



POST GRADUATE DEPARTMENT OF
CONSERVATION BIOLOGY
DURGAPUR GOVERNMENT COLLEGE

INDIAN WILDLIFE

NEWSLETTER NO: CONB/ WILDLIFE/ 2023/ 2

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MESSAGE FROM THE PRINCIPAL

Dear Friends and Colleagues,
Good morning to all!

It is a great pleasure to open the fourth newsletter of Department of Conservation Biology, Durgapur Government College. This newsletter is mainly published to highlight the academic and co-curricular activities carried out by the Department as a team or as an individual during the second half of the academic year 2023-2024. Apart from this, a news corner dedicated to the mangrove forest conservation in India is also a part of this endeavour.

Through this newsletter, ideas and messages regarding wildlife conservation and threats will be dealt with and students of this course will learn a new approach to conservation and protection.

I wish all the best to the faculty members, research scholars and students.

Dr. Debnath Palit
Principal
Durgapur Government College

22nd January 2024

NEWSLETTER OF CONSERVATION BIOLOGY

The Newsletter of Conservation Biology displays a compilation of information on the wildlife, their habitats and their conservation status around the globe in the news corner. Some information published here are obtained from free and publicly available sources such as the internet, newspapers and other publications. The publisher of this newsletter does not make any claim on the authenticity of the contents of the secondary sources of information. The information does not necessarily represent any official views of the publisher.

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PAPERS PUBLISHED FROM THE DEPARTMENT AROUND THE GLOBE

Environ Monit Assess (2023) 195:1039
https://doi.org/10.1007/s10661-023-11627-6

RESEARCH



Time series analysis of groundwater quality at selected sites of Purba and Paschim Burdwan, West Bengal, India

Sanghamitra Sanyal · Sanchari Sarkar ·
Maitreyee Chakrabarty

Received: 21 March 2023 / Accepted: 22 July 2023
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Abstract The Water Quality Index (WQI) is used to monitor the health and usability of a water body. In this study, we aimed to construct time series prediction models using groundwater WQI (GW-WQI) at four sites: IISCO-Asansol, Durgapur Town, Burdwan University, and Burdwan Station. While statistical spatio-temporal analysis has been reported earlier, no time series analysis of the data or predictive modelling has been done. Pre-monsoon and post-monsoon physico-chemical data from 2010 to 2022 were obtained from the West Bengal Pollution Control Board website to calculate the GW-WQI. Prediction modelling was performed using R 4.1.3 software. Best fit forecast models were selected to predict future trends of GW-WQI with 80% of the data. Subsequently, the models were validated using R-squared, root mean square error (RMSE), mean absolute error (MAE), maximum absolute percentage error (MAPE), and Thiel's U for the model using 20% of the data. Our results show that GW-WQI was good in pre-monsoon but unfit for drinking in post-monsoon in IISCO-Asansol, Durgapur Town, Burdwan

University, and Burdwan Station. Arsenic, fluoride, and mercury were the major contaminants resulting in poor GW-WQI. Seasonal ARIMA was the best model for Burdwan University and IISCO-Asansol, ETS for Durgapur Station, and BaggedARIMA for Burdwan Station. The forecast model for Durgapur and Burdwan Station predicted a sharp increase until 2027 but was fluctuating for IISCO-Asansol and Burdwan University. Thus, GW-WQI is a major problem in the industrial belt of West Bengal that is likely to remain high or worsen in the future.

Keywords Groundwater · Time series · Water Quality Index · ARIMA · ETS · SNAIVE · BaggedARIMA · Modeling

Introduction

Groundwater is found underground in voids and fissures in rock, sand, and soil. According to the United Nations (UN), about 2 billion people globally rely on groundwater as their primary source of drinking water. In addition, groundwater is heavily used for irrigation, providing water for agriculture in many regions. It is also used for industrial and mining operations and thermoelectric power generation (UN-Water, 2022). Due to over-extraction and pollution, many groundwater resources are under threat globally (Molle et al., 2018). Sustainable management of these

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s10661-023-11627-6>.

