



Estuarine and Coastal Studies Foundation

ANNUAL REPORT

2022 - 2023

www.ecsfindia.org



Annual Report (2022 – 2023)

Prepared by

**Dr. Arunodaya Gautam
Dr. Sourav Paul**

Estuarine and Coastal Studies Foundation

(Registered under Section 8 of Companies Act, 2013)

CIN: U80100WB2021NPL248544

Darpan ID: WB/2021/0297074

Director's note

The coasts of India face numerous stressors, both natural and human-induced, necessitating multidisciplinary organizations that move beyond the traditional reductionist approaches of academia. The Estuarine and Coastal Studies Foundation (ECSF), a unique multidisciplinary institution in India, is committed to serving estuaries, coastal areas, and the communities that depend on them. Foundation brings together scientists, professionals, advisors, and students from various fields to conduct educational programs, hands-on training, internships, and research, all aimed at broadening the scope of estuarine and coastal studies to positively impact marginalized coastal communities.

On one hand, foundation empowers young people to express their ideas and provides platforms for practical learning. Foundation is expanding its research presence along the Indian coastline, attracting scholars and fostering collaborations. The foundation is welcoming visiting scientists from institutions in India. Students and scientists are sharing their perspectives on coastal issues both within India and on global platforms. The foundation collaborates with leading institutions across West Bengal, engaging in research and educational programs. It continues to expand its infrastructure, personnel, and resources to support education and research in estuarine and coastal areas.

As part of its social responsibility, foundation promotes ocean literacy among young Indians and engages in mangrove planting initiatives to help maintain the socio-ecological balance of the lower Ganges delta. In closing, I extend my gratitude to all members, students, scientists, staff, and well-wishers, whose ongoing support and cooperation have enabled Foundation to make a meaningful difference for India's estuaries and coasts.

Thank you



Mr. Sinchan Chatterjee



Director
Estuarine and Coastal
Studies Foundation

Index

1. Introduction and Overview	01
2. Foundation's Goals	01
3. Institutional Structure	02
3.1. Board Members	02
3.2. Advisors	02
3.3. Regular Scientists	02
3.4. Visiting Scientists.....	03
3.5. Staff members.....	03
4. Programs	04
4.1. Education & Training	04
4.1.1. Hands-On	04
4.1.2. Field Course	05
4.1.3. Internship	05
4.2. Research	06
4.2.1. Student Research	06
4.2.2. M.Sc. Dissertation	07
4.2.3. Research Conducted by Scientists	07
4.3. Outreach	08
4.3.1. Seminar/Webinar	08
4.3.2. Workshop	12
4.3.4. Institutional and Social Responsibilities	15
4.3.5. Consulting	15
5. Memorandums of Understanding	16
6. Publications	16
6.1. Research Articles	16
7. Achievements	17
8. Institutional Facilities	17

