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**NAVRACHANA
UNIVERSITY**

In association with



**Wildlife & Conservation
Biology Research Foundation**

ABSTRACT



National Conference on
**Climate Community and
Conservation** - NC-CCC 2022



26th - 27th September, 2022
Navrachana University, Vadodara



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President, NUV, Vadodara



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NATIONAL CONFERENCE ON CLIMATE, COMMUNITY & CONSERVATION

DAY 1: SEPTEMBER 26, 2022

Time	Details
8:00 to 9:00	Registration and Breakfast
9:00 to 9:50	Inauguration Ceremony
9:50 to 10:35	Key Note Address by Prof. Devesh K Sinha Director, Delhi School of Climate Change & Sustainability, University of Delhi "Ocean-climate connection, abrupt and gradual climate change in the past: Lessons for future"
SESSION 1	Climate change and mitigation measures
10:35 to 11:05	Lead talk by Dr. Jitendra Gavli Director, Community Science Center, Vadodara, Gujarat "Community action-based conservation efforts and societal efforts that contribute to ameliorate the impact of climate change"
SESSION 2	Community actions for a sustainable environment
11:05 to 11:35	Lead talk by Dr. Gururaja K V, S M Institute of Art, Design & Technology, Bengaluru, Karnataka "People's participation in amphibian conservation – A study on Malabar tree toads from the Western Ghats"
11:35 to 11:45	Tea break
11:45 to 13:30	Oral Presentations in Parallel Sessions Session 1 OP 1 to OP7 Session 2 OP8 to OP13
13:30 to 14:30	Lunch
SESSION 3	Conservation of Nature and Natural Resources
14:30 to 15:00	Dr. Nita Shah, Scientist, Bombay Natural History Society, Mumbai, Maharashtra "Tracking long term changes in arid landscapes"
SESSION 4	Advances in Conservation Science
15:00 to 15:30	Lead Talk by Prof. Pratyush Shankar, Interim Provost, Navrachana University, Vadodara, Gujarat "Climate change and built environment"
15:30 to 15:40	Tea break



15:40 to 17:10	Oral Presentations Parallel Session Session 3: OP14 to OP18 Session 4: OP19 to OP24
17:15 to 17:45	Lead Talk by Dr. Prasoon Gargava, Regional Director-West, Central Pollution Control Board "Moving towards zero waste cities"
17:45 to 18:15	Lead talk by Dr. Prachi Thatte, World Wide Fund for Nature-India, New Delhi "Collaborative Conservation: Building a network to save wildlife corridors in India"
18:15 Onwards	Cultural evening followed by dinner

DAY 2: SEPTEMBER 27, 2022

Time	Details		
8:00 to 8:30	Breakfast		
SESSION 5			
8:30 to 9:00	Lead Talk by Dr. G. Umapathy, Senior Principal Scientist & Group Leader, Laboratory for the Conservation of Endangered Species (LaCONES), CSIR-Centre for Cellular and Molecular Biology (CCMB), Hyderabad "Biotechnological tools in biodiversity conservation in the Anthropocene era"		
9:00 to 9:30	Lead talk by Dr. C P Singh, Scientist, SA C, Indian Space Research Organization (ISRO), Ahmedabad, Gujarat "Role of Geo-spatial Technology for Wildlife habitat management in changing world"		
9:30 to 11:50	Presentations for Dr. M I Patel National Award		
9:30 to 9:40	Introduction	Dr Nishith Dharaiya	Founder and Hon. Director of Research, WCB Research Foundation
9:40 to 10:00	Finalist 1	Dhanesh Bhaskar	IUCN SSC Grasshopper Specialist Group, Kerala
10:00 to 10:20	Finalist 2	Dhruv Prajapati	JRF, Gujarat Forestry Research Foundation, Gujarat
10:20 to 10:40	Finalist 3	Nisha Singh	Scientist, Gujarat Forestry Research Foundation, Gujarat
10:40 to 11:00	Finalist 4	Shikha Srikant	Independent Wildlife Biologist, Assam



11:00 to 11:20	Finalist 5	Sreeparna Dutta	Turtle Survival Alliance, Uttar Pradesh
11:20 to 11:40	Finalist 6	Sumesh Dudani	Natural Heritage Division, INTACH, New Delhi
11:40 to 11:50	Concluding Remarks	Dr Sagarika Damle	Chairperson, Dr M I Patel Award Committee
11:50 to 12:00	Tea Break		
12:00 to 13:00	Poster Presentations		
13:00 to 14:00	Lunch		
14.00 to 15:00	Valedictory Function and Award Ceremony		
15.00 onwards	High Tea and Departure		



Sr. No.	Title	Presenter	Page No.
Key Note Address	Ocean-climate connection, abrupt and gradual climate change in the past: Lessons for future	Prof. Devesh K Sinha	1
LEAD TALK			
LT 1	Community action-based conservation efforts and societal efforts that contribute to ameliorate the impact of climate change	Dr. Jitendra Gavli	3
LT 2	People's participation in amphibian conservation – A study on Malabar tree toads from the Western Ghats	Dr. Gururaja K V	4
LT 3	Tracking long term changes in Arid Landscapes: Factors governing Greater and Lesser Flamingo Occupancy in Gujarat and Likely Impact of Climate Change	Dr. Nita Shah	5
LT 4	Climate change and built environment	Prof. Pratyush Shankar	7
LT 5	Moving towards zero waste cities	Dr. Prasoon Gargava	8
LT 6	Collaborative Conservation: Building a network to save wildlife corridors in India	Dr. Prachi Thatte	9
LT 7	Biotechnological tools in biodiversity conservation in the Anthropocene era	Dr. G. Umapathy	10
LT 8	Role of Geo-spatial Technology for Wildlife habitat management in changing world	Dr. C P Singh	11
ORAL PRESENTATIONS			
Theme – 1: Conservation of Nature and Natural Resources			
OP 1	Study of fruit preference of Hornbills in Pench Tiger Reserve, Madhya Pradesh	Nikhil Borode	12
OP 2	The Foraging Behaviour and Activity Patterns of Globally Endangered Egyptian Vulture, <i>Neophron percnopterus</i> in Unnao district of Uttar Pradesh, India	Shivangi Mishra	13
OP 3	Assessment of Fish Diversity and Toxicity in the Okha Port, Gujarat.	Tejas Gurjar	14
OP 4	An Insight Into: Bird-Plant Seed Dispersal Network of Deciduous Forest of Dang, Gujarat.	Jigar Patel	15
OP 5	Enlisting the conservation status of some endangered medicinal plants of Indravati National Park, Bijapur, Chhattisgarh	Sharda Darro	16



OP 6	Evidence based Evaluation of the medicinal potential of Mangroves as an approach to economically beneficial conservation	Mayuresh Joshi	17
OP 7	Suitability assessment of Irrigation Water quality in Semi-arid Region	Ankita P. Dadhich	18
Theme – 2: Advances in Conservation Sciences			
OP 8	Morphometric Analysis of Gandak Drainage Basin using Geographic Information System (GIS) and CARTOSAT-DEM.	Arushi Jha	19
OP 9	Comparative analysis of vegetation and urbanization with climate of Diu city through Geospatial techniques	Kavya P. Tanna	21
OP 10	Minimizing Residential Carbon Footprints with EcoLife C 3	Kelly Nigrel	21
OP 11	Using modified Generic Impact Scoring System (GISS) to assess the risk of Biological Invasions in a Wildlife Sanctuary in Southern Western Ghats	Karthika M. Nair	23
OP 12	Characterization of the Gut Microbiota of Indian Cormorant (<i>Phalacrocorax fuscicollis</i>) from the Coastal area of Bhavnagar District, Gujarat-India	Leena Agravat	24
Theme – 3: Community Action for Sustainable Development			
OP 13	Modelling the hotspots of livestock depredation by leopard at human interphase of Rajaji tiger reserve	Shashank Yadav	25
OP 14	Attitude of local community toward Sloth Bear (<i>Melursus ursinus</i>): A Case Study from Central Gujarat, India	Vishal Patel	26
OP 15	Rejuvenation of abandoned houses in Rohru, Himachal	Neha Raje	27
Theme – 4: Climate Changes and Mitigation Measures			
OP 16	Integrated Mangrove Aquaculture (IMA) in Sundarban: An ecosystem-based, climate adaptive livelihood in the context of global sea level rise	Sabyasachi Chakraborty	28
OP 17	Estimation of Forest Fragmentation and Natural Regeneration of Native Tree Species in Urban Forest. A case study of Sanjay Van in Delhi, India	Khushboo Randhawa	29
OP 18	Diversity of Insect Pests and its Infestation in the Agricultural fields of Vadodara District	Nishi Pandya	30



OP 19	Breeding biology of some wetland birds in Malkhed lake & Chhattri lake of Amravati, Maharashtra	Zainab K. Ali	31
OP 20	Diversity of Avian species in Upper Wardha Reservoir, Morshi, Amravati, Maharashtra	Lunge Ashwin	32
OP 21	Vegetation patterns on a landslide after six years of natural restoration in the Indian Himalayan region of Uttarakhand	Deepesh Goyal	33
POSTER PRESENTATION			
PP 1	Impact of Human Centric Lighting on Human Health	Abhishek Madhavan	35
PP 2	Impact of Carbon Fiber & Kevlar on Construction Industry	Aishwarya Hatkar	36
PP 3	Genetically modified rhizobia to combat heavy metal stress on fenugreek seedlings	Akash Dave	37
PP 4	Route Analysis of garbage trucks using artificial intelligence: A review	Arzold Evox	38
PP 5	A Time Series analysis of Normalized Difference Vegetation Index and Land Surface Temperature Relationship over Gir Landscape	Dhruvi Sedha	39
PP 6	Behavior Ecology of the Indian Peafowl (Pavo cristatus) in Pilani, Jhunjhunu District, Rajasthan	Dr. Adesh Kumar	40
PP 7	Prediction of Route Analysis of Garbage Trucks in solid waste management: Review	Harshil Prajapati	41
PP 8	Study of Amphibian Diversity in Urban and Semiurban Areas of Amravati, Maharashtra	Hayat Akhtar Asrar Ahemad Qureshi	42
PP 9	Prediction of Solid waste generation through mathematical modelling: A Review	Jay Gujarati	43
PP 10	Influence of predator suppression and prey availability on carnivore occurrence in Western Himalaya	Jenis Patel	44
PP 11	Faunal Diversity of Arboretum, M.S. University Campus, Vadodara, Gujarat	Khusbu Rajani	45
PP 12	Toxic effects of Bifenthrin and Deltamethrin on the development of Zebrafish embryo (Danio rerio)	Khyati V Kulkarni	46
PP 13	Conservation of Rocky Plateaus, Community development and Challenges in the development of sustainable tourism development model – case of Ratnagiri District in Maharashtra	Koustubh Joshi	47



PP 14	Study of Plant Diversity in Kaleshwari Forest Mahisagar District, Gujarat, India	Kunjana Narendrakumar Patel	48
PP 15	Floristic Study on Hydrophyte Vegetation of Aravalli District, Gujarat, India	Mayur Patel	49
PP 16	Gastrointestinal Parasite Survey of Antelope Cervicapra (Black Buck) In Karanja Sohool Sanctuary, India	Milind Vishnupant Shirbhate	50
PP 17	Biofuels: Affecting Climate Change & Contribution towards Sustainable Development	Mohit Majmudar	51
PP 18	Prediction of Landfill Leachate Treatment using ANN Model	Mohit Mojindra	52
PP 19	Food Habits of leopards in Human Dominated Landscape of Vansda Taluka, South Gujarat	Mohmadnavaz Ikbalbhai Dahya	53
PP 20	Nesting characteristic of spotted owl (Athene brama) in and around Mount Abu Wildlife Sanctuary	Narayan Lal Choudhary	54
PP 21	Identifying Gaps for The Assessment of Metallic Elements in Marsh Crocodile Eggshell of Vishwamitri River, Gujarat	Nidhi Thanki	55
PP 22	Plant-based Meat as a Solution for Global Sustainable Food System	Nikhil Thadhani	56
PP 23	Insect Diversity and Pest Status in the Agricultural Fields of Vadodara District	Pankaj Sharma	57
PP 24	Seasonal Variation and Habitat Utilization by Lesser Whistling Duck, (Dendrocygna Javanica) in the Selected Wetlands of Udaipur District, Rajasthan, India	Pritesh Patel	58
PP 25	Breeding Biology of Black drongo (Dicrurus macrocercus) in Jarga Forest Area Southern Rajasthan, India	Pushkar Kumawat	59
PP 26	Prediction of Solid Waste Generation in Gujrat using Artificial Intelligence: Review	Raj Thakkar	60
PP 27	Coprological Prevalence of Gastrointestinal Parasites in Wild Herbivore Animals at Girnar Wildlife Sanctuary, Junagadh, Gujarat	Riddhi Dipeshkumar Kanabar	61
PP 28	Conservation Risk Assessment of Mesosphaerum suaveolens and Ocimum basilicum (Lamiaceae)	Riddhi Rajendra Mavani	62
PP 29	Unusual floral characteristics of Alpinia calcarata and conservation studies	Rudra J Patel	63
PP 30	Fluctuations in Water Quality Due to Climate Change: A comparative case study of urban and rural wetlands of Vadodara district	Sheetal Prasad	64



PP 31	Assessing the Impacts of Urbanisation on Stream Ecosystem in Urban Areas	Shirke Shaily .S.	65
PP 32	Biomonitoring of Harni Pond Using Aquatic Macroinvertebrates as Bioindicators	Sneha Tapadar	66
PP 33	Diversity of Angiosperm macrophytes in selected wetlands in Lunawada taluka of Mahisagar district, Gujarat, India	Surpal P Baria	67
PP 34	Conventional Conservation Techniques- Case Study of Himachal Pradesh	Swapnil S. Bhole	68
PP 35	Assessment of Physicochemical and Total Carbon of Soil in Different Land Use Forms of Delhi	Tanu Prakash	69
PP 36	Behavioural Analysis of Southern Pig-Tailed Macaque (<i>Macaca nemestrina</i>) in captivity, a family residing in Sri Sayajibaug Zoo, Vadodara, Gujarat	Utsav Navinkumar Navadiya	70
PP 37	A Preliminary Floristic Study on Chotila Taluka of Surendranagar District, Gujarat	Vipul P. Sorani	71
PP 38	Identification and Ecophysiological Studies on the Grasses of nearest area of Kheda	Nupur A. Vijayanshi	72
PP 39	The common Insecticide cyfluthrin and chlorpyrifos alter the expression of subsets of genes with diverse functions in primary human astrocytes.	Rutvi Vaja, Chandana R Hosur	73
PP 40	Phthalate- A molecule hindering milk production in cow	Aastha Bhattasana	74
PP 41	Neonicotinoids: Endocrine Disrupting Agents In Non-Targeted Species	Shilpi Pillai	75
PP 42	Understanding the Diversity and Distribution of Agricultural important insects of Vadodara District	Mithil Trivedi	76



Message

Development and Poverty, Environment and Climate Change – all are conjoined through critical linkages that impact each other in complex ways. We are already feeling the heat!

We always believed that our generation will not be around to see and experience the effects of Climate Change – what I mean is that we thought these horrible things would happen many, many decades later, maybe even in the next century. And we hoped that the awareness which climate and environment activists were garnering would make the powers-that-be see sense and reason and would act accordingly for the benefit of the planet.