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Published online: 12 August 2023



CHEMISTRY AND ECOLOGY
https://doi.org/10.1080/02757540.2023.2263439



RESEARCH ARTICLE



Acute and sub-acute toxic effects of cadmium to freshwater tropical oligochaete *Tubifex tubifex* with special reference to oxidative stress and behavioural biomarkers

Neha Majumdar^a, Nimai Chandra Saha^b, Priyajit Banerjee^b, Tapajit Bhattacharya^a and Shubhajit Saha^b

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ABSTRACT

Current environmental issues include heavy metal contamination. Cadmium pollution in aquatic environments harms aquatic creatures and can pass to people through food chains. Cadmium poisoning damages bones, kidneys and causes cancer. *Tubifex tubifex* is a well-known water pollution indicator because of its good adaptation power in environmental pollution. *Tubifex* sp. is chosen as the test animal in this study since it is an indicator species and also a model non-target organism in ecotoxicology. The aim of this present work is to assess the toxicity of cadmium nitrate on *Tubifex tubifex* as a biomarker. Acute toxicity of cadmium nitrate was analysed by measuring the 96 h LC₅₀ value. Physical observations revealed that cadmium induced autotomy of the caudal region of the worm and induced more mucus secretion. Behavioural alterations like changes in mucus secretion, clumping tendency and wrinking effect were observed in cadmium-treated worms. Antioxidant enzymes level (MDA, CAT and SOD) increased significantly on cadmium nitrate exposure. In general, biomarker data show that cadmium exposure has stress-related consequences at the biochemical and physiological levels, reducing the overall health and survival of such animals.

Highlights

- The toxicity of the heavy metal cadmium in acute and sub-acute levels was investigated in *Tubifex tubifex*.
- The goal of this study was to look at the effects of cadmium on oxidative stress and behavioural biomarkers in *T. tubifex*
- Sublethal cadmium exposure can impact the physiological functioning of annelids in the wild.

ARTICLE HISTORY

Received 21 May 2023
Final Version Received 21
September 2023

KEYWORDS

Cadmium; acute toxicity;
Tubifex tubifex; heavy metal;
oxidative stress

1. Introduction

During last few decades, the rapid growth of industries demands the exploitation of natural resources, which results in increased level of environmental pollution [1,2]. Improper waste disposal in the water body from metal industry causes toxicity in

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Chapter 13

Wetland-based agroforestry: Carbon management toward sustainability

Nazma Khatun¹ and Debnath Palit²

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Abbreviations

- AF Agroforestry
- BD Bulk density
- C Carbon
- CO₂ Carbon dioxide
- GHG Greenhouse gas
- N₂O Nitrous oxide
- OC Organic carbon
- SD Sustainable development

13.1 Introduction

Keeping the goal of sustainable development (SD) in mind, we must focus on reversing the degradation in the forest, wetlands, and other ecosystems. To do that, first, we have to understand the reasons for this degradation. Climate change is one of the primary reasons for creating and, unfortunately, will continue to cause several problems and crises for us (Banerjee et al., 2020). One of the significant effects of climate change is agriculture, which will create a severe food crisis for future generations (Jhariya et al., 2021a,b; Choudhary and Meena, 2022). Though agriculture seems to be the victim of global warming and climate change, it also plays the role of a culprit. Agricultural practices are one of the primary reasons for the difference in land use and the destruction of different ecosystems, especially forests, and wetlands. The agriculture sector contributes to approximately 14% of greenhouse gas (GHG) emissions (Le Quere et al., 2009). It contributes 84% of all N₂O (nitrous oxide) and 47% of CH₄, which makes it the most significant contributor to noncarbon dioxide (CO₂) GHG producers (Beach et al., 2008; Meena et al., 2022a). It is also found that 74% of all agriculture emissions occur in developing countries like ours. This number is also expected to increase over time due to increasing population size and changes in dietary preferences (Beach et al., 2008). Research has also shown that tropical forests are disappearing at an alarming rate. It is not due to timber harvest but rather to convert forests into agricultural land (Leduc and Gossiland, 1988). We are very aware that the development and expansion of agriculture are significant for the survival and food security of any country and the globe. But this should not be the excuse to destroy the ecosystem, which also supplies us with ecosystem services worth billions of dollars annually.

In these circumstances, we need unique and novel scientific approaches that will help to expand agriculture while maintaining the sustainability of the ecosystems (Van Noordwijk et al., 2020; Meena et al., 2022a,b). Agriculture, especially rain-fed agriculture, depends on rainwater and faces several biophysical and socioeconomic challenges (Korwar et al., 2014). Incorporating agriculture with the plantation of trees, also known as agroforestry (AF), can help to solve the problem. Practice of AF in the wetland ecosystem solves the water supply problem and makes it more efficient. It can protect the wetland ecosystem, which is under threat. At the same time, it provides social and economic benefits by generating extra income. It also reduces the risk of crop failure. Wetland-based AF can be the solution to those many problems.