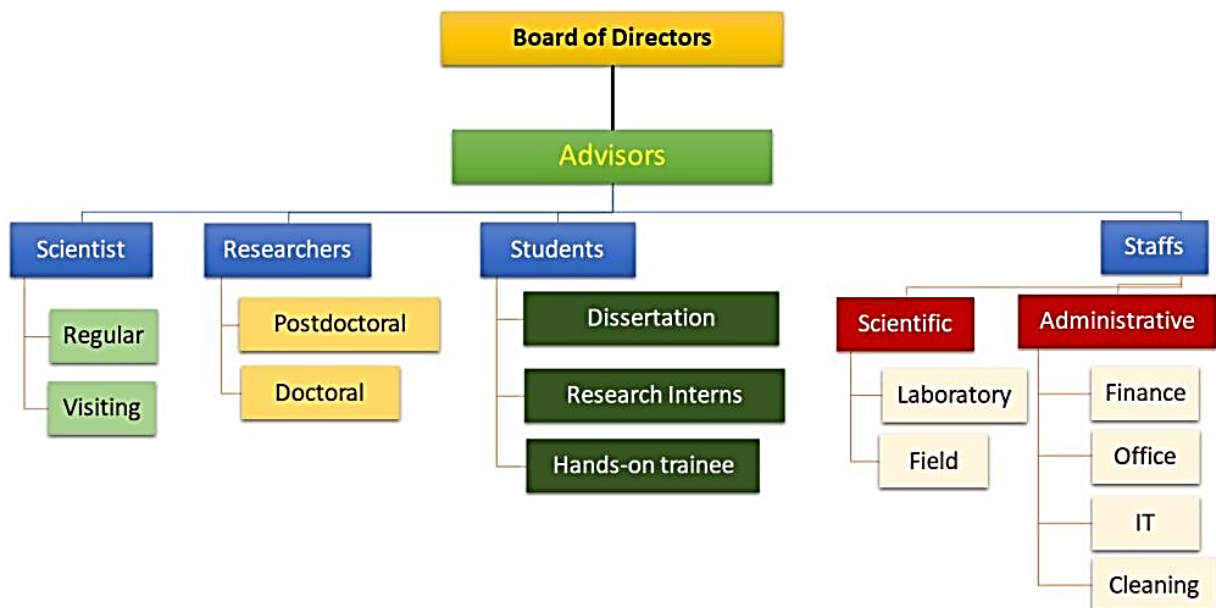
1. Introduction and Overview

Estuarine and Coastal Studies Foundation (ECSF) is a non-profit education and research organization founded on 1 October 2021 at Howrah, West Bengal, India. It operates under section 8 of the Companies Act 2013 (CIN: 80100WB2021NPL248544). ECSF is registered with the NITI Aayog DARPAN portal (DARPAN ID: WB/2021/0297074), GST (No: 19AAGCE6818B1ZP), and compliant with the Corporate Social Responsibility (CSR) Act (Reg. no: CSR00039301) and the Income Tax Act (80G). It is also recognized by various universities (government and private) and colleges (government and government aided) of nationally and by international societies and associations, various programmes of Indian Science Academy (INSA) and International Oceanographic Commission of UNESCO. Foundation's mission is to advance estuarine and coastal education and research to manage natural resources sustainably. By bringing together scientists, professionals, and students, the foundation aims to achieve Sustainable Development Goals (SDGs) through innovative research, education, and community involvement. The foundation focuses on bridging scientific and social knowledge to conserve coastal environments and promote sustainable practices.

2. Foundation's goals

- **Conduct Research and Development:** Promote sustainability in estuarine and coastal environments.
- **Provide Education and Training:** Develop skilled manpower for estuarine and coastal sustainability.
- **Address Sustainable Development Goals:** Align efforts with the United Nations' SDGs.
- **Advocate Sustainable Practices:** Encourage decentralized natural resource management and the use of local and indigenous knowledge for conserving coastal environments.

3. Institutional structure



3.1. Board Members:

1. **Dr. Amalesh Mukhopadhyay** - Co-founder, Director of Administration
2. **Dr. Sourav Paul** - Co-founder, Director of Education & Research
3. **Mr. Sinchan Chatterjee** - Co-founder, Director of Finance & Administration

3.2. Advisors:

- **Prof. Srimanta Kumar Raut**
Expertise: Ecology and Ethology
Position: Senior Professor, Department of Zoology, University of Calcutta
- **Prof. Dr. S. Bijoy Nandan**
Expertise: Mangrove and Marine Biology
Position: Dean of School of Marine Sciences, CUSAT, Kerala

3.3. Regular Scientists:

Dr. Bhaskar Deb Bhattacharya

Expertise: Marine Science, plankton and pollution

Dr. Md. Moniruzzaman

Expertise: Fish biology and endocrinology

Mr. Madhusudan Paul

Expertise: Marine biogeochemistry

3.4. Visiting Scientists:

Dr. Kanailal Das

Expertise: Geomorphology, Vulnerability Assessment

Dr. Jhimli Mondal

Expertise: Tunicate Taxonomy and Ecology

Dr. Anish Bhattacharya

Expertise: Coastal Microbiology, Biochemistry

Dr. Tanoy Mukherjee

Expertise: Wildlife, Geospatial Applications

Dr. Tanmoy Nandy

Expertise: Zooplankton, Benthos

Ms. Titli Pramanik

Expertise: Civil Engineering

Ms. Moumee Jesmin

Expertise: Social Development, Public Health, Gender Equity, Environment

3.5. Staff members:

- **Mr. Sourav Nandy**
Graphics and IT
- **Mr. Samya Karan**
Field Assistant

4. Programs

4.1. Education and Training

Conducting workshops, seminars, and hands-on training sessions for students and professionals to build capacity in estuarine and coastal studies.

4.1.1. Hands-on

The Science Hands-On program of the foundation provides students and early-career researchers with practical scientific experiences beyond traditional textbook learning. Participants develop critical thinking skills, handle scientific equipment, conduct field and laboratory work, analyze data, and engage in scientific writing. They also interact with scientists and participate in workshops and seminars, receiving career advice to help advance their professional journeys. The foundation runs hands on programs such as

- **Coastal ecology and biodiversity**
- **Coastal dynamics and communities**
- **Coastal aquaculture and environment**

Foundation worked with the students, researchers and faculty members of reputed educational and research institutions of India such as University of Calcutta, West Bengal State University, Diamond Harbour Women's University, Sidho-Kanho-Birsha University, The University of Burdwan National Institute of Technology (Rourkela), Maulana Abul Kalam Azad University of Technology (West Bengal), Adamas University, Gitam University, Chandernagore College, Shibpur Dinobundhoo Institution (College), City College and others.



4.1.2. Field Course

Field Course provides hands-on field experience for students and researchers, focusing on sampling and handling various field equipment. Participants learn planning, sampling, data collection techniques, and sample preservation. This course allows students and researchers to gain hands-on experience of sampling and handling of different field gears and equipment. The course includes planning and preparations for the fieldwork, sampling and data procurement techniques, and sample preservation and transportation methods. The field course assesses vegetation, benthos, pelagic and terrestrial samples. The objectives of this course are to study biodiversity, ecology, conservation, geography, environment, pollution, soil/water quality of estuaries and coastal ecosystems. On return from field work, sample analysis could be carried out and taught to students and researchers if they desire. Foundation organizes different field-based workshop in the Indian Sundarbans.

