# Book of Abstracts

## 5th World Clean Environment Summit

## and

## International Conference on "Technological Innovations for Climate Change Mitigation and Global Warming"

**12 – 13- 14 December, 2023**

## Venue:

**Magadh Mahila College, Patna, Bihar**

*Jointly Organised by:*

**IQAC , Magadh Mahila College, Patna, Bihar**

**International Benevolent Research Foundation (IBRF)**
**Kolkata, West Bengal**

*In Collaboration with:*

**Durga National Education Trust (DNET), Patna, Bihar**

**Confederation of Indian Universities (CIU), New Delhi**

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Durga National Education Trust (DNET), Patna

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Kolkata- 700118
E-mail: sindhusarash@gmail.com

# About the Conference

The Earth's climate is changing and the global climate is projected to continue to change over this century and beyond. The magnitude of climate change in the next few decades will depend primarily on the amount of greenhouse (heat-trapping) gases emitted globally. With significant reductions in the emissions of greenhouse gases (GHGs), global annual averaged temperature rise could be limited to 2°C or less.

Nations are striving hard to mitigate climate change and global warming. Emergence of new technologies such as pollution control devices, early warning system, non conventional source of energy are widely utilized by different countries to abate climate change.

With the impacts of climate change becoming more prominent, innovation is expected to play a major role in combating global warming.

Against this backdrop the ***5th World Clean Environment Summit and International Conference on "Technological Innovations for Climate Change Mitigation and Global Warming*** has been organized at Magadh Mahila College, Patna on December 12, 13 and 14' 2023to vividly discuss on various issues related to environment, global warming, biodiversity, climate change etc.

## Themes & Sub Themes

The three days conference will comprise of scientific sessions, paper presentations and discussions. Scientists, environmentalists, academicians, research scholars and students are requested to send abstracts on the following sub areas mentioned below:

**(i)** Biodiversity and Climate change
**(ii)** Climate change and Health
**(iii)** Global Warming and Changing Ecosystem
**(iv)** Climate Change Adaptation and Resilience
**(v)** Climate change governance, legislation and litigation
**(vi)** Green Technologies
**(vii)** Renewable Energy
**(viii)** Waste Management

# Magadh Mahila College, Patna, Bihar

Magadh Mahila College, a pioneer institution of higher education for young women in Bihar was established in 1946. Prof. (Dr.) Ramola Nandi was the founder Principal of the College. A constituent unit of Patna University, possessing a permanent affiliation under section 2 (f) and 12 (B) of UGC Act – 1956 and reaccredited with B+ grade (2.54 CGPA) by NAAC in January 2019, it is imparting education to more than 4000 students in various disciplines. College offers both Under-Graduate and Post-Graduate Programmes. Choice Based Credit System (CBCS) has been introduced for Under-Graduate students from the academic session 2022-25.In Post-Graduation, CBCS has been introduced from the academic session 2018-2020. The enrollment process of the Institution is fully transparent and follows the guidelines of Patna University including the Reservation Policy of Central Govt. and Govt. of Bihar. Students from different community backgrounds are enrolled in every academic session.Ragging in any form is strictly prohibited in the campus. The Institution is adding up to the human resource by making qualitative and quantitative enhancement and has been adorned with several honours and awards.

The College is situated besides the holy river Ganga. The college campus is lush green and spread over an area of 09 acres of land in the heart of Patna, Bihar. It has 9144 Sqm. of built-up area with academic blocks, smart class rooms, laboratories, faculty rooms, open auditorium, seminar halls, computer labs, with latest computing facilities, well-equipped library, modern cafeteria with full hygiene facilities, sports ground, indoor sports complex, well-equipped GYM, day care center, banking facility, botanical garden and recreation facilities. The campus is equipped with latest teaching aids and is Wi-Fi enabled.

As a prime learning resource, the College Central Library namely ‘Medha Knowledge Centre’ is automated with all its subsystems like LAN connectivity and Wi-Fi. Library Management Software system is incorporated with latest technologies that enables library to serve its users more effectively. The Central Library is well-stocked and has a wide collection of Books, Reference Books, Rare Books, Journals, Periodicals, Newspaper, Previous Year Question Papers, Photo coping facility, e-journals, Audio-Video Materials etc. A specialized service provided by the library includes INFLIBNET facility with Network Centre for access and download the e-resources with KOHA software and

OPAC (Online Public Access Catalogue) facility for searching the library resources. Barcode online circulation system is in practice in the library. The digitalization of library through OPAC has resulted in the easy access of information from any computer within the campus. The College library has linked with National Digital Library and OPAC helps the students to search the available reading materials easily. A special software is available in the Central Library for visually challenged students.

College has an active Internal Quality assurance Cell (IQAC), as a mechanism to build and ensure a quality culture at the college level. Quality teaching, Computer education, facility for extracurricular activities including Sports, Music, NSS, NCC, Science and IT Society, Students' Counselling Cell, Grievance Redressal Cell, Anti-Ragging Cell, Gender Knowledge Centre, Green Earth Brigade, Red Ribbon Club, Language Lab and Hostel accommodation are inside the campus with modern facilities. Thousands of motivated and dedicated women have passed from the college and have successively entered in various fields of life making us proud.

The College is strongly committed to sustainable development through its mechanisms of environmental management in accordance with many of the schemes employed at college campus. The College further develops social, environmental and ecological sustainability. College has its own functional 'Environment Policy' to guide its ongoing improvements in the environmental concerns of the institution. In collaboration with Central Govt. Scheme under (SECI) Solar Energy Corporation of India, a 100 KWp Solar Power Plant has been installed on the top roof of Main Administrative Building to generate electricity from renewable energy source which saves the 50% monthly electricity expenses of the Institution and reduces environmental pollution.

The College has developed a Solid-Liquid Waste Management System on its campus at the entrance and a MOU was also signed with Sunai Consultancy (P) Ltd. It serves beneficial to entire campus. Rain Water Harvesting (RWH) is a unique feature of the college as a valuable alternative or supplementary water resource, along with more conventional water supply technologies. Water shortages can be relieved if rainwater harvesting is practiced more widely.

The activities outside of the classroom give opportunities to student to participate in the areas of their interest. Beyond the classroom life outdoor learning is facilitated and is a regular feature for the students of professional courses. When it comes to academic and professionalism, the student of MMC are excellent. From bagging internship with reputed brands; to achieving noteworthy feats in their careers, students have proved their acumen in all fields. We strive to build a talent pool of excellent human capital.

# About International Benevolent Research Foundation (IBRF), Kolkata

International Benevolent Research Foundation (IBRF), An ISO 9001: 2015 certified organization has been established on the auspicious occasion of the National Teacher's Day on 5th September, 2015 and incorporated under the Central Act II of 1882, Government of India in Kolkata with the main objective of locating avenues for alternative employment creation besides designing a neological as well as neocratic approach to research and entrepreneurship in the field of education among the younger generation all over the world in general and India in particular with a view to bringing peace on earth in the third millennium by having country wise appropriate solutions for the burning problems like peacelessness, poverty, greed, unemployment, faulty educational and training methodologies, religious intolerance, etc. The International Benevolent Research Foundation (IBRF) has decided to design a master plan paradigm (2015-2025) for a new world order.

The activities of IBRF will include the strategies for creating more researchers besides transfer of appropriate technologies among the globe for ensuring a balanced and a sustainable growth in all countries of the world by using clean as well as cleaning-up technologies through new and emerging techniques for climate change management, environmental and disaster education, geriatric care, waste management, green business and technologies besides strengthening of diplomatic relations among nations for protecting our Mother Earth.

The idea is also to promote entrepreneurial educational leadership among the school and the college going boys and girls by "Catching Them Young" and for designing appropriate messages for the educators to see that they produce a greater number of job givers rather than job seekers. This will be possible as IBRF has the qualified inventory of experts for establishing universities, colleges, institutions, schools and other training enterprises in different countries with the latest equipment and infrastructure for conducting formal, informal, non-formal, open, distance, online, internet and web based employment-centric programmes in all countries of the world.

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As we approach the Twenty first Century, a number of major challenges face women and men around the world as they interact with one another as individuals, groups, and with nature. Globalisation of trade, of production, and of communications has created a highly interconnected world. Yet the tremendous gaps between the rich and the poor continue to widen both within, and between nations. Sustainable development remains an elusive long-term goal, too often sacrificed for short-term gains.

It is imperative that higher education offer solutions to existing problems and innovate to avoid problems in the future. Whether in the economic, political, or social realms, higher education is expected to contribute to raising the overall quality of life, worldwide. To fulfill its role effectively and maintain excellence, higher education must become far more internationalized; it must integrate an international and intercultural dimension into its teaching, research, and service functions.

The most significant feature of education for mother earth protection in the 21st century is not so much what the French call li explosion scolarie, but the knowledge explosion, which has expanded the catchment areas of learning so fast that it takes only a few years now for the state-of-the-art in any field to become obsolete. Different modes and types of communicating for advancement of knowledge are fast changing and becoming more than sophisticated. In this technological era knowledge can easily be dispensed technologically and electronically. Teachers and formal school structures are becoming less important, and the conventional age limits on the learning process are becoming blurred.

Viewing the urgent need for mutual and technical cooperation among the Universities in India, exchange of information, export and import of educational know-how and consultancy, control on duplication of efforts and wastage in higher education, vocationalisation of existing careers besides strengthening the financial health of the existing Universities for implementing educational programmes having social, cultural, technical, economic and positive contents for the optimum development of our country, the “Confederation of Indian Universities (CIU)” has been established with the cosponsorship of selected university level institutions in India.

# Durga National Education Trust (DNET), Bihar

Established on Sept. 2020 under Trust Registration Act at Hajipur,Bihar , it has to its credit, multidimensional creative activities in the field of education particularly of biological sciences under its manifold objectives since last three years. It has been helping needy students by providing financial help scholarships, tuition fee support and encouraging budding as well as young scientists with suitable awards & citations.

The trust has another achievement to its credit in the form of publication of an International refereed Peer-reviewed Biannual journal of life sciences, **RECENT LIFE SCIENCE MIRROR**: ISSN 2319 5320 from Sept. 2012, having more than 100 life members. The major objectives of this prestigious trust includes:

- To provide a vibrant platform to young researchers and scientists to discuss new ideas, processes, development, relevance and research support network for quality research.
- To promote biological appropriate technology for larger adoption in the benefit of society.
- To encourage young minds to take up innovative and creative research in the areas of emerging Biosciences.
- To organize scientific events for providing opportunities to researchers to present their work and exchange of ideas. To publish scientific journal, Newsletter, Books, monographs, reviews, proceedings etc for wider participation and larger coverages.
- To support academic institutions to build up better research and academic activities.
- Selection of Senior and Young Scientist Gold Medal Awards to outstanding researchers in the field of Life Sciences. In addition, some Life Time Achievement Awards are also given to eminent life scientists for their outstanding/unparalleled contributions in life science research for the benefit of the common man. Prizes and felicitation certificates will also be given to the selected.

For further information and joining the trust as an active member, please contact Mrs Anita Kumari, Secretary, North Shahi Colony, Hajipur, Bihar. Mob. **9123269907.**

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# Abstracts

# GROUP - A
# (BIODIVERSITY AND CLIMATE CHANGE)

# Evolution of Plants &Development of Earth's Climate and Ecosystems

**Tridib Bandopadhyay**

*Scientific & Environmental Research Institute, Kolkata*

Researches in cosmogony, astronomy and physics have shown the beginning of the planet Earth. The established theories bring out –at one stage, the formative Earth consisted of water only. The plant-life began during Cambrian Period about 538 million years ago from water-froth and deposited chemicals, metal oxides and carbonates. Spore-producing plants, mosses evolved into trees. sudden radiation of complex life-forms During the Cambrian explosion, and appearance of major animal phyla started. As the trees caused lowering of $CO_2$, plants continued to proliferate in the Earth's ambience – that acquired up to 82% of total biomass.The rise in plant species reduced ambient temperature, increased oxygen, balanced water cycle and stabilized soil stratum. As the plant-species proliferated into all vacant spaces on Earth and grew into forests, they changed the ambience and the regional climate making the Earth a garden of life with her climate and ecosystems. Forests provided habitats to 80% amphibians, 75% bird species and 68% mammal groups.

In India, dense forests once covered the integrated landmass– from Middle Himalayas to the tip of landmass at Indian Ocean. Agni Purana and other texts, written some 4000 years ago, mentioned dense forests once covered the areas and how people revered forests. Trees were held in high admiration and veneration in divinity. Scholars propagated values of nature and preached safeguarding them. Most of the sacred groves represented natural climax of vegetation at different geographical locations. The forest composition and density represented people's minimum dependence on forest resources. This tradition continued till the invasions of Mohammad Ghori in 1127 AD. That was the beginning of people fleeing to forests for safety, livelihood and avoiding religious purging. They cleared forests for agriculture and dwelling. The invaders were keen hunters and so maintained patches of forests for hunting. Subsequently, Mughals showed interest in gardens and their development. The forest ecology was generally maintained then, till the arrival of British colonialists around 1850. British invaders considered forests for profit, cleared sal, teak and sandalwood for export.

Balance of the ecosystems faces severe threats from the planetary catastrophe of rising temperature and $CO_2$ in unprecedented scales. "State of the World's Plants and Fungi (2023)" report finds, three out of four plant-species now face existential pressure, with 45% of flowering plants — including food cultivars. The loss of threatened species could substantially affect global phytogeographic-regions, with a knock-on effect on evolutionary and ecological processes at all scales.

***Keywords:*** *Cambrian Period, Forest ambience, Agni Purana, phytogeographic-regions.*

# Physiological Parameters and Their Relation with Biodiversity of Indrapuri Dam: A Case Study

**Ambiya Khatoon and Babita Sharma**

*Dept. of Zoology, Patna Science College, Bihar*

This study focuses on study of the freshwater parameters of Indrapuri Dam, a topic of great interest and importance in ecology and conservation biology. We highlight the complex interactions between the physical and ecological factors of dam environments and how these can dramatically impact the fish populations they support. Our review explores how dams alter the flow regime, reduce access to habitats, change water temperatures, and may introduce pollutants, all of which can lead to changes in diversity of a water body. Dams can also be a source of novel environments that host unique species assemblages, including the introduction of exotic species and the creation of habitats, such as rivers being converted into reservoirs or dams creating warm water outlets. We understand that effective management practices, including the restoration of habitat connectivity and focusing on conservation efforts, can positively impact biodiversity of dam environments and help to preserve and restore the natural environment. This review cum diversity study compiles the work done in this direction till date on Indrapuri Dam of Rohtas district in Bihar, India along with the comparison of data collected by us. Our aim here is to know how diversity is changing in this dam over the years. We also wish to study how climate change and anthropogenic activities are affecting fish biodiversity in this area. In comparison to previous studies we found an increase in type of species of fishes in the dam. According to our observations this water body is supporting life and healthy practices are in practices which in turn are not only conserving biodiversity but also making it suitable for more and more species. All the parameters that we studied are well in the healthy range signifying the importance of keeping pollution in check if we wish to conserve the biodiversity of this place for our future generations. We present here the changes in water parameters that we observed throughout the year in this area and its probable effects on populations that thrive here.

***Keywords:*** *Physicochemical Parameters, Fish Diversity, Anthropogenic Effect and Indrapuri Dam.*

# Ichthyofaunal Diversity of Ghaghara River in and Around Siwan District (Bihar), India

**Jay Prakash Sharma and D. K. Paul**

*Dept. of Zoology, Patna University, Bihar*

Bihar provides considerable potential for the development of inland fisheries and aquaculture, in addition to its abundant aquatic bioresource potential. In order to look into the ichthyofaunal variety of Siwan, Bihar, data were gathered over the course of a year in 2021–2022, with the assistance of knowledgeable local fish growers and fishermen from various parts of the district.Lakes, ponds, irrigation canals, and rivers (Ghaghara, Daha) were the sources of the collections. Sixty-two fish species from twenty families, forty genera, and eight orders were discovered throughout the research period. With 22 species (35.48%), the Order of Cypriniformes was the most dominant, followed by Siluriformes with 20 species (32.25%) and Perciformes with 9 species (14.51%). The current study demonstrated that while Siwan has a high diversity of fish, appropriate conservation measures are needed to preserve the district's sustainability and species richness.

***Keywords:*** *Fish Diversity, Species Composition, Siwan, Bihar.*

# Number of Medicinal Plants Are on Declinaat Gopalganj District in Bihar

**Rajkishor Prasad**

*Dept. of Botany, J.P.U. Chapara*

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Plants are reservoir of many complex biochemical compounds with immense therapentic value. These compounds are in use as drugs to uses various ailment in Ayrveda siddha, unani as well as homopathy system of medicine, in this context a detail servey an sereeing of medicianal plant growing in around of Gopalganj district of bihar curried out day the year 2016-2019 total 102 plants species collected and indentified on the basis of morphological, anatomical, biochemical studies. Frequence of plants specimen recorded different seasons from various places The plant are being categorised into following three group on the basis of availity and frequency of these plants growing in different regions.Abundant plant species:-Chenopodium sps., Ecliptasps., Boerhaaviasps., Blumeasps., Commelinasps., Oxalis sps, Tridaxsps, etc. Moderates plant species:- Mucuna sps., Paederiasps., Astercanthasps., Leucas aspera sps. Trichosanthessps. etc. Numberless and growing in a few places: Tribulassps., Gloriosa sps., Andrographicsps., Centenellasps., Bacopa sps. etc. Over exploition of these plants, Enthropogenicactivites, calimatic change, alteration in soil texture etc. Detrimental effect on population of medicinal plants species of Gopalganj district.

***Keywords:*** *Ayurveda, Enthropogenicactivites, Endengerssps., reservoir, Trichosanthessps.*

# Impact of Arsenic Contamination on Biodiversity and Climate Change in the Environment

**Piyush Kumar and Preety Prasad**

*Patliputra University, Bihar*

The escalating anthropogenic activities and industrialization have triggered environmental concerns, with arsenic contamination emerging as a pivotal issue affecting both biodiversity and climate change. This study delves into the multifaceted repercussions of arsenic on the delicate balance of ecosystems and its subsequent implications on global climate patterns.

Arsenic, a naturally occurring metalloid, is released into the environment through various human activities such as mining, agricultural practices, and industrial discharges. Its pervasive presence in soil and water systems poses a significant threat to biodiversity. The impact on aquatic ecosystems is particularly profound, as arsenic disrupts the normal functioning of aquatic flora and fauna, leading to adverse effects on species diversity and ecosystem stability. Additionally, the bioaccumulation of arsenic in aquatic organisms further extends its deleterious effects up the food chain, affecting higher trophic levels and, consequently, ecosystem services.

Furthermore, arsenic contamination has been linked to alterations in soil microbiota, impacting plant growth and diversity. This, in turn, affects terrestrial ecosystems and the intricate web of interactions among different species. The cascading effects on biodiversity have far-reaching consequences for the resilience and adaptability of ecosystems to changing environmental conditions.

In addition to its direct impact on biodiversity, arsenic contamination plays a role in exacerbating climate change. The release of arsenic into the atmosphere, often through industrial processes, contributes to air pollution and greenhouse gas emissions. This amplifies the greenhouse effect, leading to an accelerated pace of global warming. The interconnectedness of environmental components underscores the importance of understanding the synergistic effects of arsenic contamination on both biodiversity and climate change. Mitigating the impact of arsenic contamination requires a comprehensive approach that integrates sustainable land-use practices, stringent industrial regulations, and the development of eco-friendly technologies. Additionally, fostering awareness and education about the consequences of arsenic contamination is crucial for encouraging responsible environmental stewardship.

In conclusion, this study underscores the intricate interplay between arsenic contamination, biodiversity, and climate change. The holistic understanding of these interactions is imperative for formulating effective strategies to mitigate the adverse effects on ecosystems and safeguard the delicate balance of our planet's environment.

# Climatic Factors Influencing the Foraging Activities of Honeybees (*Apis mellifera)* During the Mango Blooming Period

**Fazlah Wahid and Braj Kishor Prasad Singh**

*Dept. of Zoology, B .R. A. Bihar University, Muzaffarpur, Bihar, India*

Entomophily has been crucial in the evolution of angiospermic plants. Numerous insect visitors continue to interact with the plants in mutualistic ways, obtaining food and dispersing pollen as a result, fostering cross-pollination and plant diversity. The honeybee is one of the most important of these insects. Changing climatic conditions, such as growing greenhouse gas concentrations and global warming, have caused widespread variations in various abiotic components, including temperature, relative humidity, rainfall, and wind speed. Many workers are paying attention to how these changes are affecting *Apismellifera's* foraging habits because they could have a negative effect on bee activity. The present study was carried out in local mango orchards in Muzaffarpur, Bihar, a northern state of India, during the mango blooming period in March 2023. Observations were done by using domesticated *A. mellifera*hives. Temperature (°C) was recorded hourly from 7:00 hours to 18:00 hours at 3-day intervals during the entire observational period with the help of internet. Foraging activities were determined by counting the number of bees going out from hives and coming into hives with pollen (pollen gathers) and nectar (nectar gathers). Weather data were recorded hourly during the mango blooming period from 7:00 hours to 18:00 hours and correlated with foraging activities to quantify the influence of weather parameters on foraging activities. It was found that *A. mellifera's* foraging activity was significantly and negatively impacted by temperature. Temperatures above 33°C had a negative impact on *A. mellifera* activity. The minimum temperature, above 17 degrees Celsius, on the other hand, exhibited a positive impact on the outgoing($r = 0.68$), incoming with pollen ($r = 0.77$), and without pollen ($r = 0.79$) gathering activity of*A. mellifera.* Throughout the whole mango blooming period, an *A. mellifera* exhibits a variety of foraging behaviours due to changes in temperature as well as the availability of different amounts of nectar-rich flowers at various times of the day. Additionally, a clear link between *A. mellifera* foraging behaviour and relative humidity, wind speed, and precipitation has been established.