But that does not appear to be going very far; and certainly much, much slower than the rate at which our forests are depleting, the polar caps melting, long stretches of drought in otherwise rainy parts of the world, crop failures, sudden rises and falls in temperatures, disease-causing pollution, and devastating floods, earthquakes and cyclones creating havoc and destruction on a massive scale across the globe.

As an educational institution it is our responsibility to address these challenges and provide a platform to budding researchers and students to sensitise their communities for building a better future. Navrachana University has already taken one step forward in the direction towards clean energy by installing solar panels thus increasing energy efficiency.

I firmly believe that this Conference will be fruitful in creating awareness among young minds under the guidance of eminent scientists and conservationists participating.

My best wishes to the Conference and a very warm welcome to all the participants to Navrachana University.

Smt. Tejal Amin
Chairperson
Navrachana Education Society



Message

Climate change is a huge environmental problem that we are facing today, it has various causes and there is a lot to talk about. However, there is another important aspect to consider – the impact on communities. Conservation efforts are vital to protect both natural resources and the people who depend on them. As the earth's climate changes, it can cause problems for local communities, including more extreme weather conditions and changes in the availability of resources. This can lead to social and economic disruptions, which in turn can impact the ability of communities to conserve their natural resources.

"We are all in this together." To paraphrase an old saying, what we do to the Earth, we do to ourselves. There is no 'away' to throw things; there is only here. And what we do to the Earth, we do to each other – every single one of us. The climate crisis is a global issue that necessitates a global solution. As a global community, we need to work together to conserve our planet's resources.

We here at Navrachana University strongly believe that to tackle climate change we all should come together and work towards a better future,

I am confident that this conference will be beneficial in raising awareness amongst younger generations, who are going to lead the world tomorrow.

I wish everyone the best and extend a hearty welcome to all participants.

Shri Rahul Amin

Patron

Navrachana Education Society



Message

When teenage climate change activist Greta Thunberg at the United Nations Climate Action Summit in New York said “You have stolen my childhood and my dreams with your empty words” It represented the voice of millions of youngsters who feel cheated and deprived of a life that many of us enjoyed. In some sense Greta's powerful words remind us of the deep crisis that we have created by altering the climate of the planet which we now understand have reached a tipping point or perhaps the point of no return. This crisis is not an ordinary one and has the potential to alter or maybe completely wipe out the world as we know today.

Our linear idea of progress and development which very much had been the outcome of the Industrial Revolution and the modern movement comes at a cost which cannot be measured. The damage that so-called "progress" does to the environment is only completely understood now. In such dismal and dark times however some individuals and organizations gives us hope for a better future

The fact that green parties and political organization basing their politics and manifestos on environmental protection are gaining vote share in Europe is indeed heartening. This is leading to change in political discourse if these nations while centering the idea of environment. The youth in many of these nations are especially upset and are choosing alternate lifestyles. It remains to be seen if such ideas can be sustained but still it is a good beginning

The conference such as this should hopefully inspire the younger generation to not make the same mistakes that my generation did and provides a much needed spirit of scientific enquiry and research in a field that quite often is contested by pseudo-science and fake news

I wish to congratulate the School of Science at Navrachana University for organizing such a relevant and topical conference and wish them all the best

Prof. Pratyush Shankar

Provost & Dean,

School of Environmental Design & Architecture, Navrachana University, Vadodara



Message

The world has been engaged in discussing, debating, and finding sustainable solutions to climate change and its adverse implications since more than two decades. We all are directly or indirectly, intentionally, or unintentionally contributing to the emission of greenhouse gases.

The Intergovernmental Panel on Climate Change (IPCC) February 2022 report provides a detailed assessment of climate change impacts, risks and adaptation in cities, where more than half the world's population lives. People's health, lives and livelihoods, as well as property and critical infrastructure, including energy and transportation systems, are being increasingly adversely affected by hazards from heatwaves, storms, drought and flooding as well as slow-onset changes, including sea level rise. Collectively, rapid trend of urbanization and climate change create complex risks, especially for those cities that already experience poorly planned urban growth, high levels of poverty and unemployment, and a lack of basic services. However, cities also provide opportunities for climate action – green buildings, reliable supplies of clean water and renewable energy, and sustainable transport systems that connect urban and rural areas can all lead to a more inclusive, fairer society. This key finding underlines the urgency for climate action, focusing on equity and justice. Adequate funding, technology transfer, political commitment and partnership lead to more effective climate change adaptation and emissions reductions.

Role of Universities to reduce greenhouse gases emission – Walk the Talk

Universities also contribute significant greenhouse gas emissions. E.g., they generate emissions on their campus through their laboratories by burning gas and emitting refrigerants, consuming electricity for their various buildings, stakeholders travelling for various academic and non-academic purposes, to and from campus. Many universities of repute in the world have set their own targets to become Net-Zero and started their bit to achieve these goals. In this direction, **Navrachana University** has installed solar panels as a renewable alternative to an eco-friendly pollution-free environment. This Conference will be a great platform for exchange of ideas pertaining to environment and its conservation with eminent speakers from Delhi, Bangalore, Hyderabad, Mumbai and Ahmedabad. It will also include research scholars and students who will be presenting their work from different Institutes of India.



I am sure that this conference will give more opportunities to all of us to think and responsibly act in this direction.

Professor Sandeep Vasant

Registrar

Navrachana University



Message

I am happy that Navrachana University, in association with Wildlife and Conservation Biology Research Foundation (WCB RF), has thought it fit to organize a National Conference on Climate change, Community and Conservation on the 26th and 27th of September 2022.

The footprint of climate change is visible in every corner of the planet. Erratic and unpredictable weather patterns, rising sea levels and melting glaciers due to climate change are reshaping societies across the globe.

India is one of the world's most climate-vulnerable countries. In India, climate change is already affecting human health, wildlife, food production, clean water access and the economy at large. On the one hand, community activities contribute to climate change and, on the other hand, climate change in turn affects the lives of communities. Biodiversity depletion is also a major contributor to climate change, and so effective conservation measures would be a major challenge in mitigating climate change effects.

I am sure that this two-day meeting would touch upon these aspects and suggest ways and means of mitigating climate change consequences besides identifying major activities contributing to climate change and life on this planet.

I wish the conference all the best and hope that this will help chalk out more work on these directions.

Prof. A. V. Ramachandran
Mentor, School of Science,
Navrachana University



Message

Communities have always played a significant role in conservation actions and we have learned many things through the conventional conservation practices in our country, there is a need to transform these conventional knowledge and practice of conservation with a scientific base. National conference on Climate, Community and Conservation is an effort on the same thought that can bring community practice and scientific research on a same platform to conserve the nature and natural resources and formulate the mitigation actions for the changing climate. Wildlife and Conservation Biology (WCB) Research Foundation is committed to conservation of wildlife and habitat through scientific research and capacity building and it is a great opportunity and pleasure for us to join with Navrachna University, Vadodara for this national conference and hosting the researchers and scientists from all over India. There will be four parallel sessions in the conference where conservation through community practice to the advanced scientific technologies will be discussed and demonstrated by the researchers from all over India and I am sure that we all will learn from each of the research paper presented in the conference.

We are also pleased to felicitate one of the young conservation researchers from India with Dr. M I Patel National Award 2022. We have received 20 nominations and five out of them as finalists presenting their research in this conference. Dr. M I Patel Award for young wildlife and conservation biologist being awarded every year to the young conservation biologist from India, who have contributed in wildlife and nature conservation through research. The nominations for the next year 2023 will open from October 1, 2022 through June 30, 2023.

At the outset, I wish this conference will be a learning platform for all of us who are committed for conservation of Mother Nature and her creatures and saving our natural resources from changing climate. This conference will generate the community of practice and provide the opportunities for future collaborations and joint actions for conservation in our country.

Dr. Nishith Dharaiya
Founder
WCB Research Foundation



Key Note Address

Ocean-Climate Connection, Abrupt and Gradual Climate Change in the past: Lessons for future

Prof. Devesh K Sinha

Director
Delhi School of Climate Change & Sustainability (DSCCS), Institution of
Eminence, &
Professor of Oceanography and Marine
Geology Department of Geology, University of
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Oceans have played a major role in driving climate changes through the geological past and continue to affect the Earth's climate in modern times. The present-day debate on "Climate Change" is incomplete if we do not understand properly the role of oceans. Ocean water has large specific heat and thus has a vast storage of heat energy. Through their massive transport system in the form of ocean currents, the oceans transfer vast amounts of heat from tropics to pole and from surface to deep Ocean. A number of climatic phenomena are directly linked to ocean circulation and ocean-climate interaction. Many questions have been answered through scientific investigations and need to be brought into the public domain in simple language. The study of modern and past ocean circulation gives us answers to **many intriguing questions** listed below.

When and why did the Antarctic ice cap develop? When and why did the Northern Hemisphere Ice sheet (Greenland Ice Sheet) develop? Why did the Northern Ice Sheet form later than the Antarctic Ice sheet? How did the large-scale movement of continents and changing ocean-continent geometry affect climate? Why has the Earth undergone a series of Glacial- Interglacial stages? How can the past climate be inferred from Ocean Archives? How did the formation of mountains like the Himalayas cause climate change in the world? How will the present climate change affect the biosphere? What is the scientific issue with the present "Global Warming" and the role of oceans in mitigating it? How did climate change affect the two poles? What is Polar Amplification and Bipolar See Saw? What threats are there for the glaciers in light of climate change?



The present “fear” of so-called “**Global Warming**” is also linked to a possible abrupt change in **oceans’ thermohaline circulation**. Geological archives have shown that such a change occurred 12000 years back known as “**Younger Dryas**” when there was a shut down in the Thermohaline circulation leading to an Ice age in North America and Europe. Such a scenario is predicted if sea surface temperatures continue to rise in case of a “possible Global Warming”. Much of the debate about abrupt climate change and the parts of the world most affected can be understood through ocean circulation.

The information gained from the climate archives consisting of well-dated marine sediments and ice cores points towards abrupt climate changes in the northern hemisphere during the last glacial period known as the **Dansgaard–Oeschger (D-O)** events. The causes of such abrupt warm events are yet to be fully understood. The Younger Dryas Cold event also is enigmatic as several hypotheses have been put forward to explain the event ranging from tropical **El Nino Southern Oscillation (ENSO)** to high latitude freshening of the Atlantic. The non–linearity of the climate system is puzzling as we never know the thresholds which, if crossed may put us in a very hostile type of climate. Often the intricacies of scientific terms are not understood by the common public who must be made aware of climate change issues. The present talk explains the above issues in simple language understandable to a non-specialist.



LT 1

Community action-based conservation efforts and societal efforts that contribute to ameliorate the impact of climate change

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"Climate, Community, and Conservation"

All these 3 Cs are the reason and bases of survival of every life form on this unique life supportive planet. Climate is the normal weather conditions of a particular region and as it has shown changes mainly due to human activities, the routine life pattern, the resources and population is facing impact. The group of people or individuals with similar requirements and life cycle are defined as Community. They are first to get the impact of climate change. What best one can do must be followed by community to check the alterations. It is an individual's own efforts of conservation of natural resources, purity of air, water and soil that is important. Every individual must follow reuse, refuse, recycle and refuse for the material used in day to day life. Communities must have more coordinated efforts to overcome local level changes/pollution and adulteration. There must be alternatives for the least carbon loads.

In the present context Chennai floods (2015) is the direct impact of excessive rains of annual north-eastern monsoon. In a very recent case of Bangalore, man-made mistakes (poor infrastructure, carefree wetland management) has increased the calamity. For climate change, excess rain is a sum of several mistakes that we make. Or it can be further hard hit due to our poor designs. We need to work on both, long term and short term water management as per locality and topographical considerations. The large scale decision making, implementing regulations and practices of regulations is exclusively in the hands of the government. As a citizen, we certainly can do our bit to neutralize the dangerous impact of climate change. We must ensure green cover around us. We must also care not to disturb our water bodies and wetlands. Our lifestyle shall always have deep considerations of sustainable living and conservation of biodiversity and natural resources.



LT 2

People's participation in amphibian conservation – A study on Malabar tree toads from the Western Ghats

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The Malabar Tree Toad (*Pedostibes tuberculosus*) was described in a museum collection in 1876 from Malabar. It was re-discovered after 105 years in 1980 from Silent Valley, Kerala. It was considered Endangered in the 2004 IUCN assessment. Over the next 10 years, there were about 6 reports, in a few localities across the Western Ghats. In 2015, within India Biodiversity Portal, I started the Mapping Malabar Tree Toad programme and today there are over 287 observations. My talk covers the challenges and aspirations of a citizen-driven conservation programme.



LT 3

Tracking long term changes in Arid Landscapes: Factors governing Greater and Lesser Flamingo Occupancy in Gujarat and Likely Impact of Climate Change

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Here we present the case of Greater and Lesser Flamingo occupancy and distribution driven by the rainfall patterns in the State of Gujarat. Landscape mapping was done using Google Earth images, Landsat, AWiFS, MODIS, World climate data, FSI Forest cover map and several secondary data sources. The population distribution and estimation was done by aerial and vehicle transects, covering paths of 4718 Km, Over 1700 hours were invested in interviews along the Gujarat coast. Fourteen districts reported of flamingo presence out of which 12 districts reported of all year presence.

The comparison of landscape change from year 1700 to the present day indicate a manifold increase of over 13 times in agriculture putting the grassland, woodland and wetlands at stake. Gujarat has undergone tremendous change over time, maximum loss is recorded for forest and pasture/grassland and gains were in agriculture (rainfed and irrigated) and urban/rural settlements. Gujarat has 15,075 sq km of wetlands (includes manmade) in winter while is reduced by almost 80 % i.e. 3,286 sq km in summer. Kutch has maximum area under wetland followed by Banaskantha, Bharuch, Bhavnagar and Surat.

The Great & Little Ranns of Kutch are seasonal wetlands and the only large flooded short grasslands in the Indo-Malayan realm. 76 % (20946 sqkm) of this ecoregion is under Protected Area. This zone falls under a very important Migratory route, the Central Asian Flyway accessed by migratory birds from Russia, Eurasia and Central Asia thereby making this desolate fragile mudflat unique and biodiverse. The Rann of Kutch since long has been Asia's only traditional breeding grounds for the greater and lesser Flamingos.

Flamingo habitat is largely hyper saline and saline areas like mudflats, creeks, saltpans and inland saline lakes, apart from these areas they are found seasonally in some freshwater lakes



and water bodies receiving human waste. The habitat suitability model for Flamingos based on CART model indicates they are largely distributed within 17 Km of coastline of Gujarat as most of the saline lakes, and salt work are within this area. High salinity shallow waterbodies appear to have higher food productivity, and food resources are also more regular over time in these water bodies.

Higher specialization of flamingos provides limited scope to adapt to changing conditions and increases its vulnerability to climate change, human interference, particularly because the saline environments favored by this group of birds are ideal for salt and other chemical extraction processes by industries. Connectivity in a landscape is an important aspect, it facilitates movement or impedes it in context of landscape architecture and behavioral needs.

