AmbujaNeotia
THE NEOTIA UNIVERSITY
ज्ञानम् आत्म प्रदीपाय
Approved Under Sec.2(f) of UGC Act 1956

# MATSYA JAGAT

Volume 3 issue 1. March 2025


Faculty of Fisheries Science
The Neotia University
Editor in Chief : Prof. HS Murthy
Editor: Dr. Avishek Bardhan

# Matsya Jagat

## A Quarterly Online Publication of the Division of Fisheries Science, The Neotia University

### a. About the Journal

**Matsya Jagat** is a quarterly online magazine dedicated to advancing knowledge and awareness in the field of Fisheries Science. Published by the Division of Fisheries Science, The Neotia University, this periodical serves as a platform for academicians, researchers, students, and industry professionals to share insights, research findings, and innovations in aquaculture, fisheries management, marine biodiversity, and related fields.

### b. Aims and Scope

**Matsya Jagat aims to:**

- Disseminate knowledge on contemporary issues in Fisheries Science and Aquaculture.
- Promote sustainable fishery practices and innovations in aquatic resource management.
- Provide a platform for students and researchers to publish scientific and extension-based articles.
- Encourage interdisciplinary research contributions in marine and freshwater ecosystems.

Matsya Jagat is published quarterly (four issues per year).

### c. Language:

The magazine is published in English.

### d. Starting Year:

Matsya Jagat commenced its publication in 2023.

### e. Format of Publication:

The magazine is available exclusively in an online format through The Neotia University website.

### f. Publisher Details

**Division of Fisheries Science**
The Neotia University

Sarisha, Diamond Harbour Road, 24 Parganas (South), West Bengal, India

Website: **www.tnu.in**

### g. Author Guidelines

Authors interested in contributing to Matsya Jagat must adhere to the following guidelines:

- Articles should not exceed **three pages** (including references and images).
- Each submission must include at least **two references** (journal articles, books, or credible online sources).
- **Plagiarism should be less than 15%**; submissions exceeding this limit will be rejected.
- Images used in articles can be **AI-generated**, provided they are appropriately cited and sourced.
- Articles should be formatted in **Times New Roman, 12-point font, double-spaced,** proper page numbered and submitted in **DOCX format**.

### h. Submission Details

- All submissions should be sent to: **avishek.bardhan@tnu.in** [Editor]
- The subject line should be: Submission for Matsya Jagat – [Article Title].
- Articles undergo a brief editorial review process before publication.
- Authors will be notified of acceptance within **two weeks** of submission.

# Contents

# Foreword

Dear Readers,

Welcome to the 4th issue of Matsya Jagat, the E-Magazine of the Division of Fisheries Science, The Neotia University. It is with great pride that we present this edition, which places a critical focus on one of the most urgent challenges of our time-climate change and its far-reaching impacts on fisheries and aquatic ecosystems.

Fisheries serve as a vital source of sustenance, livelihood, and economic security for millions worldwide. However, rising temperatures, ocean acidification, habitat degradation, and unpredictable climatic events are increasingly threatening fish stocks, biodiversity, and the delicate balance of aquatic ecosystems. In this issue, our esteemed contributors-faculty experts, researchers, and passionate scholars-explore scientific innovations, adaptive management strategies, and policy interventions essential for ensuring the sustainability of fisheries in a rapidly changing world.

From the ecological consequences of climate shifts to the emerging technologies and conservation practices that offer hope for the future, this edition sheds light on the evolving landscape of fisheries science. As we navigate these challenges, it becomes imperative to adopt a collaborative and forward-thinking approach to mitigate climate impacts and safeguard the blue economy for generations to come.

I extend my sincere appreciation to the editorial team for their relentless dedication in curating this issue, and to Prof. (Dr.) H. Shivananda Murthy (Chair Professor, Division of Fisheries Science, TNU) for his visionary guidance. Let Matsya Jagat be a catalyst for awareness, dialogue, and action toward resilient and climate-adaptive fisheries management.

Wishing you an insightful and thought-provoking read.

**Dr. Biswajit Ghosh**
Hon'ble Vice Chancellor
The Neotia University

# The Editor-in-Chief **Message**

It is my pleasure to welcome you to the 4th issue of Matsya Jagat, the E-Magazine of the Division of Fisheries Science, The Neotia University. This edition is dedicated to a topic of immense significance—climate change and its profound impact on fisheries and aquatic ecosystems.

Fisheries are not just an economic backbone but also a crucial component of global food security and environmental balance. However, the escalating threats posed by rising temperatures, ocean acidification, habitat degradation, and unpredictable climatic events are reshaping aquatic ecosystems at an alarming pace. As these challenges intensify, it is imperative to explore scientifically driven solutions, adaptive management strategies, and sustainable policies to mitigate their impact.