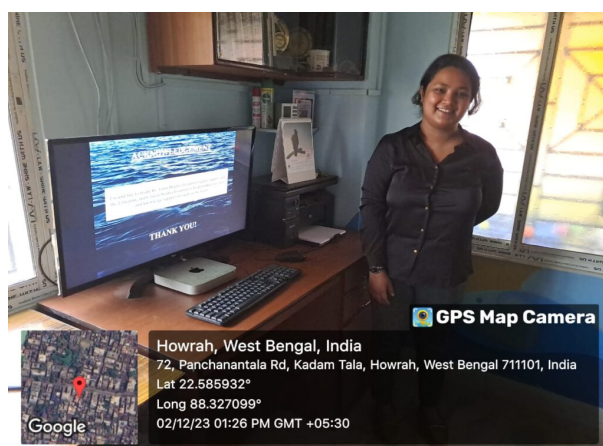
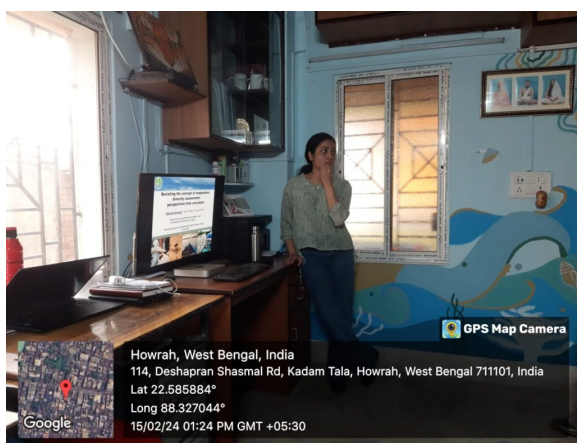


4.1.3. Internship

Young Estuarine and Coastal Scientist Program (YECS)

The foundation is committed to developing critical thinking and hands-on skills among young scientists through the 'Young Estuarine and Coastal Scientist (YECS)' program. This initiative encourages each YECS participant to undertake a unique research project,

with the aim of preparing them for future careers in estuarine, coastal, and marine research. Students from institutions such as the **University of Calcutta, Diamond Harbor Women's University, and the University of Kalyani** have participated in short- to medium-term internships (2-12 months) under the mentorship of experts like **Dr. Kanailal Das, Dr. Bhaskar Deb Bhattacharya, Dr. Mahammed Moniruzzaman, Dr. Sourav Paul, Dr. Danilo Calliari, and Dr. Jhimli Mandol**. Their research has been published in articles and book chapters and presented at international, national, and local conferences, seminars, and symposiums. Some students have even secured independent funding to pursue further research and disseminate their findings through various platforms.



4.2. Research

4.2.1. Student research

- **Ayan Mallick** completed an NGSF-funded internship in 2022 under the supervision of **Dr. Sourav Paul**. His research focused on ‘*Studying the zooplankton community structure in the low salinity zone of the Ganges estuary*’.
- **Debarati Sengupta** conducted her project on ‘*Calibrating the measurement of zooplankton diversity in Indian Sundarbans*’ by under the guidance of **Dr. Sourav Paul** and **Dr. Danilo Calliari**.
- **Puja Mishra** conducted her project on ‘*Microzooplankton diversity of salinity limiting zone of Ganges estuary*’ under the guidance of **Dr. Jhimli Mondal** and **Dr. Bhaskar Deb Bhattacharya**.
- **Aritra Bhattacharya** conducted his project on ‘*Acoustic variations of birds in contrasting landscapes*’ under the guidance of **Dr. Tanoy Mukherjee**.

- **Jhinook Mitra** conducted her project on ‘*Assessment of copepod grazing in the lower stretch of Ganges estuary*’ by under the guidance of **Dr. Bhaskar Deb Bhattacharya**.
- **Susmita Hazra** conducted her research on ‘*Efficacy of Melatonin in the amelioration of endotoxin induced brain inflammation in Zebrafish*’ under the guidance of **Dr. Mahammed Moniruzzaman**.
- **Soumi Ghosh** conducted her research on the ‘*Role of Folate gold nanoparticle in amelioration of hepatotoxicity*’ under the guidance of **Dr. Mahammed Moniruzzaman**.

4.2.1. M.Sc. Dissertation

The Foundation, in collaboration with its partner institutions, facilitates M.Sc. dissertation programs. The program supported the students from Adamas University in completing their dissertations on topics such as climate refugee livelihoods, shoreline changes. Each dissertation is guided by expert faculty, contributing valuable research to coastal and estuarine ecosystems.

- ‘*The pursuit of livelihoods of climate refugees and social vulnerability of Sagar Island, Indian Sundarbans*’ by **Mohor Samadder** of **Adamas University** under the guidance of **Dr. Kanailal Das** and **Dr. Anu Rai**.
- ‘*Spatio-temporal shoreline change assessment and livelihood vulnerability at the dialuvating Island Ghoramara, Indian Sundarbans*’ by **Debisha Ghosh** of **Adamas University** under the guidance of **Dr. Kanailal Das** and **Dr. Anu Rai**.