South Asia accounts for over 33% of the floods in Asia of which 40% of the flooding events were reported from India which was a larger percentage of impact compared to Bangladesh, Pakistan or Srilanka. The implications are visible and therefore climate change coupled with rampant development programs (linear infrastructure, renewable energy park) in the vicinity of the breeding and foraging grounds are drastically having an impact on flamingo nesting, distribution and abundance



LT 4

Climate change and built environment

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The question of cities and its architecture is central to the concern of usage of natural resources for human needs. Whereas we struggle to find an appropriate solution to develop while finding sustainable solutions for living habitat, examples from the past demonstrate how cities were built by working around nature and establishing a kind of balance that is now disturbed. By showcasing examples from the fragile eco system of Indian and Nepalese Himalayas, this talk will highlight the formation of cities, public places and architecture in the Himalayan region in context with its relationship with "nature"



LT 5

Moving towards zero waste cities

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The generation and management of waste in any city, have close linkages with impact on environment, climate and conservation of resources. The concept of zero waste for landfill, which was once considered to be difficult, has now been demonstrated through regulatory, technological and community participation tools. Decreasing trend in solid waste landfilled with increase in collection efficiency is indicating cities moving towards zero waste concepts. It is important to keep a close watch on global scenario with respect to waste management in cities to realign targets from time to time. New initiatives can get spark from success stories and can be supported by adequate regulatory framework, technological solutions and regular strategic fine tuning to achieve the goal of zero waste cities.



LT 6

Collaborative Conservation: Building a network to save wildlife corridors in India

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Habitat degradation and fragmentation are driving India's imperilled wildlife towards extinction. A key challenge confronting conservation in fragmented landscapes is maintaining permeability and functional connectivity for a suite of species with diverse life history needs. Connectivity conservation in India's human dominated landscapes is especially daunting given that diverse socio-economic imperatives are poorly aligned with conservation goals, driving deleterious and often irrevocable land use change at an unprecedented rate. Making headway with connectivity conservation increasingly demands collaboration between organizations to leverage capacity, increase impact and advance evidence driven decision making towards the shared vision of sustaining vital ecological processes in rapidly changing landscapes. Recognizing this need, twelve conservation organisations in India collectively established the Coalition for Wildlife Corridors (CWC). The CWC envisions advancing connectivity conservation in three key ways. First, a web-portal profiling state-of-the-art information on India's key wildlife corridors is under development – and will serve as a vital repository of actionable data to monitor and prioritize connectivity conservation interventions in dynamic landscapes. Second, coalition member organizations are actively contributing to advancing connectivity science and practice through key operational and methodological advances, for example, developing comprehensive indicators to assess connectivity status in corridors, standardized frameworks to monitor corridor-wildlife and identifying best practices to aid government agencies in conservation planning corridor management, including the equitable and sustainable local stewardship of corridors. The third is to influence land use planning and policy through advocacy. In time, with enduring collaborations and a growing network of partners, we anticipate that the coalition can be a potent force to maintain permeability for wildlife.



LT 7

Biotechnological tools in biodiversity conservation in the Anthropocene era

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Approximately one-quarter of the world's mammal species, one-eighth of the birds and one-third of the amphibians are considered to be threatened with extinction. About one thousand species have been listed as critically endangered, and these need immediate attention. Conservation responses in the field can be directed towards habitats or localities or can work directly with species by management interventions (in situ) or captive breeding (ex situ). The Laboratory for Conservation of Endangered Species (LaCONES) was established by the CSIR-CCMB in collaboration with the Central Zoo Authority of India and Department of Biotechnology to cater the needs for the conservation of endangered species in India using modern biotechnological tools. LaCONES-CCMB has been involved during the last 23 years in the field of conservation of endangered animals to develop molecular markers for ascertaining their genetic status and to develop assisted reproductive technologies. Over the years many genetic and reproductive techniques that have been developed and standardized for the conservation of endangered animals would be discussed in the meeting.

LT 8

Role of Geospatial Technology for Wildlife habitat management in changing world

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Geospatial technologies (Satellite Remote Sensing, Drone imaging, Geographic Information System, Global Positioning System, etc) are very powerful platforms and tools for data collection, analysis and conservation planning of wildlife habitats. The applications of geospatial technologies for wildlife habitat monitoring and management has evolved very fast in short time. Plethora of literatures having usage of geospatial technologies for characterisation, parameterisation and modelling of the wildlife habitats are indicating its popularity. Remote sensing is advantageous because of its not only synoptic capability, timeliness, accuracy and cost-effectiveness but also for having access to difficult and unreachable terrains. This technology is ever evolving and adding new elements day by day e.g. usage of drone imaging, artificial neural network, machine learning and big data analytics have found ways into wildlife management. Some of the examples of wildlife management using geospatial technology includes carrying capacity and productivity analysis of natural habitats, modelling of fundamental niche of wildlife species in relation to bioclimatic parameters, habitat suitability and corridor planning, human animal conflict zonation and habitat disturbances (e.g. cyclone, flood, disease outbreak, forest fires etc).

Various algorithms and techniques are being developed for counting animals using high-resolution remote sensing data (e.g. satellites, aerial, ground based and drone images). This becomes very handy tool when species are located in very remote and inaccessible places. This technique of counting animal population using unambiguous feature matching is gaining importance for many animal colonies including large mammals. Applications of tracking routes of migratory animals using geo-trackers and global positioning systems (GPS) is another well explored segment where geospatial technologies are utilised for generating track-logs and analysing their migratory patterns. With increasing loss of wildlife species all over the world, there is a special need for conservation and taking stock of the situation. Geomatics techniques with the help of machine learning based niche models and species-specific datasets can play an important role in creating scientifically informed decision-making maps for conservation.



OP-1

Study of Fruit Preference of Hornbills in Pench Tiger Reserve, Madhya Pradesh

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Hornbills are the largest and most conspicuous birds in the old world tropical forest, adapted to live in trees as arboreal birds. Two species of hornbill were enlisted in Pench Tiger Reserve, namely, the Malabar Pied Hornbill and the Indian Gray Hornbill. According to the IUCN Red List (2021), Malabar Pied Hornbill is listed as "Near Threatened" (Criterion NT C1) while another species Indian Grey Hornbill listed as Least Concern (LC). Hornbills study is very important because of decreasing trends in its population due to continuous deforestation, habitat loss and fragmentation. Both the species prefers deciduous forest and thick canopies. The study was conducted from November 2020 to November 2021 in Pench Tiger Reserve M.P. which is situated in the districts of Seoni and Chindwara of Madhya Pradesh. Standardized survey were conducted in the morning (0600-0900 h) and Evening (0400-0600 h) when hornbills are most easily detected. All the observations were recorded using binocular. When hornbills were sighted on fruit-bearing trees, we recorded tree species, flock size and number of feeding individuals. Feeding activity was recorded as 5-minute bouts. Total twenty-five fruit species, including nine fig and Sixteen non-fig, were recorded in hornbill's diet. Among these eleven tree species prefer in nonbreeding season (August to February) and twenty two species prefer in breeding season (March to July). The number of fruiting tree species are more in breeding season as compare to non-breeding season. All twenty-five species belong to sixteen family and Moraceae is the most preferred family among all plant species in hornbill diet. Nine individual belongs to Moraceae, two individual belongs to Euphorbiaceae, two individual belongs to Anacardiaceae and rest of the individuals belongs to other families like Annonaceae, Ebenaceae, Boraginaceae etc. From fig plants *Ficus benghalensis* most preferred followed by *Ficus religiosa* and from non-fig plants *Putranjivaxnburgiis* most preferred by hornbill species because of availability in both the breeding and non-breeding season. The rich diversity and availability of fruiting plants in Pench Tiger Reserve supports the significant population of both the Hornbills species.

Key words: Malabar Pied Hornbills, Indian Grey Hornbill, Fruit Preference, Pench Tiger Reserve.



OP-2

The Foraging Behaviour and Activity Patterns of Globally Endangered Egyptian Vulture, *Neophron percnopterus* in Unnao district of Uttar Pradesh, India

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The basic concern for species survival is the food availability; consequently, it is a fundamental component to identify the habitat preference, population density and endurance of the species. In the present study, our goals were to assess the foraging behaviour and other activity patterns of Egyptian Vulture. The focal animal sampling method described by Altman (1974) was followed for recording the time-budget and activity pattern of Egyptian Vulture during feeding. Data on various activities were recorded at the prominent feeding site in Unnao from January 2016- January 2019. Various foraging activities were followed keenly throughout the day. Following the techniques adopted by Kambale (2011), the day was divided into three-time frames to observe various behavioral activities of the Egyptian Vulture throughout the day. 17 different types of behavioural activities were observed at the feeding site, of which maximum time spent in performing sunning and least time spent in Parental care. Egyptian Vultures spent maximum time for foraging during afternoon followed by morning and evening hours. The major factor in predicting the feeding time preference during a day is the predictability of the food supply. The study will assist the conservation and management of a healthy Egyptian Vulture population. The study recommends the protection of the legal slaughterhouses and dumping sites in the region where Egyptian Vultures still exist and establishment of 'Vulture restaurants' for providing the safe and healthy food for vultures.

Keywords: Egyptian Vulture, Foraging, Population, Behaviour, Conservation



OP-3

Assessment of Fish Diversity and Toxicity in the Okha Port, Gujarat.

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India is one of the megadiverse countries in the world enriched with varied taxonomic, genetic and ecosystem diversity of Fishes. Ichthyofaunal studies are on top in marine ecosystem so as to develop policies for mitigating the problem of overfishing and constantly monitoring the threats to its population. In this context, the present study aims to deal with understanding the Fish Diversity via Morphological and Molecular approach and also assessing the toxicants in the area of Okha port. Morphological identification was carried out which revealed that a total of five individual including two species of rays belonging to the family *Dasyatidae*. In case of sharks, two species were found belonging to the family *Sphyrnidae*, and ***Carcharhinidae***. For teleost, 20 individuals representing seven species belonging to the family *Serranidae*, *Stromateidae*, *Siluriformes*, *Sphyrnaeidae*, *Mugilidae*, *Sciaenidae*, *Belonidae*, *Monacanthidae*, *Leiognathidae* and *Lutjanidae* were being accounted. As this is a preliminary data, further studies are on board to elucidate the toxicants found in that area and their correlation with the molecular parameters of fish. To identify the toxicity of micro plastic first we extracted micro plastic by digesting organic matter from water and fish organ by KOH digestion method. And identify the micro plastic using FTIR and micro plastic finder (MPF) software.

Keywords: Fish Diversity, Family, Toxicant, FTIR, MPF software Okha port.



OP-4

An Insight into: Bird-Plant Seed Dispersal Network of Deciduous Forest of Dang, Gujarat.

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Ecological interactions have been studied majorly in Neotropics and Afrotropic by various community ecologists to identifying communities of different species. In ecology, a network describes relationships between two species which tends to interact with each other using mathematical algorithms. Network is made of nodes and links which represents the species living in same community and interactions among them respectively. Complex network such as Seed-dispersal is composed of non-random quantitative interactions, studying them are important in order to identify the roles of biotic seed dispersers which has relevant implications in conservation. In present study, we have observed plant-avian frugivore interactions in deciduous forest of dang district, formulated unweighted bipartite interaction matrix & analyzed seed dispersal network up to “Network and Species level” by tree watching/focal sampling method in R software. Study reveals 22 interacting species including 13 avian frugivores and 9 plants with 36.75% matrix fill. *Ocyroceros birostris* (Indian grey hornbill), *Pycnonotus cafer* (Red vented bulbul) and *Megalaima haemacephala* (Coppersmith barbet) were the main frugivores. Most of the frugivores found to be generalists. The seed dispersal network found significantly nested, where $N=11.60$ and Total NODF=71.48. we found total 3 modules with Modularity $M=0.30$ & Connectance =0.36. The study concludes seed dispersal network of Dang deciduous forest is highly nested. Very low connectance suggests forest ecosystem didn't formulate any specific dispersal network pattern as found in Neotropics.

Key words: Ecological network, Frugivory, Seed dispersal.



OP-5

Enlisting the Conservation Status of some Endangered Medicinal Plants of Indravati National Park, Bijapur, Chhattisgarh

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India has a rich biodiversity of flowering plants and is considered as one of the mega biodiversity countries throughout the world. Loss of biodiversity occurs due to disruption and destruction of natural habitat mainly due to anthropogenic activities which are now seen as a global concern. Hence, identification and conservation of biodiversity is of utmost importance. In the present study, 40 medicinal plants belonging to 39 genera and 28 plant families were explored in the Indravati National Park region, Bijapur district, Chhattisgarh. The observed plant species were further enlisted on the basis of their conservation status into rare; endangered, critically endangered, threatened, vulnerable and least concern species. Among the 40-plant species observed, 13 were endangered, 9 were least concern, 5 were threatened, 4 were critically endangered, 3 were rare, 2 were vulnerable and 4 were with indeterminate status. The probable reasons for the loss of biodiversity could be over-exploitation of the plant species, destruction of their natural habitat that briefly destroys the ecosystem. Thus, there is an urgent need to develop and introduce conservation strategies for the endangered plant species of medicinal importance.

Keywords: Biodiversity; conservation; medicinal plants; Indravati; endangered.



OP-6

Evidence Based Evaluation of the Medicinal Potential of Mangroves as an Approach to Economically Beneficial Conservation

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The studies based on the knowledge of ethnic groups and literature survey reveals that scientific investigation of mangrove plants has been neglected. Mangrove species have been reported to be efficacious in the treatment of numerous health concerns. Mangroves are very important ecological floras which are found in a very defined and selective niche. Thus, exploring the hidden medicinal abilities of the mangroves may have multiple benefits to both the society and the environment, ensuring that the plants are given the importance they deserve by introducing them in the mainstream. In the current research work, the leaves of five medicinally potent mangrove plants including true Mangroves and associate Mangroves, have been comparatively evaluated for their phytochemical and physicochemical properties. Further, a common HPTLC fingerprint has been developed by applying an ICH validated method using Toluene:Methanol as the mobile phase. The standardized extract of these selected plants was further evaluated for their anti-microbial activity and anti-oxidant potential using DPPH free radical scavenging assay. The developed HPTLC Fingerprint can be used as a quality control tool to prevent adulteration of the medicines prepared from these mangroves. Further, the potent antioxidant and anti-microbial analysis confirms the traditional tribal claims pertaining to these plants. The results of the study clarify the potent medical properties and present an opportunity for entrepreneurs to invest in this area as an economically beneficial venture. With financial gains being the basis of conservation, medical properties of these Mangroves can be used as an invitation to pharmaceutical companies and small and large scale ayurvedic set-ups to be benefitted by further exploration and this inturn shall become the basis of conservation.

Keywords: Chromatography, Validation, Antioxidant property, Anti-microbial analysis.

OP-7

Suitability Assessment of Irrigation Water Quality in Semi-Arid Region

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Present study aims to evaluate the suitability of groundwater quality for irrigation purpose in Phagi tehsil, Jaipur district (Rajasthan). In this study, forty-two groundwater samples were examined at panchayat level by applying the Geographical Information System (GIS) based Inverse distance weighted (IDW) interpolation method for the years 2012 and 2019. Different parameters like pH, salinity (EC), alkalinity (RSC) and sodicity (SAR) have been used to assess the suitability of groundwater for irrigation purpose. GIS technology enabled to reveal the spatial distribution and temporal variations during eight years (2012-2019) in the study area. For all the 32 panchayats of Phagi tehsil, the irrigation water quality was categorized into different categories based on EC, SAR and RSC. The spatial and temporal changes indicate that groundwater quality in Ladana panchayat was marginally alkali, 16 panchayats fall under alkali and remaining 15 panchayats were under highly alkali category in the year 2012. However, spatial distribution results for the year 2019 reveal that irrigation water quality is deteriorating in most of the panchayats of Phagi tehsil with highly alkali groundwater, except Nimeda (marginally alkali) and Kisorepura (alkali). Results clearly suggest that groundwater of the study area is not suitable for irrigation purposes and proper management practices can help to minimize the risk of reduced crop production. Therefore, decision-makers should take appropriate initiatives with introduction of improved salt-tolerant crop varieties, improved hydraulic technologies along with rainwater conservation strategies for maintaining the sustained productivity in Phagi tehsil.

