between biotic and abiotic components of ecosystems, including nutrient cycling, energy flow, species diversity, and ecological succession. Case studies from forests, wetlands, and urban ecosystems are used to illustrate how anthropogenic pressures disrupt ecological balance, leading to loss of biodiversity and ecosystem services. The study also explores ecological indicators that help assess environmental health and resilience. Technological tools such as remote sensing, biodiversity databases, and ecological modeling are discussed for their role in monitoring ecosystem changes. Furthermore, the paper highlights the significance of conservation ecology, restoration practices, and sustainable resource use as essential strategies to restore and maintain ecological integrity. Environmental ecology plays a vital role in guiding policy decisions, land-use planning, and climate adaptation strategies. This research underlines the urgent need for integrated ecological approaches to ensure a sustainable coexistence between humans and nature.

Keywords:

Environmental Ecology, Ecosystem, Biodiversity, Ecological Balance, Human Impact, Habitat Loss, Ecological Succession, Conservation, Energy Flow, Sustainability

Wetland Biology: Ecosystem Functions, Biodiversity, and Conservation Strategies

BHAVANI.D

GROUP;- B.SC BIOTECHNOLOGY

YEAR:- 2ND YEAR

GOVERNMENT DEGREE COLLEGE FOR MEN, SRIKAKULAM

Abstract:

Wetland biology is the study of ecosystems that are saturated with water either permanently or seasonally and support unique plant and animal life adapted to such conditions. Wetlands—including marshes, swamps, bogs, and mangroves—are among the most productive ecosystems on Earth, providing critical ecological services such as water purification, flood control, carbon sequestration, and groundwater recharge. They serve as important habitats for a wide variety of flora and fauna, including many migratory birds, amphibians, and endangered species. Wetlands play a vital role in maintaining biodiversity and ecological balance. However, rapid urbanization, industrial development, agricultural expansion, and climate change are contributing to wetland degradation and loss worldwide. Wetland destruction leads to loss of biodiversity, increased greenhouse gas emissions, and reduced natural disaster resilience. Conservation and restoration of wetlands are essential for sustainable development and climate adaptation. Strategies include enforcing wetland protection laws, promoting community-based conservation, and integrating wetland management into land-use planning. Raising public awareness and conducting ecological research can further enhance protection efforts. Preserving wetland ecosystems is crucial not only for environmental health but also for supporting human livelihoods and cultural heritage.

Keywords:

Wetland biology, aquatic ecosystems, biodiversity, conservation, ecosystem services, water purification, flood control, carbon sequestration, habitat loss, ecological restoration.

Landscape Degradation: Causes, Consequences, and Strategies for Restoration

PRAVALLIKA.K

GROUP:-B.SC BIOTECHNOLOGY

YEAR:- 2YEAR

GOVERNMENT DEGREE COLLEGE FOR MEN, SRIKAKULAM

Abstract:

Landscape degradation refers to the decline in the quality and productivity of the land due to natural processes and human activities. It involves the deterioration of soil, water resources, vegetation cover, and biodiversity, ultimately affecting ecosystem services and human livelihoods. Major drivers include deforestation, overgrazing, urban expansion, mining, and unsustainable agricultural practices. Climate change further accelerates degradation through extreme weather events such as droughts and floods. The consequences are severe—loss of fertile soil, desertification, reduced agricultural productivity, and increased vulnerability to disasters. Degraded landscapes contribute to poverty, food insecurity, and displacement, especially in rural and marginalized communities. Addressing landscape degradation requires an integrated approach combining ecological restoration, sustainable land management, community participation, and policy support. Techniques such as reforestation, soil conservation, water harvesting, and agroforestry can significantly restore degraded areas. Global initiatives like the UN Decade on Ecosystem Restoration highlight the urgent need for coordinated action. Restoring landscapes not only improves environmental health but also supports climate resilience, biodiversity conservation, and socio-economic development. Sustainable management of landscapes is crucial for achieving long-term ecological balance and human well-being.

Keywords:

Landscape degradation, soil erosion, deforestation, ecosystem restoration, sustainable land management, biodiversity loss, desertification, climate change, agroforestry, environmental sustainability.