4.2.2. Research conducted by scientists

- **Species specific bioaccumulation of heavy metals in copepods of lower stretch of Ganges estuary**

PI: Dr. Bhaskar Deb Bhattacharya

CO-PI: Dr. Sourav Paul

Start date: 4th April, 2022 End date: 31st March, 2023

Brief description:

The project aimed to assess the *bioaccumulation of different heavy metals (Cr, Cd and As) in the lower food web of various sites along the stretch of the Hooghly estuary*. The said project also in *detail analyze the pollution status of the Ganges estuary*.

- **Meroplankton and holoplankton variability along lower stretch of Ganges estuary**

PI: Dr. Bhaskar Deb Bhattacharya

CO-PI: Dr. Sourav Paul

Start date: 11th April, 2022 End date: 31st March, 2023

Brief description:

The project aimed to assess *the diversity and distribution of different mero- and holoplankton species of various sites along the stretch of the Hooghly estuary*. The said project also in *detail analyze the physico-chemical variability of the Ganges estuary*.

- **Impact of cyclones on the lower food web of Ganges estuary**

PI: Dr. Sourav Paul

Start date: 4th April, 2022 End date: 31st March, 2023

Brief description:

The project assessed the changes of *water quality, shoreline shifts and impact on mangroves of different estuarine stretches of Indian Sundarbans* by taking a multidisciplinary approach.

4.3. Outreach

Engaging with local communities through awareness programs and initiatives to promote sustainable practices and conservation efforts in coastal regions. Foundation has engaged in numerous outreach programs to promote estuarine and coastal studies, including:

4.3.1. Seminar/Webinar:

- An International webinar '*Advances in Coastal-Marine Studies in Indian Ocean*' to celebrate **World Ocean Day 2023** on **8 June, 2022** from **4 P.M. to 7 P.M. IST**. The webinar was endorsed by **IOC-UNESCO UN Decade of Ocean Science for Sustainable Development (2021-2030)**. Scientists and faculty members of Oman, South Africa and India have presented their research and perspectives on sustainability of estuarine, coastal and marine issues in India and raised concerns about the changing climate. The webinar was conducted through Zoom and YouTube. Participants include faculties, scientists, students, nature enthusiasts of various universities of Indian and abroad.

World Ocean Day 2022
Webinar on
Advances in Coastal-Marine Studies in Indian Ocean
Organized by
Estuarine and Coastal Studies Foundation
(A non-profit organization recognized by NITI Aayog Govt. of India)
Date: 8 June 2022 Time: 16.00 to 19.00 IST

Dr. Yanasivan Kisten
Postdoctoral Fellow, Zoology,
Nelson Mandela University,
South Africa

Soumik Ghosh
Research Scholar,
Centre for Life Sciences,
Vidyasagar University

Madhusudan Paul
Senior Research Fellow,
Marine Science,
Calcutta University

Dr. Radhika R.
Postdoctoral Fellow,
Marine Science,
Cochin University of
Science and Technology

Dr. Ismail Mondal
Postdoctoral Fellow,
Marine Science,
Calcutta University

Dr. BD Bhattacharya
Scientist C,
Estuarine and Coastal
Studies Foundation

Avanti Acharya
Senior Research Fellow,
Marine Science,
Calcutta University

Dr. Sejuti Roy
Assistant Professor, Zoology
Dinabandhu Mahavidyalaya
Bongaon, West Bengal

Dr. Sachinandan Dutta
Assistant Professor,
Marine Science and Fisheries,
Sultan Qaboos University, Oman

Patrons: Dr. A Mukhopadhyay Secretary: Mr. S Chatterjee Convener: Dr. S. Paul Moderator: G Sengupta
LINK : meet.google.com/fvd-yhfv-yzr

NELSON MANDELA UNIVERSITY

RESEARCH CHAIR
SHALLOW WATER
ECOSYSTEMS
NRF

**Estuaries, Freshwater and the
Cape stumpnose
(*Rhabdosargus holubi*)**

Dr Yanasivan Kisten

Dr Sourav Paul, Mr. Mfundo Mpinga, Prof. Renzo Perissinotto, Prof. Nadine Strydom

WORLD OCEAN DAY 2022
ADVANCES IN COASTAL-MARINE STUDIES IN INDIA
(JUNE 8TH 2022)

REASSESSING THE TAXONOMIC STATUS OF
DIOTHRONA RIGIDA GIESBRECHT, 1896
(CRUSTACEA: CYCLOPOIDA) FROM
LAKSHADWEEP WATERS

Dr. Radhika R
Postdoctoral Fellow
School of Marine Science
Cochin University of Science
and Technology (CUSAT)
Kerala, India

Radhika Radhakrishnan

- The foundation in association with **Shibpur Dinobundhoo Institution (College)** had held a one day state level seminar on **28th March 2023**. The seminar was on *‘Exploring the dynamic interface: Understanding the coastal and estuarine environment’*. This event is a result of the MoU activities between two institutions. The seminar was attended by faculties of different colleges, school teachers, undergraduate students of different disciplines. In future two institutions would carry out hands-on activities and workshops related to environmental issues.