***Keywords:*** *A.mellifera, temperature, mango bloom.*

# Climate-Induced Fungal Degradation and Biodiversity Impact on Heritage Monuments: A Case Study on Golghar, Patna

**Suman Priya[1] and Namita Kumari [2]**

*[1]Dept. of Botany, Patna University, Bihar, India*

*[2]Dept. of Botany, Magadh Mahila College, Bihar, India*

Climate change contributes to the decay of historical monuments in India by creating conditions favorable to the growth of fungi. Elevated temperatures, increased humidity and altered precipitation patterns can encourage the proliferation of fungi on these structures. Changes in biodiversity especially in microbial communities, may also contribute to the degradation process. Successful conservation strategies need to address these environmental factors to mitigate fungal damage to India's monuments. This research investigates factors promoting the growth of mycoflora and the subsequent degradation of heritage monuments, with a specific focus on Golghar at Patna, a large granary built by Captain John Garstin for the British army in 1786. The study explores various stresses and factors, emphasizing the role of mycoflora, that have significantly impacted Golghar in recent decades. The examination aims to understand the diversity of fungi associated with deteriorated monument sites, specifically collecting 25 samples from different locations of Golghar in Patna, Bihar State. So many fungal species were isolated with Aspergillus sp. being the most dominant, followed by Penicillium sp. and others. These identified microfungi contribute to the discoloration and mechanical exfoliation of building stone material, as evidenced by mechanical hyphae penetration and the production of dark pigments and organic acids.

***Keywords:*** *climate change, monument, biodiversity, Golghar.*

# Length-Weight Relationship and Condition Factor of Some Small Indigenous Fish Species from Floodplain Lakes of North Bihar

**Roushni Parween**

*Dept. of Zoology, T. M. Bhagalpur University, Bihar*

Fish growth is one of the importantaccountable factors to know the state of stocks. Age and growth as well as the length-weight relationship (LWR) determination are critical variables to determine condition of fish and play vital roles in the fishery management. The LWRs can beused as characteristicto distinguish taxonomic units and relationship varies with different life stages,such as growth, maturation and transformation. Fisheries scientists can estimate an individual fish's weight from its length, calculate condition indices and compare life histories and morphologies of populations from different locations using LWR parameters (a and b). It is also an estimate of the allometric changes. These biological estimations help in formulating conservation and management strategies regarding the stock exploration. Till now there is no sufficient information on LWRs of fish from floodplain lakes of India. Therefore, the present studywas conducted to estimate the LWRs and conditions factorsof some small indigenousfish speciescollected from floodplain lakes of North Bihar.The species studied were*Puntiusticto*, *Botialohachata*,*Alia coila*, *Chandanama* and*Chandaranga*.

In thisstudy,fish samples for length-weight studies were collected from various landing sites of floodplain lakes from October, 2021 to September, 2022using traditional boats and nets.The data on total length was collected by measuring length in cm taken from the tip of the snout to the tip of the caudal fin and weight in gram (g) was taken by using electronic balance with accuracy to 0.01g. The length weight analysis was conducted on the field and laboratory also. The length-weightrelationship of fishes wasestimated from the allometric formula: $W=aL^b$and logarithmically transferred into W= log a + b logL, where,W is the total weight (gms), L is the total length (cm) and a and b are the regression parameters. When the value of b is equal to 3.0, it suggests the isometric pattern of growth occurs, while when b is not equal to 3,allometric pattern of growth takes place. The condition factor (K) is a numerical indexwhich describesthe state of condition, fatness and wellbeing of fish that evaluate prospect of present and future success of a stock. The condition factor was calculated by formula: K= W × 100 L3,where, W= weight of the fish,L= its total length. The value of condition factorsindicates that fishes were in good condition.The analysis of LWRrevealed thatsome small indigenous fish species follows isometric growth pattern while other speciesexhibitpositive allometric growth pattern and negative growth pattern which were discussed in relation tothe lakes habitats, relativelyhigher temperature of summer,enhancements of food availability, intensive feeding and metabolic activity of fishes.

***Keywords:*** *Length-Weight Relationship, Condition Factor,Small Fish Species, Floodplain Lakes.*

# Excessive Human Interferences Put Drastic Effects on River and Its Fish Biodiversity of River Gandak, Bihar, India

**Kalyani[1] and Mridula Renu Sinha[2]**

*[1]Patna University, Bihar*

*[2]Magadh Mahila College, Patna, Bihar*

India is a developing country and incredible in all aspects. 70% of its population depends on agriculture. Bihar, land of rivers, state is divided into north and south Bihar. North comprises of numerous rivers and aquatic diversities as compared to the South. In this 21st century, everything is running around the modernization. For all the self-comforts people harm the nature by various illegal ways. River is also affected by these. The present study was done from July 2022 to June 20230to represent the types of human activities that are directly associated with the decline of river water quality and the fish biodiversity of the river Gandak at Hajipur, Bihar. Basically flows between Vaishali and Saran district supporting a huge population resides at the bank of the river. Data were collected from primary and secondary sources of present fish biodiversity as well as conservative status globally and physicochemical parameters were calculated in different seasons that showed variations. A total of 39 individual fish species were identified that belonged to 18 family, 29 genus and 39 species. Cyprinidae family (61.11%) was dominating followed by Bagridae family (27.78%). 79.4% are LC, 10.25% are VU, 5.12% are NT and 5.12% are EN. All these data will be helpful in development, preservation, conservation for the fish biodiversity of river Gandak.

***Keywords:*** *Gandak River, Fish Biodiversity, Physicochemical Parameters, Illegal Human Activities.*

# Comparative Study of Different *Litchi chinensis* Sonn. Cultivars Based On Physical Analysis During Ripening

**Nidhi [1] and Garima Pathak [2]**

[1]*Dept. of Botany, Patliputra University, Patna, Bihar*

[2]*Dept. of Botany, B. D. College, Patna, Bihar, India*

*Litchi chinensis* Sonn., often known as Litchi, is sometimes hailed as the "Queen of Fruits" and belongs to the *Sapindaceae* family. Its fruit is renowned for being exceptionally juicy, delicious, and nutritious. The litchi fruits are highly popular due to their exceptional flavor, fragrance, white aril, and visually striking scarlet skin. Litchi fruit is abundant in vitamins, minerals, and phenolic compounds. India accounts for 91 percent of the global litchi production. Bihar accounts for 73.38 percent of the country's total litchi production, whereas approximately 40 percent of its land is used for cultivation. The presence of multiple litchi cultivars with distinct features offers an excellent opportunity to investigate the physical and chemical qualities that occur during fruit ripening, as well as explore the range of nutritional variety. Currently, there is a scarcity of data on the comparative analysis of physical and chemical characteristics of various litchi cultivars during the ripening process. While a few studies have focused on the chemical profile of one or two specific varieties, there is a lack of comprehensive research in this area. In this current investigation the physical quality of fruits during ripening was examined using five different litchi cultivars: Shahi, Rose Scented, Dehradun, Dehra Rose, and Ajhauli. The evaluated characteristics included fruit weight, length, and diameter; peel and pulp weight; as well as seed weight, length, and diameter. The findings indicated that the cultivar Shahi exhibited the highest fruit weight, while the cultivar Dehradun displayed the lowest fruit weight. The cultivar Rose Scented exhibited the highest pulp weight, whereas the cultivar Dehradun had the lowest pulp weight. The cultivar Shahi exhibited the highest recorded fruit length and diameter, while the cultivar Dehradun displayed the lowest measurements. The cultivar Rose Scented had the maximum peel weight, while the cultivar Ajhauli had the lowest recorded weight.

***Keywords:*** *Litchi, Physical, Chemical, Fruit weight, Peel, Pulp, Seed.*

# Biodiversity: Our Natural Defense against the Anthropogenic Lead Climate Change

**Priya[1], Dr. Usha Kumari[1], Madhu Kumari Gupta[1] and Vikash Anand[2]**

*[1]Dept. of Chemistry, Magadh Mahila College, Patna, Bihar*

*[2]Geological Survey of India, Patna*

Biological diversity or biodiversity is the variety of life on Earth, in all its forms, from genes and bacteria to entire ecosystems such as forests or coral reefs. The biodiversity we see today is the result of 4.5 billion years of evolution. Climate change and biodiversity loss (as well as pollution) are part of an interlinked triple planetary crisis the world is facing today. Since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels like coal, oil, gas, excessive cutting of plants and trees for resources and changing the natural landscape with cultural invasion. When human activities produce greenhouse gases, around half of the emissions remain in the atmosphere, while the other half is absorbed by the land and ocean. These ecosystems – and the biodiversity they contain are natural carbon sinks, providing so-called nature-based solutions to climate change.

The loss of flora and fauna will create an irreversible situation for the coming generation if the rapid process of urbanization without check and balance will continue. In the rapid process of urbanization ongoing in the state capital Patna, extensive loss to biodiversity has been on its rise. Be it on the banks of Ganges, wetlands adjoining to the earlier urban fringe of the expanding city, concretization of the exposed land area in the city, construction of high rising buildings, changing of agricultural lands and cropping patterns with excess use of fertilizers.

Measures by the human civilization need to be taken for the conservation and preservation of biodiversity that is our natural defense against the mitigation of climate change. Biodiversity and Climate change needs to be tackled together if we are to advance the Sustainable Development Goals and secure a viable future on this planet. Government agencies deal with climate change and biodiversity through two different international agreements – the UN Framework Convention on Climate Change (UNFCCC) and the UN Convention on Biological Diversity (CBD), both established at the 1992 Rio Earth Summit. The framework includes wide-ranging steps to tackle the causes of biodiversity loss worldwide, including climate change and pollution.

***Keywords:*** *Biodiversity, Climate Change, Anthropogenic, Urbanization.*

# Fish Biodiversity in Mahananda River with the Relation of Water Quality Parameters

**M Nayan[1] and Mridula Renu Sinha[2]**

*[1]Dept. of Zoology, Patna University, Bihar*

*[2]Dept of Zoology, Magadh Mahila College, Patna University, Patna, India*

This research aimed to determine the water quality and fish biodiversity in Mahananda River. While the Mahananda River experiences fragmentation, water abstractions, municipal sewage, and industrial pollution from industrialized cities like Kurseong, Siliguri in the Darjeeling district, and English Bazar in the Malda district of West Bengal, it is relatively cleaner in the hills (upper stretch) than in the plains (middle and lower stretches). Three sites in the middle stretch have their water quality index (WQI) values determined by analysing 13 water quality parameters (pH, TDS, Total Alkalinity , Turbidity, Total Hardness, Nitrate asNO3, Nitrite as NO2, Free Ammonia, Total Phosphorus, Sulphate as SO4, Cadmium as Cd. Following is the physicochemical analysis of river water sample collected from Mahananda River from the location Labha in Katihar. Period of Testing: 06-07-2023 to 15-07-2023.

| Sl. No. | Parameter | Unit | Test Method | Observed Value | Requirement MOEFCC Notification 2000 Part-2, Sec.3(1) | Requirement CPCB Water Quality Standard$_1$ | Requirement IS:2296 Surface Water Quality Standard$_2$ |
|---|---|---|---|---|---|---|---|
| 1 | pH | - | IS3025(P-11);2022 | 6.71 | 6.5-8.5 | | |
| 2 | TDS | mg/L | IS3025(P-16);2023 | 349.7 | - | - | Max. 1.2mg/l for Class E |
| 3 | Total Alkalinity (as CaCO3) | mg/L | IS3025(P-23);2019 | 72.0 | - | - | - |
| 4 | Turbidity | NTU | IS3025(P-10);2012 | 160.0 | - | - | - |
| 5 | Total Hardness (as CaCO3) | mg/L | IS3025(P-21);2019 | 39.6 | - | - | Max. 1.2mg/l for Class A |
| 6 | **Nitrate** (asNO3) | mg/L | IS3025(P-34);2019 | 1.12 | - | - | Max 1.2mg/l for Class A |
| 7 | **Nitrite** (as NO2) | mg/L | IS3025(P-34);2019 | 0.28 | - | - | - |
| 8 | Free Ammonia (as N) | mg/L | IS3025(P-34);2019 | 0.44 | - | Max. 1.2mg/l for Class D | Max. 1.2mg/l for Class D |
| 9 | DO(Initial) | mg/L | IS3025(P-38);2019 | 5.3 | - | - | Max. 4.0mg/l for Class C |
| 10 | DO(Final) After 5 days | mg/L | IS3025(P-38);2019 | 3.4 | - | - | - |
| 11 | Total Phosphorus | | IS3025(P-31);2022 | 0.04 | - | - | - |
| 12 | Sulphate (as SO4) | mg/L | IS3025(P-24);2022 | 23.7 | - | - | Max. 400 mg/l for Class A |
| 13 | Cadmium (as Cd) | mg/L | IS3025(P-41);2023 | <0.001 | - | - | Max. 0.01mg/l for Class C |

***Keywords:*** *Biodiversity, Pollution, Physicochemical Analysis.*

# Exploring Medicinal Plants: Historical Significance, Current Relevance, and Climate-Induced Challenges

**Sweta Kumari, Aditi Singh and Muskan Raj**

*Dept. of Botany, Magadh Mahila College, Patna*

Medicinal plants have played a crucial role in traditional healing practices across diverse cultures for centuries. This work explores the significance of medicinal plants, highlighting their historical roots, current relevance, and potential future impact. The rich array of chemical compounds, including alkaloids and flavonoids, supresstheir therapeutic potential. Within the context of Magadh Mahila College's (DhanvantriVatika), various medicinal plants are identified, each serving specific health purposes. The Dhanvantri Vatika has Lemon grass (*Cymbopogon*) which is used as pain reliever and fever reducer. Gulmarg (*Gymnema sylvestre*) for curing stomach woes, constipation and fluid retention. Harsingar stem is very useful in joint pain and malaria. Sadabahar (*Catharanthus roseus*) for diabetes and menstrual cramps and Aloe vera treats skin injuries and digestive problems. The study also scrutinizes the impact of climate change on the medicinal properties of plants. Changes in temperature, precipitation patterns, and atmospheric conditions are found to influence the biochemistry of medicinal plants, altering their composition and potency. Elevated temperatures can lead to stress responses in plants, potentially increasing the production of secondary metabolitescompounds responsible for medicinal properties. However, the consequences of climate change are intricate, as excessive heat or drought may compromise overall plant health. Additionally, shifts in growing conditions may alter the geographical distribution of medicinal plants, affecting accessibility and traditional knowledge. Consequently, climate change introduces uncertainties and challenges to the consistency and availability of plant-derived medicines.

***Keywords:*** *Medicinal Plants, Dhanvantri Vatika, Alkaloids.*

# Increasing Biodiversity of Begomovirus in the Fields of Bihar

**Pankaj Kumar and Punam Ranjan**

*Dept. of Botany, Patna Science College, Bihar*

In India, tomato crop covers a total area of 0.879 Mh with a production of 20.5 Mt. Andhra Pradesh, Karnataka, Orissa, Maharashtra, West Bengal, Gujarat, Chhattisgarh and Tamil Nadu, are leading states [data from National horticultural board bulletin, 2018-2019]. Bihar produced 1056 t tomatoes in 2011, 1009 t in 2017-18 and 941 t in 2018-19. There is decline in production is 2018-19. Crop production has been hindered in India, by whitefly-transmitted begomoviruses causing tomato leaf curl disease (ToLCD). In the current scenario, considering the significance of diversification, ToLCD has been disseminated to all major tomato growing regions in the country that is responsible for severe yield loss. Several monopartite begomoviruses which includes *Tomato leaf curl Patna virus*, and *Tomato leaf curl Ranchi virus* have been found to be associated with ToLCD in Bihar and Jharkhand state.

In last five years, spread of this virus is increased not only to different regions of India and outside but also to several hosts. This paper provides an idea of alarming increase in biodiversity of begomovirus that infects tomato and related crops in Bihar. In this study we found moderate to severe disease conditions. The Tomato leaf curl virus (ToLCV) which causes Tomato leaf curl disease (ToLCD), affected crop productivity from 25 to 95%, in case of varying disease severity. Rarely plants were disease free except few cases where, organic farming along with organic pesticides was being used. There were some very innovative findings observed during survey in Vaishali district.

Bihar has three major vegetable growing zones in Lakhisarai district, Nalanda district and at the Smastipur-Darbhanga-Madhubani Districts. Present survey has covered Lakhisarai (Village- Badhaiya) and Nalanda (Village-Shahoker-Sosarai) district. In Lakhisarai, tomato is growing on large scale and incidence of Tomato leaf curl is observed, but in Nalanda tomato is not growing in large scale and disease incidence is also not observed. Form collected sample total DNA of tomato plant was isolated through CTAB method and checked with degenerate primer for DNA-A of begomovirus (Rojas et al., 1993 and Wyatt and Brown, 1996). Identification of different species of begomovirusvirus existing in fields are done by DNA sequencing. Further this data is used for phylogenetic analysis of DNA for developing criteria to control ToLCD and to understand diversification in genomic DNA.

***Keywords:*** *Evolution Of Begomovirus, Tomato Leaf Curl, Plant Disease In Gangetic Plain, Biodiversity, Transcomplementation, Pseudorecombination*

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# *Catharanthus roseus:* A Promising Antimicrobial Agent in the Era of Drug Resistance

**Sajda Yasmine[1], Aishwarya Priyadarshni[2]** and **Vinod Prasad[1]**

[1]*Dept. of Botany, Patna University*

[2]*Institute of Science, Banaras Hindu University,Varanasi,UP*

*Catharanthus roseus*, the Madagascar periwinkle, is renowned for its robust antimicrobial properties attributed to compounds such as vincristine. This alkaloid, found in the plant, exhibits potent antibacterial and antiviral effects, positioning *Catharanthus roseus* as a valuable asset in addressing various infections and combating antibiotic resistance. Ongoing research is delving into its potential for developing novel drugs and treatments in the medical field.

Studies have reported the antibacterial activity of the ethanolic extract of *C. roseus* against diverse bacteria. Saponin-enriched fractions from the plant's stem and root have demonstrated formidable antifungal activity against *Candida albicans* and *Aspergillusniger*. Isolated compounds from *C. roseus*, such as yohimbine from the leaf, stem, and root, showcase potent antimicrobial properties. Another compound, catharoseumine, found in the whole plant, inhibits Plasmodium falciparum falcipain-2, a protozoan parasite.*C. roseus* extracts, particularly from the flower and leaf, exhibit promising wound healing activity. In rats, the ethanol extract demonstrated wound healing activity and in diabetic rat the leaf extract promoted wound healing. In steptozotocin-induced diabetic mice, the methanol extract of *C. roseus* leaf significantly enhanced wound contractions. While numerous alkaloids and phenolics have been identified, many compounds remain unknown. Continued efforts to identify and isolate new phytochemicals from different structural components of *C. roseus* are crucial. Furthermore, exploring the potential applications of bioactive compounds derived from this plant in the nutraceutical and pharmaceutical industries warrants further investigation.

*C. roseus* offers significant antimicrobial potential through its diverse compounds. The exploration of its bioactive elements opens avenues for sustainable antimicrobial agents. Additionally, utilizing plants like *C. roseus* emphasizes the crucial role of biodiversity in healthcare. Biodiversity not only inspires scientific discovery but also sustains life on Earth. Conservation becomes imperative, ensuring resilience for future medicinal discoveries. In integrating botanical treasures into medical practices, we diversify treatments, promote sustainability, and conserve Earth's rich biological heritage for a harmonious relationship between humanity and the natural world.

***Keywords:*** *Antibiotic Resistance, Bioactive Compound, Phytochemical, Vincristine.*

# Climate Change and Its Impact on Morphological Behaviour of *Aloe Vera* Collected From Different States of India

**Shabnam Kumari**

*Dept. of Botany, Mahatma Gandhi Central University Bihar*

*Aloe vera* belongs to the family Aloaceae consisting of indigenous to Africa with about 360 species are known worldwide in the region of Africa, Europe, Asia and the Americas is an admired medicinal plant used as a folk medicine. In this study, the aim of analysing quantitative and qualitative parameters of some morphological behaviour of *Aloe vera*. The plants used in this study collected from the different states of India (Orrisa, Meghalaya, Jharkhand and Bihar). Morphological and behavioral assessment of *Aloe vera*on the basis of their climatic changes,plants showed significant differences in their heights, leaf length, width, thickness, color, margins, venation, no. of spine (color, arrangement). In this study findings all the importance data from morphology among *Aloe vera* plants by using statistical analysis One -Way ANOVA test. The numerical data were utilized to study the significant difference among all the *Aloe* plants.