Bioremediation: A Sustainable Approach to Environmental Clean-up

KARTHIK.S

GROUP:-B.SC BIOTECHNOLOGY

YEAR:-2YEAR

GOVERNMENT DEGREE COLLEGE FOR MEN,SRIKAKULAM

Abstract:

Bioremediation is an environmentally friendly and cost-effective technique that uses living organisms, primarily microorganisms, fungi, and plants, to detoxify and restore polluted environments. This natural process harnesses the metabolic potential of these organisms to degrade, transform, or remove contaminants from soil, water, and air. Bioremediation is particularly effective in treating oil spills, heavy metals, pesticides, and industrial waste, offering a sustainable alternative to conventional chemical and physical remediation methods. Techniques include in situ approaches like bioventing and bioparging, and ex situ methods such as land farming and bioreactors. The success of bioremediation depends on factors like the type of pollutant, environmental conditions (pH, temperature, oxygen), and the presence of effective microbial communities. Advances in biotechnology, including genetic engineering and microbial consortia design, have further enhanced the efficiency and scope of bioremediation strategies. While it presents challenges such as slower remediation rates and limited effectiveness in highly toxic environments, bioremediation remains a promising tool for mitigating pollution, conserving biodiversity, and supporting ecosystem recovery. Promoting bioremediation is essential for sustainable development and long-term environmental health.

Keywords:

Bioremediation, environmental restoration, microorganisms, pollution control, sustainable technology, oil spills, heavy metals, soil remediation, microbial degradation, ecosystem recovery

Environmental Biotechnology: Innovative Solutions for a Sustainable Future

RAJESWARI .M

GROUP;- B.SC BIOTECHNOLOGY

YEAR:- 2ND YEAR

GOVERNMENT DEGREE COLLEGE FOR MEN,SRIKAKULAM

Abstract:

Environmental biotechnology is a dynamic field that applies biological principles and organisms to solve environmental problems and promote sustainable development. It involves the use of microbes, plants, and enzymes to treat waste, clean up contaminated environments, and reduce pollution. Key applications include bioremediation of hazardous pollutants, wastewater treatment, solid waste management, and bioenergy production from organic waste. Environmental biotechnology also plays a critical role in monitoring environmental health through biosensors and microbial indicators. With the rise of industrialization and environmental degradation, this field offers eco-friendly alternatives to conventional chemical and mechanical methods, minimizing ecological harm and conserving natural resources. Advances in genetic engineering, synthetic biology, and bioinformatics have further enhanced the efficiency and scope of environmental biotechnological tools. Challenges such as slow degradation rates, regulatory barriers, and public acceptance remain, but continued research and innovation are addressing these issues. Overall, environmental biotechnology is vital for achieving global sustainability goals, reducing the human ecological footprint, and fostering cleaner and greener technologies for future generations.

Keywords:

Environmental biotechnology, bioremediation, waste treatment, bioenergy, biosensors, pollution control, sustainable technology, microbial applications, genetic engineering, environmental sustainability.

"Environmental Impact Assessment: A Strategic Tool for Sustainable Development and Decision-Making"

LAVANYA.K

GROUP:-B.SC BIOTECHNOLOGY

YEAR:-2YEAR

GOVERNMENT DEGREE COLLEGE FOR MEN, SRIKAKULAM

Abstract:

Environmental Impact Assessment (EIA) is a critical process used to evaluate the potential environmental effects of proposed developmental projects before their implementation. This research paper examines the methodology, significance, and challenges of EIA in ensuring that development occurs in harmony with environmental sustainability. The EIA process involves identifying, predicting, and assessing the likely environmental consequences of activities such as infrastructure construction, mining, industrial development, and energy projects. Key stages include screening, scoping, impact prediction, mitigation planning, public participation, and monitoring.

Using case studies from infrastructure and industrial projects, the paper highlights the effectiveness of EIA in reducing negative environmental impacts such as air and water pollution, habitat destruction, and socio-economic displacement. The role of regulatory frameworks, such as the Environmental Protection Act and global agreements, is also discussed in promoting compliance and accountability. Despite its importance, EIA faces limitations, including inadequate data, political interference, and weak enforcement.

This paper argues for strengthening the EIA process through transparent governance, community engagement, and the integration of modern tools like Geographic Information Systems (GIS) and environmental modeling. A robust EIA framework is essential for achieving sustainable development, protecting ecosystems, and ensuring responsible decision-making.

Keywords:

Environmental Impact Assessment, EIA, Sustainability, Development Projects, Environmental Regulations, GIS, Public Participation, Mitigation, Policy, Environmental Management

Environmental Microbiology: Microbial Interactions and Their Role in Ecosystem Sustainability

KUSUMA.P

GROUP:-B.SC BIOTECHNOLOGY

YEAR:-2YEAR

GOVERNMENT DEGREE COLLEGE FOR MEN, SRIKAKULAM

Abstract:

Environmental microbiology is the study of microbial processes in the environment, microbial communities, and interactions with other organisms and abiotic factors. Microorganisms play vital roles in nutrient cycling, organic matter decomposition, pollutant degradation, and maintaining soil and water quality. They are central to biogeochemical cycles, including carbon, nitrogen, sulfur, and phosphorus transformations. Environmental microbiology also explores the use of microbes in bioremediation, wastewater treatment, and bioenergy production, highlighting their importance in addressing global environmental challenges. Recent advancements in molecular biology and metagenomics have revolutionized our understanding of microbial diversity and function in various ecosystems, from oceans and soils to extreme environments like hot springs and polar ice. Additionally, environmental microbiology examines microbial threats, such as waterborne pathogens and antibiotic-resistant bacteria, which have significant implications for public health. Understanding microbial ecology and harnessing beneficial microbes can promote sustainable agriculture, waste management, and climate change mitigation. As the global population grows and environmental pressures intensify, the role of environmental microbiology becomes increasingly crucial in ensuring ecosystem resilience and human well-being.

Keywords:

Environmental microbiology, microbial ecology, nutrient cycling, biogeochemical cycles, bioremediation, wastewater treatment, metagenomics, microbial diversity, sustainable environment, public health

"Urban Flood Vulnerability and Response: A Case Study of the 2024 Vijayawada and Budameru Floods"

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III B.Sc(Botany)

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Abstract

In 2024, Vijayawada, a major city in Andhra Pradesh, experienced one of its most severe flood events in recent history, exacerbated by continuous monsoon downpours and excess upstream discharge from the Prakasam Barrage. The Krishna River, along with its tributaries, particularly the Budameru stream, played a crucial role in the inundation of low-lying urban and peri-urban areas. The flood disaster followed a similar event in 2024, when the Budameru stream overflowed due to intense rainfall, serving as an early warning of the city's growing vulnerability to extreme weather events. In both years, large-scale displacement, loss of livelihoods, and damage to critical infrastructure highlighted significant gaps in Vijayawada's flood management systems. This abstract reviews the meteorological and hydrological triggers, socio-economic consequences, and emergency responses associated with the 2024 flood, while drawing parallels with the 2024 Budameru flooding. It emphasizes the urgent need for integrated watershed management, real-time flood forecasting, and climate-resilient urban infrastructure. These recurrent flood events underscore the necessity for proactive policy-making and long-term investment in flood mitigation strategies to safeguard Vijayawada's future.

KEY WORDS : Vijayawada floods 2024, Budameru stream, urban flooding, Krishna River, monsoon rainfall, Prakasam Barrage, flood management, watershed planning, climate resilience, extreme weather events, real-time flood forecasting, disaster preparedness, infrastructure damage, urban vulnerability, flood mitigation strategies

Production of Sustainable Bricks Using Waste Fly Ash in NTR District of Andhra Pradesh, India

T. Naga Madhavi, SK. Jamunnisa, E.Lakshmi, S. Sandhya Rani& J. Ramudu

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Abstract:

The increasing demand for construction materials, along with the environmental challenges posed by industrial waste, has spurred innovation in sustainable building practices. This study focuses on the production of eco-friendly bricks utilizing **waste fly ash**, a by-product of **VTPS, Ibrahimpatnam thermal power plants**, located in the **NTR District of Andhra Pradesh, India**. When combined with locally available materials such as **lime, gypsum, and sand**, fly ash offers a viable and environmentally friendly alternative to traditional clay bricks, significantly reducing **carbon emissions** and **topsoil degradation**. Through a series of **experimental analyses** and **field tests**, the research evaluates key parameters including **compressive strength, thermal conductivity, water absorption, and durability** of fly ash bricks. Results demonstrate that these bricks meet established building standards and serve as a **sustainable and cost-effective** solution for both rural and urban construction needs. The study underscores the potential of **circular economy practices** in the construction sector and highlights the need for **policy interventions** to support wider adoption. This initiative aligns with the **United Nations Sustainable Development Goals (SDGs)** by addressing industrial pollution, promoting waste resource utilization, and contributing to sustainable infrastructure development.

Keywords:

Fly ash bricks, sustainable construction, waste utilization, VTPS Ibrahimpatnam, NTR District, Andhra Pradesh, eco-friendly materials, circular economy, green building, SDGs, industrial waste management

Fly Ash Impact from VTPS, Kondapalli on Vegetation of Kondapalli Reserve Forest, Andhra Pradesh

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Abstract:

Fly ash, a major by-product of coal combustion in thermal power plants, has emerged as a significant environmental pollutant, especially near ecologically sensitive zones. This study investigates the impact of fly ash emissions from the **Vijayawada Thermal Power Station (VTPS), Kondapalli**, on the **vegetation health and biodiversity** of the adjacent **Kondapalli Reserve Forest** in **NTR District, Andhra Pradesh**. Through field surveys, soil and leaf sample analysis, and remote sensing observations, the study evaluates changes in **species diversity, chlorophyll content, leaf morphology, and soil pH** across different zones based on proximity to VTPS. Findings indicate that **deposition of fly ash particulates** has led to **altered soil chemistry**, reduced photosynthetic activity in several native tree and shrub species, and a decline in overall **floristic diversity**, especially in areas within 3–5 km of the emission source. The study emphasizes the ecological sensitivity of the Kondapalli Reserve Forest and the **urgent need for fly ash management strategies**, green buffers, and continuous environmental monitoring. This research also underscores the importance of **balancing energy production with ecological preservation**, particularly in biodiversity-rich buffer zones.