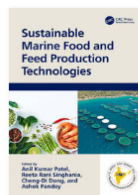


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Chapter

Sustainable Development for Shrimp Culture

A Critical Analysis

By Kaushik Dey, Sanghamitra Sanyal

Book [Sustainable Marine Food and Feed Production Technologies](#)

Edition 1st Edition
First Published 2023
Imprint CRC Press
Pages 18
eBook ISBN 9781003326946

ABSTRACT

Sustainable shrimp culture entails shrimp management and conservation, as well as an emphasis on technological and institutional obligations to ensure a sustained supply following human needs for current and future generations. Sustainable shrimp farming in the world not only increases shrimp production but also draws criticism for having a negative environmental and social impact, putting the system's sustainability



LESSER MAMMAL SURVEY IN PURULIA

Lesser mammals are a group of small to medium-sized mammals that include rodents, shrews, moles, hedgehogs, bats, and others. They are often overlooked or neglected in conservation efforts, despite their ecological importance and diversity.

A day long training cum capacity building workshop was organized by the forest department where Dr. Tapajit Bhattacharya acted as a resource person where he presented the theoretical part of the methodologies of sign encounter rate surveys and camera trap surveys. More than 80 forest personnel were present in the workshop

The theoretical part of the training involved the following:

- Wildlife sign encounter rate survey method and the datasheet to be used for the survey
- Details of grid-based sampling approach
- Camera trapping method
- Basic identification of the targeted species and their pugmarks/footprints/hoofmarks and scat/pellets

Two of the faculty members of the Department of Conservation Biology were invited by Purulia and Kangsabati South Forest Division to train the forest personnels and carry out a survey on the lesser mammals which are often known to co-exist with the local village community. Seven students of the department were also a part of the survey team as volunteers.

Total span of the survey was from 24.11.2023 to 01.12.2023 of which the students of the department along with Dr. Rajib Biswas carried out the survey from 24.11.2023 to 27.11.2023 in Kangsabati South and Purulia Forest Division. In Purulia Division, a total of 1479 signs were encountered by surveying 224.7 km in 125.08 hours. Most number of signs were recorded for Black-naped Hare (270) followed by Wild pig (254), Bengal Fox (241), Golden Jackal (115) and Barking Deer (112). Common Leopard, Sloth Bear and Barking Deer were only recorded from this division.

The surveying team conducted survey for 103.27 hours covering 167.53 km of six ranges in Kangsabati South Division which resulted for 262 wildlife signs. Of these 262 signs, 28 were unidentified and the greatest number of signs were encountered for Black-naped Hare (79), Wild pig (43), Indian Grey Wolf (29) and Golden Jackal (21).





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Kullapal, West Bengal, India
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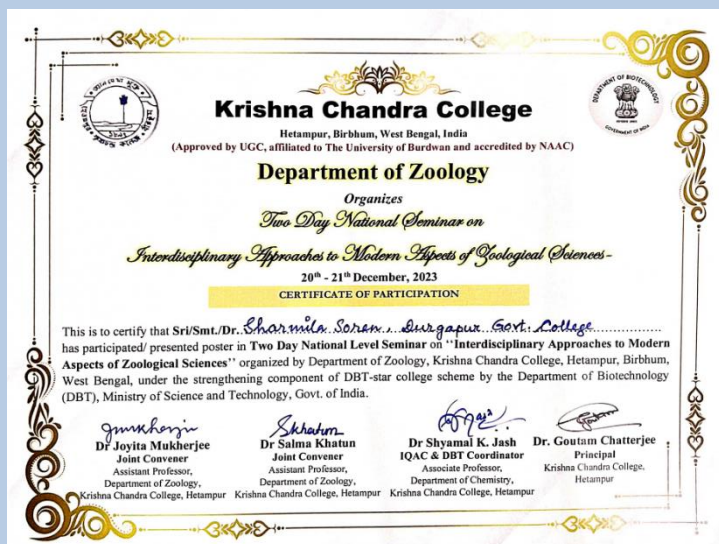
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GPS Map Camera



PARTICIPATIONS IN INTERNATIONAL AND NATIONAL SEMINARS





STUDENT'S SEMINARS ON RAMSAR SITE AND THREATENED SPECIES

Semester I of MSc Conservation Biology presented on Ramsar Site and Threatened Species (18.12.2023) as a part of their course curriculum. They were given 8 minutes time to present on the topic, followed by 2 minutes interaction. All the students presented on different Ramsar Sites of India which were categorised as Wetlands of International Importance by Ramsar Convention based on the threatened floral and faunal assemblage. The sites were namely Chilika, Astamudi Lake, Loktak Lake, East Calcutta Wetland etc.