***Keywords:*** *Aloe vera, Quantitative, Qualitative Analysis, Morphology, Climatic Change.*

# GROUP - B
# (CLIMATE CHANGE AND HEALTH)

# Assessing the Therapeutic Potential of Moringa Oleifera in Ameliorating Diabetic Conditions

**Sapna Kumari and Rajeev Ranjan**

*Dept. of Zoology, Patna Women's College, Bihar*

Diabetes mellitus (DM) poses a significant threat to global populations, leading to hyperglycemia—a major driver of complications like retinopathy, nephropathy, and neuropathy. This study aimed to compare fasting blood sugar (FBS) levels between diabetic control and Moringa-treated groups. Twenty-one male swiss albino mice were evenly distributed into normal control (NC), diabetic control (DC), and diabetic treated (DT) groups. Alloxan (250mg/kg-bw) induced diabetes intraperitoneally in the DC and Moringa-treated groups. Blood samples collected after 72 hours compared FBS levels among the three groups, with mice registering FBS levels at or above 200 mg/dl confirmed as diabetic. Post-confirmation, DT received oral aqueous Moringa extract (300 mg/kg-bw) continuously for 25 days. FBS measurements were taken every fifth day using Dr. Morepen Gluco One Glucometer. Significant ($P < 0.05$) reductions in FBS levels were observed post-administration of dry *Moringa oleifera* powder in the experimental group. The potential recovery of treated mice from diabetes through *Moringa oleifera* might stem from its positive impact on pancreatic beta cells. This plant extract proves effective in reducing blood sugar levels, presenting a cost-effective solution that enhances the overall well-being of the experimental group. These findings potentially hold considerable implications for human health.

***Keywords:*** *Swiss Albino Mice, Diabetes, Alloxan, Moringa oleifera, Fasting Blood Glucose (FBS).*

# Effect of Heavy Metal Chromium on Haematological Parameters of *Channa gachua*

**Komal [1], Ranjana[1] and Satyendra Kumar [2]**

*[1]Dept. of Zoology, Patna Science College, Patna University, Patna*

*[2]Dept.of Zoology,SNS College,Muzaffarpur, Bihar*

The aim of present investigation was to determine the effect of heavy metal pollutants chromium on haematological parameters of fresh water fish, Channa gachua. The experimental group of fish was exposed to a sublethal concentrations of chromium for a period of 45 days and observations were made on Haemoglobin (Hb), Packed Cell Volume(PCV), Total Erythrocyte Count(TEC), Mean Cell Volume (MCV), Mean Cell Hemoglobin Concentration (MCHC), Total Leucocytes Count (TLC), Serum Glutamate Oxaloacetate Transaminase (SGOT) and Serum Glutamate Pyruvate Transaminase (SGPT). It was found that there was significant decrease in Haemoglobin Content, PCV and TEC in majority of results. This was accompanied by decrease in MCV and MCH and increase in MCHC of chromium exposure. The study suggested that the presence of toxic heavy metals in aquatic environment has strong influence on the hematological parameters in the fresh water fish.

***Keywords:*** *Chromium, Haematological, Parameters, Channa gachua.*

# Aeromycoflora of Patna, (Bihar) and their Immunological Response

**Shivani Jaiswal[1] and Surendra Kumar Prasad[2]**

*[1]Dept. of Botany Patna Science College, Bihar*

*[2]Dept. of Botany, Patna University, Bihar*

The atmospheric Aero mycoflora survey for two years have led to the establishment of metrological parameters in the atmosphere of Patna the summer season shows the prevalence of aero mycoflora. belonging to Candida albicans, Aspergillus flavus, Cladosporium, Trichoderma, etc. and The rainfall season shows the dominance of aeromycoflora Aspergillus fumigatus, Aspergillus versicolor, Fusarium solani, Penicillumspp., Neurospora and others on the basis of wind speed and temperature.

To determine the extent of immunological response of these suspected aeroallergens, a total no. of 419 cases intradermal test were carried out in (100) cases of nasobronchial and dermal allergens at Patna during 2020-2022. The study of aero mycoflora refers to the estimation of fungal load in the air, including fungal spores, hyphal fragments, fungal aeroallergens and various sporulating and resting bodies. A total no.of 18 mycoflora components were isolated during November,2020 from the indoor environmental samples collected through Burkard air sampler. Culturing of sampleswas done through open petri plate method by exposing Potato Dextrose Agar Petri plates in different patient Rooms each for a period of 10 to 15 minutes.

***Keywords:*** *Allergens, Antigens, Hospital, Environment, Biotic Pollutant, Bronchial Asthma.*

# Climate Change and Its Impact on The Health of People of Muzaffarpur, Bihar

**Kiran and Faiyaz Ahmad**

*Dept. of Zoology, B.R.A.Bihar University, Muzaffarpur*

The study was carried out to analysis the impact of climate change on the health of people of Muzaffarpur, (Bihar). It has been known for thousands of years climate change endangers human health affecting sectors of society. The area is highly affected by high speed wind of 47 m/s intensity. Temperature increase will potentially severely increases rate of extinction for many habitat and species (up to 30 percent with a 2°c rise in temperature). Rising temperature causes shifts in crop growing season, which affects food security and change in the distribution of disease vectors putting more people at risk from diseases such as malaria and dengue fever. The impact of climate change on mental health is growing concern. The stress and trauma induced by extreme weather events contribute to increased rates of anxiety, depression and post-traumatic stress disorder (PTSD) Adapting to climate change require a multifaceted approach.

***Keywords:*** *Endanger, Concern, Trauma, Approach.*

# Study of Uncontrolled Cement Dust Exposure and Its Prolonged Effects on Glycemic Status and Renal Function Markers among Male Cement Handlers at Dalmia Cement Factory

**Shahbazuddin Ansari and Nitin Arora**

*Chandigarh University , Chandigarh, India*

The current study has explored the persisting effects of cement dust on glycemic status and selected renal function markers between male cement handlers at Dalmia Cement Factory. This study revealed that prolonged and recurrent exposures, contingent on the length of time and sensitivity of factories workers exposed to cement dust particles, have caused deleterious complications and deterioting health conditions particularly seen in their glycemic status and selected renal function markers. The findings results of this investigation demonstrated that uncontrolled cement dust- exposure causes significant commonness of (T2DM) Type 2 diabetes mellitus and prediabetes derailed renal function markers among cement handlers (CH). The levels of HbA1c, 24 hours urinary protein, blood urea, creatinine, bi-carbonate and serum electrolytes (Na+ and K+) is significantly increased in cement handlers as compared to non-cement handlers (NCH) as controls. The hyperglycemic and nephrotoxic consequences of cement dust and potential for development insulin resistance, T2DM disease and renal insufficiency might exacerbated if the exposure to cement dust among cement handlers is not controlled. No significant difference was recorded in the blood pressure levels among exposed group when compared with control subjects at Dalmia Cement Factory.

***Keywords:*** *Cement dust, Glycemic Status, Diabetes mellitus, Renal function, Exposed, Unexposed, Environmental pollution.*

# An Emerging Contaminant Ibuprofen Induces Toxicity by Targeting Histone Proteins in Budding Yeast

**Sushant Kumar and Gajendra Kumar Azad**

*Dept. of Zoology, Patna University, Bihar, India*

Nonsteroidal anti-inflammatory medications (NSAIDs) are still among the most often utilised pharmaceutical therapies for mild to severe musculoskeletal pain around the world.Ibuprofen is a well-established anti-inflammatory drug having analgesic and antipyretic effects. Although ibuprofen is beneficial for treating medical conditions; however, its mode of toxicity at higher dose is poorly understood. In this study, we used budding yeast *Saccharomyces cerevisiae* as a model organism to study the role of histone H3 and H4 residues in mediating toxicity by ibuprofen. We screened approximately 430 histone H3 and H4 mutants to identify critical residues required for mediating ibuprofen induced toxicity. Our result revealed several H3 (R17A, K42A, R53A, L60A, L61A, Q68A, K115Q, R135D, S57D, S86D) and H4 (R36A, R55A, A56S, D85A, K77Q, R3K, R78K) point mutants were sensitive for Ibuprofen. The two H3 point mutants R17A and S135D were found to be most sensitive for Ibuprofen. Furthermore, the removal of H3 and H4 N-terminal tails also lead to hypersensitivity for Ibuprofen induced stress. We mapped the sensitive residues on the nucleosome three dimensional structures to visualise the location of the histone residues that showed sensitivity for Ibuprofen. We also used computational tools to identify Ibuprofen protein interactome that showed significantly enrichment of lipid metabolic and carbon catabolic processes. Altogether, our data establish critical residues of the H3 and H4 in regulation of ibuprofen induced toxicity in budding yeast.

***Keywords:*** *Ibuprofen; Toxicity; Histone H3/H4; Epigenetics; Saccharomyces cerevisiae.*

## Cytotoxic Assessment Of Pesticide Dimethoate By Using Chromosomal Behavior Of Root Meristem in *Allium cepa* L.

**Pravin Kumar and Vinod Prasad**

*Dept. of Botany, Patna University, Bihar, India*

Dimethoate 30% EC is a potential genotoxic pesticide that has found wide usage in agriculture. Considering its impact on biota, the present study was designed to assess the cytotoxic and genotoxic effects of various concentration of pesticide by using the Allium cepa test. The roots were exposed to dimethoate pesticide concentration (0.2%, 0.4%, 0.6%, 0.8% and 1.0%) for the aforementioned evaluation. Root growth was determined in terms of the mitotic indexes at a time interval of 24, 48 and 72hrs. The results indicate significant ($p < 0.05$) reduction of mitotic index in dose-duration dependent manner over to control. Moreover, many cytological aberrations were also observed like cytolysis, elongated nuclei, chromosome fragmentation, sticky metaphase and anaphase, laggard chromosome, c-metaphase, and anaphase bridges. The RAR, PAC and micronuclei frequency was also augmented. These findings confirm the cytotoxic and genotoxic potential of dimethoate that that might be toxic as mitodepressive action. The carcinogenicity of this xenobiotic was also evident. So that use of higher concentration of dimethoate should be not recommended as it not only causes cytogenotoxicity but might be led to death of the plants at higher doses.

***Keywords:*** *Allium cepa; Dimethoate; Cytological aberration; Mitotic index; Pesticide.*

## Impact of Fish Disease in Fresh Water Fish Breeding

**Kumari Priyanka and Shivanand Singh**

*B.R.A. Bihar University, Muzaffarpur*

Indian fisheries and aquaculture is an important sector of food production, providing nutritional security to the food basket, contributing to the agricultural exports and engaging about fourteen million people in different activities. With diverse aquatic resources the country has shown continuous and sustained increments in fish production since independence. However, occurrence of disease has become a primary constraint to sustainable aquaculture production and product trade, there by affecting the socioeconomic status of fishers in country like India. Different stress factors such as inadequate physicochemical and microbial quality of culture water, poor nutritional status and high stocking density can cause infection by opportunistic pathogens. Acute level of pollutants and suspended solids can directly bring about abnormalities and mortalities in seed fishes and adults. Different Indian fisheries and aquaculture is an important sector of food opportunistic bacterial pathogens and parasites cause devastating loss to fish industry in terms of high morbidity and mortality, diminishing growth and enhanced expenditure on use of chemicals as preventive and control measures.

***Keywords:*** *Aquaculture, Pathogen, Mortality, Parasite.*

# Overexploitation of Groundwater Related to Potable Water Disinfection Health Effects of Calcium Hypochlorite

**Joyita Das[1], Reshma Sinha[2] and Maya Rani[3]**

*[1]PC Vigyan College, Chapra, Bihar*

*[2]SGGS College, Patna, Bihar*

*[3]Magadh Mahila College, Patna, Bihar*

The effects of chlorine salt, Calcium hypochlorite (bleaching powder- commonly used for disinfection of potable water), on the renal histopathology of Swiss albino mice were observed in the present study. Oral exposure of 150 ppm and 200 ppm calcium hypochlorite for three and four months caused marked decrease in the diameter of glomerulus. The glomerular diameter decreased to 0.0929223mm ± 0.009423 as compared to the control (0.0983091mm ± 0.0013416) upon treating mice with 150ppm Calcium hypochlorite for three months. Oral dose of 200ppm for four months caused significant decline ($P<0.05$) in the diameter to 0.070477mm ± 0.015684 as compared to the control which was 0.0938201mm ± 0.00134. Besides this structural change, Pycnotic nuclei were clearly observed in the renal cells. The basement membrane showed variations in width with thick and thin segments on the same and adjacent capillary loops, suggestive of glomerular nephropathy. Besides glomerulus, the Bowman's capsule, proximal convoluted tubules and distal convoluted tubules also showed the changes induced by calcium hypochlorite. Studies have indicated harmful effects of calcium hypochlorite even on liver, heart and haematological parameters. Due to the adverse effects of this particular chemical and its indiscriminate use and shortage of potable water there has been a substantial increase in groundwater boring in an unplanned manner. Since increased number of bore-wells have come up in close proximity coupled to huge imbalance between extraction and recharge, freshwater bodies are shrinking and drying out which is causing great damage to environment. Reduction of pollution and remedial action for recharge measures are required with meticulous planning for a better tomorrow.

***Keywords:*** *Kidney, Mice, Glomerulus.*

# Exploring the Efficacy of Aqueous Fenugreek Extract in Alloxan-Induced Diabetic Swiss Albino Mice

**Rajeev Ranjan and Sapna Kumari**

*Dept. of Zoology, Patna Women's College, Bihar*

Diabetes, a widespread and concerning illness, affects a substantial portion of the global population, currently estimated at 463 million people, representing 9.3% of the world's adults. This study aimed to assess the potential effectiveness of aqueous Fenugreek extract in mitigating diabetes in Swiss Albino mice induced with alloxan. The primary objective was to compare fasting blood sugar (FBS) levels between the diabetic control and Fenugreek-treated groups. Twenty male Swiss Albino mice were evenly divided into four groups: normal control (NC), diabetic control (DC), diabetic treated under lower temperature {(21.0±1.8° C) ($DT_{LT}$)} diabetic treated under higher temperature {(mean 23.7±1.7° C) ($DT_{HT}$)}. Alloxan (250mg/kg-bw) was intraperitoneally administered to induce diabetes in the DC and Fenugreek-treated groups. Blood samples were collected 72 hours post-administration, and FBS levels were compared among the three groups. Mice with FBS levels equal to or above 200 mg/dl were confirmed as diabetic. Following diabetes confirmation, the DT group received continuous oral administration of aqueous Fenugreek extract (2.5g/kg-bw) for 25 consecutive days. FBS levels were assessed every 5th day throughout this period using the Dr. Morepen Gluco One Glucometer. The study observed a notable reduction in FBS levels in the DT groups over the course of the study. However, it was observed that there was significant difference in FBS of $DT_{HT}$ groups than that in $DT_{LT}$ groups. $DT_{HT}$ groups shown higher reduction in FBS than $DT_{LT}$ groups. These findings suggest that Fenugreek effectively lowered blood sugar levels and is influenced by environmental temperature, maintained body weight, and expedited wound recovery in the tested mice.

***Keywords:*** *Swiss Albino Mice, Diabetes, Alloxan, Fenugreek, FBS.*

# Application of Computational Tools to Identify Lifespan Extending Natural Molecule and Thus Minimizing the Toxic Effects of Synthetic Drugs on Environment

**Khushboo Kumari and Gajendra Kumar Azad**

*Dept. of Zoology, Patna University, Bihar, India*

Ageing is a progressive phenomenon which is associated with the deterioration of cellular function at both cellular and systemic levels in an organism.Lifeexpectancy is positively correlated across countries with environmental status.Environmental quality is a very important factor affecting health and morbidity: air and water pollution, soils deteriorations andthe like, are all susceptible of increasing human mortality (thus reducing longevity). Several synthetic molecules have been developed that can delay the ageing process and are characterized as lifespan extending molecules. One significant drawback of these molecules lies in the potential for toxicity complications. The development and use of these drugs to extend lifespan may introduce unforeseen toxic effects, posing serious risks to individuals and undermining the overall goal of improving health and longevity. Consequently, the phytochemicals, naturally occurring compounds found in plants, have garnered attention due to their low toxicity and for their potential health benefits, including their role in promoting longevity. In this research work, we are trying to identify novel lifespan extending phytomolecules using computational tools. We used STITCH database to generate a list of interacting partners of known lifespan extending molecules that includes rapamycin, metformin spermidine and resveratrol. The high score 328 proteins were obtained from these four molecules to constitute lifespan extension network interactome. Next we used STITCH database to identify interacting partners of proposed phytomolecule and match them with high score 328 proteins. More matching partners will have the higher probability to possess lifespan extension property. Using this approach we screened more than 30 molecules and identified Curcumin, EGCG, Simvastatin and cinnamaldehyde have high similarities in interacting protein partners so it is further assumed that these molecules may have lifespan extension property. This insilico analysis is experimentally being tested by performing chronological lifespan assay using budding yeast *Saccharomyces cerevisiae* as model organism. Moreover, conserved nature of ageing pathways, making it likely that identified phytomolecules will also impact human aging.

***Keywords:*** *Environmental Quality, Insilico Tools, Drug Protein Interactome, Aging, Chronological Lifespan Assay.*

# Unsustainable Exploitation of Ground Water Due to Anthropogenic Activities in 11 Districts of Bihar

**Kumari Gouri and Manish Kumar**

*Dept.of Botany, K .K .M. College, Jamui*

*Dept. of Zoology, Koshi College, Khagaria*

Ground water is the huge source of fresh water on the earth. It however ignored as it beyond human sight. The ground water already provides almost half of the of the total water used for domestic purposes including drinking water. In the year 2022 World Water Day celebrated with the theme "Ground Water :Making invisible Visible". to converse the Ground Water sources. Out of 38 Districts-11 Districts of Bihar ground water level reportedly have dipped according to the Data of Bihar Economic Survey(2022-2023) ground water level were at least 10 meter below ground in the districts like Aurangabad , Nawada , Kaimur and Jamui the pre-monsoon period in 2021.Managements are facing challenges to full fill the need of safe Ground Water for Rural population. In India third largest State Bihar facing a serious problem of ground water.

The quality of Ground Water deteriorating because of increasing pollutant loads from various sources, climate change adversely affect the availability and Distribution of Ground Water.

According to Telemetry Reports released by Bihar Minor Water Resources Department in February 2020 the level of Ground water dipped 10 feet in Arwal and Bhagalpur,24 feet in Begusarai and 21 feet in Gaya.

This paper is the case study and attempt to identify the Anthropogenic Activities to improve the Rural population health and Ground Water Supply.

***Keywords:*** *WWD, Telemetry, Bihar Economic Survey.*

# Microplastic and Its Effect on Human Health

**Nidhi Rastogi**

*Dept. of Zoology, J.L College, Hajipur*

Plastic became inevitable part of our life. Since morning to night we used many products made up of plastic and throw lots of plastic materials in the dustbin. Most of these plastic products are recyclable but in reality most of these lands in the dumped or landfills. These plastics decomposed into microplastics and leeches out chemicals in the surroundings. photodegradation or weathering by sun, wind or water causes the plastics to break down into tiny, nearly invisible bits. Microplastics are small plastic particles less then 0.2 inches or 5mm in size, according to the National Oceanic and Atmospheric Administration (NOAA). Microplastics are not biodegradable. Thus, once in the environment, primary and secondary microplastics accumulate and persist. Additives used in plastics styrene, bisphenol A and phthalates are all known toxic particles that make their way into microplastics and stay in them even through breakdown.

Since there is no standard protocol of assessing effects of microplastics on human health and its very difficult to study the direct effects of microplastics on different organ system. The objective of this study is to conduct a comprehensive review of the existing research especially on the role of micoplastics as a potential endocrine disruptor. A bibliographical search was used to conduct the literature review across a number of databases including Science Direct, Google Scholar, and Research Gate.

It was reported that additives used in microplastics induce a variety of toxic effects, including oxidative stress, metabolic disorder, immune response, neurotoxicity, as well as reproductive and developmental toxicity. These additives directly or indirectly induce insulin resistance. The impact of microplastic on organoids showed impaired functional abilities. Although recent researches on different cell lines showed toxic manifestations of microplastic. Still there is limited knowledge of mechanisms and pathways which deviated from normal functioning under the influence of microplastics.

***Keywords:*** *Microplastic, Endocrine Disruptors, Insulin Resistance.*

# Evaluation of Physico-chemical Characteristics of a Fresh Water Pond of Samastipur (Bihar)

**Rahul Kumar and Faiyaz Ahmad**

*Dept. of Zoology, B.R.A.Bihar University, Muzaffarpur*

The stepwise concentration of modern stable insecticides as they pass one step to another is hierarchy of animal kingdom show the phenomenon of biological magnification. Beside insecticides other important sources of pollution which disturb a pond ecosystem specially in Urban areas are human wastes . The aim of this study was to investigate physico-chemical quality of water of a fresh water pond of Samatipur district of Bihar and to detect the overall trophic status of ecosystem. Parameters for physico-chemical characteristics includes water temperature, transparency, pH, dissolved Oxygen (DO), alkalanity, Calcium, Magnesium, BOD, COD etc. The study comprises from July 2021 to June 2022. Sulphate sulpher maximum 30.8 mg/l in May 2022 and minimum 6.3 mg/l in September 2021. Phosphate and Phosphorus was maximum 0.827 mg/l in May 2022 where as recorded minimum 0.483 mg/l in August 2021. Nitrate and Nitrogen was maximum 0.693 mg/l in March 2022 and minimum 0.513 mg/l in July 2021. The maximum amount of Chloride was 113.6 mg/l in April 2022 and minimum 49.8 mg/l in August 2021. BOD were recorded maximum and minimum as 5.9 mg/l in September 2021 adn 2.5 mg/l in February 2022 respectively COD was recorded maximum 28.8 mg/l in May 2022 and minimum 14.0 mg/l in August 2021.