One Day State-level Seminar on the occasion of
Platinum Jubilee Celebration of SDBIC

EXPLORING THE DYNAMIC INTERFACE
Understanding the Coastal and Estuarine Environment

Organized by
SHIBPUR DINOBUINDHOO INSTITUTION (COLLEGE)
in association with
ESTUARINE AND COASTAL STUDIES FOUNDATION

Patron
Dr. Manideep Chandra
Principal SDBI College

Organizing Secretary
Md. Ekramuddin
Assistant Professor, Dept. of Zoology, SDBI College

Members
Dr. Subhanida Mazumdar, 2019 College
Dr. Subhanida Karimdar, 1920 College

Invited Speakers
Dr. Sourav Paul
Director, ECSP
Dr. Bhaskar Deb Bhattacharya
Scientist D, ECSP

DATE: 28.03.2023 (TUESDAY) TIME: 1:00 PM
VENUE: SHIBPUR DINOBUINDHOO INSTITUTION (COLLEGE)

GPS Map Camera

Kolkata, West Bengal, India
H83G+WG, Kolkata, West Bengal 700022, India
Lat 22.565154°
Long 88.327119°
28/03/23 02:47 PM GMT +05:30

GPS Map Camera

Howrah, West Bengal, India
H879+3XM, Choura Bustee, Shibpur, Howrah, West Bengal 711102, India
Lat 22.562499°
Long 88.31977°
28/03/23 01:47 PM GMT +05:30

CERTIFICATE OF APPRECIATION

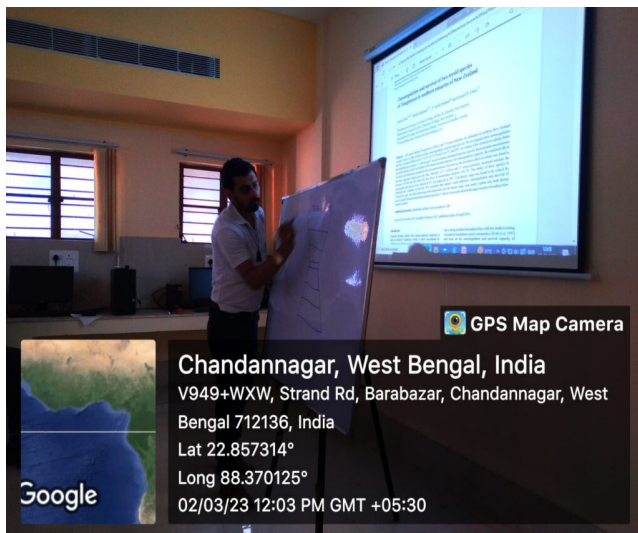
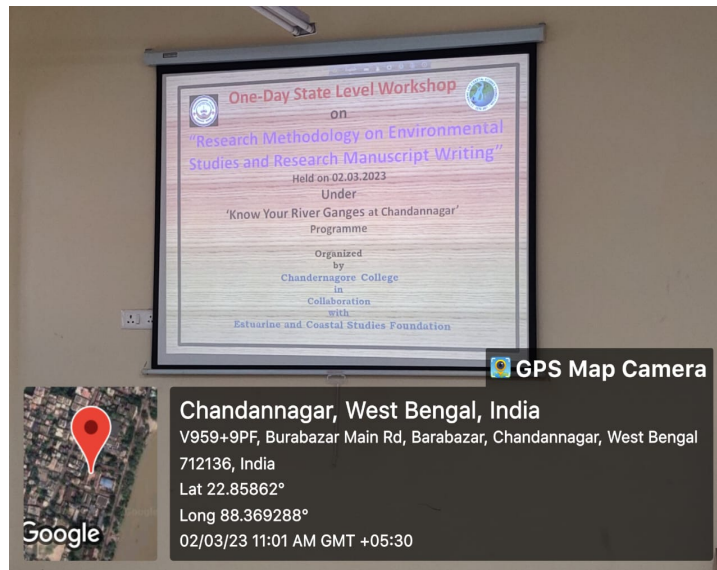
This is to certify that Mr./Mrs./Ms./Dr. _____ of _____ has participated in One Day State-level Seminar titled **‘EXPLORING THE DYNAMIC INTERFACE: Understanding the Coastal and Estuarine Environment’** on 28.03.2023 (Tuesday) at Shibpur Dinobundhoo Institution (College). This seminar was organized to celebrate the Platinum Jubilee Year of Shibpur Dinobundhoo Institution (College) in association with Estuarine and Coastal Studies Foundation.

Dr. Manideep Chandra
Principal, SDBI College

Md. Ekramuddin
Organizing Secretary,
Assistant Professor, Dept. of Zoology,
SDBI College

Dr. Sourav Paul
Director, ECSP

- Foundation had jointly conducted a one day seminar on research methodology and environmental manuscript writing jointly with Chandernagore College on **2nd March, 2023**. This is a part of the '*Know your Ganges*' program. The students and faculties of both the organization attended the seminar.



- ECSF celebrated the life and work of one of the India's best oceanographers **Dr. Meenakshi Chatterjee** on **11th January, 2023**. In this national event faculties, scientist, researchers and students gathered together to remember and carry forward the legacy of **physical oceanographic work in Indian Sundarbans**.