WORLD ENVIRONMENT DAY CELEBRATION: DEBATE COMPETITION

The main objective of this seminar was to provide an interactive platform for the students of Conservation Biology to compete among themselves and inquire more on a topic provide and to think something out of the box and put up their own point of view over the topic.

The topic of the debate was 'Towards a life without single use plastic: India is doing enough?'

Two groups with students from both semesters participated: one for the motion and one against the motion. Each placed their arguments and counter arguments for the use of plastic, its effects, the remedial measures and future perspective of India for the single use plastic in our day to day life. Each group was presented with a plant pot by our Respected Principal, Dr. Debanth Palit at the end of the program.





EDUCATIONAL EXCURSION TO PURULIA AND NIL NIRJON

A field excursion was organised from 23rd to 26th of November, 2023, by the Department of Conservation Biology, Durgapur Government College at Kangsabati South Division Purulia, West Bengal.

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Bengal. As a part of the semester practical this excursion was planned to know the diversity of flora and fauna, soil characteristics and some other parameters. The four-day tour started with 7 students, 1 research scholar and 2 teachers from Durgapur Government College in

morning around 6 a.m. and all reached at our destination at around 10.30 a.m. Different field sampling techniques such as light trap, pitfall trap, water and soil sample collection and sign survey for lesser mammals were carried out.

Another field excursion was organized on 15th December 2023 to Nil Nirjon Dam in Bakreshwar, Birbhum, West Bengal with seven students of third semester and five students of first semester. The one-day tour was started at 7 a.m. from Durgapur Government College and all reached the destination at 9 a.m. Point count for migratory waterbirds, Soil and water sample collection and

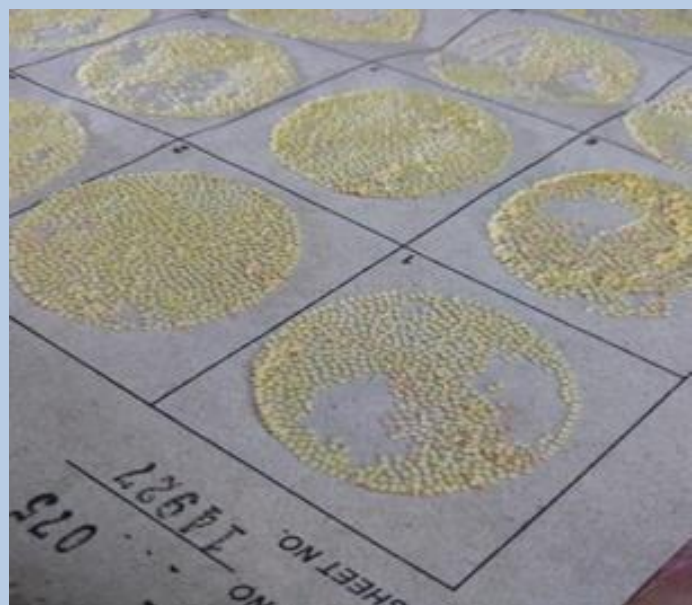
Quadrat method of vegetation sampling were carried out there.





INDUSTRY VISIT

Visit to an industry for industrial-based *studies* is an integral part of the curriculum of Conservation Biology, and following the trends set earlier, this time also the students of third semester visited the Sriniketan Sericulture Composite Unit under West Bengal Government Textile Industry, Bolpur, West Bengal on 1st august, 2023











COLLABORATIVE ENDEAVOURS WITH SERAMPORE COLLEGE

The Post Graduate Department of Conservation Biology, Durgapur Government College is currently continuing one research specific collaborative activity. The details of this collaboration are as follows:

Department of Zoology, Serampore College dated proposed for a collaboration between the Department of Conservation Biology and their college to work for MSc dissertation.