# Identification of Plant Parasitic Nematodes, A Key to the Success of Plant Parasitic Nematodes Control

**Priti Ranjan, Shivanand Singh and Anita Kumari**

*Dept. of Zoology, B.R.A.Bihar University, Muzaffarpur*

Plant parasitic nematodes are microscopic worms that have a significant economic impact on agriculture in Bihar, India. These pests can damage crop roots, reducing plant growth and yield, and ultimately leading to substantial economic losses to the farmers particularly in the paddy cultivated areas. Several economically important plant parasitic nematodes affect the crops in Bihar, including, root-knot nematodes (Meloidogyne spp.), cyst nematode (Heterodera spp.), reniform nematodes, lesion nematodes, burrowing nematodes. Control and containment of these nematodes are crucial for the agriculture sector in Bihar. Farmers employ a variety of strategies such as crop rotation, the use of nematode-resistant crop varieties, and soil fumigation when necessary. Integrated Pest Management (IPM) approaches that combine chemical and non-chemical methods are increasingly important to manage nematode infestations sustainably, and the success is very much dependent on the correct identification involves the assessment of nematode population in the soil and the examination of root symptoms, such as galls, lesions or cysts, to determine the specific nematode species infesting crops.

***Keywords:*** *Nematodes, Meloidogyne sp, Heteroderasp, Chemical and Non chemical, IPM.*

# Effect of Industrialization on Mental Health: An Empirical Study

**Kanchan Singh**

*Dept. of Psychology, Magadh Mahila College, Patna*

Industrialization is very prominent factor for economic growth in every country. Most of the time governments are highly desired to promote industries to generate Jobs and increase revenue. But it is a natural phenomenon that every thing has some bright as well as some dark side. Currently, world has witnessed numerous international summits focusing mainly to reduce carbon foot print. The recklessly setup of industries not only harming the global climate but became an agent of various health issues as well as mental health problem. There are many reports and studies whichever discussed the impact of industrialization and urbanization upon physical heath but very less upon mental health. The present paper is basically an attempt to provide a glance to this problem. The study was based upon the slum dwellers living very close near to Tupudanaindustrial area Ranchi, Jharkhand. The sample design was based upon 2x2 factorial research design. The factors were divided upon two strata of genderand age. Each gender has been divided in two age group 20-35 (young age group) and 36-50 (old age group). To make a compare or control group a same size of sample was taken from Sakhuabagan slum Ranchi. To measure the mental health, hindi adaptation of GHQ-12 was used. The questionnaire consists 12 questions whose effectively measures different aspects of mental health issues. The study very clearly presents a notable difference among two slum dweller's mental health status. The people who live near industrial area slum have shown 76% of respondent suffering from high mental distress and poor mental health, whereas among non-industrial slum dwellers only 37% have shown poor mental health. Women sample group has been found more mentally distressed (64%) than male sample group (33%) and old sample group have shown better mental (68%) health than young sample group (23%).

***Keywords:*** *Industrialization, Mental Health, Urbanization, Slum Dwellers.*

# Impact of Climate Change on Vegetation and Rising Health Issues among Grazers

**Rashmi Srivastava and Vinod Prasad**

*Dept. of Botany, Patna University, Bihar*

Jharkhand, a state of India is located at a latitude and longitude of $22^0$ 28'N- $25^0$ 30' N and $83^0$ 22' E- $37^0$ 40' E respectively, and have an altitude up to 1142m above msl. The annual temperature of Jharkhand is $26.78^0$C which is 0.81% higher than India's averages. It has been observed that over the decade there is an increasing trend in average annual maximum temperature of different cities of Jharkhand, $0.58^0$C, $0.47^0$C and $0.29^0$C in Ranchi Jamshedpur and Daltonganj respectively. Average precipitation observed here is 70.76 mm. between 1986-2018 average rainfall decreased at the rate of 13mm per decade. Tropical moist deciduous and tropical dry deciduous forests are the kind of vegetation that is found in Jharkhand with *Butea monosperma, Madhuca longifolia* etc as few dominating plant species. According to the report of global forest watch, Jharkhand has lost 5.62 kha of tree cover between 2001-2022, which is equivalent to 1% decrease in tree cover since 2000 and 2.79 Mt of $CO_2$ emission. There are 64 endemic plant species of Jharkhand belonging to different plant species that comes under threatened plant species. Climate change over the decades has resulted in increased average annual temperature, decrease in average rainfall and in turn reduce in vegetation of Jharkhand. The amount of $CO_2$ emission is increasing that again result in rising temperature. Grazers rely on local vegetation for their food and shelter which also provides health benefits to them. *Indigofera cassioides* is a plant species of family Fabaceaewhich according to local survey provide lipolytic effect to the feeders. When grazers feed on it, they burn their fat deposit which prepare them for summer. Eradication of*Indigofera cassioides* plant species may result in cardiovascular diseases among grazers. Also, there will be decrease in secretion of sex hormones and oogenesis. The size of the babies will reduce and they will become infertile. Eventually there will be extinction of some species which will disturb the food chain and whole ecosystem will be affected.

***Keywords:*** *Climate Change, Vegetation, Grazers, Indigofera cassioides. Lipolysis.*

# Emerging Constitutional Challenge of Climate Change: An Indian Perspective

**Pushpalata Kumari and Niraj Kumar**

*Dept. of Political Science, Magadh Mahila College, Patna*

This article investigates the crucial topic of climate change in India, centered on emerging constitutional challenges and potential legal solutions. Climate change is posing an imminent threat to constitutional rights, prompting a complete examination of the legal Landscape. This paper addresses India's susceptibilities, encompassing factors like its expansive population and diverse topography, along with the depletion of natural resources driven by urbanization, industrialization, and economic growth. It discusses current climate-related events, focusing on the devastating effects of heat waves, prolonged dry spells, and heavy rainfall on India's population and economy. It emphasizes the link between climate change and disasters such as hunger, loss of employment, and income disparities.The projected temperature increases by the 2040s is expected to have an adverse impact on agricultural production, resulting in food shortages and related health issues, particularly among disadvantaged people.Furthermore, the study investigates constitutional ways to address climate change, citing Article 21 of the Constitution, which acknowledges the right to a pollution-free environment as a component of the right to live with human dignity. The lack of specific legislation is explored, emphasizing the significance of existing regulations such as those adopted under Article 253, as well as the responsibility of state governments in designating 'air pollution control regions. It also dives into judicial remedies under public law, highlighting the court's jurisdiction to award damages against entities accountable for environmental degradation under Article 32. It also evaluates the scope and limitations of judicial interventions in resolving constitutional challenges posed by climate change.

***Keywords:*** *Climate Change, Judicial Action, Constitutional Rights, Environment, and Poverty.*

# Studies on Some Biochemical Changes in the Muscle of Eviscerated *Channa striatus* in Chilled and Super Chilled Storage Conditions during Summer and Winter Months

**Dinesh Kumar[1] and Ashok Kumar[2]**

[1]*P.G. Dept. of Zoology, J.P. University, Chapra, Bihar, India*

[2]*Dept. of Zoology, Ganga Singh College, Chapra, Bihar, India*

A comparative storage characteristics of iced (chilled) and super chilled (375 gm common salt +25 kg Ice + 12 kg fish) conditions has been studied for *Channa striatus* in eviscerated condition has been studied during winter & summer months. The antero-dorsal portions of muscles were used to determine some biochemical changes during selected days of storage till the fish becomes unacceptable for human consumption. A gradual increase has been observed in moisture, free fatty acid, soluble salt of total nitrogen and non volatile base nitrogen contents which have been recorded during flag days as the increases were found statistically significant 10th to 12th days in chilled and on 14th to 16th days in super chilled conditions during summer and on 14th to 16th day in chilled and on 17th to 19th day in super chilled conditions during winter months. Whereas, a gradual decrease has been observed in total protein, glycogen, fat, non protein nitrogen & á-amino nitrogen contents with maximum significant decreases on 15th to 16th day in chilled and on 18th & 19th day in super chilled conditions during winter months. However, the ash content showed insignificant fluctuations during both seasons. The increase in moisture content may be due to absorption of ice-melt water by muscle and fluctuations in ash content may be to leaching to the salt present in ash content. The decrease in total protein content might be due to the breakdown of amino acids. The decrease in glycogen content shows gradual decomposition and oxidised to lactic acid which controls duration of contraction of muscle during rigor mortis. An initial increase followed by decrease in fat content with significant increase in free fatty acid content during flag days showed a relationship in between them which might be due to hydrolysis of fat due to low temperature while the decrease in non protein nitrogen may be due to breakdown of protein and/or utilization of its fragments by bacteria. The initial low value followed by a significant increase may be due to the effect of rigor mortis and followed by significant increase may be related to gradual spoilage of the fish. The initial increase followed by significant decrease in á-amino nitrogen content reflects to maintain good flavour & texture but subsequent decrease may be related to spoilage of fish. A significant increase in non volatile base nitrogen content in flag days reflects that the fish were almost unacceptable condition. Thus the super chilled & chilled storage condition showed an increase in shelf-life of the eviscerated fish during both summer & winter months than chilled (iced) storage condition.

# Physico-Chemical Parameters of Kabar Lake, Begesarai, Bihar

**Rupa Dey**

*Dept. of Botany, S M College, Bhagalpur, Bihar*

Water is one of the most in shaping the land and regulating the climate. Kabar lake is formed by meandering of river Budhi Gandak. It lies about 22km north west of the Begusarai town. It is situated at latitude of 25° 35' N and longitude 86° 10 E. Kabar is an important wetland in Begusarai. Due to shallow depth, the water area varies from a maximum of 15 $km^2$duringmonsoon, post-monsoon to a minimum of 6 $km^2$ and less during summer. Hence an attempthas been made to study physico –chemical variables of water (pH, DO, TDS, Chloride, PO4-P) during summer, monsoon and winter (2018-19).

Turbidity of water was higher during rainy season 41.5NTU. PH of Kabar wetland fluctuatedwithin a narrow range 6.7-8.6. DO concentration was higher during winter 12.4mg/l due tohigher photosynthetic activityof phytoplanktonic algae.TDS range from 958mg/l duringsummer and 189.2mg/l during winter, higher concentration of chloride was observed duringsummer. PO4-P was high during summer 0.131mg/l, phosphates are the requisite factor for phyto plankton growth. It play akeyrolein the eutrophication ofanysystem.

From the results of physico-chemical variables of water, it is obvious that pH of water wasacidic to slightly alkaline. Higher values of chloride during summer might be attributed to decomposition of organic matter at high temperature. Phosphate-phosphorus content in range of medium to high indicate the presence of higher amount of algalbiomass.

***Keywords:*** *Kabarlake, Requisite Factor,Eutrophication.*

# Impact of Arsenic ($As^{3+}$ and $As^{5+}$) Toxicity on *Pisum sativum* in Relation to Its Growth, Metabolism and Physiology

**Saumya Srivastava**

*Dept. of Botany, Patna University, Bihar*

Arsenic(As) toxicity is one of the major health issues throughout the world. It is a metalloid listed in group VA of the periodic chart. It exists in nature in the oxidation states +V (arsenate), +III (arsenite), 0 (arsenic), and -III (arsine). Soils contain both organic and inorganic arsenic species. Inorganic As species include arsenite and arsenate, which are the most abundant forms found in the environment.In the present study, a pot experiment was conducted to investigate the effect of arsenic on growth of pea.Pea (*Pisum sativum* L. cv Arkil) plants were grown in re-fined sand and subjected to different doses of arsenic (III and V forms). A total of 5 treatments were maintained i.e. control, 0.05 mM $As^{3+}$, 0.1 mM $As^{3+}$, 0.05 mM $As^{5+}$, 0.1 mM $As^{5+}$. Among both forms of As (3+ and 5+) tested against pea, $As^{3+}$ clearly proved to be more toxic for growth and metabolism of plant. All the parameters tested under the purview of $As^{3+}$ showed more deleterious effect. However, at many places 0.05 mM $As^{5+}$ showed more toxicity than 0.05 mM $As^{3+}$ stating that higher doses of $As^{5+}$ are also very harmful for plants. After 3-4 days of metal exposure, depression in growth was apparent in nearly all As treated plants. The symptoms of As stress appeared on leaves as chlorosis, which gradually turned necrotic. Shoot and root length, fresh and dry weight, yield parameters all decreased on As application. Growth reduction was more in higher doses of As application (both As 3+ and 5+). Arsenic also caused a reduction of the photosynthetic pigments, and protein content. Malondialdehyde content (an indicator of lipid peroxidation) followed the order 0.1 mM $As^{3+}$> 0.1 mM $As^{5+}$> 0.05 mM $As^{5+}$> 0.05 mM $As^{3+}$> control.Anti-oxidative enzymes like, catalase, peroxidase, and superoxide dismutase increased at all applied As doses.

***Keywords:*** *Arsenic; Pea; Photosynthetic Pigments; Malondialdehyde; Anti-Oxidative Enzymes.*

# Carcinogenic Pollutants in Ground Water of India

**Zeba Parween**

*Dept. of Chemistry, Magadh Mahila College, Patna*

In India and other parts of the world,groundwater resources have been contaminated by human activities, thus, imparting an adverse effect on drinking water quality. Presence of heavy metals, pesticides, radioactive compounds etc. in drinking water possess asignificant health risk.Arsenic, lead, cadmium,radon, and pesticides are the primarilydetected carcinogenic contaminants present in the Indian water. Groundwater is a sustainable source for drinking water in India and other countries.Untreated wastewaters from industries, excessive applications of pest control, chemical and geological activities are the important causes for the contamination of the portable groundwater. Zinc, copper,lead,mercury, iron, selenium and chromium are often detected in industrial wastewater which originate from metal plating mining activities, smelting, battery manufacturing, petroleum refining, pesticides, pigment manufacturing, printing photographic industries etc.Groundwater can becontaminated either geologically or anthropogenically. Now a days pollutions due to heavy metals contaminate is one of the most important environmental concerns due to their high toxicities and adverse impact on human health.According to WHO report published in 2006, drinking of contaminated water is responsible for 80% of all the diseases and deaths of the developing countries. Hence, it is the most urgent need of the society and government to supply fresh and uncontaminated water to the public.

***Keywords:*** *Contamination, Heavy metals, Anthropogenically.*

# Soil Texture Shifts Due to Climate Change: Unravelling Implications for Food Chain Disruption and Public Health Concerns

**Shrikant Kumar[1], Puspaa Sinha[2]**

*[1]P.G. Dept. of Biotechnology, Magadh University, Bodh-Gaya*

*[2]Dept. of Botany, S.G.G.S College , Patna*

Climate change is significantly altering the composition and texture of soil, presenting dire consequences for the food chain and human health. This abstract explores the correlation between climate change-induced shifts in soil texture and the ensuing disruptions in the food chain, contributing to a surge in food-related illnesses. Rising temperatures, erratic precipitation patterns, and extreme weather events are altering soil composition, affecting its physical, chemical, and biological properties. Such changes in soil texture directly impact crop growth, nutrient availability, and microbial diversity, ultimately compromising food quality and safety. The disruption in soil texture affects the abundance and diversity of beneficial soil organisms crucial for nutrient cycling and maintaining soil structure. Reduced soil stability and fertility not only diminish crop yields but also lead to increased susceptibility to pests and diseases, necessitating higher chemical inputs for agriculture. These alterations in the food chain contribute to the proliferation of food-related illnesses. Diminished nutritional quality of crops, elevated levels of contaminants, and the introduction of new pathogens into the food chain pose significant health risks, causing a surge in foodborne diseases and related health issues among consumers. Understanding the intricate relationship between climate change-induced soil texture changes, disruptions in the food chain, and subsequent impacts on human health is crucial for implementing adaptive measures, sustainable agricultural practices, and resilient food systems to mitigate these adverse effects. Data from various studies underscore the urgency of concerted efforts to address the multifaceted challenges posed by climate change to ensure food security and public health in the face of evolving environmental conditions.

***Keywords:*** *Climate Change, Food Chain, Agriculture, Human Health.*

# Effect of Climate Change on Physical and Mental Health in Older Person

**Sneha Agrawal**

*Dept. of Psychology, Magadh Mahila College, Patna*

Climate change presents a fundamental threat to human health especially the older people.The proportion of people over 65 years of age is expected to double in just 50 years, reaching 2 billion in 2050. The adverse effects of climate change have a vast range of detrimental impacts on older people physical and mental health. The response of older people to the effects of climate change is conditioned by the changes that occur in the body because of the physiological ageing process. Their bodies are less able to compensate as their immune system become weak to cope the effects of climate change leading to certain environmental hazards, such as air pollution, water pollution, heat waves, cold waves etc. Older people can also be more at risk because of social and economic factors, such as fixed incomes, living alone, lack of support networks and dependence on others for medical care and assistance. Due to this older people face many climate change related hazards such as heat Illnesses, respiratory Illnesses, water-related illnesses, injuries and deaths, infectious diseases and negative effects on their mental health.Older people are concerned about their safety and fear, leaving their homes during events of climate change such as heat waves, cold waves increases their social isolation and risk of health effect.Extreme weather events like hurricanes, floods, and wildfires can cause emotional trauma. Older people who have cognitive disabilities like dementia can have a harder time responding to and coping with these events.Both short-term and long-term interventions are required to enhance the older person's adaptive capacity.At an individual level technology can be usedand special education is needed to teach older people about the risks associated with climate change. At a community and population level, preparations for extreme weather events such as evacuation plans are of paramount importance. At policy level "climate gerontology", an emerging field looking at the interaction of climate change and challenges experienced by older people, should be prioritized as a research field. Insight into specific needs and vulnerabilities of the older population allows families, government, NGOs and care takers to pre-empt and strategically plan for events that would otherwise lead to worse consequences.

***Keywords:*** *Climate Gerontology, Health, Older People, Coping.*

# Climate Change and Health

**Swati**

*Dept. of Zoology, Magadh Mahila College, Patna*

Climate impacts are not only caused by extreme events, but also by slow-onset climate trends. These effects contribute directly to humanitarian emergencies and they are increasing in scale, frequency and intensity day by day. It's a matter of concern because it presents a fundamental threat to human health, ultimately leading to illness & death. Frequent climatic changes like storm, extreme heat, floods, droughts, wildfires etc affects health both directly & indirectly e.g. increased risk of deaths, non-communicable diseases, emergence & spread of infectious diseases and other health emergencies. It's exposure to people and communities, energy system, water and food systems etc is causing injury and mortality, heat related illness, respiratory illness, water-bornediseases, zoonoses, vector-borne diseases, malnutrition and most importantly, mental and psychosocial health.

WHO data indicates 2 billion people lack safe drinking water & 600 million suffer from food borne illness annually. In 2020, 770 million faced hunger, predominantly in Africa & Asia. Also, heat-related deaths among those over 65 have rise by 70% in 2 decades. According to a survey, over 930 million people, around 12% of the world's population spend at least 10% of their household budget to pay for healthcare. Clinical data showing most common health effects include Chronic diseases(77%), increased allergic symptoms(58%), injuries due to severe weather(57%) and heat-related effects(48%). Research shows that 3.6 billion people already live in areas highly prone to climate change. Between 2030 & 2050, climate change is expected to cause approx. 2,50,000 additional deaths per year.

The negative impact of climate change on health can be reversed by policy, regulatory & institutional reforms. Educational support & capacity building are essential to ensure national ownership of climate and health programmes. Initiatives like promoting actions to reduce carbon emissions, building climate-resilient and environmentally sustainable health systems, awareness programmes, proper monitoring etc. must be done. UN Climate Change Conference COP26 are supporting countries in developing climate-resilient and low carbon sustainable health systems.

# Stochastic and Chaotic Analysis of Time Series Data of Temperature: A Comparative Study

**Kamad Nath Shandilya[1] , Satish Kumar[2] , Supriya Rani[1] , Kumari Sammy[1] and Sumita Singh[1]**

[1]*Dept. of Physics, Patna University, Bihar*

[2]*Dept. of Physics, IIT Patna, Bihar India*

There are two popular methods for analyzing time series data of a climate parameter, stochastic and chaotic. Most of the meteorological stations in India uses conventional stochastic approach, especially for forecasting. As many studies have substantiated climate as chaotic system and chaos can be demonstrated by time series data of a single parameter, so, chaotic analysis is vital.In this theoretical study, we compared the conventional stochastic approach as well as advanced chaotic approach to analyze the time series data of temperature. We used Delhi's temperature data from 1995 to 2019 during dry season. We used logistic map as tool for chaotic analysis and ARIMA (Auto Regressive Integrated Moving Average) for stochastic analysis. The result in this study showed chaotic approach is more elegant specially in deciding the attractor values of the temperature but the stochastic approach deviates much from the pattern. This study showed that chaotic approach could be used to analyze a climate parameter for more reliable result.

***Keywords:*** *Attractor, Chaotic System and Conventional Stochastic Approach,*

# Climate Change and Health

**Poornima Krishna**

*Magadh Mahila College, Patna, Bihar*

Health is inextricably linked to climate change. It is important for peoples to understand this relationship in order to maintain one's well being. Climate change affect health through range of pathways , for example as a result of increased frequency and intensity of heat waves disease incidence and spread , air quality, extreme events like increased floods and droughts, reduction in cold related deaths , also affects health badly for example mental health, malnutrition , changes in the distribution of vector- borne diseases and effects on the disasters.

India is a large developing country, with the Great Himalayas, the world's third largest ice mass in the north, 7500 km long, and densely populated coast line in the south. Nearly 700 million of her over one billion population living in rural areas directly depends on climate-sensitive sectors (agriculture, forests, and fisheries) and natural resources (such as water, biodiversity, mangroves, coastal zones, grasslands) for their subsistence and livelihoods . Over the past few decades, it has become increasingly apparent that human actions are changing atmospheric composition, thereby causing global climate change.[1] Humankind's activities are altering the world's climate by increasing the atmospheric concentration of energy-trapping gases (greenhouse gases *GHGs+), thereby amplifying the natural "greenhouse effect" that makes the Earth habitable. According to the Fourth Assessment Report (2007)[1] of the Intergovernmental Panel on Climate Change (IPCC), the observed effects include:

Studies have shown that, the global average surface temperature has increased by approximately 0.65°C over the last 50 years.Eleven of the last 12 years (1995–2006) rank among the 12 warmest years since records began in the 1850s.