Estuarine and Coastal Studies Foundation
Remembering
Dr. Meenakshi Chatterjee
on her 66th birthday

Date : 11th January 2023
Time : 7PM - 9PM IST

Programme

1. Remembering Dr. Meenakshi Chatterjee, 7:00-7:45pm
2. Memorial Lectures, 7:45pm-8:30pm
3. Forwarding the Legacy, 8:30pm-9:00pm

Organizers

- 1) Dr. Tanmoy Nandy
- 2) Dr. Sourav Paul

Speakers

Dr. Shankar Doraiswami
(Chief Scientist and Head, Physical Oceanography Division, CSIR National Institute of Oceanography)
Title of talk: **Meenakshi Chatterjee and her contribution to the Sundarbans.**

Dr. Satheesh Shenoji
(MoES chair Professor/ Scientist, Former director Indian National Centre for Ocean Information Services, INCOIS)
Title of talk: **Climate Change and Indian Coasts.**

Global Warming only continues

Overall, the world is now 1.2 °C hotter than it was in the second half of the 19th century

Global average temperature Compared to a preindustrial baseline

2022 +1.18°C
+1.0°C
+0.5°C

1940 1950 1960 1980 2000 2020

Source: Copernicus/ECMWF

- Eight warmest years on record have occurred since 2014.
- Last year was the fifth-hottest year on record.
- 2016 remains the hottest ever.

Recording Satheesh Shenoji is presenting

Climate Change and Indian Coasts

Dr. S. S. C. Shenoji
MoES, Chair Professor/Scientist
Former Director
Indian National Centre for Ocean Information Services (INCOIS)
Hyderabad

Estuarine and Coastal Study Foundation
Remembering
Dr Meenakshi Chatterjee

11 January 2023

Amitava Roy
Satheesh Shenoji
S Kumar
29 others

4.3.2. Workshop

- A one day workshop was conducted by the foundation at Bhairab Ganguly College, West Bengal State University on 'Freshwater Quality Assessment' at the Department of Zoology on 10 September 2022 for the students and faculties of both the institutions.



BHAIRAB GANGULY COLLEGE
(Government Aided), NAAC Accredited Grade 'A' College
Feeder Road, Belghoria, Kolkata- 700056

DEPARTMENT OF ZOOLOGY
In Collaboration with
INTERNAL QUALITY ASSURANCE CELL
Is organizing an

**One-Day Departmental Hands-On Workshop on
FRESHWATER QUALITY ASSESSMENT**

Conducted by
ESTUARINE AND COASTAL STUDIES FOUNDATION



Resource Person:
Dr. Bhaskar Deb Bhattacharya
Scientist C, E.C.S.F.



Prof. (Dr.) Subhranil Som
Principal, Bhairab Ganguly College

Program Highlights:

- Profiling of - Temperature, pH, Total Dissolved Solids (TDS), Nitrate.
- Demonstration of zooplankton sampling and identification.
- E-certificates to all the registered participants.

Registration link:
<https://forms.gle/9roJDM2wucj3A3Q7>



Dr. Dhananjoy Halder
IQAC Co-ordinator



Dr. Subharthi Pal
In-Charge, Dept. of Zoology

Date: 10th September, 2022 Venue: College Campus



- Foundation had conducted an **IOC-UNESCO endorsed field training workshop** on ‘Cyclone induced changes of lower Ganges delta’ on 24-25 March 2023 in Indian Sundarbans. Participants included university and college faculties, PhD and PG students, community and corporate professionals of various disciplines including Zoology, Marine Science, Microbiology, Geography, Environmental Management, Fisheries, Economics, Gender studies, IT and NGO professionals. Prof. SK Raut (Professor of Zoology, University of Calcutta) was the chief guest. Among the technical resource persons **Dr. Bhaskar Deb Bhattacharya, Dr. Kanailal Das, Dr. Mahammed Moniruzzaman, Karabi Das, Jagati Bahchi** and others were noted. Dr. Sourav Paul co-ordinated such a multidisciplinary program for Indian estuaries (1st ever attempt for Indian estuaries).



ESTUARINE AND COASTAL STUDIES FOUNDATION
(registered with NITI Aayog DARPAN, Govt. of India)

United Nations Decade of Ocean Science for Sustainable Development (2021-2030) endorsed field training workshop on
Cyclone induced changes of lower Ganges Delta

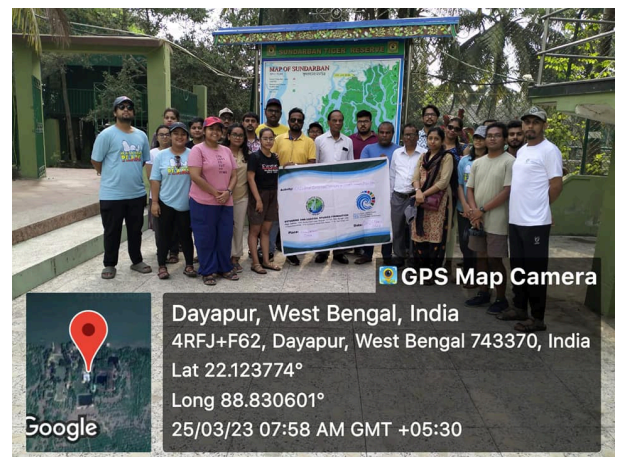
Venue: Sundarbans, India Date: 24 - 25 March 2023