<p>DEPARTMENT OF ZOOLOGY FOR UG & PG STUDIES Serampore College Founded by Carey, Marshman and Ward 1818 Incorporated by Royal Charter, 1827 and Bengal Govt. Act. IV of 1918 as modified upto 1997 by the Govt. of West Bengal</p> <p>SERAMPORE HOOGHLY WEST BENGAL INDIA PIN - 712201</p> <p> (Accredited 'A' grade by NAAC)</p> <p>Ref. No. :</p> <p>To Dr. Moitreyee Banerjee Chakrabarty, Assistant Professor and Head, P.G. Department of Conservation Biology, Durgapur Government College, Paschim Burdwan - 713214</p> <p>Ref. No.: PG/2023-24/ 01</p> <p>Date: August 09, 2023</p> <p>Sub. Request for academic collaboration related to M.Sc. Dissertation related work</p> <p>Dear Madam,</p> <p>Keeping in view with the expertise of Dr. Tapajit Bhattacharya of your Department, he has been requested to act as a "Co-Supervisor" for the M.Sc. dissertation project related work in association with Dr. Soumyajit Banerjee for the elective paper. In this aspect, Ms. Prachestha Chowdhury, student of PG Semester III, Serampore College shall be working and visiting the PG Department of Conservation Biology, Durgapur Government College to get necessary guidance from Dr. Bhattacharya.</p> <p>In shall really appreciate if you kindly allow Ms. Prachestha Chowdhury to visit the department and work therein under his guidance including utilization of the resources as per rules laid down by your department and college.</p> <p>Awaiting your kind consideration and cooperative support for this academic collaboration, related to M.Sc. Dissertation work.</p> <p>Thanking you in anticipation.</p> <p>Sincerely yours,</p> <p> Dr. Soumyajit Banerjee, Head, Department of Zoology, Serampore College & PG Course Coordinator in Zoology, Serampore College Dr. Soumyajit Banerjee, Head & PG Course Coordinator in Zoology, Department of Zoology for UG and PG Studies, Serampore College</p> <p></p>	<p> Government of West Bengal</p> <p>Durgapur Government College DEPARTMENT OF CONSERVATION BIOLOGY J N Avenue, Durgapur - 713214, Paschim Burdwan, West Bengal, India. Phone & Fax: +91 0343 2500534 Email: conservationbiology.dgc@gmail.com Website: www.durgapurgovtcollege.ac.in</p> <p></p> <p>To The Principal, Durgapur Government College</p> <p>Date: 11.08.2023 Place: Durgapur</p> <p>Sub: Request for collaborative works with Department of Zoology, Serampore College</p> <p>Respected Sir,</p> <p>This is in reference to the mail received from the Head, Department of Zoology, Serampore College dated 10.08.2023. They have proposed for a collaboration between the Department of Conservation Biology and their college to work for MSc dissertation.</p> <p>I will be highly obliged if you kindly consider the matter and advice.</p> <p>Soliciting your kind co-operation and necessary guidance in this regard.</p> <p>Thanking you, Yours faithfully,</p> <p> Dr. Moitreyee Chakrabarty Assistant Professor & Head P.G. Department of Conservation Biology Durgapur Government College</p>
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BUTTERFLY WALK TO CELEBRATE WORLD WILDLIFE WEEK

To commemorate World Wildlife Week and Butterfly Month, Department of Conservation Biology organized a butterfly walk on 12 October, 2023 in collaboration with IQAC, Durgapur Government College. A field survey with the students of the college was organized to observe and identify the butterfly species and prepared an inventory of the same for Durgapur College Campus.





RAMNABAGAN ZOO VISIT

Ramnabagan Zoo is situated in Bardhaman. Department of Conservation Biology arranged one day visit to this Zoo on 19th December 2023. Seven students of third semester along with two faculties and one research scholar started from Durgapur at 6 a.m. and reached there by 9 a.m. One important method of behavioural ecology, the ad libitum sampling was carried out for different species within their enclosures. The observed species were common leopard, jackal, hyena, adjutant stork, rhesus macaque, hanuman langur, barking deer and sloth bear. The behavioural data obtained were then analysed to prepare ethograms of each individuals observed.





ONLINE SPECIAL LECTURE SERIES

Online Special Lecture Series was organized in the month of November 2023. The main objective of the program was to generate an interactive platform with eminent research personnels from different fields.

Four eloquent speakers were invited for the lecture series.