The rates of warming and of sea level rise have accelerated in recent decades.

Many areas, particularly mid- to high-latitude countries, have experienced increases in precipitation and there has been a general increase in the frequency of extreme rainfall.

Some ways to prevent climate change include:

Making policies and agreements on climate change Implementing projects on clean energy Creating social awareness on climate change Prohibiting deforestation and cutting down trees Conducting capacity building programs on climate change Keeping the surroundings clean This paper focused on the concept of climatic disasters occurring slowly in the environment and its impact on human.

# Climate Change and Slum People

Ritu Rani

*Magadh Mahila College, Patna*

The health of populations living in urban slum against the backdrop of increasing risk and disaster brought on by climate change is a key development issue of the twenty first Century.

Climate change multiply the vulnerability of poor and slum people by adversely affecting their health and livelihood and jeopardizing growth opportunities.Variation in climate and change cause death and disease through occurences such as heatwaves, floods and droughts. Besides diseases that are highly sensitive to changing temperatures and precipitation such as vector-borne diseases and other major killers like malnutritionand diarrhoea that already contribute to global burden of disease.

The slum people often have few choices available to adopt to variations in natural conditions: they may not able to harvest water, move to less stressed regions or provide disaster - resilient infrastructures. In urban slum it was found that when water started pouring in, Some families built bamboo platform and shifted their belonging on it. In cases, families raised their beds by putting the bricks under it homes, if roof were sturdier. The situation from urban slum is dismal due to the overcrowding and lack of access to basic services. such as water and sanitation. Consequences of these living conditions include stress due to crowding insecurity due to lack of housing and land tenure. These condition worsen during floods and disasters.

The absence of clear and forwarded looking policies on urbanization and urban slum settlements discourages long-term thinking and interventions to improve term prospects of people who live who live in slum.

# GROUP - C

# (GLOBAL WARMING AND CHANGING ECOSYSTEM)

# Technological Innovations For Climate Change Mitigation and Global Warming

**Rachana Bharati**

*Patliputra University, Patna, Bihar*

Greenhouse gases like Co2, CH4, N20 and CFcs are increasing in the lower atmosphereTheir increasing level are affecting the global climate and this phenomenonisnowrecognised as climate change. Climate change has been recognised as the foremostenvironmental problem of the 21 st century. It is predicted to lead to adverse, irreversibleimpact on earth & the ecosystem as a whole. Climate change has been implicatedonmass mortalities of many aquatic species including plants, Fish, Crabs and mammals. Itmay affect human health in many ways including heat stroke, air pollution, foodscarcity, spread of infectious diseases and intensity of disease outbreaks. Thus Global climatechange has been a major issue that has credited global concern & this hasbeenhighlighted by awarding the 2007 Nobel Peace prize for this cause, ontheIntergovernmental panel on climate change (IPCC) & Albert Arnold (Al) Gore Jr, FormerAmerican Vice-President Jointly. The Present paper focuses on different aspectsofglobal climate change, the cause, Predicted impacts, changing ecosystems, Probablesteps for mitigation and bringing global awareness on the issue. Their effects are:- CO2Fertilisation, Greenhouse effects global Warming, depletion of ozone layer inthestratosphere. CO2, CH4, water vapour are also known as greenhouse of gasesthatallows sunlight to pass through but prevents heat go back into atmosphere. Thisiscalled Greenhouse effect'. It is the main cause of global warming.

# Climate Change and Its Impact on Agriculture in Bihar

**Vandana Kumari, Sneha and Sweta Kumari**

*Dept. of Botany, Magadh Mahila College, Patna, Bihar*

Climate change means a long term shift in temperature and weather pattern that may be natural or a result of anthropogenic activities such as carbon emission, deforestation or over-exploitation of bio-reserve or resources.Global climate change has emerged as one of the major threats to agriculture in recent times. Climate is changing at a faster rate resulting in increase in temperature melting of ice, riseinsea level, extreme weather conditions, etc. which directly and indirectly affects agriculture. Agriculture and climate change are inter-related. Crop productivity, irrigation demand, soil fertility, incidence of diseases and weeds, etc. are affected significantly as the climate change.Climate change threatens to enhance the potential for soil erosion, reduce soil fertility and lower agriculture productivity thus enhancing the severity of challenges that we are facing in 21stcentury. Monsoon season determines who will thrive and whose crop will suffer and climate change is interfering with those weather patterns. This year, the Monsoon season in Bihar was delayed, which resulted in an enormous deficit of water needed for rice transplantation, leaving vast area of land uncultivated. Irregular availability of water is going to be the biggest hazard in future. In case of increased water supply the piedmont zone and river lowlands are threatened by erosion and sedimentation while in case of decreased water supply, the upland surface is endangered by salinization, desertification and drying up of aquifers . Decline in food production will be the major problem. According to an IIT study, 14 out of 50 most vulnerable districts to climate change in India are in Bihar. Sudden drop in winter temperatures and extended dry spells during the Monsoon have affected farm yields in Bihar. The rice sapling transplantation was delayed by over a month this Kharif (summer) season due to late arrival of Monsoon , followed by poor rainfall along with high temperature and a long dry spell from Mid-June to third week of July, when normal rainfall is expected. Experts emphasise that Bihar urgently needs an action plan for Climate Change.

***Keywords:*** *Anthropogenic, Aquifers, Kharif, Transplantation.*

# Impact of Global Warming : A Comprehensive Study of Climatic Shifts, Ecosystem Dynamics and Societal Challenges in the 21st Century

**Raskey Jahan, Eram Fatima and Aishwani Ishu**

*Dept. of Botany Magadh Mahila College, Patna, Bihar*

This study delves into the extensive study of global warming, a scientific domain with a longstanding history of exploration. The global landscape, including India, has borne witness to a surge in natural calamities and their consequential impacts attributed to global warming over recent years. Commonly, climate change is used interchangeably to describe this phenomenon, which has notably and adversely affected both terrestrial and marine ecosystems. The consequential effects include the escalating global temperature, heightened frequency of extreme weather events, and rising sea levels, underscoring the urgent need for global initiatives to mitigate and adapt to these changes. Simultaneously, ecosystems emerge as pivotal players in this complex interplay, capable of both exacerbating and alleviating the challenges posed by global warming.The World Health Organization identifies climate change as the preeminent threat to global health in the 21st century, emphasizing the escalating risks societies and ecosystems face without concerted efforts to limit warming. Human activities, particularly the burning of fossil fuels, are identified as the primary contributors to the current rapid rise in global average temperature. Coastal ecosystems, once viewing temperature increases with slight to moderate concern, now confront heightened risks, especially evident in the Gangetic plains where global warming has transformed into a curse, exacerbating flooding issues. The research incorporates estimates indicating that 45.24% of Bihar state's area is flood-prone. The IPCC Sixth Assessment Report projects that global warming is very likely to reach from 1.0! to 1.8! by the late 21st century under the greenhouse emission scenario. In an intermediate scenario global warming would reach from 2.1! to 3.5! and from 2.3! to 5.7! under the very high greenhouse emissions scenario.The annual mean temperature in Bihar is increasing by 0.0047°C/ year.The state's rainfall is decreasing by 1.974 mm/year.The state's reference crop evapotranspiration is increasing by 0.07248 mm/year.Until now, the impact of global warming on ecosystems and biodiversity has been comparatively limited when contrasted with direct human activities like overharvesting and alterations in land use that lead to habitat loss.Failure to prevent it promptly could result in undesirable consequences for our world.

***Keywords:*** *Global Temperature Rise, Climate Change, Coastal Ecosystem, Ecosystem Dynamics.*

# Global Warming: Problem and Its Solutions

**Sonu Rani**

*Dept. of Physics, Magadh Mahila College, Patna University, Patna, Bihar, India*

Many scientists, engineers, and ecologists are expressing serious concerns on the effects of global climate change. Combustion of carbon dioxide, nitrogen oxides and methane, releases gases that are linked to global warming. Deforestation contributes to the rising temperatures. The greatest threat to Earth's climate has always been the possibility of global warming. However, the majority of people are ignorant of climate change and do not realize that it will pose a serious threat in the years to come. Most people are unaware that global warming is occurring right now and that some of its withering effects are already being seen. Ecosystems have suffered and will continue to suffer from it, upsetting the balance of the natural world. Owing to the dangerous effects of global warming, several solutions need to be created. In addition to explaining global warming and outlining its causes and dangerous effects, the article provides several solutions to this urgent problem. Even if some of the catastrophic impacts of global warming are already being felt, the majority of people are ignorantof what is happening right now. Important changes are being made to ecosystems, which could upset the natural balance. Owing to the dangerous effects of climate change, several solutions ought to be created. The article addresses the urgent issue of global warming, including its causes, effects, and potential solutions. In particular, assets such as solar, wind, hydro, geothermal, and biomass would need to be continuously monitored. Using and locating renewable energy sources is one way to reduce the rate of global warming.

***Keywords:*** *Deforestation, Climate, Effects, Ecosystem, Renewable Energy.*

# Global Warming: A Threat to Human Life

**Archana Jaiswal**

*Dept. of English, Magadh Mahila College, Patna*

"Panchtatava Se Bnasharira,
Kshiti, Jal Pawak Gagansamira"

Body is made up of five elements and if these five elements get contaminated, life gets contaminated. Global warming has emerged as a menace to life with its ghastly consequences.

Present paper aims to focus on how global warming is a threat to life.Global warming is extreme heatingof the Globe. It is the long term heating of Earth's surface due to industrial revolution irrational human activities, primarily fossil fuel burning, which increases heat trapping green house gases, resulting in excessive heat which is making life impossible on this habitat.

Man who feels proud of this natural habitat ,is now constantly being threatened by several health hazards that are nothing but the outcome of the drastic increase in the temperature of the heavenly abode of human beings. Though global warming has a devastating impact on the whole biodiversity ,it has a scaring impact on human health .If Ozone layer that functions as an armour of our habitat ,is pierced through, what safety can be hoped of ? Actually, global warming has made a hole in the Ozone layer and the whole security of earth has been threatened , threatening life. Apart from the other inhabitants , human life is also in peril.It is triggeringso many diseases and aggravating the adverse conditions inviting diseases and health .This paper will throw light on the cause and effects of Global warming on the health of human beings.

***Keywords:*** *Panchtatve, Global, Industrial Revolution ,Hazards Menace, Habitat.*

# GROUP - D

# (CLIMATE CHANGE ADAPTATION AND RESILIENCE)

# Investigation of Climate Resilient Fungi from Paddy Field Of Naubatpur, Patna

**Shruti Kaushik[1], Aakansha Raj [2] and Surendra Kumar Prasad [1]**

[1]*Dept. of Botany, Patna University, Bihar*

[2] *Microbial and Molecular Genetics Laboratory, Patna University, Bihar*

The mycofloral constitution of soil has an immense impact upon the health of soil and affects crop productivity. In this study, attempt has been made to isolate and identify the mycofloral organization of paddy field at two different sites of Naubatpur. The soil fungi were isolated as per soil plate dilution technique and identified on the basis of their morphology with the help of relevant literature and manuals of fungi. Different parameters such as pH, temperature, carbon and nitrogen sources were optimized for selected fungi. A total of 16 different fungal species were isolated. The most optimum pH range for fungal growth was 6.0-7.0 level and the most optimum temperature for fungal growth was 28°C-32°C. Some of the fungal species namely, *Aspergillus*and *Rhizomucor*were found to show their optimum growth at 50°C and pH range 5.0 suggesting that these fungi could grow in thermophillic condition as well as tolerate acidic condition as well. These fungi could be used for industrial purpose for isolating several enzymes for industrial use.

***Keywords:*** *Soil, Mycoflora, Isolation.*

# Climate Change Adaptations And Resilience

**Anita Sharma**

*Dept. of Chemistry, Kolhan University, Chaibasa, Jharkhand, India*

The critical issues of climate change, emphasizing the concepts of resilience and adaptation are reviewed. Highlights the alarming increase in global CO2 emissions and the concentration of CO2 in the atmosphere. The G20's recent focus on renewable energy rather than greenhouse gas reduction is discussed, along with practical solutions for developing nations, including legal frameworks and collaboration with domestic institutions. The importance of community-level adaptations, such as disaster plans and air quality protection, is underscored. The path to resilience involves strategic measures like infrastructure reinforcement, afforestation, and early warning systems. The global policies, such as the Paris Agreement and India's National Action Plan on Climate Change, aligning with UNFCCC and the 2030 Agenda are described. The conclusion emphasizes the necessity of a collaborative, proactive approach to address climate change challenges and build a sustainable future.

***Keywords:*** *Disaster, Emission, Renewable, Reinforcements, Infrastructure.*

# Environmental Ethics: Think and Act Locally as well as Globally

**Tanya Sharma**

*Dept. of Economics, Magadh Mahila College, Patna*

Ethics helps us to solve many environmental problems and teaches us what to do when faced with crucial situation.Adjusting the relationship between humans and nature isone of the mostfundamental issues we face and must deal with today. With the increasingdeterioration of ecological systems on which human beings rely and theaggravation of theenvironmental crisis, human beings have realized that wecannot rely on economic and judicialmethods alone to solve the problems ofenvironmental pollution and ecological imbalances; wemust also appeal to humanbeings' limitless internal ethical resources. Only after we haveadopted anappropriate attitude towards nature and have established a new ethical relationshipbetween human beings and nature will we be able to love and respect natureautomatically aswell as conscientiously; and only with the guidance of suchlove and respect can wesuccessfully deal with the issues of environmentalpollution and ecological imbalances.

***Keywords:*** *Ecological Systems, Environmental Crisis, Human Beings, Ecological Imbalances, Environmental Pollution.*

# Nature's Harmony in Sanskrit Literature

**Kiran Mala**

*Dept. of Sanskrit, Magadh Mahila College, Patna*

**&6B* 8.> 5>*@ &65>*@ 8.K9C& :|**
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[Dash koop sama vapi Dashvapi samo hrida.
Dash hrida samh putro Dashputro samo dramuh.]

Today the entire human race is surrounded by natural disasters. Every day some natural disaster is happening. Life on earth is in danger. The entire human race is worried about the destructive effects of this angry nature that the world has to face. In Sanskrit the word nature means Prakriti referring to environment of all living beings which is a matter of great importance. The description of nature that is found in Ancient Sanskrit Literature reflects the ancient Indian society's sensitivity towards nature. Today, the polluted environment has become a serious problem for us. The entire human race will have to do its bit to find a solution. There is no solution to this problem unless there is a change in human consumerism. It worth mentioning here that we are facing a global crisis today. In the ancient times man was aware of the indispensable relation between nature and himself. He protected nature and cherished nature so that nature might protect and nourish the human. This mutual dependence was highlighted in Sanskrit literature. Our ancient Poets have minutely observed nature and have given literary touch to their works when they depict human feeling towards nature. Although their natural awareness is not always clear, a deep study of their works reveals the complete knowledge of depicting harmony with nature. The great poet Kalidas is describing the various aspect of nature. In his literary world, human being becomes perfect when they are properly related to nature. Nature becomes acceptable to human when it is interpreted and understood in proper manner with love, respect and compassion. In this context, the contribution of Kalidas's poetry are remarkable. He was master of this field. He was a profound lover and knee observer of nature. The literature of Kalidas Meghdutm, Abhigyan shakuntlam, Raghuvansham, Ritusamhara throw the light on flora and fauna that greatly contributed to the wealth of the forest of his time.

***Keywords:*** *Nature, Harmony, Kalidas, Human Beings.*

# GROUP - E
# (GREEN TECHNOLOGY)

## Role of *Azotobacter*as Viable Promoter of Green Technology

**Nivedita Sharma[1] and Pushpanjali Khare[2]**

[1]*Dept. of Botany, Patna University, Bihar*

[2]*Dept. of Botany, Magadh Mahila College, Patna*

Green Technology is the application of science and technology to develop eco-friendly products & services that protect our environment and enhance crop productivity towards sustainable future.Biofertilizer is agronomically valuable productdue to its eco-friendly & cost-effective nature. It upgrades yield and productivity of crop without disturbing the agro-ecosystem. Plant growth promoting rhizobacteria (PGPR) are potential soil bacteria that colonise rhizospheric region of crop field. These are natural biofertilizer due to their multifarious PGP attributes. The study of rhizospheric soil of rice fields of Aurangabad (Bihar) showed positive result in Indole Acetic Acid (IAA) production by the isolates obtained. Out of 8 isolates of *Klebsiella*, *Bacillus* and *Azotobacter* species, 2 isolates exhibited efficient IAA producing ability. *Azotobactertrapocalis* was identified as highly IAA producing rhizobacteria (6.8µg\ml) where as *Azotobactertropicus*yield 4.1 µg\ml IAA. These two isolates hold significant promise for revolutionizing the commercial agricultural sector by enhancing crop productivity, natural resource utilization, diminishing nutrient runoff and promote sustainable agriculture and development.

***Keywords:*** *Biofertilizer, PGPR, IAA.*

## Using Antagonistic Fungi to Biological Control of Citrus Nematode (*Tylenchulussemipenetrans*)

**Sweta Kumari and Shivanand Singh**

*B.R.A Bihar University, Muzaffarpur*

To identify antagonistic fungi of citrus nematode (Tylenchulussemipenetrans) in North Bihar. Soil and root samples collected from infested orchards. Juveniles, eggs, females extracted from soil and roots. To isolate the antagonistic fungi, suspensions of eggs and juveniles cultured separately on water containing streptomycin. Eggs or female fragments purified on W.A. and transferred to PDA plates for identification. The identified fungi are paecilomyceslilacinus, Fusarium oxyporum, Acremonium strictum, Fusarium solani. These fungi are evaluated in vitro for their parasitism of egg hatch and juvenile mortality. All isolated fungi parasitized Tylenchulussemipenetrans eggs, inhibiting egg hatch and killed juveniles. Among them, Paecilomyceslilacinus and Acremonium strictum are the most efficient and parasitized 80.24 and 71.16 % of eggs 5 days after inoculation, respectively. The highest percentage of second-stage juvenile (J2) mortality (50.26 %) observed in samples treated with Acremonium strictum.

***Keywords:*** *Antagonistic, Orchard, Citrus Nematode.*

# Smart Wearables Technologies in Construction: Improving Safety, Productivity and Collaboration

**Ajay Kumar Sinha[1] and Dinesh Kumar[2]**

[1]*National Institute of Construction Management and Research, Hyderabad, India*

[2]*Dept. of Geology, Patna Science College, Bihar, India*

The construction sector has witnessed a ground-breaking transformation due to the incorporation of wearable smart technologies. These cutting-edge devices have been designed to enhance collaboration, efficiency, and security within construction sites. This study explores the state of adoption of smart wearable technologies in the construction industry today, emphasizing their uses, advantages, and future potential. This study explores the use of wearable technology—such as augmented reality (AR) glasses, exoskeletons, smart helmets, and biometric devices—and its effects on construction site operations. The objective of the research is to provide a thorough knowledge of how smart wearables could transform the construction sector through a review of the literature, case studies, and technological advancements. Nowadays, the construction industry encounters numerous obstacles, such as safety concerns, scarcity of labour, and the imperative to enhance efficiency.The incorporation of smart wearable technologies can help resolve these issues by providing real-time data, improving communication, and enhancing worker safety.

Augmented Reality (AR) Glasses increase accuracy in jobs like planning and design by providing construction workers access to real-time data, 3D models, and visual overlays.Exoskeletons enhance the physical capability of construction workers to perform their jobs and reduce their risk of injury and fatigue.Smart helmets are designed to improve safety and communication on construction sites by incorporating technologies like sensors, communication systems, and head-up displays.Biometric wearable devices, including fitness trackers and health monitors, are currently employed to oversee the health and well-being of employees.

A smart wearable device provides real-time hazard alerts, monitors vital signs, and promotes adherence to safety protocols.Exoskeletons and augmented reality glasses promote worker productivity on construction sites by lowering physical strain and facilitating information access.In smart helmets, communication tools facilitate seamless collaboration and coordination among construction workers.

In future,with the integration of wearable technologies with Building Information Modelling (BIM) systems, construction processes could be streamlined and project outcomes could be improved.Wearable technology may become more predictive as a result of Artificial Intelligence(AI) algorithms being integrated into it, allowing for proactive risk management and decision-making.

To summarize, it can be stated that smart wearable technologies possess the capability to revolutionize the construction sector by tackling safety concerns, boosting productivity, and fostering collaboration. As the industry advances further, the integration of smart wearables can play a significant role in creating a construction environment that is not only safer and more efficient but also encourages collaboration among stakeholders.