Keywords: Water quality; Groundwater suitability; Alkalinity; Salinity; Geographic Information System



OP-8

Morphometric Analysis of Gandak Drainage Basin using Geographic Information System (GIS) and CARTOSAT-DEM

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Quantification of drainage networks in relation to climate, tectonics, lithology, and geomorphology gives important evidence of an area's drainage development, hydro-geomorphic, and denudation characteristics. The current study used CARTOSAT-DEM to investigate drainage morphometry and its impact on the environment and hydrological characteristics of Gandakriver basin, which is a prominent tributary of River Ganga, India. Pioneer approaches like Horton and Strahler have been used to assess and evaluate the morphometric parameters of watershed. The outcomes of this study show that remote sensing and geographic information system techniques are more effectual for morphometric parameter computation and analysis. With the help of the Arc GIS 10.5 programme, 17 morphometric parameters were determined. According to the morphometric analysis, the BurhiGandak catchment may be classified as a 5th order drainage basin, with an area, perimeter, and basin length of 54470.4 km², 2417.457 km, and 642.796 km, respectively. The elongated shape of the watershed was revealed by the results of form factor, circulation ratio, and elongation ratio which are 0.132, 0.117 and 0.409 respectively. They also reflect dendritic type of drainage pattern of Gandak watershed. Mean bifurcation ratio of 6.13 suggested, geologic structures play an important role in the research domain. The watershed is created by porous subsurface, and runoff is relatively low, as seen by the low drainage density, stream frequency, and infiltration number. In the present study low value for drainage density which is 0.169km/km² suggest very permeable sub-soil, shows medium relief, rather thick flora growth, and also indicates a very coarse textured drained basin. The region's wells will have good water potential and better specific capacities since the low value of drainage density impacts more infiltration. Because of the high basin relief and ruggedness number, implied that the land is more prone to soil erosion and has inherent structural complexity in relation to relief and drainage density.



The Gandak basin's low drainage density and coarse drainage pattern suggest that it has a lot of opportunity for artificial recharge structures. The presence of high Length of overland flow (Lg) 2.959 and Constant channel maintenance (C) 5.917 values indicates that the area has been subjected to sheet erosion. The first and second stream orders are high priority streams that are prone to more erosion and soil loss than the others. The current morphological-based prioritizing is also supported by geological field verification. As a result, in order to protect the land from future erosion, adequate soil erosion management techniques are required in this basin. This research will aid in the efficient use of water resources and the long-term development of the Gandak River basin.



OP-9

Comparative Analysis of Vegetation and Urbanization with Climate of Diu City through Geospatial Techniques

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Satellite sensor provides useful temporal information with ample area coverage that significantly assists the monitoring of vegetation and urbanization, which has been a demanding and complex work for researchers. The present research was carried out on Diu, a Union Territory near the Saurashtra region in Gujarat. To evaluate vegetation dynamics, agricultural land cover, and changes in urban land use patterns during the past three decades and understand human impacts on coastal diversity. The present research was done using USGS earth explorer and QGIS software. Decadal data from 1991 to 2021 was collected from Landsat Satellite using USGS earth explorer. These data were classified into various classes: vegetation cover, agriculture cover, built-up areas, water bodies, and Open land. From the present studies, it was observed that there was a remarkable change in vegetation cover, which increased from 2% in 1991 to 5% in 2001 and after that, it gradually decreased to 1% by the year 2021. Agriculture land cover increased from 13% in 1991 to 24% in 2001 and slowly reduced to 14% by 2021. Nevertheless, built-up areas show massive growth, with 27% of the total land in 1991 to 51% in 2021. LULC data were further compared with the weather data of 30 years to get a deep and vivid understanding of climate change and phenology. However, maximum coverage of built-up areas was observed in the previous year (2021) as compared to 1991. Therefore, it was concluded that there is a remarkable increase in urbanization and significant change in land cover at Diu City area in the past three decades.

Keywords: Temporal information, Urbanization, USGS earth explorer, QGIS, Land Use Land Cover Classification, Climate Change, Phenology.



OP-10

Minimizing Residential Carbon Footprints with EcoLife C 3

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The Centre for Science and Environment predicts that India's carbon emissions will nearly double by 2030. In Mumbai, the energy sector accounts for 71% of GHG emissions, with residential usage accounting for 55%. Responding to this crisis, our Prime Minister outlined the Panchamrita, a set of five milestones towards net zero emissions, making it every citizen's responsibility to reduce their emissions. Justification and Objectives: Unsustainable urban lifestyles are a key to unlocking climate change mitigating actions. Urban residents are aware of global calamities but need to be involved in community action dedicated towards reducing emissions and conserving energy resources. Therefore, our project aims to help people track and minimize their residential carbon footprint. Methodology: Two surveys were conducted with 260 and 104 participants from the Mumbai Metropolitan Region, respectively, to understand views on energy conservation and carbon footprint. EcoLife, a Microsoft Excel-based calculator, was developed with three parameters: Electricity, Cooking (LPG, PNG), and Travel (Public transport, Private vehicles). Participants could calculate their monthly carbon footprint and expenditure, then work towards reducing their footprint and saving money. Results and Discussion: Participants were encouraged to conserve energy if it saved them money. While 82.69% of the participants had heard the term 'carbon footprint,' only 27.88% were aware of carbon footprint calculators and merely 14% had used them in the past. In the months evaluated, electricity showed a significantly larger carbon footprint compared to cooking and travel. Conclusion: Through this project, we took an initiative to empower individuals to calculate their role in climate change by helping them develop a habit of monitoring their footprint. We wish to go forward by collaborating with NGOs and environmental agencies to extend the study to other cities and gradually, India as a whole.

Keywords: Climate Change, Energy Conservation, Greenhouse Gases, Carbon Footprint Calculator



OP-11

Using Modified Generic Impact Scoring System (GISS) to assess the risk of Biological Invasions in a Wildlife Sanctuary in Southern Western Ghats

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Biological invasion is a process involving introduction of non-native plants, animals or microbes intentionally or unintentionally through various pathways into any ecosystem and establishes their population by outcompeting the native species and causes either environmental, economical or health impact. Those species which are involved in this process are called the Invasive Alien Species (IAS) and are the second reason for biodiversity loss next to habitat destruction. The Shendurney Wildlife Sanctuary located in the Southern Western Ghats owes its name to an endemic tree species *Glutatravancorica* ('Chenkurinji' in vernacular) categorized as a near threatened species in the IUCN Red List. The sanctuary also holds 1257 flowering plant species with 309 endemic species to the Western Ghats. The invasive alien plant survey conducted in Shendurney has recorded a total of twenty-five plant species where the Generic Impact Scoring System (GISS) was adopted to quantify the impact of non-natives. The fact that the GISS system works exclusively on published evidence and not on the field observations was the major limitation. We modified the GISS and implemented it at the Sanctuary. The scoring was done based on the twelve impact categories covering environmental and socioeconomic impacts where each impact category was scored on a scale between zero and five where zero denotes no impact and five as the highest impact. The score calculated in a maximum of sixty for each alien plant was ranked and species with a score of ten to nineteen were categorized under medium impact and of twenty and above as high impact species. Thus, of the total recorded twenty-five alien plants, eight scored highest and six with medium impact and the rest nine as medium impact with less probable damage. The study thus became the first risk assessment of invasive alien plants conducted in a protected area in Kerala. Keywords: Invasive Alien Species, Risk assessment, Impact quantification.



OP-12

Characterization of the Gut Microbiota of Indian Cormorant (*Phalacrocorax fuscicollis*) from the Coastal area of Bhavnagar District, Gujarat-India

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Many water birds collectively share nesting trees in the same breeding site and the interactions among these breeding populations can affect the breeding period, behaviour, and also the health of these bird population. Indian Cormorant is playing an important intermediate link between the aquatic and terrestrial ecosystem. The aim of this study was to identify the specific gut microbes of Indian cormorants along the coastal area of Bhavnagar., Total eight swab samples collected from the trachea and cloacae of four, Indian Cormorants for the study of cultivable microbes. A total 31 bacterial species were identified as potential pathogenic and non-pathogenic reservoirs i.e. *Escherichia coli*, *Salmonella* spp., *Bacillus* sp., *Staphylococcus* sp., and *Proteus* sp. Amongst the isolates, *E.coli* was found to be the most prevalent bacteria. It can contaminate air and water in surrounding environments and possibly cause an infection in adverse conditions. Birds also act as reservoirs for microorganisms that may be transmitted to other animals and humans. Therefore, these results have important implications for the interpretation of Indian cormorant gut microbiome studies.

Keywords: Breeding sites, Cultivable Microorganism, Trachea, Cloacae, Microbiome.



OP-13

Modelling the Hotspots of Livestock Depredation by Leopard at Human Interphase of Rajaji Tiger Reserve

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With a large population of leopards residing outside the protected area network. Its conflict with man is ever present characterized in terms of livestock depredation, and remains to be a major impediment in conservation efforts. Therefore, as a part of studying this issue, we collected 212 spatial points where livestock were killed/attacked by leopards from the agricultural-forest matrix from 31 villages around Rajaji Tiger Reserve. We mapped the areas where the conflict is most likely to occur using “Predation Risk Modeling”, which has proven to be useful in terms reducing the attacks. We also processed the data for two spatial scales (30m and 300 m) to reduce biases of spatial autocorrelation and in accordance with the principal of parsimony. Hence as a result of using two spatial scales, two sets of spatial points, two sets of environmental layers and six functions, we ran 48 models. Using a reductionist approach, we chose the best model using principal of parsimony, which was a Quadratic function model and imposes a constraint that the variance of the environmental variable should be close to its observed value. The model defined the data in 8 variables and at 30m spatial-scale. From the analysis, it was observed that the major hotspots were the reserve forests and the tracts of the southern boundary of the Reserve with attacks majorly happening far from settlements (6-7 km away) and near the forests. Majority of the attacks happened when livestock ventured into these drier vegetation islands. These reserve forests are generally known to be poor in resource quality, serving as ecological traps for dispersing individuals from resource rich sites.



OP-14

Attitude of Local Community toward Sloth Bear (*Melursus ursinus*): A Case Study from Central Gujarat, India

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Human-sloth bear conflict is an important issue in non-protected parts of Central Gujarat. We conducted questionnaire surveys in Dahod and Chhota-udepur districts of Central Gujarat to know victims and non-victims' perception toward the Sloth bear and prevalent issue of conflict. Survey is conducted in 28 villages between Dec-2021 to Feb-2022 and we interviewed 108 sloth bear attack victims and 363 non-victims. Study of local's attitude is an important element for planning conservation strategies and understanding their opinion can be helpful to identify the gap affecting co-existence of both, locals and bears. Tribal communities of this area live in close proximity with wildlife and are dependent on forest for their economic needs. 77% of non-victims have seen the sloth bear inside forest and have encountered sloth bear in close distance. 89% non-victims believe sloth bear as dangerous animal and threat to human life. Also, during dry season in search of water and limited food resources causes bear to move near human settlements and increasing the chances of encounter with each other. We inquired villagers about their opinion on conservation of species and 15% agreed for the protection of sloth bears and others were unsure and disagreed for protection of sloth bears. Upon encounter and attacked by sloth bear locals stand the medical expenses on their own leading to the hostility towards the bears. 32% locals said that bear raids on ripe maize field. Recommendations are to organise outreach programmes in schools and villages to create awareness in locals about prevalent conflict, animal's behaviour and ecology. Education about strategies to avoid encounter will be very helpful in mitigating conflict.

Key-words: *Melursus ursinus*, human–bear conflicts, Local community, Perception



OP-15

Rejuvenation of Abandoned Houses in Rohru, Himachal.

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With every new generation, people feel the need to upgrade their dwelling as per the changing lifestyles. The existing houses prove to be inefficient due to number of reasons. Often it is believed that the aspirations of the newer generations do not get catered to in the older houses. Alterations to an extent can be done to the existing households. But families across villages in Himachal Pradesh do not choose to do this. In many villages of Himachal Pradesh, people/families feel the need of having bigger houses than the original ancestral ones. The ancestral homes in Himachal Pradesh are predominantly found to have been built in the typical pahadi style using timber and slate stone, the locally available materials. The dry masonry in stone and the timber logs interlock at corners in the traditional kathkunni style of architecture. Due to the lack of space and the will to build in newer (so-called “modern”) material that is concrete, instead of extending the original house they build a whole new one in a different premise, adjacent to the village. Over a period of time, all the families shift to their newly constructed larger houses. Consequently, the entire community is gradually shifted on a new premise, which is not very far from the original village. In this entire process, they rarely reuse the material from their original houses. The original houses are left as they are and are not used for any habitable purpose. Some families use their old houses as storerooms for grains or farming instruments. Those families who no longer have such requirements or are unable to maintain these older structures leave them at nature’s mercy. Consequently, these original village settlements are abandoned and merely remain as relics of earlier times. View showing abandoned houses in a village in Rohru district, H.P. (Photo Credit: SARAHAAN) This paper aims to look into the reasons of why are these houses left unused or un-recycled, because most of them are in sound structural condition. To understand the reasons behind abandoning of these perfectly habitable structures. Furthermore, to explore if there are any possible reuses for these time tested structures by means of which the traditional pahadi style of architecture can be conserved for the future generations. The methodology adopted in this paper is to study the examples of two villages in Rohru district of Himachal Pradesh, namely Bhamnoli and Gawas, to build my case and draw conclusions by studying the architecture, construction technology

and spatial arrangement which talks strongly of community values. This shall enable to justify the need to conserve these communal dwellings and eventually the community as a whole

OP-16

Integrated Mangrove Aquaculture (IMA) in Sundarban: An Ecosystem-Based, Climate Adaptive Livelihood in the Context of Global Sea Level Rise

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Rapid deforestation of mangroves in South-East Asia has expanded chemical-intensive shrimp farming in the last few decades. In this context, Integrated Mangrove Aquaculture (IMA) has emerged as a mitigating strategy where mangrove restoration and aquaculture have been coupled as an ecosystem-based approach to make shrimp farming sustainable. Indian Sundarban also witnessed colossal degradation of mangroves for black tiger shrimp farming, which has become unsustainable due to the White Spot Syndrome Virus Disease (WSSVD) outbreak and other unfavorable factors. A sizeable number of ponds remain abandoned. Against the above backdrop, NEWS has been implementing Integrated Mangrove Aquaculture on the pilot scale since 2018 in five Indian Sundarban, covering 38.85 hectares of area, integrating 46 farmers and forming two farmers' groups for augmenting their livelihood. The mangrove coverage in these ponds ranges from 5-30% with planted saplings. A polyculture of finfish and shellfish in a modified extensive mode is practiced where black tiger shrimp (*Penaeus monodon*) is a significant candidate species. The culture gives an annual yield of 535 Kg/ hectare where black tiger shrimp amounts to an average of 200 Kg/ hectare. The average survival rate of the planted mangroves in IMA ponds is 43%. Besides being an eco-system-based conservation linked livelihood, IMA also emerges as a climate adaptive practice for Sundarban in the context of sea level rise, ushering into coastal resilience.