Keywords:

Fly ash pollution, VTPS Kondapalli, Kondapalli Reserve Forest, vegetation impact, thermal power plant emissions, biodiversity loss, soil chemistry, environmental monitoring, industrial ecology, forest degradation

Environmental Impact Assessment (EIA): A Sustainable Development Tool for Climate Change Mitigation

P. Praveen, T. Jaswanth , B. Kondababu, B. Janson, D. Balaji , K. Chiranjeevi , B. Nagendrababu & J. Ramudu

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Abstract:

Environmental Impact Assessment (EIA) has emerged as a crucial regulatory and planning tool for integrating environmental considerations into developmental activities. As the global community confronts the escalating threats of climate change, EIA serves not only to minimize environmental degradation but also to promote **sustainable development and climate resilience**. This study explores the evolving role of EIA as a proactive mechanism for **climate change mitigation**, particularly in the context of infrastructure, energy, mining, and urban development projects. By assessing the environmental consequences of proposed actions before they are carried out, EIA enables stakeholders to adopt cleaner technologies, safeguard ecological balance, and reduce greenhouse gas (GHG) emissions. The paper examines key components of climate-inclusive EIA—such as carbon footprint analysis, vulnerability mapping, and adaptive planning—and presents successful case examples where EIA has helped in **reducing climate risks** in project design and execution. The findings underline the importance of strengthening EIA frameworks by incorporating **climate metrics, stakeholder participation, and interdisciplinary approaches**. Ultimately, the study advocates for the integration of EIA into national and regional climate action strategies, in alignment with the **Sustainable Development Goals (SDGs)** and the **Paris Agreement**.

Keywords:

Environmental Impact Assessment, EIA, sustainable development, climate change mitigation, carbon footprint, GHG emissions, environmental policy, SDGs, resilience planning, climate-inclusive EIA, adaptive development, green infrastructure

Impact of Climate Change and Anthropogenic Activities on Kondapalli Reserve Forest, Andhra Pradesh

Sruthi.B, Kavya , P, Naga Sandhya. I, P. Jyothrmaye, P. Harika , S. Cahamdrika, Devika.M
& J. Ramudu

II B.Sc (Botany)

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Abstract:

Kondapalli Reserve Forest, located near Vijayawada in the Krishna district of Andhra Pradesh, is a vital ecological zone known for its rich biodiversity, endemic flora, and role in maintaining local climate balance. In recent decades, this forest ecosystem has been increasingly threatened by the dual pressures of climate variability and human-induced disturbances. Climatic stressors such as erratic rainfall, rising temperatures, and prolonged dry spells have altered vegetation patterns, water availability, and wildlife behavior. Simultaneously, anthropogenic activities including deforestation, quarrying, urban encroachment, and pollution from nearby industrial zones have led to habitat fragmentation and loss of native species. This study explores the cumulative impact of these factors on forest health, biodiversity conservation, and ecosystem services. Satellite imagery, biodiversity surveys, and local community interviews reveal significant degradation in forest cover and increased vulnerability to invasive species. Immediate conservation efforts, sustainable development practices, and stringent enforcement of forest protection laws are recommended to restore ecological balance in the Kondapalli Reserve Forest.

Keywords:

Kondapalli Hills, Biodiversity, Climate Change, Human Activities, Forest Degradation, Conservation, Andhra Pradesh

EARTH PROVIDES ENOUGH TO SATISFY EVERY MANS NEEDS
BUT NOT EVERY MANS GREED - MAHATMA GANDHI



DEPARTMENT OF BOTANY
Dr LHR GOVERNMENT DEGREE COLLEGE,
MYLAVARAM, NTR DISTRICT, ANDHRAPRADESH

డా. లక్ష్మీరెడ్డి హనుమంతరెడ్డి ప్రభుత్వ కళాశాల

డా. లక్ష్మీరెడ్డి హనుమంతరెడ్డి ప్రభుత్వ కళాశాల మైలాపాడు
పాఠశాల ప్రాంగణం, రంగారావు రోడ్డు, ఏప్రిల్ 2011



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DEPARTMENT OF BOTANY
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