***Keywords:*** *Smart Technologies, Construction Industry, Safety, Productivity, Collaboration.*

# Survey of *Trichoderma* spp. A Biocontrol Agent used as a Substitute of Chemical Control means of Plant Disease

**Hena Mahmood and Choudhary Sharfuddin**

*Dept. of Botany, Patna University, Bihar, India*

Plant pathogens are responsible for great losses in the field of agriculture. The use of chemical pesticides for the control of plant pathogens has done great damage to the environment. The replacement of these synthetic pesticides with pesticides derived from natural sources, which are eco-friendly, is necessary to prevent any further damage to the environment. Various fungi have been studied for their antagonistic activity against different phytopathogens. Among the fungi, *Trichoderma* spp. has shown a high potential to be used as a biocontrol agent and thus it can be used in green technologies. *Trichoderma* is a filamentous fungus commonly present in soil belonging to the division Ascomycota. The present work is concerned with the isolation of *Trichoderma* spp. from soil samples collected from different areas in Bihar, India so that its antagonistic activity can be tested against some fungal pathogens which infect the agricultural crops. 17soil samples were collected from different areas in Patna and Purnia districts. The soil samples were collected in sterile sample bags from an area 15 cm below the ground level. Two different culture media namely Potato Dextrose Agar and Czapek Dox Agar media were used for isolation and culturing of*Trichoderma* in the laboratory. The soil samples were diluted using Serial Dilution Method and were inoculated using Spread Plate technique. After incubation, growth of fungus was observed. The morphological characteristics of fungal colonies were studied on the basis of its colour, texture and growth pattern. Slides were prepared using lactophenol cotton blue staining method and they were observed under microscope. The microscopic structures were compared with the structures present in Barnett and Hunter manual for identification of fungi. *Aspergillus* and *Penicillium* were the most common fungi obtained from the soil samples. *Trichoderma* was isolated from 3 of the 17 samples. *Trichoderma* was identified on the basis of colony characteristics and microscopic structure. Yellowish green colonies of *Trichoderma* were observed showing concentric rings. The microscopic observation of *Trichoderma* showed highly branched conidiophores and dense conidia which were greenish.

***Keywords:*** *Pesticides, Environment, Green Technologies, Antagonistic Activity.*

# Green Technology for Sustainable Development

**Ashwini Kumar**

*Dept.of Chemistry, S.N.S. College, Muzaffarpur, Bihar*

Green technology is the application of the environmental science and technology for the development and application of products, equipment and systems to conserve the natural resources and environment, as well as to minimize the negative impacts on the environment from human activities. Green technology development must be sustainable. Conventional green technologies have been applied in the fields of water and wastewater treatment, air pollution control, environmental remediation, waste treatment and management, and energy conservation. For increasing populations to achieve sustainable living on this planet, conventional technologies may no longer able to tackle emerging environmental issues arising from wasteful energy policies, overuse of resources, water supply shortages, climate change, global warming and deforestation.From renewable energy sources and sustainable transportation to waste management and energy efficiency, green technology has the potential to revolutionize industries and create a cleaner, greener future for all. By investing in green technology, supporting government policies, and taking practical steps to reduce our environmental footprint, we can all contribute to a more sustainable world and help preserve our planet for generations to come.Advancement in science and technology has contributed to the development of emerging green technologies that might help to solve the environmental issues that we are facing. As we move towards technological advancement, we will be positively affected with the new economy.

***Keywords:*** *Environmental Issues, Waste Treatment, Deforestation.*

# Effect of Communication Delay in a Coordinated Control Virtual Power Plants (VPP) Model: A Case Study

**Smriti Jaiswal[1] and Dulal Chandra Das [2]**

*[1] Dept. of Science,Technology and Technical Education Department, Government Engineering College Lakhisarai, Bihar, India*

*[2] Dept. of Electrical Engineering, National Institute of Technology, Silchar, Assam, India*

Conventional power systems are based on the production of electrical energy, majorly from fossil fuels (coal, oil, and natural gas), with the overall efficiency of the energy conversion process as low (typically 30-40%). Due to energy security and climatechanges, there has been a shift towards non-conventional energy sources, which has given rise to new technologies and concepts like virtual power plants (VPP), distributed generation (DG), smart grids, and many more. The fast-paced integration of Distributed Energy Resources (DER) requires new research and innovation to overcome newly emerging issues in this regard. The idea of a virtual power plant (VPP) has evolved in recent literature to incorporate DGs and widen their distribution in electricity grids. It combines various small, medium, and large DG units with existing conventional power plants into a 'virtually single' generating facility. This work focuses on modeling a VPP with solar PV energy generation, a parabolic trough solar thermal system, an electric vehicle, and a conventional thermal power plant; and designing an appropriate control strategy for the same. Modern optimization tools like Grasshopper Optimization Algorithms (GOA), Salp Swarm Optimization (SSO), and Sine Cosine Algorithms (SCA), etc., have been investigated for the sake of obtaining the optimum coordinated control of VPP.PID controller performs better than PD, PI, and ID controller in terms of convergence of the objective function. Of the four distinct optimization algorithms investigated in this work, the Grasshopper Optimization Algorithm (GOA) performs the best as compared to the other candidate algorithms like PSO, SSA, and SCA. In any practical grid, it is of utmost importance to keep the frequency within tolerance limits to avoid repercussions of frequency deviation justifies the robustness of the model with the adopted control strategy.With increasing communication delay of the VPP, the overshoot and undershoots of time responses increase; thus, the system becomes more oscillatory and eventually becomes vulnerable to system stability. The fast, responsive nature of the adopted control strategy in the event of a steep rise or fall of load and the absence of solar PV power generation.As there have been some notable research and innovation in the domain of energy storage devices, incorporation of such elements into the present model will be a potential solution for further investigation.

***Keywords:*** *Virtual Power Plant, Non-Conventional Energy System, Communication Delay, Coordinated Control Strategy, Energy Management.*

# LSF Bioproduction of Lactic Acid Exposed to Ethidium Bromide

**Reena Kumari**

*Dept. of Chemistry, Magadh Mahila College, Patna, Bihar, India*

The global lactic acid market was values at USD 967.3 million in 2020 and it is Expected to reach USD 1185.4 million the end of 2027, at a CAGR of 2.5% during 2021-2027.The research report has incorporated the analysis of different factors that argument the market's growth. Lactic acid is one of the most important organic acid which is being Extensively uses around the globe in range of industrial and biotechnology applications from its very old history to date many methods have been introduced to improve the optimization of lactic acid to get highest yields of the product of industrial interests.

In serious consideration of the worldwide economic lactic acidconsumption issues there has been increasing research interest in the value of material origin, which are cheap,abundant and easily available all around the year. Recent trends Showed that lactic acid production through fermentation is advantageous over chemical due to the Environmental concerns of the modern world. The present work is summarised on the multi-step processing technologies if produce lactic acid,In the present Communication, the imapact of Ethidium bromide a chemical mutagen on lactic acid fermentation by Some lactic acid producing bacteria such as Lactobacillus Pentosus NCIM-2669, Lactobacillus Casei NCIM-2732, LactobacillushelveticusNCIM-2737, Lactobacillus plantarum NCIM-2592 has been Studied. The bacterial strain Lactobacillus casei NCIM-2732 has been found quite effective and good lactic acid producer and produced maximum lactic acid,i.e, 10.125 g/100ml which 18.559% higher in comparison to control fermentor flask i.e, 8.540 g/100ml or 6.0 X $10^{-5}$ M molar concentration pf EtBr. It has been found that production of lactic acid in the presence of EtBr at optimum molar concentration, i.e, 6.0 X $10^{-5}$M attains its best activity when 20% .molasses soluble (w/v) is allowed its ferment for 6 days of optimum incubation period at 34 $C^0$temperature by maintaining the pH value of the fermentation medium at 6.0 along with some other nutritions ingredients by the Lactobacillus casei NCIM-2732.

***Keywords:*** *liquids,Substrate fermentation, CAGR/compounded Annual growth Rate,Mutagen /EtBr, Lactic acid fermentation Lactobacillus Casei NCIM-2732.*

# A Pragmatic Approach to Eco Friendly Management of Mealy Bugs

**Abhishek Ranjan and Moti Lal Gupta**

*Dept. of Zoology, Patna University, Patna*

Mealy bugs are the destructive pests that affect agriculture, causing significant economic losses in crops such as fruits, vegetables, and ornamentals. Traditional methods of controlling mealy bugs have relied on synthetic pesticides, which have resulted in adverse effects on the environment and human health. In response, there is a growing demand for sustainable agricultural practices that can provide effective control of mealy bugs while minimizing their impact on the environment.

There was a need to investigate a pragmatic approach for eco friendly methods for controlling mealy bugs. The study involves the implementation of eco friendly pest management strategies using plant extracts, which tends to effectively manage mealy bugs populations by providing an economically feasible and environmentally viable alternative compared to traditional pesticide-based methods.

In light of this, study was conducted on the possible insecticidal effects of turmeric (*Curcuma longa* ) extracts on mealy bugs of *Hibiscus rosa-sinensis*. The investigation's test plants all had their height, leaf count, and blooming times calculated, in addition to the soil's pH . No alterations in soil characteristics, such as pH, were seen in either the control or treated plants. The plant showed improved growth in terms of height, number of leaves, and branching after being treated with pesticide. The results demonstrated that the insecticidal properties of investigated plant extract turmeric (*Curcuma longa*) were dose dependent. The effects of different concentrations of turmeric (*Curcuma longa*) plant extract (2%, 4%, 6%, and 8%) showed an anti-mealy bug response against *Hibiscus rosa-sinensis*. These were observed and documented for 24, 48, and 72 hours. In comparison to the control, post-treatment reductions of 0%, 4%, 5%, and 8% at 24 hours, 3%, 7%, 8%, and 10% at 48 hours, and 7%, 10%, 12%, and 14% at 72 hours were noted.

***Keywords:*** *Ecofriendly, Mealy Bugs , Curcuma longa, Hibiscus rosa-sinensis.*

# Sustainable Innovations: Examining Green Technology's Role in Waste Management and Beyond

**Srija, Richa Rani and Jyoti Kamal**

*Dept. of Botany Magadh Mahila College, Patna, Bihar*

This studyexplores into the expanding realm of "Green Technology" or "Green Tech," a younger and more beneficial technology that has gained prominence in response to the escalating issue of pollution. Green tech, encompassing environmentally friendly technologies in production processes and supply chains, extends to clean energy production, the utilization of alternative fuels, and solutions less harmful to the environment than fossil fuels. The paper explores the interrelation of green tech with cleantech, emphasizing products or services enhancing operational performance while minimizing costs, energy consumption, waste, and environmental impacts. Highlighting the manifold advantages of green technology, such as power generation, cost reduction, green farming approaches, and the substantial growth of the waste management sector, valued at $25 billion in South Asia alone, the study examines key examples including LED lighting, wind energy, solar panels, green architecture, fuel cells, hydrogen-based electric vehicles, and biofuels. It underscores the criteria for green tech, emphasizing efficiency, practicality, cost-effectiveness, and pollution-free attributes. With global energy demand projected to surge by 50% by 2025, predominantly reliant on fossil fuels, the paper explores the role of nanotechnology as a green technology supporting large-scale, renewable solar and wind energy production and distribution at a low cost without environmental degradation. Notably, solar and wind power accounted for 70% of new energy capacity added in 2021, with global investments in renewable energy surpassing $300 billion in 2020. Despite advancements in technology research aimed at highly efficient solar cells, the challenge remains in achieving 100% solar conversion efficiency. The paper also delves into challenges faced by green tech, such as cyber-attacks and production costs in the food processing sector associated with reducing process-induced toxins, implementing sustainable manufacturing processes, and using sustainable raw materials. A notable aspect discussed is the potential negative impacts of green technology adoption on the environment, particularly marine ecology, as highlighted in a study published in the journal Nature Ecology and Evolution. The abstract concludes by emphasizing the significance of individual contributions to a greener lifestyle, recognizing these small steps as opportunities to collectively create positive change for a more sustainable and harmonious future.

***Keywords:*** *Wind Energy, Biofuel, Nanotechnology.*

# Effect of Amended Soil on the Growth of Seedling Raised from the Mustard Seeds for One Month Period

**Kumari Pushpanjali and Anand Kishor**

*Dept. of Botany V.K.S.U, Ara*

Mustard is an important oil yielding crop in India. It is grown as major oil seed crop in 53 countries and across 6 continents. It is used mainly for cooking purposes. In India mustard is mainly grown in the northern and eastern part of the Country. Despite being the second largest producer of mustard after China. India still imports 40% of Its annual edible oil needs (Boomirajetal; 2010). Oil seed therefore plays an important role in the agricultural economy of India.

In modern day agricultural practices attempts have been made to elucidate the impact of organic amendment of soil on various oil seed crops. Mustard is much simpler oil seed crop to cultivated. It can survive on different soil types of several climatic conditions. During recent years various technological precludes have been applied work was undertake. In the present study morphogenesis of the seedling grown for one month period. Germinating seeds exhibited marked difference in the plain soil and amended soil.

The length of root and shoot, number of leaf, node and internode and average of leaf area whichemerges after one month of growth of the seedling were recorded. This study was initiated to explore the vast variability in the climatic and edabic condition in the Mustard growth area of India. The selection of appropriate cultivars is important as it helps in improving productivity of Mustard through yield target based fertilizer application.

***Keywords:*** *Mustard, Germination, Node and Internode, Climatic and Technology.*

# Development of Novel Molecularly Imprinted Polymer Based Extracting Device for Galangin using Green Technologies

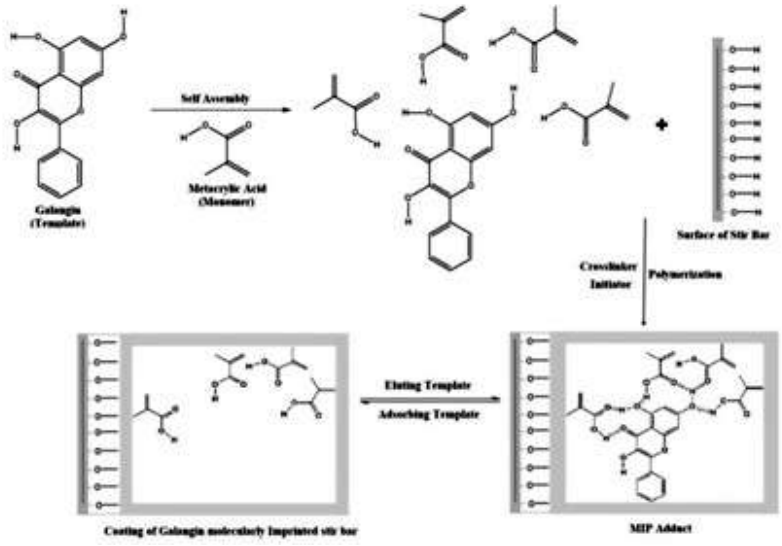
**Amrita Prasad[1], Sumit Kumar[2] and Shail Bhartee[3]**

*[1]Dept. of Chemistry, Magadh Mahila College, Patna*

*[2]P G Dept. of Chemistry, Magadh University, Bodh Gaya*

*[3] Dept. of Chemistry, Patna University*

Molecularly imprinted polymers (MIPs) are smart materials that are fabricated for the purpose of pre-concentration and enhancing selectivity in the extraction and quantification of organic and inorganic analytes from many complex matrices. The features of MIPs like re-usability due to chemical and mechanical stability are in line with green chemistry concepts. However, the synthetic procedure used for MIP generation is repeated several times to achieve the desired product. The experiments done repetitively results in massive solid and liquid waste generation which is contradictory with the green chemistry concept. In this paper, the application of computational tool for the selection of suitable monomers for MIPs synthesis has beenused. Moreover, here we have used greener applications of MIPs such as miniaturized techniques. In this work the extraction of Galanginflavonoid using novel Molecularly imprinted stir bar sorptive extraction (MISBSE) technique has been carried out. Here we have synthesised an imprinted polymer for Galangin and the selection of functional monomer is done using computational approach instead of repetitive hit and trial method. Monomers opted were methacrylic acid (MAA), n-hydroxyphenyl maleimide (HPM), 2-vinylbenzene (VB). A systematic calculation has been performed for the possible configurations of GAL - monomer (1: n) molecular systems at the B3LYP/def-SV(P) level of theory. All the calculations are performed using TURBOMOLE software with the help of TmoleX. Molecularly imprinted Stir bar (MISB) which consisted of a polymer coated glass capillary (1 mm diameter, 10 mm length and 0.7 mm long iron wire inside) has been prepared which can directly act as a stirrer for any type of magnetic stirring during the time of extraction. The extraction was carried out using “direct immersion method” where the prepared MISB (10 mm in length) required only15 mL of test sample. Extracted analyte was then determined after dilution to 10 mL, in a volumetric cell using UV visible spectroscopy.




***Keywords:*** *Stir Bar Sorptive Extraction, Flavonoid, Imprinted Stir Bar.*

# The Necessity for the Use of Green Technologies: A study of Bihar

**Telani Meena Horo**

*Dept. of Political Science, Magadh Mahila College, Patna*

Green Technologies such as wind technology, solar technology, small hydropower, biomass and waste to energy technologies is considered is this category. Green technology are also known as 'CleanTechnologies'. These technologies are developed and promoted as alternative sources that make little or no contribution to climate change and provide sustainable energy services to meet the energy demands. These green technologieshave strong potential meet the future energy demand without comprising the environment quality as they have very less carbon. Green technologies rely increasingly on new and renewable sources of energy, seeking to reserve hydrocarbons for non energy and non-substitutable uses.

Bihar government take initiatives like green budget as an instrument for coordinating planning and targeted spending encourage government at other actress to contribute sustainability initiatives.Climate climate change initiative being undertaken by the Bihar Government including Jal-Jeevan-Hariyali Mission there are also various Government sponsored schemes and subsidies provided by the government. Objective of this research article is to analyse the effect of green technology in Bihar and also to analyse the what are the steps taken to promote green technology in Bihar. This research article used both primary and secondary data.

***Keywords:*** *Government, Green Technologies, Hydrocarbons, Renewable, Sustainability.*

# *Azotobacter*: A Potential Biofertilizer as An Aid to the Goals of Green Earth

**Aishwarya Priyadarshani[1] and Ankita Sarkar[2]**

[1]*Dept. of Botany, Institute of Science, Banaras Hindu University, Varanasi*

[2]*Dept. of Mycology and Plant Pathology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi*

*Azotobacter* is an oval/cocci/rod-shaped diazotrophic, gram-negative bacteria able to fix around20 kg $ha^{-1}$ $year^{-1}$of nitrogen to usable forms like nitrates ($NO^{3-}$) and ammonium ions ($NH^{4+}$). Biological Nitrogen Fixation (BNF) has a crucial role in global nitrogen cycling and non-symbiotic bacteria like*Azotobacter*play a significant role in it. When used as a biofertilizer or as a microbial inoculant, it has been shown to reduce the need for intensive use of other chemical fertilizers like urea single-handedly. Species like *A. chroococcum, A. vinelandii*, and *A. beijerinckii*are cosmopolitan and show an astonishing range of nitrogen-fixing efficiencies because the Nitrogenase enzyme found in*Azotobacter* is resistant to oxygen and other oxidative stresses during nitrogen fixation. In recent years due to a surge inchemical fertilizer abuse and infertile soil, *Azotobacter* has captured the attention of the scientific and research community as a green substitute for chemical fertilizers. Not only BNF, butin this study *Azotobacter*spp. has also shown promising Plant Growth-Promoting (PGP) traits to accentuate plant health and development. PGP traits such as phosphorus solubilization, zinc solubilization, HCN production, siderophore production, IAA production, urease production, etc have been reported. Thisimplies that the use of *Azotobacter* spp. can reduce the dependence on agrochemicals and the negative environmental impact associated with the use of synthetic fertilizers.One of the prime reasons to select it as a bio-fertilizer is its versatility in application on a wide array of crops. Additionally, factors like good tolerance to many abiotic stresses for instance salinity and pH make it efficient for diverse biogeographical climates.The future of biofertilizers holds immense promise as a sustainable and eco-friendly alternative to traditional chemical fertilizers. As concerns about environmental degradation and the ecological footprint of conventional agricultural practices rise, these alternatives emerge as a crucial solution to minimize the adverse impacts of chemical-intensive farming in agriculture prominent countries like India. It prioritizes both productivity and environmental stewardship.

***Keywords:*** *Azotobacter, Bio-fertilizer, Biological Nitrogen Fixation, PGP Bacteria.*

# GROUP - F
# (RENEWABLE ENERGY)

# Assessing the Production of Biodiesel from Microalgae under Varying Nutrient and Abiotic Conditions

**Madhu Muskan and Kanchan Kumari**

*A N College, Patna, Bihar*

The utilization of microalgae as a residual biomass for energy production has gained significant attention, particularly amidst the escalating prices of petroleum and mounting concerns regarding global warming. While the notion of employing algae as a fuel source isn't novel, it is now being earnestly considered due to their distinctive advantages over agricultural oil crops like soybean and palm oil, which possess comparatively low oil contents, constituting only 5% of their total biomass.

The selection of an appropriate algae species stands as a vital aspect in the creation of biodiesel. Algae have garnered substantial interest owing to recent research showcasing their inherent benefits, including rapid biomass growth, high lipid content, and robustness in harsh environmental conditions. Considerable emphasis has been placed on optimizing the yield of crucial chemicals such as lipids, carbohydrates, pigments, and other metabolites during the biomass production stage. Microalgal lipids predominantly consist of triacylglycerides, serving as a primary source for biodiesel production through the conversion into fatty acid methyl esters via trans-esterification. The manipulation of various influential factors, such as nutrient availability and alterations in salinity levels, plays a crucial role in enhancing microalgae's lipid content, thereby offering potential strategies for biodiesel synthesis. Microalgae exhibit diverse responses to stressors, varying their production of triacylglycerides and modifying their fatty acid compositions depending on the specific strains or species utilized. While nitrogen starvation remains the most commonly employed method to induce lipid accumulation, other factors, including nutrient abundance, fluctuations in salinity, pH changes, temperature variations, and adjustments in metal concentrations, present promising avenues for bolstering biodiesel productivity.

Understanding the unique responses of different microalgae strains to these varied stressors is imperative in optimizing lipid production for biodiesel. By exploring and exploiting these multifaceted influencing factors, industries can potentially enhance the efficiency and sustainability of biodiesel production from microalgae.