Keywords – Integrated Mangrove Aquaculture, shrimp farming, ecosystem-based, Livelihood, Sea Level Rise



OP-17

Estimation of Forest Fragmentation and Natural Regeneration of Native Tree Species in Urban Forest. A Case Study of Sanjay Van in Delhi, India

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Delhi is a metropolitan city of India with 31.2 million population. To aid increasing population in the city, urbanization is rapidly taking place. The study area, Sanjay van urban forest is integral part of the city as provide various ecosystem services. It became primary concern to give ecological attention to ensure sustainability. Natural regeneration assessment revealed that forest area is dominated by exotic or invasive species i.e. *Prosopisjuliflora* which hinders the survival of saplings and seedling of other present species. Very few species such as *Pongamiapinnata*, *Balanitesaegyptiaca* and *Cassia fistula* shows natural regeneration. Overall forest area has 'poor' regeneration status. Uncontrolled human interferences created degradation of forest area lead to changes land use pattern, biodiversity loss, encroachment of forest land and fragmentation in the forest area. To understand forest fragmentation in the study area, study conducts forest fragmentation analysis for the year 1990 to 2020 using Landscape Fragmentation Tool (LFT). LFT divided the area into two classes: forest class and non- forest class which includes settlements, barren land, water body, scrub land, agriculture land respectively. Result shows forest became more fragmented and isolated from past three decades and no core forest present in the area. This study would help to understand and plan strategies for proper maintenance and conservation of the forest.

Sub Theme: EIA – Environmental Impact Assessment



OP-18

Diversity of Insect Pests and its Infestation in the Agricultural Fields of Vadodara District

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Pests and infestations are naturally related to the agricultural ecosystem. Farmers face high yield loss because of the outbreaks or epidemics which makes it inevitable to understand the pest status and their rate of infestation. Therefore, the present study was intended to decipher the pest population, their rate of infestation and severity in four agricultural sites (I-Ajwa, II-Chhani, III-Karjan and IV-Padra) of Vadodara district. All the study sites were visited twice a month and sampling was carried out twice a day (morning hours: 6:30 to 9:30 am & evening hours 4:30 to 6:30 pm) for insect collection. The collection was carried out from June 2017 to May 2019 and collected insects were brought to lab, preserved, and identified up to species level. A total of 132 pest species belonging to three orders (Coleoptera, Hemiptera, and Orthoptera) were recorded. Although Coleopteran pest's diversity was maximum, the highest Percentage Incidence and Severity Index were recorded maximum with Hemiptera as compared to the other two orders. The site-wise Percentage Incidence and the Severity Index of pest revealed that site IV was having higher occurrence of all the orders. The maximum similarity of pest species was observed between site I and site IV which was 40.83% in the year 2017-18 and 38.83% in the year 2018-19. The mean rate of infestation and severity was observed to be maximum in Hemiptera (21-40%), followed by Orthoptera (21-40%) and Coleoptera (0-20%). The present study is first of its kind where the pest status of agricultural fields of Vadodara district is reported by providing a baseline data which will help entomologists and agriculturalists to gain more insights and measures for better yield of the crop.

Key words: Pests, Infestation, Agricultural ecosystem, Coleoptera, Hemiptera, Orthoptera.



OP-19

Breeding Biology of Some Wetland Birds in Malkhed Lake & Chhattri Lake of Amravati, Maharashtra

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Wetland birds not only attract the attention of individuals towards wetlands but also serve as bio-indicators and models for conducting research regarding the environmental issues of the place. The present study was conducted during the study period June 2021 to July 2022 at the Malkhed Lake and Chhattri Lake situated around the Amravati city of Maharashtra State, India. Visits were made to the area on 2 days per week in the morning from 08:00 am to 10:00 pm and 4:00 pm to 6:00pm in the evening. During the study, the nesting of wetland birds belonging to the family Jacanidae, Charadriidae, Glareolidae, Laridae, Rallidae, Rostratulidae which includes Pheasant-tailed Jacana, Black-winged Stilt, Red-wattled Lapwing, Kentish Plover, Small Pratincole, Little Tern, Common Coot, Greater Painted-Snipe, Purple Moorhen were observed. For the detailed study, nest characteristics and egg characteristics including outer and inner diameter of nest, shape of nest, colour, shape and length of eggs were noted. Further clutch size, incubation period and hatching success were also noted during the study. Total 17 nests were detected in 2021 out of which breeding success of only one species were recorded as it was present on the grass land area at the peripheral side of the Lake. Whereas 16 nest which were located on the island got failed due to early monsoon unexpected heavy rain fall, hence island was submerged in water. In 2022, Total 13 nests were recorded at Malkhed Lake and 7 nest in Chhattri Lake were recorded. In 2022, breeding success were 39%, 31% at Malkhed and Chhattri Lake respectively. Breeding success could not be observed of Purple moorhen, Common Coot and Small Pranticole in 2022 at Chattri Lake. Many threats were recorded during the study which includes early monsoon heavy rain, soil mining, grazing, fodder crop cultivation by locals, fishing activities, feral dogs, and crows.

Keywords: Breeding, Wetland birds, Malkhed Lake, Chhattri Lake, Amravati, Maharashtra.



OP-20

**Diversity of Avian species in Upper Wardha Reservoir, Morshi, Amravati,
Maharashtra**

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Birds have ecological value as important elements of natural system. They are one of the best known classes of living organism. They are important bio-indicators of an ecosystem and also play an important role in seed dispersion, pest control and food chain. This study was carried out to determine the diversity and abundance of avian fauna in Upper Wardha dam Reservoir and its catchment area. This study is selected because there is lack of data concerning the avian diversity and their abundance associated with this area.

This study was carried out from January 2022 to May 2022 for five months. We have used Point transect method for this study. We have selected five stations and data was recorded from each station. Monthly four visits were made at each station. We have recorded total 151 Species of birds from the study area, out of which 84 species from 20 families of wetland dependent birds were recorded and 67 species from 21 families of scrubland bird were recorded. The diversity index, species evenness, relative density, species abundance were studied. During the survey first time, we have recorded the Greater white-fronted goose in study area and it was significant record for Amravati area. The study area habitat serves as suitable habitat for more diversity and species richness of avian fauna.

Keywords: Avian, Diversity, Abundance, Wetland, Upper Wardha Reservoir, Amravati



OP-21

Vegetation Patterns on a Landslide after Six Years of Natural Restoration in the Indian Himalayan Region of Uttarakhand

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Landslides represent the most intense type of geological disaster in the Himalayan region of Uttarakhand and have caused great damage to surface vegetation. Natural restoration is considered as an effective method for revegetation, however, vegetation patterns on landslides after natural restoration and its related factors remain poorly understood. The present study investigated vegetation patterns on a landslide after 6 years of natural restoration, which located in Rudraprayag district of Uttarakhand, to understand the natural restoration of vegetation after landslides. The species composition on the lower, middle and higher altitude of the landslide, as well as the species importance value, plant diversity and similarity were ascertained and compared with the that on undisturbed site. We used nested quadrat method and set 18 quadrats (3m x 3m) for shrubs and 36 quadrats (1m x 1m) for herbs. Results showed that 19 species of vegetation were found among all three altitudes of the landslide affected sites. In shrubs, *Ageratina adenophora* was dominant in the lower altitude, whereas middle and higher altitude were dominated by *Debregeasia salicifolia*. In case of herbs, *Verbascum thapsus* was found to be dominant in the lower and higher altitude, while the middle altitude of the landslide was dominated by *Artemisia vulgaris*. The maximum Margalef Index (2.23), the Shannon–Wiener Index (2.02) and the Pielou Index (0.95) was observed for herbs at the higher altitude. For shrubs, the maximum Margalef Index (1.31), the Shannon–Wiener Index (1.52) and the Pielou Index (0.94) was observed at the middle altitude of the landslide. Species similarity revealed a close relationship between species compositions on restored landslide and undisturbed area. These results indicated that vegetation on landslides could recovery naturally, and natural restoration was more effective on the middle and higher altitude of the landslide, which revealed that changes in topography could affect revegetation. This research provides useful



insight into the natural restoration of vegetation after landslides, and provides a reference for the selection of ecological restoration strategies.

Keywords: Landslides; Natural restoration; Vegetation; altitude; recovery



PP-1

Impact of Human Centric Lighting on Human Health

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The development in the technology have led to the negligence of its harmful affect leading to the climate change which is now affecting human health in a faster pace than earlier decades. Natural light which is the most essential source of human growth from our ancestral era is being ignored due to the working culture of the people differently for their welfare needs. The term artificial lighting which has been bombarded with a huge importance in a space for human comfort is discussed in a broad perspective. While lighting itself accounts nearly 5% of global CO2 emission as the new technology is being produced every season to save million tons of greenhouse gas emission. The artificial lighting industry have progressed in understanding the concept of circadian ambient lighting which allows them to target the intensity, colour quality and the intelligence of its needs according to the infrastructure. Light is the most crucial fundamental aspect that is based on the response of the human visual system. Human centric lighting is a term heard frequently in the market. The type of lighting which considers both visual and non-visual effects of exposing humans to light which widens the range of possible effects from visual performance and comfortable mood, behaviour and sharp alertness. Human centric lighting supports the health, well-being and the performance of humans by combining visual, biological and emotional advantages of light.

The study here is to analyse the effects of human centric lighting in an office space on the occupant's visual comfort and health. The result will analyse how the human centric lighting can affect the performance of the occupant positively as compared to the environment which have the other artificial lighting.

Keywords: Human centric lighting, visual, artificial lighting.



PP-2

Impact of Carbon Fiber & Kevlar on Construction Industry

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As the years pass by and as there is increase in population, the demand and pressure on construction industry is also increasing. This pressure and demand has led to innovations and findings in different sectors of the construction industry. But as the industry is growing so is their impact; these impacts are both negative and positive. The positive impact includes time management, cost effectiveness and faster handing over of the project; time management includes procurement of raw materials at faster rate, making it available to the consumers at the earliest and later handing over the finished material / product to the users. Cost effectiveness means that as these materials are procured in bulk they are available at disposal rates; this reduces the usage value leading to more wastage. All this has been a positive impact on the user end but it is affecting negatively on the environment.

One such industry or the root of all the other industries is the material industry. There are new materials being launched in the industry by the minute to compensate and satiate the demand of the consumers. But as pointed out previously this very satiating factor is leading to damage of the environment. So to compensate with the damage and nullify the effect many new environmentally friendly materials are being launched in the market; also many policies are being designed to monitor this impact. The following paper will cover two such materials and their impact on the construction industry in all aspects.

The study includes a comparative analysis between Carbon Fiber and Kevlar; right from how they are produced, their use, as well as how they are disposed. This will be like a 'Life Cycle Analysis' of both the materials.

Keywords: Impact, life cycle analysis, environmentally friendly, carbon fiber, Kevlar.



PP-3

Genetically modified *rhizobia* to combat heavy metal stress on fenugreek seedlings

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The demand of micro greens has increased in the recent decade due to the presence of enormous amount of biologically active compounds like antioxidants, vitamins and essential minerals as compared to the full grown plants or its products. Fenugreek is among the top micro greens consumed all around the world. Fenugreek micro greens grown in polluted soil faces oxidative stress mediated damage which decreases its nutritional value and also shows bioaccumulation of various pollutants. Industrial waste containing heavy metals leaches the soil substratum and percolates the ground water. Gradual accumulation of heavy metals in soil is very dangerous for general vegetation and agricultural crops, which ultimately results in its bio magnification and is passed on to humans by consumption. To solve this problem we used genetically modified rhizobial strains *S. fredii* NGR 234 & *S. meliloti* (transformed by a recombinant low copy number plasmid pBBR1MCS2 containing an *E.coli* DH10B ybdk gene (1.1 kb) involved in glutathione biosynthesis), as a PGPR for fenugreek seedlings growing in cadmium polluted soil. We demonstrated the effectiveness of our PGPR on fenugreek seedlings growing in cadmium contaminated soil in the terms of the oxidative damage and morphology of seedlings. SOD, H₂O₂, CATALASE and MDA levels were significantly lower in roots and shoots of the seedlings treated with genetically modified (GMO) rhizobia compared to the wild type (WT) rhizobia. While root length, shoot length, SVI, No. of leaves, GR activity of roots & shoots significantly increased for GMO rhizobia compared to WT rhizobia. Also intracellular levels of glutathione of rhizobia grown in YEM medium were recorded, which showed a significant increase in GSH/GSSG ratio for GMO rhizobia compared to the WT rhizobia. All these results indicates that the GMO rhizobia decreases the oxidative stress mediated damage by cadmium metals in fenugreek seedlings.



PP-4

Route Analysis of garbage trucks using artificial intelligence: A review

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Solid waste management is the key issue of municipal corporation of developing countries. From waste generation to waste disposal issues are high budget to handle for governing authority. Waste transfer and transportation are adding expenses exponentially due to lack in traffic management systems. Optimized route of garbage truck can save huge cost of Solid Waste Management. The aim of this paper is to optimize the garbage truck route analysis using artificial intelligence. Reviews focus on various parameters: the route from the collection point to the dumping point, cost of fuel, traffic conditions which leads to wastage of time, money and resources. In order to reduce the usage of money, time and resources, authors try to find all the possible routes and select the shortest route out of it. Assessment of waste characteristics and their impact on GIS vehicle collection route optimization using Artificial Neural Network have been studied. Development of GIS based optimization method for selection of transportation routes in municipal solid waste management, Efficient and effective solid waste management using Internet of Things – enabled smart cities, GIS based modelling for municipal solid waste management.

Keywords: Solid waste management, Artificial Neural Network, Internet of Things.

PP-5

A Time Series analysis of Normalized Difference Vegetation Index and Land Surface Temperature Relationship over Gir Landscape

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The availability of satellite imagery time series has allowed for phenological observation across previously unattainable extents, expanding our understanding of the relationship between phenology and the environment. Remotely sensed phenology (rs+pheno) or Land Surface Phenology (LSP), has the potentiality to overcome some of the field observation limits, fitting models, enabling the mapping and monitoring of phenology at the ecosystem level, and providing an integrative framework at the landscape scale. This study aimed at investigating the relationship between NDVI (Normalized Difference Vegetation Index) and LST (Land Surface Temperature) for a decade (2011-2021) over the Gir forest landscape. The LST values retrieved from MODIS (Moderate Resolution Imaging Spectroradiometer), and NDVI from Landsat (2013-2021) using GEE platform were analysed. In order to do the gap filling, Resourcesat-2 AWiFS NDVI from VEDAS (Visualization of Earth Observation and Archival System) for the year 2011-12 were also utilized and appended in the dataset. NDVI-LST relationship is important to understand the climatological effects of vegetation at regional scales. A polynomial regression is generated to evaluate the correlation of NDVI with LST. The NDVI is expected to be negatively correlated to the LST trend. However, we got a very weak positive correlation ($r^2 = 0.24$), reflecting the decadal level relationship, whereas on an annual basis it varied between $r^2 = 0.07$ to 0.67 . Consequently the study results indicate that the Land Surface Temperature variation may not be directly affected with the Normalised Difference Vegetation Index and the final values related the same may seem to be varying. Further efforts will be made to provide comprehensive knowledge of NDVI-LST relationships and their underlying interrelationships with several other phenological matrices.