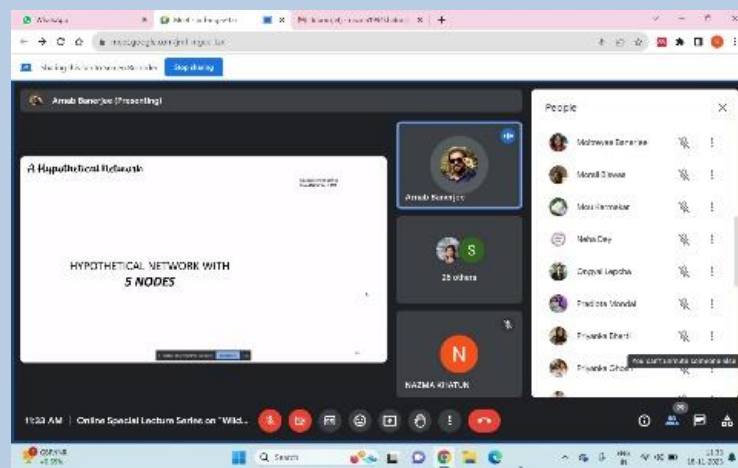
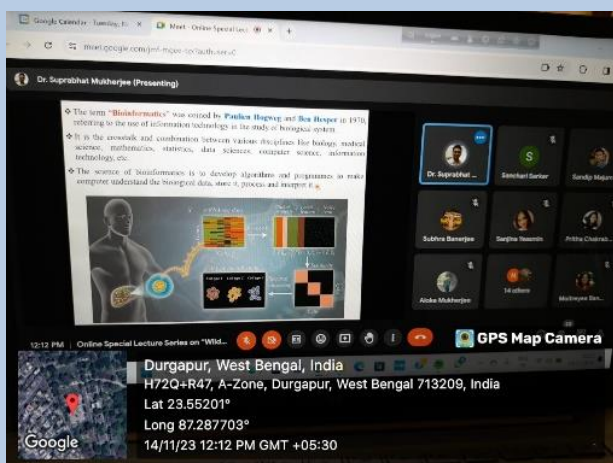
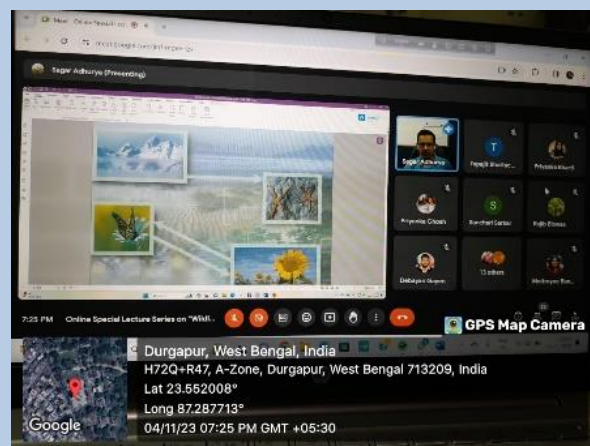
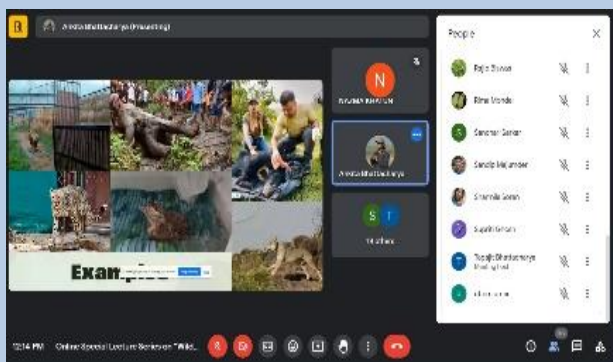
a. Dr. Sagar Adhurya from Kyung Hee University, Seol, South Korea talked about basic Ecological Modelling, its types, components and other aspects including practical application of the same on 04.11.2023. It was an highly interactive session and studnets got to learn about the use of STELLA software and other intricate details of mathematical modelling.

b. Dr. Suprabhat Mukherjee, Assistant Professor, Department of Animal Science, Kazi Nazrul University delivered a talk on Bioinformatics on 14.11.2023 where he shared his knowledge on the basic aspects of bioinformatics, sequence alignment, databases and online resources for searching different nucleic acid and protein repositories.

repositories.

c. Dr. Arnab Banerjee, Assistant Professor, Department of Zoology, Sikkim University enlightened our students on the deeper aspects of mathematical modelling with special emphasis on network analysis and static models.

d. Dr. Ankita Bhattacharya from Ministry of Environment, Forest and Climate Change, New Delhi was invited to deliver a talk on Wildlife Monitoring.