Our initiative focuses on creating a set of adaptable processes specifically designed to identify various components within algal biomass. These processes are carefully crafted to be easily implemented in diverse laboratory settings while ensuring strict compliance with regulatory standards. Biodiesel, which is derived from algae, presents a significantly lower emission of toxic pollutants and greenhouse gases compared to petroleum diesel. This positions biodiesel as a much more environment friendly alternative.

***Keywords:*** *Transesterification, Stressors, Triacylglycerides.*

# Unearthing Potential: A Comprehensive Review of Hydro Pump Storage in Abandoned Mines

**Dinesh Kumar [1] and Kunal Modak [2]**

[1]*Dept. of Geology, Patna Science College, Patna, Bihar, India*

[2]*Borehole Geophysics Research Laboratory, Ministry of Earth Sciences, Karad, Maharashtra, India*

Hydro pump storage technology is of utmost importance in the energy sector, particularly with the growing integration of renewable energy sources. The objective of this review paper is to delve into the ground-breaking idea of repurposing abandoned mines for hydro pump storage projects. Through a thorough examination of existing literature, case studies, and technical reports, this review offers a comprehensive analysis of the viability, obstacles, and consequences associated with utilizing mine sites for energy storage infrastructure.

The assessment commences by presenting a comprehensive perspective on hydro pump storage technology and its importance in the wider scope of renewable energy integration. Subsequently, it delves into an investigation of triumphant instances where hydro pump storage initiatives have been executed in abandoned mines. By means of meticulous evaluations of these initiatives, encompassing technical particulars, capabilities, and accomplished results, the assessment clarifies the practicalities and possibilities of such undertakings.

A critical aspect examined is the geological assessment necessary to determine the suitability of mine sites for hydro pump storage projects. This involves a thorough scrutiny of geological criteria and characteristics that significantly influence the feasibility and success of deploying these storage systems within mine environments.

Technical implementation and infrastructure considerations are then detailed, shedding light on the intricacies of system design, equipment requisites, and the challenges inherent in adapting mine sites for energy storage purposes. Environmental impacts and social implications, including discussions on stakeholder engagement and community perceptions, are carefully evaluated to understand the broader impact of these projects.

Economic viability and cost analyses form a pivotal segment of this review, providing an assessment of the financial feasibility of implementing hydro pump storage projects within abundant mines. This analysis includes comparisons with other energy storage technologies and traditional hydro pump storage facilities to ascertain their relative advantages and cost-effectiveness.

Moreover, regulatory challenges, policy implications, and the requisite legal frameworks for successful implementation are addressed. The review navigates through these aspects to provide insights into the regulatory landscape and the policy considerations that impact the implementation of hydro pump storage projects in mine sites.

Looking towards the future, this review offers perspectives on innovations, lessons learned, and recommendations for advancing hydro pump storage projects in abundant mines. It aims to provide a comprehensive analysis that not only highlights the potential of repurposing mines for energy storage but also addresses the challenges and offers insights into the future development of this emerging field.

To summarize, this review article consolidates various elements concerning hydro pump storage projects in abandoned mines, providing valuable perspectives and opportunities for further progress in the field of energy storage and the integration of renewable sources.

***Keywords:*** *Renewable Sources, Hydro Pump Storage, Abandoned Mines.*

## Bioenergy: Prospects and Opportunities

**Anamika**

*Dept. of Chemistry, Jamshedpur Women's University, Jharkhand*

Energy consumption reflects the development of the country. It is the source of economic growth derived from various conventional and non-conventional sources like coal, natural gas, nuclear, solar, wind power, tidal, biogas etc. These energy sources fall into renewable and non-renewable categories. In India 40 % of total energy requirement is supposed to be met by non-conventional sources like solar energy, agricultural waste, cow dung etc. as fossil fuels like coal, gas and oil are exhaustible and nuclear energy has its limitations. So, there is need to shift our attention to solar energy, biomass, biogas and the similar energy sources. Advantages of bioenergy generation will be ecofriendly, less polluting, cheap and plenty. Currently a number of thermal conversion systems are in various stages of development, which include pyrolysis, gasification and hydrogenation. Pyrolysis, liquification and gasification are upgrading processes converting biomass into stable, transportable fuel thus produced have similar properties as coal, oil and natural gas. Recycling of agricultural residues in the field, green manuring, composting, vermiculture, biomethenation are the alternate way of effective utilization of biomass. Effluents from food processing industry are most suitable for biogas production. Therefore,it may be concluded that these energy sources and technologies have immense potential to provide solutions to energy problems faced by countries.

***Keywords:*** *Conventional, Biogas, Biomass, Pyrolysis, Effluents.*

# On the History and Future of 100% Renewable Energy Systems Research

**Harsita Kumari, Neelam and Mohini**

*Dept. of Botany, Magadh Mahila College, Patna*

Increasing oil prices in the mid-1970s was the main trigger for commencement of research work into achieving a 100% renewable energy system. In today's time, it has developed into a significant field with numerous research groups worldwide. This primary finding from these studies is that transitioning to 100% renewable energy sources is possible as well as cost-effecting in longer time frame. New and smart ideas in the field now allow researchers to come up with practical and efficient plans for a future without using fossil fuels. Solar energy and wind energy are 2 key components of renewable energy sources. When models aim to reduce costs, the focus tends to shift towards Photovoltaic energy. On the other hand, if the goal is to have a variety of energy sources, the focus tends to shift towards wind power. The research paper also explores the lack of consensus within the general population about the idea of using 100% renewable energy. The research paper also finds that the resistance within some organizations like the International Energy Agency and the Intergovernmental Panel on Climate Change, is acting as a hindrance to the adoption of renewable energy. The paper also examines the concept of Energy Justice, which aims to create equitable and sustainable energy transition from fossil fuels to renewable sources for every section of society. The study addresses challenges like grid congestion, energy storage, sector coupling, and electrification of industries. The integration of natural and technical carbon dioxide removal (CDR) is being explored. The transition to a net negative greenhouse gas emissions economy is capable of limiting global warming to 1.5 degrees Celsius within a cost-effective framework by utilizing 100% renewable energy and CDR systems. The abstract concludes by stating that the real challenge lies in finding the right balance between cost-effective solutions and diverse energy resources. Issues like injustice and environmental concerns should be managed through strong industry practices and policies. Despite criticisms,the consensus is that renewable systems can power the world at low cost by utilizing solar and wind energy to its maximum potential,which will give humankind a sustainable and prosperous future without relying on conventional sources of energy.

***Keywords:*** *Solar Energy, Wind Energy, Energy Justice , Fossil Fuels.*

# A Comprehensive Analysis of Renewable Energy Strategies, Achievements, and Prospects in India

**Harsita Kumari, Mohini and Neelam**

*Dept. of Botany, Magadh Mahila College, Patna*

This study highlights the pivotal role of renewable energy in addressing persistent energy challenges in developing countries, focusing on India as a case study. Wind energy, solar energy, geothermal energy, ocean energy, biomass energy, and fuel cell technology are identified as viable solutions to overcome the energy shortage in the country. Given India's rapid economic growth, projections indicate a need for 3–4 times more energy than the current consumption levels, making renewable energy a crucial option.Presently, renewable sources account for approximately 33% of India's primary energy consumption, marking a significant contribution to the national energy portfolio. The country has demonstrated a commitment to adopting responsible renewable energy practices, aligning with efforts to reduce carbon emissions, improve air quality, and ensure a sustainable future. Over the past two and a half decades, India has actively pursued research, development, demonstration, production, and application of diverse renewable energy technologies across various sectors.Indiahas emerged as a global leader in attractive renewable energy markets, propelled by robust government support and a favourable economic environment.The government's policies, programs, and liberal initiatives have actively attracted foreign investments, accelerating the country's growth in the renewable energy sector.With a strong emphasis on creating a large number of domestic jobs, the renewable energy sector in India is poised for significant expansion in the coming years.This paper provides a comprehensive overview of the availability, current status, major achievements, and future potentials of renewable energy options in India. Additionally, it assesses specific policy interventions aimed at overcoming barriers and promoting the increased deployment of renewables in the future. The findings emphasize the strategic importance of renewable energy in India's energy landscape and its role in fostering a sustainable and resilient future.

***Keywords:*** *Solar Energy, Wind Energy, Energy Security, Sustainable Development.*

# Rare Earth Elements: Powering the Future of Renewable Energy

**Saba Imam, Bhavuk Sharma and Atul Aditya Pandey**

*Dept. of Geology, Patna University, Patna*

The growing concern about the effects of greenhouse gases has led countries around the world to explore clean energy technologies to reduce emissions. This search is even more critical for India, given its current population level and anticipated increase in GDP.There is no other option than to look for clean energy technologies forpower generation to meet the anticipated growth of our country.REE-based phosphors are required for household fluorescent lamps, CFLs, and LEDs. Additionally, portable electronics and high-performance alloys also rely on rare earth elements.

The Rare Earth Elements (REEs) are a unique group of elements that possess characteristic electronic, magnetic, optical, and catalytic properties. REE are abundant in the earth‘s crust but they are rarely concentrated into mineable ore deposits. Secondary deposits formed by weathering and erosion may include placer deposits. The useful concentration of REE-bearing minerals may be found in fluvial placer deposits derived from the source area which may include granitic rocks or high-grade metamorphic rocks. They may also be concentrated with other heavy mineral deposits.

The present work is related to the investigation of REE in fluvial sediments of the Kosi River basin.The silt load of the river is one of the highest in the Indian sub-continent. The expectation of finding REEs in the Kosi River basin‘s sediments is based on the region‘s geological diversity, the geological history of the Himalayas, and the natural process of sediment transport and deposition that occur in the riverine environments.The Kosi River is a transboundary river that originates in the Himalayas at an altitude of 7000m above mean sea level. The river carries a huge amount of sediment due to its path cutting across the Himalayas and the Shiwalik ranges. Additionally, heavy monsoonal rainfall, the geology of the Kosi River basin, and the unstable course of the Kosi River result in extensive soil erosion that leads to siltation.

Understanding the distribution of REEs in the fluvial sediments of the Kosi River basin is of interest for resource exploration and management. While REE mining in the Kosi basin may not be the primary focus, identifying potential can inform sustainable resource planning.

***Keywords:*** *Kosi River Basin, Fluvial Sediments, Rare Earth Elements.*

# GROUP - G
# (WASTE MANAGEMENT)

# Physiochemical Analysis of Sewage Fed Water In River In Vaishali District Near Hajipur

**Gyan Jyoti and Vijay Kumar**

*P. G Dept. of Zoology, R N College, Hajipur, Bihar*

The Inadequate practice of discharge of sewage into receiving water bodies changes, Physiochemical parameters, which eventually disturbs the livelihood of aquatic Flora and Fauna. The present study was focused on the development of efficiencies of sewage treatment plants based on different Technologies through analysis the Physiological parameters of wastewater affected from each treatment steps, including inlet, outlet and downstream Ganga river in Hajipur during rainy, winter and summer seasons.

Correlation analysis, explained the strong negative correlation of pH and DO with nearly all parameters of the study; whereas ammonia, TDS, hardness and BOD where each city. The factor analysis suggested the best fit amongst The Physiological parameters, with four factors illuminating 78% of the total variance, which further explained that DO, TDS, nitrate, COD, total alkalinity and temperature were the major components of pollution.

During the investigation, the research tried to find out the physiochemical analysis of water across two years. Four sampling sites where selected located at the Bank of Gandak River at Hajipur, Vaishali, Bihar.

***Keywords:*** *Gandak River, TDS, BOD, DO, COD.*

# Removal of Chromium (VI) from Industrial Wate Water by Natural Plant Waste

**Sarita Kumari**

*Dept. of Chemistry, Jamshedpur Women's University, Jamshedpur*

The environmental issues due to industrialization and globalization are becomingmore and more nuisance for human being as wellas all other living creature. Heavy metals present in wastewater and industrial effluent is major concern of environmental pollution. Copper, Silver, Zinc, Cadmium, Gold, Mercury, Lead, Chromium, iron, Nickel, Tin, Arsenic, Selenium, Molybdenum, Coalt, Manganese and Aluminum are the most common metals present in industrial waste water. They represent serious threats to the human population and the fauna and flora of the receiving water Bodies. They can be accumulated in human body and causes serious health problem like cancer, organ damage and in extreme case death. Also, it reduces growth and development of plant bodies. So, there is an urgent need to treat industrial waste water.

Methods for treating industrial wastewater containing heavy metals often involve technologies for reduction of toxicity in order to meet technology-based treatment standards. This article was focused on the recently developed processes such as; adsorption of chromium on new plant waste adsorbent.

Chromium, one of the heavy metals whichhas a considerable environmental concern as it is widely used in leather tanning, electroplating metal finishing and chromate preparation. Chromium occurs in aqueous environment in trivalent and hexavalent forms. Hexavalent chromium is more toxic than the trivalent from because of its carcinogenic and mutagenic effect. The use of adsorption provides means for-effective removal of Cr(VI). The natural adsorbents under consideration were orange peel powder for bench scale studies. The adsorbent was dried in ambient conditions for three weeks and powered by using household grinder. The effect of important parameters such as stirred speed,particle size, pH and concentration of adsorbate and adsorbent were studied. The orange peel powder was found to be capable for the removal of chromium(VI) up to 98% from synthetic chromium solution. The change in lattice structure of adsorbent before and after adsorption was analyzed by FTIR and SEM analysis. The kinetics investigation follows pseudo second order behavior.

# A Comparative Assessment of Quality of Water Samples From Sewage Treatment Plant (STP) and Fresh Water Pond in Relation to Fish Culture Properties

**Mimansa Kiran[1] and Mridula Renu Sinha[2]**

*[1]Dept.of Zoology, Patna University, Patna*

*[2]Dept. of Zoology, Magadh Mahila College, Patna*

Water quality in aquaculture is one of the key concern to ensure optimal growth and survival of aquatic organisms. The research is aimed to find the suitability of treated water of sewage treatment plant for the fish culture by evaluating the Physico-chemical properties of water samples from STP ,Saidpur Patna and fresh water pond, Mithapur. Ten (10) water quality parameters were analyzed by collecting wastewater samples from different sites of STP and analyzed using standard laboratory methods and procedures. Average value of physico-chemical parameters of STP water were compared with Mithapur fresh water pond. The observation suggests that water treated by STP plant conforms to the minimum value of physico-chemical parameters of water required for fish farming in freshwater pond. However it can be more convenient if some water quality management practices and fish farming techniques are used for fish culture in water treated by STP.

***Keywords:*** *Aquaculture, Sewage Treatment Plant, Physico-Chemical, Fish Culture.*

# Treatment and Recycling of Surface Waste Water

**Sarita Kumari**

*Dept. of Chemistry, Jamshedpur Women's University, Jamshedpur*

Waste water is the polluted form of water generated from rain water runoff, human activitiesand industrial effluents and host of alike impurities. Today it is not safe to directly use the water from rivers, reservoirs and lakes as it contains various micro-organism, pathogens and other contaminants that have an adverse effect on the health of humans, plants, animals and to some extent environment also. This situation of unhealthy and unsafe water has necessitated the need of Waste Water Treatment.

Water treatment is a process that improves the quality of water to make it appropriate for specific end use. Waste water can be treated up to different level to satisfy demands from different sectors including industry, agriculture and human needs.This (waste water)can be processed in various multiple steps which should be eco-friendly and proper for human needs. In this paper a successfulapproach has been discussed so as to the treatment of surface water to make it suitable not only for human needs but also for animals and other alive uses.

The journey of usable form of water starts from the polluted source and after treatment it reaches in satisfactory form for the end users. The treatment of water involves cascaded several steps like aeration, coagulation, flocculation, filtration and disinfection. Only after going through these steps, we can supply the water particularly for drinking purpose and other uses in general.

Aeration is effective in management of dissolved harmful gases such as radon, carbon dioxide, some taste and odor problem such as methane and hydrogen sulfide as well as volatile organic compounds.Aeration oxidizes dissolved iron and manganese and helps its precipitation. The sedimentation process removes the heavy particles.Next Ultra Voilet raysfrom the sun falling on the polluted water which kill many pathogenic organisms. The addition of coagulants destabilizes colloidal suspensions and aggregation of smaller particles. In clariflocculator, solid contaminants present in polluted water will settle down and there after collected by scraper mechanism.After different subsequent stages of filtration and chlorination or disinfection water is ready for recycling.

# Removal of Chromium (VI) by Using Orange Peel Powder

**Sarita Kumari**

*Dept. of Chemistry, Jamshedpur Women's University, Jamshedpur*

Chromium is a considerable environmental concern as it is widely used in leather tanning, electroplating metal finishing and chromate preparation. Chromium occurs in aqueous environment in trivalent and hexavalent forms. Hexavalent chromium is more toxic than the trivalent from because of its carcinogenic and mutagenic effect. The use of adsorption provides means for-effective removal of Cr(VI). The natural adsorbents under consideration were orange peel powder for batch studies. The adsorbent was dried in ambient conditions for three weeks and powered by using household grinder. The effect of important parameters such as stirred speed,particle size, pH and concentration of adsorbate and adsorbent were studied. The orange peel powder was found to be capable for the removal of chromium(VI) up to 98% from synthetic chromium solution. The change in lattice structure of adsorbent before and after adsorption was analyzed by FTIR and SEM analysis. The kinetics investigation follows pseudo second order behavior.

***Keywords:*** *Cr(VI), Natural Adsorbent, Adsorption Kinetics.*

# *Salviniamolesta*: An Aquatic Fern with Potential use in Phytoremediation

**Sweta Kumari [1] and Rimjhim Sheel [2]**

[1] *Dept. of Botany, Magadh Mahila College, Patna, Bihar*

[2] *Dean of Science, Patlliputra University, Patna*

*Salviniamolesta* is a weed of still and slow-flowing fresh water. It is very adaptable and can diverse survive in climates. It can withstand an occasional frost, but persistent low temperature and frosts kill the exposed portions of plants. Aquatic ferns in particular exhibit exorbitant potential to remove various contaminates including heavy metals and organic compounds from the environment. *Salviniamolesta*, free-floating aquatic fern holds a distinct position because several advantages including high productivity and tolerance to a wide range of temperatures. Several species of *Salviniamolesta, Salviniaminima,* and*Salvinianatans,*haveslow potential to remove various contaminants including heavy metals from wastewaters. *Salvinia* possess exhibit capacity for removing contaminants such as heavy metals, inorganic nutrients,and explosives from wastewaters. Thisfern has immense potential for use in phytoremediation. The wide geographical distribution of *Salvinia*within the tropical and sub-tropical regions of the world, very high productivity around 5.8 to 11.4 g d.w., under natural conditions.*Salvinia* can be recommended as a plant species with greater potential for the use of phytoremediation.

***Keywords:*** *Heavy Metals, Phytoremediation, Wastewater.*

# Challenges in E-Waste Management in India: Regulations and Challenges

**Manish Kumar Verma**

*Dept. of Physics, Magadh Mahila College, Patna, Bihar*

Rapid evolution in technology and the ever-growing demand forelectrical and electronic equipment (EEE) in the last few decades has resulted in the generationof significantly large quantities of electronic waste (e-waste) worldwide. There has been tremendous growth in the information technology industry throughout world. Technological advancements are taking place in both the developed and the developing economies. With the continuous introduction of better technologies and related equipment, the volume of outdated or obsolete products has also increased many folds adding a new form of waste popularly known as "E-waste". As per Global e-waste monitor 2020 : world dumped 53.6 million metric tonnes of e-waste in 2019 with only 17.4% of generated e-waste recycled. India stood at third position in e-waste generation after China and United States in 2019 generating e-waste of 3230 kt. 95% of e-waste is recycled by informal sector. They burn or dissolve them in acids, which causes pollution. Gold copper and other metals are extracted by informal sectors. However, these processes cause environmental pollution due to other harmful heavy metals and gases discarded in the surroundings.

In India laws to manage e-waste have been in place since 2011, mandating that only authorised dismantlers and recyclers collect e-waste. A manufacturer, dealer, refurbisher, and Producer Responsibility Organization (PRO) were brought under the ambit of the E-Waste (Management) Rules 2016. E- Waste (Management) Amendment Rules, 2018 has mandated e-waste collection target for the manufacturers under Extended Producer Responsibility (EPR). The number of producers granted EPR authorisation stand at 2330 as per CPCB data as on 26/04/2023. E-Waste (Management) Rules,2022 have been in force with effect from 1 April 2023. It applies to every manufacturer, producer refurbisher, dismantler and recycler involved in manufacture, sale, transfer, purchase, refurbishing, dismantling, recycling and processing of e-waste or electrical and electronic equipment, mandating increasing the recycle target from 60% of EEE products placed in the market in the year 2023-X to 80% of EEE products placed in the market in the year 2028-X, where X is the average life of the product. The regulation also provides responsibilities of CBCB, SPCB, local bodies, port authorities and BIS. Although the regulations seem good but proper implementation, awareness among consumers is required to meet the stipulated targets.