Keywords: Remote Sensing, Land Surface Phenology (LSP), Land Surface Temperature (LST), Normalized Difference Vegetation Index (NDVI), Gir forest landscape



PP-6

Behavior Ecology of the Indian Peafowl (*Pavo cristatus*) in Pilani, Jhunjhunu District, Rajasthan

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Indian Peafowl (*Pavo cristatus*) is a symbol of grace, joy, beauty and love is the national bird of India, is a designated repetitive of the Indian fauna. They play a very important role in regulating and maintaining the ecosystem balance. It is given the most extreme protection by its consideration in the schedule I of wildlife protection act, 1972. *Pavo cristatus* (Peafowl) is widely distributed bird but its behavioral aspects dealing with activities, mechanism and strategies with respect to environment still unexplored in Pilani, Rajasthan. The regular observation was done from June 2020 to December 2021 in Pilani district to determine the ecological adaptation strategies through the behavior activities, mechanism and strategies of Indian peafowl in-relation to their habitat types. The individual activities in relative with duration, frequencies mechanism and strategy were studied by Ad libitum sampling method and Chi-square test was used for statistical analysis of various behavioral activities which was influenced by type of habitat. The study revealed that most of the habitat show the similar activities but the duration of activities was different according to habitat type. Peafowl choose shady area for walking and feeding, choosing tall trees for roosting, open area and road for dancing or display, shrubs as nesting site are the Indian peafowl ecological behavior strategies. Disturbance factors positively correlated with the behavioral activities in their habitat types conditions.

Keywords: Indian Peafowl, Behavior, Roosting and Dancing.



PP-7

Prediction of Route Analysis of Garbage Trucks in solid waste management: Review

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Solid waste Management(SWM) plays crucial role in developing cities and countries. Effective SWM includes waste generation, proper waste collection systems, effective segregation and transportation system and powerful waste disposal facilities. Transportation of collected Solid waste to the disposal point is one of the most expensive components in modern Waste Management Systems. Hence, modern optimisation approach for transport of waste materials from various locations to discharge point secure utmost attention of municipal authorities. Optimization of waste collection helps to reduce truck travel distance, collection time, fuel utilization as well as air discharge. The main goal was to reduce the time for garbage collection and transfer stations. Addition to this optimization of route also minimise total cost of SWM, vehicle fuel consumption and emissions. This paper focuses on the review of analysis of solid waste collection process in city by recording a route by Sony DCR-TRV145E brand video camera and using GPS data they optimized the route by the help of software called ProTM. Study pointing Geographical Information System (GIS) also be possible solution most effective method for route analysis of garbage truck in and out of the city area. Review incorporated pilot study of the city and found to be 22% length minimization in the routes. The collection time was reduced from 6934s to 4602 s. Artificial intelligence (AI) techniques which gained momentum in offering alternative computational approaches to solve solid waste management (SWM) problems. They use Artificial Neural Network (ANN) model to predict the waste generation rate of the recycling and garbage streams for the year 2023 in four sub-areas. This ANN model resulted in mean absolute percentage errors ranging from 10.92% to 16.51%.

Keywords: Geographical Information System, Artificial intelligence, Solid waste management, Optimization.



PP-8

Study of Amphibian Diversity in Urban and Semiurban Areas of Amravati, Maharashtra

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Amphibians are considered as a useful indicator species of ecosystem. The information on amphibian diversity is becoming increasingly important in the context of global amphibian declines. Various studies dealing with the diversity of amphibians in forest and riverine habitat have been conducted and published but the diversity of amphibian in urban and semiurban area was lacking, hence an attempt was made. This study is carried out in urban and semiurban areas of Amravati, Maharashtra. For this we selected four areas, Chatri lake area, Kathora area, Naosari area and Kund-sarjapur area. The study was conducted during the 2020-2021 monsoon seasons (June-September). Surveys were conducted twice a week in each area from 19:00 to 22:00 at night, covering all possible habitats and using visual-encounter, transect and opportunistic survey methods. During study, we documented 11 anuran species belonging to 4 families and 9 genera, and 3 unidentified anuran species. In this study, we observed that *Microhyla ornata* had the most abundant populations, followed by *Fejervarya limnocharis*, *Minervarya syhadrensis*, *Euphlyctis cyanophlyctis*, *Duttaphrynus melanostictus*, *Polypedates maculatus*, *Holobatrachus tigerinus*, *Sphaerotheca breviceps*, *Duttaphrynus stomaticus* and *Duttaphrynus scaber*. We had the first significant sighting of *Kaloula taprobanica* in Amravati city. Our research showed that semiurban area has more amphibian population than urban area.

Keywords: Amphibians, diversity, urban and semiurban, Amravati, Maharashtra.



PP-9

Prediction of Solid waste generation through mathematical modelling: A Review

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The prediction of municipal solid waste generation(MGW) plays an important role in solid waste management. Yet achieving the anticipated prediction accuracy with regard to the generation trends facing many fast growing regions is quite challenging. The quantity estimation of solid waste and predicting the future demand over the planning duration is contrivance to a successful plan. The waste management processes typically involve numerous technical, climatic, environmental, demographic, socio-economic, and legislative parameters. Such complex nonlinear processes are challenging to model, predict and optimize using conventional methods. The main goals were to develop Artificial Neural Network (ANN) based models for predicting MWG, to overcome the problem of incomplete MWG data, which is notable in developing countries. This provide a new method for the planning of municipal solid waste management systems. Artificial intelligence has been efficient at tackling ill-defined problems, learning from experience, and handling uncertainty and incomplete data. The formula method includes the current status of solid waste generation, landfill site, topography and transportation. Due to the tremendous generation of solid waste and open disposal, most of the Indian towns are facing the problems of polluting the land and surface water sources. Population growth leads to increase in per capita waste generation hence prediction of MSW in necessary. Ann method found to be fast and more preferable among different methods. It's a fast process to find the waste generation. Accurate and detailed forecasts of solid waste generation allow municipal authorities to plan capacity requirements for waste-treatment systems and collection and transportation systems, and to select sites and predict landfill lives.

Keywords: Municipal Solid Waste, Artificial Neural Network, landfilling.



PP-10

Influence of predator suppression and prey availability on carnivore occurrence in Western Himalaya

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Species assemblages are influenced by trophic and intraguild interactions, which may be competitive, facilitative, or neutral. These interactions vary in relative importance depending on the availability of resources. We assessed the nature of interactions among six carnivore species (*Ursus arctos*, *Panthera uncia*, *Vulpes vulpes*, *Mustela altaica*, and *Martes foina*) and their prey (*Capra sibirica*, *Pseudois nayaur*, *Hemitragus jemlahicus*, *Moschus leucogaster*, *Ochotona* sp. and *Rodentia* sp.) by examining their spatial-temporal overlaps using camera-trap data gathered from the resource-limited landscapes of the high Himalayas. The carnivore species showed relatively high spatio-temporal overlap. Pairwise occupancy analyses and overlap of kernel density functions of activity patterns indicated spatial avoidance between two out of 15 pairs of carnivores. Contrary to our expectation that carnivore species would segregate due to competition in a resource-poor environment, our results showed that they generally showed significant co-occurrence, and appeared to track the activity of their prey. Our findings highlight the potentially overriding role of prey availability in influencing carnivore species occurrence in resource-poor landscapes.



PP-11

Faunal Diversity of Arboretum, M.S. University Campus, Vadodara, Gujarat

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Due to rapid urbanization it is important to promote and conserve urban biodiversity as we cannot have a healthy ecosystem without proper management of such habitats. The vegetation of Arboretum of MSU Campus is a dry deciduous covered with vast diversity of plants and trees which has become home to large number of faunal species. The study was conducted through line transect method, twice a week during morning and evening hours, and a checklist was prepared accordingly. Binoculars and cameras were used for the study observations. During the entire study period, 12 species of insects, 2 species of reptiles, 30 species of birds and 6 species of mammals were recorded from the study site. Density and diversity indices like species richness, Shannon-Weiner diversity index, evenness and abundance were calculated. As the Arboretum has rich floral diversity, large numbers of birds get favorable environment and contrast to that mammals were less because area is fenced. The percentage abundance of omnivorous birds was higher than graminivores and nectarivores as omnivorous birds don't have any specificity in diet which allows them to take nutrition from plants and other organisms. The mean species richness did not show much variation as most of the organisms are active at both times. Long term study in all aspects is required to get precise information as the data collected here was for a short span of three months. Urban areas are a wealth of biodiversity and conserving such habitats promote ecosystem wellness.

Keywords: Arboretum, urban, fauna, insects, birds, mammals, biodiversity

PP-12

Toxic effects of Bifenthrin and Deltamethrin on the development of Zebrafish embryo (*Danio rerio*)

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Pesticides can contaminate soil, water, turf, and other vegetation. It can be harmful to non target species also. Testing substance toxicity on living organisms is an important step in the development and adoption of any chemical for various purposes. Bifenthrin and Deltamethrin are the members of Pyrethroid compound which are group of man-made pesticides similar to the natural pesticide pyrethrum. Pyrethroids are one of the most commonly used residential and agricultural pesticides. They have been implicated in various neurological disorders in humans and experimental animals. However, their toxicity assessment is complex and several critical data gaps exist. Zebrafish is now a well-validated animal model to study treatment with small molecules, as well as to elucidate biological functions, and deciphering the mechanism of bioactive compounds. Embryos of *Danio rerio* are used as a cheaper alternative to adult fish in toxicological studies. The zebrafish embryo toxicity test conducted here is based on 96 h exposure of newly fertilized eggs in a static or semi-static system according to OECD guidelines. Different concentrations of both compounds were tested. As toxicological endpoints, coagulation of eggs and embryos, failure to develop somites, lack of heart-beat as well as non-detachment of the tail from the yolk were recorded after 24, 48, 72 and 96 h. Other abnormalities were also recorded.

Key words: Bifenthrin, Deltamethrin, Pyrethroids, Zebrafish Embryo, OECD guidelines



PP-13

**Conservation of Rocky Plateaus, Community development and Challenges
in the development of sustainable tourism development model – case of
Ratnagiri District in Maharashtra**

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Western Ghats area in Maharashtra has its unique position in environmental importance. Rocky Plateaus (high plain, tableland) found in Ratnagiri District are famous for its flora and fauna. In addition to this Petroglyphs found in the same region needs to be taken seriously from the point of view of tourism model. Conservation and nurturing of biodiversity need to be linked with sustainable business model of the tourism. This paper talks about challenges in drafting the tourism development model for Rocky Plateaus or 'सडा' (word used in local language) found in Ratnagiri district of Maharashtra. This paper initially talks about present status of Rocky plateaus and variety of rich flora and fauna. Then paper drafts the tourism model to nurture the Rocky plateaus thus providing employment opportunity to the local community. I would like to highlight possible threats in the development of sustainable business model and policy. I also suggest the grassroot level initiatives to spread the awareness of conservation amongst local community. I also discuss the present initiatives taken by local organisations in association with the Government departments. Paper highlights the governance and community issues associated with the same. I also discuss the local community needs, political economy of the area and hurdles in making tourism the ultimate business for the local community. I introduce the concept of 'village ambassador' by connecting the cultural events and promotion of tourism. At the end this paper highlights the huge scope of sustainable business model for local community in earning and maintaining decent standard of living.

Keywords: Western Ghats, Petroglyphs, Sustainable tourism, community development.



PP-14

Study of Plant Diversity in Kaleshwari Forest Mahisagar District, Gujarat, India

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Plant diversity is one of the greatest gift for god for every person and every earth things. This Floristic studies can provides a clear understanding of the processes and conditions ecology and development in plant growth. While, it is commonly accepted today that the conservation of all biodiversity should be the goal, understanding the natural distribution of plants (floristic studies) is central to managing the ecosystem for the conservation of biodiversity and long-term sustainability. In present study, a total of 304 plant species belonging to 68 families and 211 genera have been recorded from Kaleshwari forest in Khanpur Taluka of Mahisagar District. This study will play an important role in proper knowledge of plant diversity, conservation and planning for sustainable use of available sources.

KEY WORDS: -Plant, Floristic, Diversity, Kaleshwari, Forest, Mahisagar



PP-15

Floristic Study on Hydrophyte Vegetation of Aravalli District, Gujarat, India

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Wetlands are highest yield giving reproductive ecosystem. Among other ecosystem wetlands are considered as most reproductive ecosystem due to presence of water. It provides shelter and breeding opportunities for resident and migratory birds, they function as carbon sink, also support diverse vegetation of plants like algae, aquatic macrophytes and microphytes, its function as food source for many organisms, for human it provides diverse needs such as food, shelter material, irrigation, domestic water supply, fishes, and water for recreations. Wetland support many plant species due to present of water. All plants need water to growth. some plants are characteristic future to grow and multiply in water and adjoining area these plants are always associated with water and function as wetlands veins which connect all organisms to wetlands. These types of plants are commonly known as hydrophytes. Each wetland has their distinct vegetation depend on that wetland ecosystem is variable among other wetlands. For the study of wetland ecosystem, to study of hydrophyte species are most important. For that we have done floristic study of wetland and noted different forms of hydrophytes such as Free floating (*Azolla pinnata*), Rooted hydrophytes with floating leaves (*Trapa natans*), Submerged (*Vallisneria spirallis*) and Emergent hydrophytes (*Typha angustata*). during study we have surveyed 12 major wetland and Vatrak river of Aravalli district. During study we have collected and identified total 221 plant species from wetlands of them 33 hydrophytes have been documented. From total 33 hydrophytes species 30 belongs to angiosperms and 3 species belongs to pteridophyte. All 33 species have been comprised 13 families of them 10 angiospermic families and 3 pteridophyte families. All plants have been identified at species level using various state and regional floras, monograph, online resources and research articles. This study provides brief information regarding hydrophyte vegetation in wetlands of Aravalli district, Gujarat, India.

Key Words: Hydrophytes, Wetland Ecosystem, Aravalli District



PP-16

Gastrointestinal Parasite Survey of *Antelope Cervicapra* (Black Buck) In Karanja Sohol Sanctuary, India

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To study the prevalence of gastrointestinal parasites of *Antelope cervicapra*, 25 faecal samples were collected from Karanja Sohol Sanctuary during the period from January 2021 to June 2022. Out of these Twenty nine samples were found to be infected with gastrointestinal parasites and overall prevalence rate was 82.85%. *Paramphistomum* sp. (28.57%), *Ascaris* sp. (25.71%) *Fasciola* sp. (17.14%), stomach worm (17.14%), hook worm (14.28%), *Strongyloides* sp. (5.71%), *Balantidium coli* (5.71%) *Oesophagostomum* sp. (2.85%), *Eimeria* sp. (2.85%) & Mixed type of infections of *Ascaris* sp. was found in 5 different scat samples or droppings.

Seasonal prevalence of gastrointestinal parasites in summer and winter were 80.01% and 17.3% respectively. This study provided a first overview on parasites of *Antelope cervicapra* in the Karanja Sohol Sanctuary, but to evaluate parasite transmission dynamics much more studies were required on livestock and on wild herbivores.

Keywords: *Antelope cervicapra*, Faecal sample, Parasite, Scat analysis.

PP-17

Biofuels: Affecting Climate Change & Contribution towards Sustainable Development

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Climate change has also put the integrity and survival of many species at stake due to shifts in optimum temperature ranges, thereby accelerating biodiversity loss by progressively changing the ecosystem structures. Energy development improves quality of life for humans, but also incurs environmental consequences. The sustainable development in fuel industry is quite necessary as they have been major source of climate change. They're come biofuels which have less/no GHG emission and is quite sustainable for the vehicles as they provide high energy output as compared to fossil fuels. Though they have some disadvantage such as food scarcity, but they can be avoided by genetically engineering those crops or food stocks which are being used and increasing their yield.