She provided excellent information on the recent techniques that are being used in different situations for live capture and management of wild animals.



News Corner Theme: Mangrove Conservation in India

WEST BENGAL GOVT ANNOUNCES MANGROVE CELL ON INTERNATIONAL DAY OF MANGROVE ECOSYSTEM

West Bengal, which is home to about 40% of mangrove forests in India, announced the setting up of a 'Mangrove Cell' in the State, on the occasion of the International Day for the Conservation of the Mangrove Ecosystem on Wednesday. The Mangrove Cell will generate funds from private and international sectors, as well as publish books and conduct research on the subject. It will have an annual action plan for the plantation of mangroves, look at maintenance and coordinate with NGOs. The article also highlights that about 15.56 crore mangrove saplings were planted by the West Bengal Forest Department in an area of about 10,398 acres from 2020 to 2021

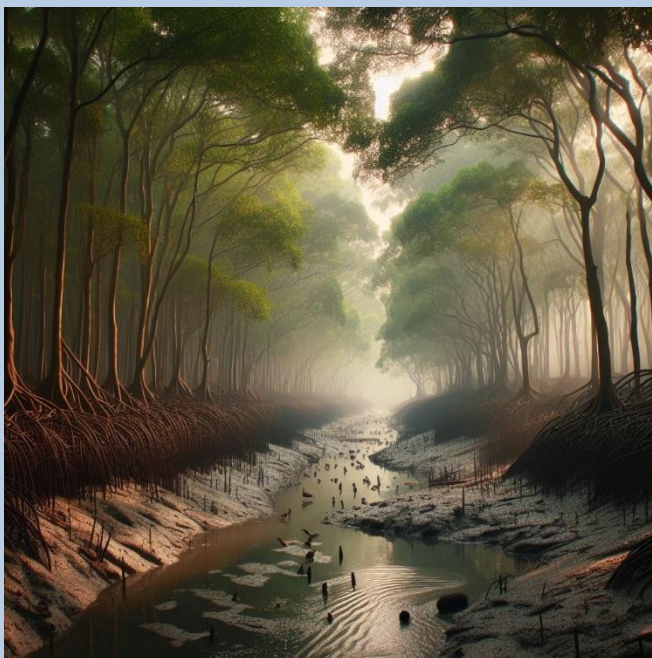
<https://www.thehindu.com/news/national/other-states/wb-government-announces-mangrove-cell-on-international-day-of-mangrove-ecosystem/article67123522.ece>

Mangrove Initiative for Shoreline Habitats and Tangible Incomes

The Indian government launched the '**Mangrove Initiative for Shoreline Habitats and Tangible Incomes (MISHTI)**' scheme in Budget 2023-24 to protect and revive mangrove ecosystems on the Indian coast while enhancing the socio-economic status of coastal communities.

The first Ministerial meeting of the Mangrove Alliance for Climate (MAC) was held in Dubai during the COP28 summit. The Indian Environment Minister, Shri Bhupender Yadav, expressed India's commitment to mangrove conservation and shared India's experience in the area for nearly five decades. He also highlighted the success of mangrove plantation drives in coastal areas of Gujarat and Tamil Nadu.

<https://www.downtoearth.org.in/news/wildlife-biodiversity/budget-2023-24-experts-hail-centre-s-mangrove-restoration-scheme-but-stress-on-scientific-implementation-87445>





ANNOUNCEMENT

Back Cover Photo: Supriti Ghosh

The theme of the next issue (JUNE 2024) of Newsletter of Conservation Biology will be **“Conservation of Wildlife in Indian wetlands”**. Contributions may please be submitted to **Dr. Moitreyee Chakrabarty**, Assistant Professor and Head, PG Department of Conservation Biology at Durgapur Government College, Durgapur (hodconb.dgc@gmail.com) by 1 MAY 2024.

Published by: PG Department of Conservation Biology, Durgapur Government College, Durgapur-713214 (West Bengal) India.

Editorial Board: Moitreyee Chakrabarty, Sandip Majumder, Rajib Biswas, Nazma Khatun, Alope Kumar Mukherjee, Sanghamitra Sanyal and Tapajit Bhattacharya

News Compilation: Supriti Ghosh, Mou Karmakar

Design and layout: Tapajit Bhattacharya