Capacity : 24 Eligibility : Faculty/Scientist/Postgraduate student/Professional

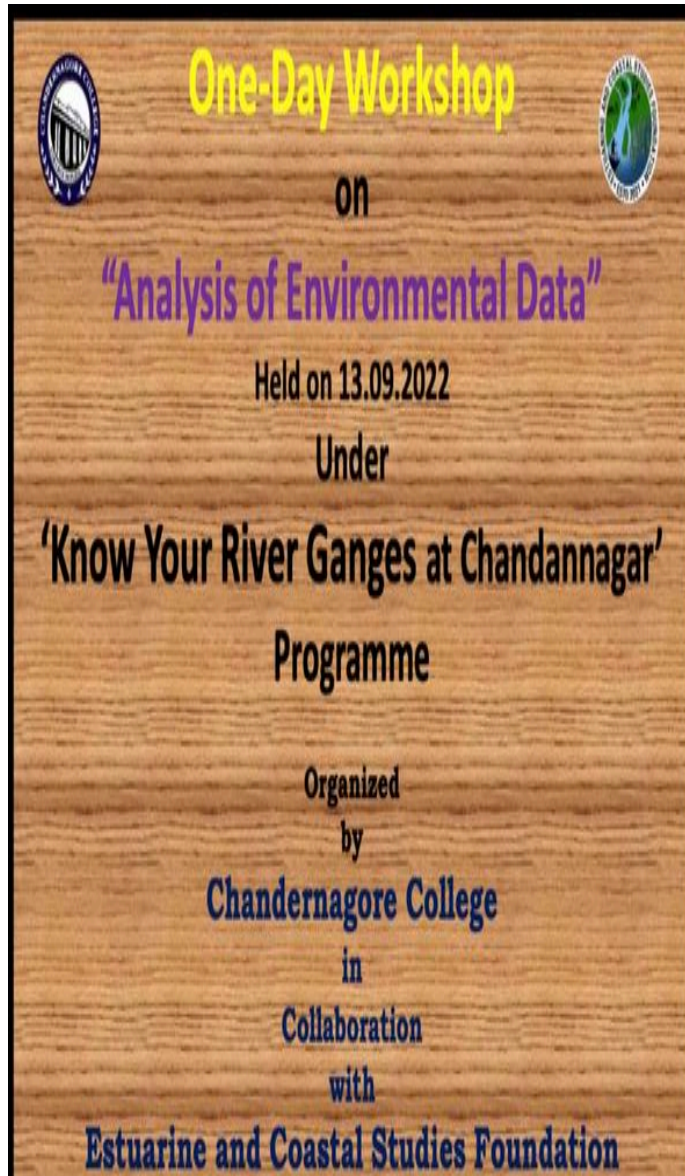
CERTIFICATE to participants

Biology	Fisheries	Microbiology
Mangrove, Plankton (Phyto + Zoo), Pelagic and benthic sampling Expert: Dr. Bhaskar Deb Bhattacharya	Fish diversity, Tissue collection, Tissue processing Expert: Dr. Mahammed Moniruzzaman	Microbial diversity in soil and water, Sample collection and preservation Expert: Dr. Anish Bhattacharyya
Geography and Economics Embankments, Soil and water quality, Socio-economic surveys. Experts: Dr. Kanailal Das, Jagati Bagchi	Cyclone and Society Causes, Frequency, Consequences, Socio-ecological adaptations Experts: Dr. Sourav Paul, Mr. Umashankar Mandal (Mangrove Man)	Instrumentation Niskin sampler, Multiparameter probe, GPS, Range finder, Abney, Light meter, Anemometer, Mechanical flow meter, Plankton nets Experts: Dr. BD Bhattacharya, Dr. S Paul, Dr. K Das

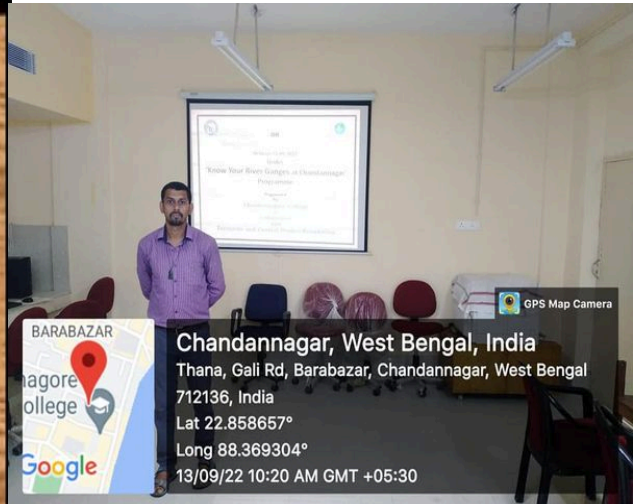
Coordinator: Dr. Sourav Paul **Registration: estuarycoast@gmail.com**



- A one day workshop was conducted by the foundation at Chandernagore College, University of Burdwan ‘*Analysis of Environmental Data*’ on **13 September 2022** for the students and faculties of both the institutions.