PP-18

Prediction of Landfill Leachate Treatment using ANN Model

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Landfill leachate is a wastewater containing high concentration of organic and inorganic components. Solid waste generation is tremendously high in our country about 1.50 lakh MT on daily basis. Volume reduction of solid waste can be achieved by compaction of solid waste on dumping site. That results in generation of leachate which contaminated groundwater as well as surface water resources. The aim of the study is to optimize the leachate treatment. Leachate generation is highly nonlinear in nature and traditional methods are failed to treat them with chemical or biological methods. Hence artificial intelligence could be the key which makes the process treatment easy. Reviews suggested AC/H₂O₂ process using, ultrasonic process and fenton process using ANN model. The optimal operating condition of AC/H₂O₂ treatment of landfill leachate was obtained using ANN model as leachate pH of 3, H₂O₂ dosage of 5 ml/L, AC to H₂O₂ ratio of 0.5, reaction time of 120 min, and temperature of 20°C. ANN has been applied for the prediction of COD removal from landfill leachate by the ultrasonic process. In ultrasonic process studied some variables (pH of 3, 7 & 10, contact time range 30-120min, Power range 70-110 W & frequency range 30-60 kHz). The ANN could effectively predict COD removal from landfill leachate by ultrasonic process.

Keywords: Leachate, Artificial intelligence, Ultrasonic process, Landfill.



PP-19

Food Habits of leopards in Human Dominated Landscape of Vansda Taluka, South Gujarat

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Leopard is among the most widely distributed felids worldwide due to its flexibility in resource use, particularly food. There is ample information available regarding the food habits of leopards from the protected area across the world. But lack of data on the food habits of leopards in a human-dominated landscape hinders their conservation in a human-dominated landscape. We studied leopards' food habits in the human-dominated landscape of Vansda taluka of South Gujarat, India. Since large carnivores are hard to study through direct observation, we used scat analysis, a non-invasive method to study large carnivores. We walk trails and roads in the human settlement and agricultural land to collect leopard scats. Scats were washed in warm water to remove the impurities and sun-dried. A total of 20 hairs from each scat were put in a solution of xylol for 24 hours to remove impurities. Prey species were identified from the medullary pattern of their hairs. The Diet of leopard was quantified using the count of occurrence and percent occurrence. Diet analysis shows that leopards consume 19 prey species. The highest contribution to the diet was from the wild pig (41%) followed by birds (20%), Poultry birds (6%) while lowest was of fish (0.94). Diet analysis shown that wild pig is among the principal prey species of leopard in Vansda taluka. At the same time, low contribution of livestock such as cows, buffalo and goats indicate low predation by the leopard. Wild pig has also been considered a pest to crops, and the debate about their removal is continuous. However, the decline in wild pig abundance, either by killing or any other reason, may shift leopards to depredate livestock in Vansda taluka. Present study could act as a baseline for future studies in human-dominated landscape.

Keywords: Leopard, Human-dominated landscape, Food-habits, Wild pig, Livestock depredation, Vansda taluka.



PP-20

Nesting characteristic of spotted owlet (*Athene brama*) in and around Mount Abu Wildlife Sanctuary

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The nesting ecology of the spotted owlet was studied from January, 2022 to May, 2022 in various microhabitats of Mount Abu Wildlife Sanctuary and its surrounding areas. During study, a total of 29 nests and 71 fledglings were observed in different habitats; forest, agricultural lands and human habitation areas. Spotted owlet nests were observed on *Mangifera indica*, *Ficus religiosa*, *Phoenix sylvestris* and *Azadirachta indica*. Forest habitats had the most nests and fledglings, followed by agricultural land and human habitation areas respectively. In forest habitats, an average tree height of 10.52 metres and an average nest height of 6.36 metres were observed. In agricultural habitats, an average tree height of 11.02 metres and an average nest height of 5.95 metres were observed. While minimum average tree height (8.98 metres) and nest height (4.98 meters) were observed in human habitation areas. The nesting and breeding biology of spotted owlets has been significantly influenced by dramatic declination in holes and cavities, as well as the cutting of old and large trees.

Keywords- Spotted owlet, nesting, habitat, cavity, trees



PP-21

Identifying Gaps for The Assessment of Metallic Elements in Marsh Crocodile Eggshell of Vishwamitri River, Gujarat

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The mugger crocodile (*Crocodylus palustris*) is a medium sized crocodile, also known as mugger and marsh crocodile. Excessive industrialization and development exert pressure on the riverine system deteriorating the tranquillity of the rivers, same happening with the vishwamitri river of Vadodara. Mercury, iron, and copper can be the level of concern as the water pollution might have these metal elements in a higher level and can be the toxic for the aquatic life and ecology. Apart from toxicology implications, iron can possibly contributing towards thicker eggshells. Thicker eggshells can be the barrier for gas and water exchange as well as possibly increasing the effort required for the hatchling to emerge from tightly packed shells under sand. The water quality of vishwamitri river in some areas majorly downstream stations are highly polluted and cannot be used for any purpose as well as might have the iron, mercury and other metal contaminants. There is no other report on metals and metalloids in crocodile eggshells from Gujarat (Vadodara). Other possible sub-lethal effects associated with metallic elements are the reduced fitness, endocrine disruption, and effects on behaviour. These effects may become apparent decades later in long-lived species like mugger crocodile. As the human population, habitat destruction, climate change, and pollution increases, further research is needed regarding pollutants concentration and effects in mugger crocodile eggshell. The river entering the city sustain the aquatic life, but as the river flows through downstream, pollutants are being added by industrialization. Therefore, further analysis and improved source mitigation remains as an important task and responsibility for all involved.

Keywords: Ecology; Toxicology; metal contaminants; endocrine disruption; climate change

PP-22

Plant-based Meat as a Solution for Global Sustainable Food System

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India has the world's largest population of livestock and produces about 5.3 million tonnes of meat annually. It has been estimated that Indian livestock releases over 200 million tonnes of CO₂ equivalents each year. As a result, animal agriculture in its current form is unsustainable, and this will be exacerbated by the increasing growth in global population. Livestock farming can have deteriorating environmental consequences such as global warming, land degradation, air pollution, water pollution and loss of biodiversity. Ministry of Health and Family Welfare (MoHFW) established Eat Right India, which aims to transform the food environment in the country to ensure that every citizen has access to safe, healthy and sustainable diets. In line with this, implementing a sustainable diet includes a shift towards the consumption of plant-based meat alternatives. These alternatives seek to resemble the sensory experience of animal products by prioritizing key consumer needs such as flavour, texture and nutritional value. More importantly plant-based products are said to be 120 times more carbon-efficient than animal products. The current research work is aimed to highlight plant-based meat substitutes that emulate the properties of animal-based foods. It is based on an understanding of the differences in the characteristics and functionalities of plant and animal proteins. It provides an updated and comprehensive evaluation of the nutritional value, phytochemical profiling, and underlying biochemical mechanisms to explore the potential of indigenous plants as meat substitutes. The study, supported by in-silico studies, would provide a comprehensive list of alternatives for entrepreneurs to begin working in the field of synthetic meat development. Further analysis shall provide a sufficient database for exploring previously unknown options of the sustainable food system.

Keywords: Meat substitutes, plant-based meat, in-silico analysis, carbon-efficiency



PP-23

Insect Diversity and Pest Status in the Agricultural Fields of Vadodara District

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The present study aimed to fill up the lacunae of the Diversity of agriculturally important Insects with particular reference to their ecological and pest status of the Vadodara district in Gujarat. A preliminary survey was carried out for the presence of agriculture fields based on the crop pattern and type and four sites were selected viz., Ajwa (I), Chhani (II), Karjan (III) and Padra (IV). All the four sites were visited twice a month, and the sampling was done twice in a day, (morning hours 6.30-9.30am and evening hours 4.30-6.30pm). In the present study, 423 species of insects representing 12 orders and 101 families are recorded. Coleoptera, Orthoptera, Hymenoptera, Lepidoptera, Hemiptera, Diptera, and Odonata were the most dominant and common orders as they were present on all the four sites. Out of these 423 species, 163 species were pest species belonging to four orders (Coleoptera, Hemiptera, Orthoptera, and Lepidoptera). Thysanoptera and Neuroptera were uncommon at all the sites. Thysanura was rare at site III and uncommon at other sites. Dictyoptera were uncommon at site I and III and rare at site II and IV. There was a distinct seasonal variation in the abundance of insects. The majority of the orders were monsoon dominant. The results revealed that the maximum diversity was in monsoon season. The maximum even distribution of insects was found at site IV, As far as the richness of insects is concerned, season-wise, it was maximum during monsoon, which was parallel with the diversity. This work concludes that site I was the most dominant for insect diversity and richness among the four selected sites.

Keywords: Insects, Pest, Agriculture, Diversity, Richness, Evenness



PP-24

**Seasonal Variation and Habitat Utilization by Lesser Whistling Duck,
(*Dendrocygna Javanica*) in the Selected Wetlands of Udaipur District,
Rajasthan, India**

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The Lesser Whistling Duck, *Dendrocygna javanica*, is an important species in the wetland's ecosystem. Lesser Whistling Ducks forage primarily in freshwater wetlands, such as lakes, repositories, and swamps rich in aquatic vegetation. Feeding and foraging are important aspects of wetland birds that are influenced by water quality, depth, the presence of different aquatic bird species in the same body of water, and prey abundance. The present study was carried out in waterbodies of Udaipur district, from January, 2021 to December, 2021. The study site was visited monthly throughout the study period. The present study deals with seasonal variation and habitat utilization of Lesser Whistling Ducks in the different wetlands of Udaipur district. On the basis of their habitat preferences, it can be concluded that their flock distribution among various study sites has shown considerable variation. The highest individual frequency was found in Menar pond and Pichola lake in Udaipur district. The highest preferred habitat for Lesser Whistling Duck was open water (57%), sewage (21%), puddles (10%) and shallow water with sparse vegetation (39%). They utilize habitat in the monsoon and winter seasons in comparison to the summer season.

Keywords - Lesser Whistling Duck, Seasonal Variation , Habitat Utilization



PP-25

**Breeding Biology of Black drongo (*Dicrurus macrocercus*) in Jarga Forest
Area Southern Rajasthan, India**

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The present study was carried out on egg clutch size variation, hatchling and fledgling success of Black drongo in Jarga forest area, from January, 2021 to December, 2021. A total 23 nests and 69 eggs were observed during study. Out of 23 nests 9 nests has egg clutch size three followed by seven- seven nests have four and two clutch sizes. The incubation and nestling periods of black drongo were ranges between 11 to 16 days and 18 to 23 days respectively. Hatching and Fledgling success rate of 86.23 %, 75.36% were observed respectively. Also, out of every 3 eggs average 2.17 individuals fledge successfully which was 72.33 % success rate.

Keywords- Black drongo, clutch size, hatchling, fledgling



PP-26

Prediction of Solid Waste Generation in Gujrat using Artificial Intelligence: Review

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Growing rate of population influences enhancement of municipal solid waste (MSW) generation.

Municipal Solid Waste contains household and commercial refuse including paper, textiles, food and vegetable waste, and wood and non-degradable materials; leather, plastics, rubbers, metals, glass, and electronic waste. The current study reviews a recent scenario of a municipal solid waste system which revealed that the solid waste system needs to be modified scientifically to manage non-biodegradable components. This review paper consists of waste management in Vadodara city, Ahmedabad city, Surat city, Bulgaria and Serbia. This paper reveals that prediction of solid waste cannot done directly and depends on various factors which include: Collection, Segregation, Transportation and disposal. Prediction of solid waste generation helps to manage the available resources within city. Artificial Neural Network (ANN) is a powerful tool for the prediction and optimization of resources. Review suggested ANN can be impressive tool for forecasting of solid waste generation in Gujarat City.

Keywords: Municipal solid waste (MSW), Artificial Neural Network (ANN), non-biodegradable.

PP-27

Coprological Prevalence of Gastrointestinal Parasites in Wild Herbivore Animals at Girnar Wildlife Sanctuary, Junagadh, Gujarat

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Parasites are depended on their host for food and shelter. Endoparasites might be protozoan or helminth. Parasitic infection is directly affecting their physical or reproductive health. Gastrointestinal parasites are usually found in the digestive tract of animals. Ova/Eggs of GI parasites pass through their faecal materials. The present study was undertaken to assess the prevalence of Gastrointestinal parasites in herbivore animals of Girnar Wildlife Sanctuary, Junagadh, Gujarat. Dropped faecal samples of wild herbivore animals viz., Spotted Deer, Blue bull and Sambar were collected from the sanctuary area. Samples were analysed by Direct smear, floatation and sedimentation methods. A total of 122 faecal samples were collected from different sanctuary areas. Out of which only 25 (20.5%) samples were positive for parasitic infections. Among all species, The Blue bull showed the highest prevalence rate (12.3%) of GI parasites followed by Spotted deer (5.7%) and Sambar (2.5%). During the study, an overall prevalence of *Fasciola* sp. 7.4%, *Strongyloides* sp. 7.4%, *Trichuris* sp. 4.1%, and *Moniezia* sp. 2.5% were observed in free-ranging wild herbivore animals.

Keywords: Gastrointestinal (GI) Parasite, Eggs, Prevalence, Herbivore, Girnar Wildlife Sanctuary



PP-28

Conservation Risk Assessment of *Mesosphaerum suaveolens* and *Ocimum basilicum* (Lamiaceae)

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Lamiaceae, family of flowering plants of mint is considered as one of the largest family of the order Lamiales consisting of almost 236 genera and more than 7000 species. India has around 454 species of Lamiaceae and around 42 species of Lamiaceae have been known to occur in Gujarat amongst which 70 percent of the species are not yet assessed in IUCN Assessment of the species. Lamiaceae family is considered as an economically especially important family whose plants are used as condiments, medicines, ornamental purposes, perfumery, different dyes, essential oils, cosmetics, flavouring agents, food industries and many more. Besides this importance, this family contains species which are not assessed, and it is an important study to be undertaken to know their value and importance. Geographical status of the species such as the Extent Of Occurrence (EOO) and Area Of Occupancy (AOO) needs to be known to check whether the plants are endangered or not. This assessment was done to study the status of the plant which would help in protecting the economically important plants of the Lamiaceae. Study of EOO and AOO of plants of this family is very essential for risk assessment for conservation studies.

Keywords: Lamiaceae, IUCN Assessment, Extent Of Occurrence, Area Of Occupancy and Conservation



PP-29

Unusual floral characteristics of *Alpinia calcarata* and conservation studies

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In Zingiberaceae, androecium is represented by a single fertile stamen and usually 2-3 lobed labellum; the fertile stamen has quadrilocular anther which has a furrow into which the style fits in. The fertile stamen is the posterior one of the inner whorl. Recently it has been reported about the six types of abnormal flowers in *Alpinia*, viz. 2-stamens, 1.5-stamen, 1-stamen, stamen with only one theca, stamen absent and twin-flower. Such diversification in the number of stamens might be a recurrence of the evolutionary history of stamen in ginger families. In the present study, we observed some flowers of *Alpinia calcarata* with 2 and 1.5 fertile stamens. In case of the flower with two fertile stamens it can be hypothesized that the two anterior staminodes have now become fertile stamens, and the posterior fertile stamen reduces to a staminode (infertile stamen). *A. calcarata* has been cultivated at the arboretum of The M.S. University of Baroda. Photographs of the plants were taken at different time intervals with DSLR camera. Inflorescences were collected and studied for the various floral characters. Ethnomedical uses for this rhizome is found to be against rheumatism, bronchial catarrh, bad breath, ulcers, whooping cough in children, throat infections to control incontinence. It also showed presence of polyphenols, tannins, flavonoids, steroid glycosides and alkaloids in the extract and essential oil of this plant. However, there were no conservation threat studies carried out for this species. So, in the present work the IUCN Red List Assessment was done. There are no reasons or evidences about such floral anomalies. We hypothesize that this could be due to climate change.