***Keywords:*** *E-Waste, Recycle, EPR.*

# A Comparative Analysis of Nutritive Value of Paddy Straw and Oyster Mushroom Grown on Agro-Waste in Bihar

**Archana Gandhi and Pushpanjali Khare**

*Dept. of Botany, Patna, Bihar, India*

In the post-corona pandemic scenario, mushroom has become a major healthy diet and natural medicine for people all over the globe. Considering the circumstances of the need for mushrooms to enhance the immunity of the person, people are now interested in including mushrooms of various kinds in their diet. For this purpose, paddy straw mushrooms and oyster mushrooms, are the two most commonly grown and demanding mushrooms all over the country. It has been noticed that the popularity of paddy straw mushroom and oyster mushroom is increasing day by day as it has easy cultivating techniques. It is important to note that these mushrooms which have high nutritive value can be cultivated even on waste material as it is locally available. Further, these two mushrooms can be grown by investing even less amount as compared to another crop. Paddy straw mushroom (volvariella species) popularly known as Chinese mushroom can be grown between the months of April to October-November month. For its growth high temperature, i.e., 30-35 C for fructification, is required for its life cycle to be completed within 30-40 days. The nutritional value of paddy straw mushrooms depends upon the type of agricultural waste that is to be used during the cultivation. On the other hand, Oyster mushroom is popularly known as Dhingri mushroom all over the world. This mushroom is cultivated mostly in the winter season as well as in hilly regions of the country. In Bihar, it is grown mostly during the months of November to February. For its growth, the required temperature is between 15-25 C. Its life cycle is completed between 30 to 40 days.Further, in this study comparison of the nutritive value of paddy straw as well as oyster mushroom is to be done. It has been found that the carbohydrate content in Volvariellavolvacea is nearly 80% while in oyster mushrooms, its content is about 50%. Similarly, protein analysis is also done which shows paddy straw mushroom contains about 14-27% protein. As per antioxidants concern, mushrooms of both kinds are rich in antioxidants as paddy straw mushroom contains about 21.19% while oyster mushroom is highly enriched with it which is about 35.91%. likewise, the other nutrients present in these two mushrooms are also described in the research work.

***Keywords:*** *Paddy, mushroom, antioxidants, volvariella.*

# A Case Study of Waste Management Practices in the Campus of Magadh Mahila College, Patna

**Harshita Kumari, Raj Nandani and Anusha**

*Dept. of Botany Magadh Mahila College, Patna, Bihar*

This study explores the waste management practices performed at Magadh Mahila College, Patna university, Patna. The college campus houses numerous facilities, including laboratories, a canteen, and Mahima Girl's Hostel, catering to a student population exceeding 400. With the diverse activities on campus, there is a substantial generation of both dry and wet waste. To address this issue, a solid waste management plant has been strategically installed at the college entrance.The solid waste management plant serves as a central facility for the disposal of dry wastes originating from laboratories, canteens, and garden areas. The objective of the project is to convert the MMC premises into a No Open Waste (NOW) zone within the year. The Solid-Liquid Waste Management (SLWM) initiative is distinctive, intending to establish the College as a benchmark for other institutions in effective waste management. It is estimated that there is a formation of 20-25 kg manure in a course of 45 days via solid waste management plant of MMC. Regarding Mahima Hostel of MMC,approximately 20 kg of kitchen waste is utilized as fertilizer; whereas, 50 kg of cooked waste is repurposed for animal feeding. The project is the outcome of continuous and sustained efforts of the Centre for Green Initiatives of MMC.Through efficient processing, these dry wastes are transformed into valuable manures and fertilizers. The resulting products are subsequently utilized in maintaining the greenery and landscaping within the campus, promoting a sustainable and environmentally conscious approach to waste disposal.In addition to managing dry waste, the campus employs a systematic approach for handling wet waste. The municipal corporation regularly collects wet waste generated within the college premises, ensuring proper disposal and adherence to waste management protocols. The presence of bio and non-biodegradable bins strategically positioned throughout the college campus facilitates the segregation of waste at the source, contributing to an organized and environmentally responsible waste management system.This paper sheds light on the practical implementation of waste management strategies within an educational institution, showcasing the integration of sustainable practices for waste disposal and recycling. The comprehensive approach adopted by Magadh Mahila College serves as a noteworthy example for institutions seeking effective waste management solutions that align with environmental conservation goals.

***Keywords:*** *Sustainable Initiatives, SLW, Waste Management Practices.*

# Synthesis and Characterization of Complexes of Co+3 and Mn+2 with Ligands of Hydrazine Derivatives of "Ortho-Benzoyl-p-Ethylphenol"

**Nisha[1], Himanshu Shekhar[1] and Shyam Deo Yadav[2]**

*[1]Dept. of Chemistry, VKSU, Ara, Bihar*

*[2]Dept. of ChemistryMagadh Mahila College, Patna, Bihar*

In the current investigation, our focus has been on the examination of complexes formed by Co(III) and Mn(II) with bidentate hydrazine derivatives derived from Ortho-Benzoyl-p-Ethylphenol. Elemental analysis, FT-IR, UV-Vis, molar conductance measurements, and melting points were used to characterize the Schiff base and the metal complexes. Within these complexes, metals are coordinated with ligands through oxygen and nitrogen donor atoms, wherein two ligands bind to the central metal atom. The resultant complexes exhibit octahedral geometry, with solvents, including water, associating themselves with the central metal atom. Both Co(III) and Mn(II) form octahedral complexes, wherein two ligands and solvent molecules contribute to the octahedral configuration.

The ligands utilized in this study were synthesized through the condensation of Ortho-Benzoyl-p-Ethylphenol with hydrazine derivatives. Complex formation was achieved by subjecting the ligands to heating with metal salts in appropriate solvents through refluxing. Observable changes in the color of the metal salts indicated successful complex formation. Notably, Co(III) and Mn(II) possessing 4 and 5 unpaired electrons, respectively, suggest that the resulting complexes are high spin and paramagnetic in nature. Molar conductance studies on the complexes indicated that Mn (II) shows non-electrolytic nature whereas Co(III) shows electrolytic nature.

Upon immersion of the complexes in solvents, the pre-existing solvent ligands were replaced. The Mn+2 complexes exhibited distinctive coloring attributed to d-p mixing. Verification of ligand coordination with central metal ions was conducted through the examination of IR spectra. A discernible reduction in the IR frequencies of OH and HNN groups post-complexation signified the establishment of coordinate bonds with these ligand moieties.

***Keywords:*** *Ambidentate Ligand, Hydrazine, IR-spectra, Paramagnetism, VBT.*

# Importance of E- Waste Management in India

**Binay Kumar Bimal**

*Dept. of Sociology, Magadh Mahila College, Patna, Bihar*

Electronic waste or e-waste is one of the rapidly growing problems of the world. E-waste comprises of a multitude of components, some containing toxic substances that can have an adverse impact on human health and the environment if not handled properly. In India, e-waste management assumes greater significance not only due to the generation of its own e-waste but also because of the dumping of e-waste from developed countries. This is coupled with India's lack of appropriate infrastructure and procedures for its disposal and recycling.

E-waste broadly covers waste from all electronic and electrical appliances and comprises of items such as computers, mobile phones, digital music recorders/players, refrigerators, washing machines, televisions (TVs) and many other household consumer items. These are made of a multitude of components, some containing toxic substances that have an adverse impact on human health and the environment if not handled properly. Often, these hazards arise due to the improper recycling and disposal processes used. It can have serious repercussions for those in proximity to places where e-waste is recycled or burnt.

The absence of government mechanisms to manage and recycle or dispose E-waste effectively has opened doors for social entrepreneurs to take the lead to address this issue. While companies are helping to integrate the informal recycling sector and setting up an effective e-waste take back programme through training and consumer e-waste collection/awareness events, however, to tackle this issue effectively, at a much larger scale and faster, we need the support of governmental agencies like municipal corporations.

Given the recent efforts of the government to foster growth and development of industries and manufacturing units under the Make in India programme, India today boasts of allowing 100% FDI for solid waste management. Replicating successful initiatives in e-waste management set up and skills across Indian cities require support from government.

Having the proper mechanisms and skills already in place, it is essential to utilise them. While countries like China are importing waste, India is merely seen as a large scale dumping ground, for which adequate disposal mechanisms without affecting the lives and health of its people are not taken care of. While programmes such as the Swachh Bharat are helping to keep the city clean, nevertheless, the garbage is still being dumped in landfills and so is the e-waste, which is far more harmful. Public private partnerships can help to manage e- waste more effectively while various other parameters such as carbon credits given to companies under their CSR initiatives could give a boost to the programmes.

The dumping of e-waste in open grounds can cause serious health issues to the e-waste collectors and surrounding region. The e-waste kept in open can release harmful toxins. These toxins can also affect

the environment and the soil, thereby affect the lives of humans and animals. These toxic chemicals can also penetrate into ground water and cause serious water pollution issues.

These toxins can cause defects in the kidney, liver, heart and skin and bone damage. They are also known to have a seriouseffects on the nervous and reproductive systems of the human body.

The burning of computer boards and cells can produce very harmful toxins which can lead to cancerous disease.

E-waste is rapidly growing with new technology and upgrade or products day by day. However, one must take responsibility and understand the use of these products and the harmful effects of recklessly dumping e-waste. Certain principles should be laid down for dumping e-waste. Just like garbage collection, there should be separate e-waste collect drive or resale of old products which will help users in reducing e-waste within the country and reduce its harsh effects consistently.

***Keywords:*** *E-waste, Hazardous Waste, Risk, Management, Environmental Issues, HealthImpacts.*

## Recent Trends in Solid Waste Management Status, Challenges and Potential for the Future Indian Cities

**Bhagwan Mishra and Yashaswi Navshree**

*Dept. of Zoology, Patna University, Bihar*

In recent years, the exponential population growth, high density of urban areas, diverse culture, changing food habits, and lifestyles have seen an unresolved problem in terms of Municipal Solid Waste Management (MSWM) in India. Consequently, the municipalities have been facing many other issues related to the collection, treatment, and managementof solid waste. The present study is a comprehensive review summarising the present SWM status identifying the associated challenges and deriving potential solutions for the MSWM in the Indian context. The unsorted solid wasteat source, social taboo, citizen's attitude, poor assessment, inadequate potential strategies unorganised informal sectorof waste, unplanned fiscal, and poor implementation government policies. The discussion in this review article concludes, there is an urgent need for adequate treatment and recycling strategies required to be adopted as per the Indian solid waste composition. The appropriate implications of the potential solutions for MSW at the centralized and decentralised level need to be emphasised through various available of scientific treatment processes. Hence municipalities, along with the involvement of informal sectors, private agencies required to focus on creating potential opportunities and achieves the long term goal of the MSWM sustainability for Indian cities.

***Keywords:*** *Exponential Population, Municipal Solid Waste Management, Potential Solution, Scientific Treatment Process, Sustainability.*

# Environmental and Health Implications of Waste Management: Successes and Challenges

**Priya Darshini**

*Chanakya National Law University, Mithapur, Patna*

This exploration embarks upon an intricate journey, which aims to unravel the multifaceted connections between waste management choices and their consequential effects. For decades, conventional waste disposal methods have triggered environmental degradation and posed substantial health hazards. From leachate seepage contaminating soil and groundwater to emissions from incineration plants compromising air quality, the toll on our ecosystems and well-being is undeniable.

The path to sustainable waste management is riddled with complexities. As we navigate the transition toward more environmentally benign practices, we confront a myriad of challenges. These encompass technological limitations, regulatory frameworks, socioeconomic disparities, and the imperative need for heightened public awareness and participation.

This article henceforth endeavours to comprehensively examine the intricate web of environmental and health implications embedded within waste management paradigms. By dissecting successes, challenges, and emerging opportunities, it seeks to shed light on the nuanced landscape of waste management's influence on our environment and well-being.

Within the intricate tapestry of waste management lies a crucial, often overlooked facet: the profound environmental and health ramifications of our collective waste handling practices. As societies grapple with the burgeoning volumes of waste generated each day, the intricate interplay between waste management strategies and their impacts on the environment and public health demands urgent scrutiny.

Furthermore, this exploration extends beyond mere theoretical discourse. It aims to bridge the gap between academia, policy, and practice by offering actionable insights into enhancing waste management systems. By dissecting the nuances of waste management implementation within the ambit of the Waste Hierarchy, this article endeavours to contribute to the ongoing dialogue on sustainable waste practices.

***Keywords:*** *Environmental Challenges, Waste disposal, Multifaceted connections, Technological limitations.*

# Comprehensive Approaches to Heavy Metal Waste Management: Cadmium, Lead, and Chromium: A Review

**Neha Manjari[1], Diksha Bhanu[1], Kumari Gouri[2], Preety Sinha3**

*[1]Dept. of Zoology, A.N. College, Patna, Bihar*

*[2]Dept. of Zoology, Magadh University, Bodh Gaya, Bihar*

*[3]P.G. Dept. of Zoology, Patliputra University, Patna, Bihar*

Heavy metals are persistent, poisonous, and pose serious threats to human and ecological health. Heavy metals especially cadmium, lead, and chromium have become a crucial environmental issue. This abstract provides a review on assessment of Heavy Metal presence in Ganga Ghats of Patna of the latest techniques and technology used in the successful control of these heavy metals. The characterization and continuous monitoring of contaminated sites with the help of spectroscopy and chromatography are essential for understanding the nature and the levels of heavy metal contamination facilitating the targeted remediation efforts. The sustainable practices of source reduction and prevention are instrumental in industrial processes coupled with adoption of cleaner production technology reducing the environmental burden. Various remediation technology and microbial remediation can be employed for the targeted heavy metals. Effective waste management may require regulatory framework and policies addressing the generation, transportation and disposal of heavy material. Stringent regulations compliance measures for illegal dumping of heavy metals can be used for safe and responsible industrial practices. Public awareness and education campaigns plays sense of responsibility and sustainable practices at both individual and industrial levels.

***Keywords:*** *Heavy Metal Waste Management, Technological Advancements, Regulatory Framework, Contamination.*

# Impact of Plastic Pollution on Environment

**Ekta Rani, Shagufta Parveen, Harshita Kumari and Sweta Kumari**

*Dept. of Botany, Magadh Mahila College, Patna*

Plastic pollution has emerged as a prominent and pervasive environmental concern, prompting extensive research into various aspects of its presence and effects. This study provides a comprehensive review of the major characteristics of plastic pollution to contribute to a deeper understanding of this burgeoning issue. This work encompasses an analysis of diversity, persistence, global implications, combined pollution scenarios, and the threats posed to both organisms and human health. Notably, the exponential increase in global plastic production, amounting to as much plastic between 2004 and 2015 as in the previous half-century, has resulted in the accumulation of a staggering 8.3 billion tonnes of virgin plastics. Derived mainly from natural gas and crude oil, these plastics serve as critical chemical feedstocks and fuel sources. The trajectory of plastic waste, revealing that of the 6.3 billion tonnes generated between 1950 and 2015, a mere 9% has been recycled, while 12% was incinerated, leaving a staggering 79% either in landfills or released into the natural environment. With 2015 witnessing the production of 407 million tonnes of plastic, packaging alone accounted for 36%, with approximately 40% destined for landfills and 32% escaping the collection system. The study delves into the pervasive issue of plastic entering oceans, with an estimated 9 million tonnes introduced in 2010 due to mismanaged waste, along with additional contributions from microplastics originating from synthetic textiles and tire abrasion. However, the measured amount of plastics in oceans is less than 1% of the minimum 150 million tonnes released over time. China, Indonesia, Philippines, Vietnam, and Sri Lankaare the leading contributors of plastic pollution responsible for 56% of global plastic waste. In conclusion, this comprehensive review underscores the urgent need for global initiatives to address the multifaceted challenges posed by plastic pollution, emphasizing the importance of sustainable practices, waste management, and innovative solutions to mitigate the adverse impacts on ecosystems and human well-being.

***Keywords:*** *Global Implications, Combined Pollution Scenarios, Ocean Pollution.*

# Bioremediation of PCB-Contaminated Sites using Microbes

**Meenu Gupta[1] and Swapnil Kumari [2]**

*[1]Dept. of Botany, J. D. Women's College Patna, Bihar*

*[2]Dept. of Zoology, J. D. Women's College Patna, Bihar*

Electronic waste, commonly known as e-waste, contributes to environmental pollution when recycled. Polychlorinated biphenyls (PCBs), among the pollutants present in e-waste, pose a significant threat due to their widespread occurrence, organic nature, and severe health and environmental risks. These PCBs are utilized in various electrical devices like transformers and capacitors for heat exchange and hydraulic fluid purposes. Bioremediation emerges as a promising technology for eliminating PCBs from the environment. Despite their chemical stability, certain microbes have the ability to bio-transform or mineralize PCBs under aerobic or anaerobic conditions.

This review aims to consolidate information on PCB-degrading enzymes and microbes. The analysis indicates that *Dehalobacter, Dehalococcoides*, and *Desulfitobacterium* are highly proficient PCB degraders in anaerobic conditions, while *Burkholderia, Achromobacter*, *Comamonas, Ralstonia, Pseudomonas, Bacillus*, and *Alcaligenes*, among others, exhibit broad substrate specificity among bacterial strains in aerobic conditions. Enzymes present in the soil, such as dehydrogenases and fluorescein diacetate (FDA) esterases, demonstrate the capability to break down PCBs.

The biphenyl upper pathway involves key enzymes, including dehydrogenase (bphB), multicomponent dioxygenase (bphA, E, F, and G), second dioxygenase (bphC), hydrolase, and (bphD). Biphenyl dioxygenase stands out as a pivotal enzyme in the aerobic degradation of PCBs within the metabolic pathway. Numerous microorganisms have been identified as responsible for PCB metabolization. The review introduces innovative strategies for managing soil contaminated with e-waste.

***Keywords:*** *Bioremediation, Polychlorinated Biphenyls (PCBs) Dehydrogenases, Fluorescein Diacetate (FDA) Esterases, Biphenyl Dioxygenase.*

# Waste Management: Serious Problem Now A Days

**Sneha Raj**

*Magadh Mahila College, Patna*

Now- a- days we all know waste management is a serious problem. Their should be a proper system to manage waste. We all know there are many types of waste like sewage waste, municipal solid waste , electronic waste ,industrial waste, agricultural waste, and many more.

Waste is something not only affect the humans but it also affects the whole ecosystem . The main goal of waste management is to reduce the amount of waste that goes to landfills. It also aims to reduce the negative effects of waste on human health, the environment, and planetary resources.

Waste management intended to reduce the adverse effects of waste on human health, the environment, planetary resources, and aesthetics Waste management plans should include the following:

- Who is responsible for managing waste on site
- Goals and objectives
- Estimates of waste types and amounts
- Targets for reducing the amount of waste sent to landfills
- Recycling and reuse methods for each material. Effects of waste :-
- Waste from agriculture causes eutrophication of lakes and pond
- Waste from industries which are drained in river directly without proper treatment can cause water pollution and can affect the aquatic ecosystem .
- Waste of thermal power plant can cause damage to the indigeneous flora and fauna.

There are many more ways in which they affect us . So for the proper management of waste government should imply a proper system . Government should promote integrated waste management strategies reuse of materials, organic farming and many more ways .

This paper focused on waste management its necessity ways ideas and their effective implementations and encourages further regarding finding more ways of waste management. Thank you.

# GROUP - H

# (CLIMATE CHANGE GOVERNANCE, LEGISLATION AND LITIGATION)

# Climate Change Legislation and Litigation

**Pankaj Kumar**

*Dept. of Political Science, J.J College, Bihar*

There is no country in the world that does not have at least one law or policy dealing with the climate change. The most prolific countries have well over 20, and globally there are 1,800 such laws. Some of them are executive orders or policies issued by governments, other are legislative acts passed by parliament. The judiciary has been involved in 1500 court cases that concern climate change. We use climate change law of the world, a publicly accessible database, to analyze patterns and trends in climate change legislation and litigation over the past 30 years. The data reveal that global legislative activity peaked around 2009-14, well before the Paris Agreement. Accounting for effectiveness in implementation and length of time laws have been in place, the United Kingdom and South Korea are the most comprehensive legislators among G20 countries and Spain within the Organization for Economic Cooperation and Development. Climate change legislation is less of a partisan issue than commonly assumed: the number of climate laws passed by government of the left, center and right is roughly proportional to their time of office. We also find that legislation actively decreases in time of economic difficulty. Where courts have gotten involved, judges outside the United States have ruled in favour of enhanced climate protection in about half of the cases (US) judges are more inclined to rile against climate protection.

***Keywords:*** *Legislation, G20 Countries ,United States, Judiciary, Paris Agreement.*

# Climate Change: Governance, Legislation and Litigation

**Prakriti**

*Dept. of Zoology, Magadh Mahila College, Patna*

Climate change that is variation in the global climatic condition including change in the temperature and precipitation over a long period of time has now become one of the most daunting global policy challenges falling under international community in the 21st century. Surely it hasn't been the new thing to consider but the efforts toward it has been started since 1950s with the first initiative of lowering the CO2 emissions for fossil fuel sustainability and clean environment to keep the global temperature below 2° C in Paris agreement but the results were quite opposite cause it has been only increased after that.

Countries to be called as developed nations have the most significant roles in both making and breaking the laws when it comes to the governance and legislation on climate change. What these changes are calling for floods, storms, heat waves, drought, wildfires. The increasing human population with leading technologies and advancements with more demand of animal based food concerns the air with more greenhouse effects and global warming causing the inhospitable continent like Antarctic to have flowers due to landscape warming at an unprecedented rate in this year 2023. This makes us to hold 95% of share in deterioration of our environment and a 100% responsible for our actions to live through these conditions.

With such an alarming problem of today do we have any solution to it? Well the acts and laws are made to keep it under the control but they are being constantly breeched, challenged and are under negligence. Climate litigation which has almost doubled in five years includes certain legal claims and cases which resulted in rising costs. With these many problems there are nations who are keeping the record of their national growth and development with climate policies and regulations to magnify the ecological sustainability with development in individual and national level including public health to national security. Surely politics has a lot to do with the climate change on a global scale to make peace and reparation with the nature and developing countries like India, Gambia and Morocco are actively showing the results with efforts with renewable energy projects and many more.

Our action inspired by awareness can contribute a lot to this major problem of today and we have a duty towards our environment and future generation to provide the best with sustainability.

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