One-Day Workshop
on
“Analysis of Environmental Data”
Held on 13.09.2022
Under
‘Know Your River Ganges at Chandannagar’
Programme
Organized
by
Chandernagore College
in
Collaboration
with
Estuarine and Coastal Studies Foundation



4.3.4 Institutional and social responsibilities

The foundation is committed to carry out its socio-environmental responsibilities. Foundation is building environmental resilience among coastal communities by planting mangroves in the coastal belts of India. That activity is also helping the foundation to minimize its carbon footprint. Following actions have been taken so far

- Plantation of mangroves in the Chargheri of the Indian Sundarbans by the summer-intern students of the foundation.
- Plantation of mangroves along the banks (i.e., Baranagar and Chandannagar) of the Ganges estuary by students and faculty members of the foundation.



4.3.5 Consulting

The foundation is associated with the various types of consultancy facilities such as *field works* and *surveying* by the experts of various domains and **field instruments, laboratory-based assessment to monitor soil and water quality** of freshwater, brackish and marine environments. Foundation also provides expertise in *taxonomy and biodiversity of plankton, fishes in mangroves of estuaries and coasts*. **Lady Braborne College, University of Calcutta** is consulting the foundation for training man power, supporting in field and laboratory works related to **DBT Builder Project** of the college.

5. Memorandums of Understanding (MoUs)

ECSF has established MoUs with several institutions to enhance education and research collaborations. Key partnerships includes:

- **West Bengal State University, Barasat**

The Foundation is recognized by West Bengal State University Barasat as a partner organization for carrying out Interdisciplinary research and education on **17th November, 2022**. The joint program has led to PhD research collaboration for students. Partner organization for interdisciplinary research and education, leading to PhD research collaborations.

- **Adamas University, West Bengal**

The foundation has memorandum of understanding (MoU) with **Adamas University, West Bengal** on **23rd May, 2022**. Two institutions have jointly initiated interdisciplinary training of students of Geography and Biotechnology. The joint program has already conducted summer internship of the students in the Indian Sundarbans and started working on the joint MSc dissertation projects of the students of the two institutions.



6. Publications

6.1. Research articles

- Chakrabarty C, *Mukhopadhyay SK and *Paul S. 2022. **Seasonal mesozooplankton dynamics of marine-dominated estuaries of Indian Sundarbans.** *Journal of Aquatic Biology & Fisheries*, 9 (1), 1-9. ISSN 2321–340X.
- Moniruzzaman M, Datta U, Saha NC, Bhowmick AR and Mukherjee J*. 2023. **Abiotic factors and heavy metals defining eco-physiological niche in fish.** *Science of The Total Environment*, 162328. DOI: 10.1016/j.scitotenv.2023.162328
- Dutta S*, Paul S* and Homechaudhury S. 2023. **Food web structure and trophic interactions of the Northern Bay of Bengal ecosystem.** *Regional Studies in Marine Science*, 61 (102861). DOI: 10.1016/j.rsma.2023.102861

7. Achievements

- **Ayan Mallick**, a student of the science hands-on course has secured the prestigious Next Gen Scientist's Foundation (NGSF) funding for pursuing his internship on the diversity and community structure of zooplankton in low sanitary zone of the Ganges estuary on **20th May, 2022**.
- **Adrita Chakraborty**, a student of the science hands-on course has secured a prestigious internship at the Indian Institute of Science Education and Research

(IISER), Kolkata. A M.Sc. Life Science student, she would be working as a Research Intern with focussing on Marine Microbiology on **20th May, 2022**.

- ECSF's mangrove plantation drive has been featured in a daily newspaper on **1st July, 2022**.
- ECSF is proud of YECS **Ms. Debarati Sengupta** for her selection as an ECOP Asia intern in UN Ocean Decade on **19th November, 2022**. It is a pleasure to the Foundation to facilitate her.

8. Institutional facilities

Central Instrumentation Facility

Foundation provides arrays of state of the art equipment for education and research.

Freezer, Hot air oven, Vortex mixture, Weighing Scale, pH Meter, Plankton nets, Clinometer compass, Sacchi disks, Hot plate, Microscope with camera, TDS meter, Autoclave, Mechanical flow meter, Multi parameter probe, Nitrate meter, GPS, Vaccum Pump, Light meter, Seives, Variable pipettes, Hygro meter, Soil pH meter, Compound Microscope, Multiparameter probe, Dumpy level, Abney level, 4m levelling stand, Prismatic compass, Ranging rod, Refractometer, Depth sensor, Hot water bath, BOD incubator, ORP meter, Range finder, Hand pump, Anemometer, Current meter, pH sensor, Spectrophotometer, EC Meter.

Other facilities

Office, Laboratory, Administrative / Secretarial support, Water and Electricity, Internet and Telecommunication, Computation, Storage.

-----End-----

Estuarine and Coastal Studies Foundation



**THANK
YOU**

www.ecsfindia.org