PP-30

Fluctuations in Water Quality Due to Climate Change: A comparative case study of urban and rural wetlands of Vadodara district

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Wetland in the urban and rural areas are one of the most attractive spots for the public to spend time around but it also, plays a crucial role in offering the wide range of ecosystem services by providing habitats to wildlife species, aquatic flora, helps in maintaining carbon sequestration, reducing the effects of urban heat islands. However, challenges are faced such as maintaining quality of water, contamination by wastewater, habitat loss due to land-use change and human anthropogenic activity. This study aims to understand the changes in the water quality due to alterations in the climatic parameters in two different wetlands. In this study, two wetlands were identified namely Sursagar and Ajwa lake. Sursagar located in the middle of the Vadodara City while Ajwa is in north-east direction of the city at the distance of 30 kms. Data related to physicochemical parameters was collected from the CPCB for one decade (2010 to 2020). Various statistical methods were used to understand the variability, trend and linear relationship between physico-chemical parameters and climatic parameters. Upward and downward trends were observed in climatic parameters and, they had low to moderate relationship with water parameters which revealed that change in these parameters will have impact on water quality. Based on this case study we would highlight the role of policymakers and stakeholders. We would also like to propose some modern mitigation approaches that can be implemented in preserving these wetlands.



PP-31

Assessing the Impacts of Urbanisation on Stream Ecosystem in Urban Areas

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Urban stream management requires awareness for sensitization towards these degrading ecosystems and effective assessment of damaged ecosystems. It involves combination of human activities like regular monitoring of damaged ecosystem and natural processes of ecological succession. Monitoring of urban streams help to determine the changes in the water quality and different indicator organisms are used to indicate pollution. These organisms are used as bio-indicators of water quality to understand the effect of pollution on a water-body which are affected by several factors including industrialisation, agriculture and urban development near a stream. Furthermore, if these problems are ignored it might lead to a condition termed as “Urban Stream Syndrome”. This condition is referred to the degradation of streams in urban areas. As long as the ecosystem’s structure and function is not hindered by any stresses or human activities, its diversity is maintained and is capable of self-renewal. Urban streams have to be particularly understood as an integral part of urban environments. Thus, assessment of streams help to determine the effect of disturbances which would be further helpful to assess the stream ecosystem overtime.

Keywords: Ecological Succession, Bio-indicators, Urban stream syndrome



PP-32

Biomonitoring of Harni Pond Using Aquatic Macroinvertebrates as Bioindicators

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Aquatic Macroinvertebrates have been widely used as models for assessment of environmental health. The threats to the biotic community have a direct correlation with the water quality, making them as Bioindicators. The diversity of these pollution tolerant or intolerant species indicates the quality of water in a given area. Harni Pond located near Vadodara Airport is an example of urban freshwater ecosystem. Invertebrate samples were collected from 5 different sites, representing a variety in the abiotic factors affecting the ecology of the pond. These factors mainly include the temperature, turbidity, pH and mostly the anthropogenic activities. Significant variations were observed among the sites when the study was carried out in the littoral zone of the pond. Odonates having a moderate tolerance to water pollution were found to be the highest in number. Other taxonomic families including the mollusc were also studied in this area. Correlating with the BMWP index, the water quality was found to be good in terms of ecological condition. The reason for an improved water quality in comparison to earlier studies could be the construction of the artificial boundary. But the diversity of flora and fauna reduced to a great extent.

Keywords:- Bioindicators, Aquatic Macroinvertebrates, Water quality, Odonates, Anthropogenic activities.



PP-33

**Diversity of Angiosperm macrophytes in selected wetlands in Lunawada
taluka of Mahisagar district, Gujarat, India**

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The wetlands and wetlands plants play important role in the ecosystem. A study was carried out in Lunawada taluka of Mahisagar district of Gujarat state. During the study selected wetlands of Lunawada taluka have been visited and surveys for data collection of floristic and physicochemical characteristic of wetlands. Main aim of study is to evaluate macrophyte angiosperm diversity of Lunawada taluka. Fields's survey has been carried out during different seasons from Jan-2022 to Aug-2022 and total 5 wetlands have been selected for study. During survey of wetlands, we have collected total 28 angiosperms species belong to 19 genera of 12 families.

Key words: Angiosperms, Lentic ecosystem, Macrophytes, Wetlands



PP-34

Conventional Conservation Techniques- Case Study of Himachal Pradesh

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Abstract mainly talks about the superior traditional construction technique which still exists in certain districts of Himachal Pradesh, with detailed case study of Chehni Kothi fort, situated in Kullu district. In India, many native building practices have kept changing over the times, but few have remained unchanged till date. One such place where these practices still kept alive is known as "Abode of Gods" i.e. Himachal Pradesh. Lot has been written on its traditions, ethnicity, people, mythologies, its valleys and mountains, but extremely less has been written about its Architectural marvels. Here we come across great buildings build in traditional PAHADI style. The history of any architecture is not only a classification of buildings in isolation, but definitely a history of the region, state and the country in whole. Himachal Pradesh falls under seismic zone IV and V. To counter these natural forces, the locals have devised indigenous ways of constructing buildings which are earthquake resistant, traditionally called KATH-KUNNI method of construction. The Kath-Kunni technology uses the humble but clever principles which optimize the use of the locally available materials to come up with a superior earthquake resistant technology in high seismic zone regions of Shimla, Kullu, Mandi and Kinnaur districts. This traditional discipline of building has been transferred through inherited knowledge systems of master masons. These systems are very much still put into practice. This style of architecture is not only seen in Temples, Forts and Palaces but also in residential dwellings. With passage of time and unsustainable growth taking place, this earthquake resistant architecture is in need of urgent attention. This paper is a modest attempt, spread over a period of eighteen years, in understanding, documenting and analyzing this vernacular earthquake resistant construction technology. Case Study: Fort Chehni View of the village Chehni showing Chehni Fort over the village skyline (Photo Credit: sarahan) In Chehni Kothi, the Kath Kunni technology as a construction system is skillfully reflected in all aspects of the building, hence bringing in seismic resistance efficiency in the micro behavior of the building structural systems.



PP-35

Assessment of Physicochemical and Total Carbon of Soil in Different Land Use Forms of Delhi

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Global warming is becoming a huge problem due to carbon emissions from modernization and urbanization. Therefore, an assessment of the carbon pool is essential for a better action plan for management. Land cover and land use change significantly impact soil carbon stocks and their distribution in ecosystems, therefore playing a vital role in global carbon dynamics. One of the main factors contributing to the degradation of soil quality and greenhouse gas emissions is land-use changes (LUC), which are driven mainly by deforestation and soil disturbance. The present study focused on the physicochemical properties of soil and carbon content for various land use for different depth classes (10cm, 10-20cm, and 20-30cm) of Delhi. An examination of soil samples shows that Forest's land cover has pH ranges from 6.38-8.45. For an urban area, pH was found to be 7.79-8.19, whereas, for scrubland, it was between 6.9-8.0, indicating neutral to slightly acidic. In addition, soil moisture was highest in the Forest area while lowest in the scrubland. The highest carbon content was found in the topmost layer (0-10cm) and the least in 20-30 cm. Subsoil below 30 cm contains approximately 50% of the soil carbon measured at 1 m soil depth of the world's entire land surface. The study's findings will help evaluate the soil's health and the soil's potential to store carbon and could be used in implementing land use management and planning to increase carbon stock. The findings of this study can be baseline data for policymakers to adopt suitable land use systems in urban cities.

Key-words: Carbon sequestration, Soil carbon, Soil analysis, Land use changes, Delhi



PP-36

Behavioural Analysis of Southern Pig-Tailed Macaque (*Macaca nemestrina*) in captivity, a family residing in Sri Sayajibaug Zoo, Vadodara, Gujarat

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Southern Pig-tailed Macaques (*Macaca nemestrina*) display number of behaviours in captivity of which some are also observed in the wild. These include foraging, reproductive behaviour, aggressive behaviour, sleeping behaviour, grooming behaviour etc. The main aim of this study was to comprehend some of the most primary gestural signals and behaviours observed in Southern Pigtailed macaques and discuss their cognitive implementation in captivity. The study was conducted at Sayajibaug Zoo, Vadodara which is situated at the center of the city. The behaviour of 5 selected visual and tactile behaviour patterns in 3 males and 2 females captive group of macaques was recorded (80 hours of observation). Time sampling and scan sampling methods were used to carry out this study. Pucker face, play bite/play chase and hyperactive were some of the predominant behaviours observed in males and food washing and allogrooming were some observed in females foremost. Pucker face was the most frequent facial behaviour observed in the group. However, food washing behaviour is a very particular behaviour noted among these macaques which is not the cultural behaviour of pigtail macaques, the origin of which still remains unclear.



PP-37

A Preliminary Floristic Study on Chotila Taluka of Surendranagar District, Gujarat

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In nature, plants are one of the most precious gifts. Knowledge of plant diversity is important in understanding the environment and its function. Plant diversity inventory conservation of any area is the starting point of any strategy or management methods helps to identify specific hotspots as well as specific ecological communities in a particular area. In this regard, plant diversity inventory study was conducted at surrounding areas of Chotila taluka of Surendranagar district. During this plant diversity inventory study, A total number of 203 plant species were recorded and 161 genera and 55 Families were also recorded.

Keywords: Chotila; Floristic; Preliminary study; Surendranagar



PP-38

Identification and Ecophysiological Studies on the Grasses of nearest area of Kheda

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Grasses are very important group of plants not only to human beings but also to animals. Grass species are the most of the world's major crops including wheat, barley, oats, rice, maize, millets, sugarcane and pasture species. Grasses have a major influence on climate through the cycling of carbon and water between the soil and the atmosphere. Grasses show high adaptability with respect to changing environment, the ability to coexist with grazing animals and with man. The study has been carried out during the summer season in the nearest area of kheda district. During this study ecological data like Frequency, Density and Abundance and IVI(Important Value Index) and physiological data like leaf area, Specific Leaf Area(SLA) were studied. During this study total 10 Grass species were identified. Among these the highest dominant species was *Cynodon dactylon* in Kheda as it has the highest Important Value Index (IVI) of 1.4371 while *dichanthium annulatum* has the lowest IVI value of 0.4511. Using the Physiological data indicated above it can be concluded that *Chloris virgata* has the highest and *Cynodon dactylon* has the lowest SLA value among the total species found in Kheda District. Krywords: Ecophysiology, Grasses, Specific Leaf Area(SLS), Important Value Index(IVI)



PP-39

The common Insecticide cyfluthrin and chlorpyrifos alter the expression of subsets of genes with diverse functions in primary human astrocytes.

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Background- The effects of insecticide in nature is more risky because of their exposure either directly or indirectly. Despite their importance, insecticide also has a negative impact on non-target species like humans. While synthetic insecticides are well studied, very little is known about their potential role in causing neurotoxicity.

Methods- In this current study we performed the bioinformatics analysis on transcriptomic profiles of 9 astrocytes samples: including 3 control and 6 test samples (insecticide- chlorpyrifos and cyfluthrin). First, exploratory data analysis based on gene expression data using Principle Component Analysis (PCA), depicted distinct patterns between control and test samples. Subsequently, Welch's T- test differential gene expression analysis identified 1525 genes (p.adj, arbitrary fold change) between these conditions.

Results- This study reveals some genes as the key features contributing to the disturbed defence mechanism of astrocytes and mitochondrial dysfunction owing to neurotoxicity.



PP-40

Phthalate- A molecule hindering milk production in cow

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Plastics are one of the most leading substances for causing environmental changes in negative way. It has hindered everywhere in ecosystem, not only humans but animals are also suffering from the harmful chemicals released by plastics. One such chemical which is used in plastics is phthalate. This study is done on cow by using bioinformatics tools. The study is about how phthalates can hinder milk production in cow and also can be a reason of low nutrition in its milk. Animals like cows and other cattle are livestock and any kind of harm to them will also cause humans a problem. The possible result from bioinformatics study would describe that the phthalate molecule would hinder in nutritive column of milk produced by cow

PP-41

Neonicotinoids: Endocrine Disrupting Agents In Non-Targeted Species

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EDCs interfere with hormone receptors and are linked to a variety of negative health effects. As a result, worldwide concern about these substances is growing. EDCs are a class of xenobiotic substances that are found in the environment and have a negative impact on the developmental and reproductive functions of living species. These substances work by directly or indirectly binding to hormone receptors and controlling hormonal activity abnormally.

However, there are significant challenges in analyzing the effect of these substances experimentally due to the associated costs and performance time. As a result, many researchers use the bioinformatics base of the research as a potential substitute to experimental approaches. Popular computational methods, such as molecular docking, are now being used to predict the effect of EDCs on endocrine receptors. The molecular docking method employs EDCs as ligands and hormonal receptor proteins as targets to computely assess binding affinity, conformational changes, and stability.

Neonicotinoids affect the central nervous system of insects, and do not discriminate between target (e.g., com rootworm, flea beetle) and nontarget insects (e.g, bees). Generally, Neonicotinoids target nicotinic acetylcholine receptors (nAChR) in non target species but it may also act as endocrine disrupting chemicals. Hence, we tried to reevaluate the neonicotinoid risk to address the EDC-like behavior by molecular docking of it with hormone receptors of non-target species.

KEYWORD: Endocrine disrupting chemicals, Hormone receptors, non- target species, molecular docking. Neonicotinoids.



PP-42

**Understanding the Diversity and Distribution of Agricultural important insects of
Vadodara District.**

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Insect plays significant roles in ecosystem, which involves managing and sustain the agricultural ecosystem. Objective of the current research was to fill in the lacunae to knowledge on the diversity of agriculturally important insects, with particular emphasis on their ecological and pest status in and around Vadodara district of the Gujarat. The present study was conducted from January 2022 to June 2022 in four selected sites: (I) Ajwa, (II) Chhani, (III) Karjan and (IV) Padra. For the collection of samples, the study sites were visited once per week and sampling was carried out during early morning and evening hours. The collected specimens were brought to laboratory, freshly photographed, preserved, and identified up to species level using standard taxonomic keys. A total of 122 species of belonging to two order viz. Orthoptera (70 species 51 genera), Lepidoptera (40 species 34 genera) and Odonata (12 species 11 genera) were recorded. The Lepidopteran family Nymphalidae was the most common while the family Lymantridae, Plutellidae and Pyralidae was rare among all the selected study sites. Similarly, the Orthopteran family Acrididae was the most common while the family Raphidophoriade was rare among all the selected study sites. Although Orthopteran diversity was recorded maximum, the Percentage Incidence and Severity Index was recorded maximum in Lepidoptera. In terms of site-wise Percentage Incidence and the Severity Index of pest, highest occurrence of both the orders was recorded from site IV. The similarity indices revealed that site I and site III has maximum similarity of pest species. It was also observed that the severity and mean rate of infestation was higher in Lepidoptera (39-58%) as compared to Orthoptera (26- 40%). Maximum and minimum species richness was observed at site I and site II respectively. Furthermore, maximum and minimum evenness was observed at site IV and site II respectively.

Keywords: Agriculture Insect, Orthopteran, Lepidoptera, Diversity, Richness, Evenness.



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