This issue brings together insights from faculty experts, researchers, and scholars who delve into climate-adaptive fisheries practices, technological advancements, and conservation efforts. Our collective responsibility is to ensure that fisheries remain resilient in the face of climate uncertainties, securing livelihoods and marine biodiversity for future generations.

I extend my heartfelt appreciation to the editorial team for their dedicated efforts in bringing this issue to life. It is my hope that Matsya Jagat serves as a platform for awareness, discussion, and transformative action in the realm of fisheries science.

Wishing you an engaging and thought-provoking read.

**Prof (Dr.) H Shivananda Murthy**
Dean & Chair Professor
Division of Fisheries Science
The Neotia University

Email: dean.fisheries@tnu.in
Contact: +91-9900712081

# From the **Editorial Desk**

As we embark on yet another exciting edition of Matsya Jagat, I am delighted to welcome you to a magazine that promises to be thrilling, insightful, and thought-provoking. Our goal is not just to inform but to inspire curiosity and a deeper appreciation for the fascinating world of fisheries science.

This issue places a special emphasis on climate change and its far-reaching impact on fisheries and aquatic ecosystems. From rising ocean temperatures to shifting fish populations, climate change is redefining the way we understand and manage aquatic resources. Through expert analyses, cutting-edge research, and innovative solutions, we explore ways to adapt, mitigate, and build resilience in the fisheries sector.

But fisheries science is more than just data and conservation—it is a dynamic, ever-evolving field filled with discovery, technology, and real-world applications. Our student corner, recent fisheries news, and engaging articles bring together a mix of scientific rigor and engaging storytelling to make this subject not only educational but also exciting!

We hope that Matsya Jagat continues to be your go-to platform for knowledge, dialogue, and inspiration. Let's work together to make fisheries science an intriguing and impactful domain, fostering sustainable practices that protect both livelihoods and aquatic biodiversity.

Enjoy this issue, and may it spark new ideas, collaborations, and a passion for aquatic sciences.

*Best regards,*

**Dr. Avishek Bardhan**
Editor- Matsya Jagat
Assistant professor and Head, Department of Aquatic Animal Health Management,
The Neotia University,

Email: avishek.bardhan@tnu.in
Contact: +91-8583945217

# From the **Faculty Head**

It is with great pleasure that I extend my warmest greetings to the readers of Matsya Jagat as we present Volume 3, Issue 1. In the ever-evolving field of Fisheries Science, this magazine continues to serve as a beacon of knowledge, fostering intellectual curiosity and professional growth among students, researchers, and industry experts.

As Assistant Professor and Faculty Head of the Division of Fisheries Science at The Neotia University, I recognize the significance of sharing valuable insights and building a collaborative learning community. This issue, centred around the impact of climate change on wetlands, promises to deliver thought-provoking discussions and research findings that highlight critical challenges and innovative solutions in fisheries and aquatic ecosystem management.

From sustainable aquaculture practices to climate-resilient fisheries, each article has been carefully curated to provide a comprehensive perspective on the pressing issues shaping our industry. I commend the editorial team for their commitment to excellence and thank the contributors whose expertise and dedication enrich the pages of this publication.

Matsya Jagat remains a vital platform for knowledge exchange, discussion, and shaping the future of fisheries science. I hope this edition inspires readers to explore new ideas, contribute to meaningful research, and work toward sustainable solutions in the face of environmental change.

Wishing you all an insightful and engaging read!

**Dr. Neeraj Pathak**
Assistant Professor and Faculty Head
Division of Fisheries Science
The Neotia University

Email: neeraj.pathak@tnu.in
Contact: +91-8870290283

# Editorial Board Members

## Faculty

### Prof. (Dr.) H. Shivananda Murthy

(Editor in Chief)
Chair Professor, Faculty of Fisheries Science
The Neotia University

Email: **dean.fisheries@tnu.in**

### Dr. Avishek Bardhan

(Editor)
Assistant Professor and Head, Department of Aquatic Animal Health Management
The Neotia University

Email: **avishek.bardhan@tnu.in**

### Dr. Neeraj Pathak

Assistant Professor and Faculty Head, Department of Fish Processing Technology,
The Neotia University

Email: **neeraj.pathak@tnu.in**

### Dr. Hakim Mudasir Maqsood

Assistant Professor and Head, Department of Aquaculture,
The Neotia Univetsity

Email: **mudasirmaqsood.hakim@tnu.in**

Contact: **+91-7006883489**

### Ms. Camelia Chattopadhyay

Assistant Professor (Ad-hoc G-I),
Department of Fisheries Economics, Extension and Statistics
The Neotia University

Email: **camelia.chattopadhyay@tnu.in**
Contact: **+91-7063496667**

### Dr. Vikas Pathak

Assistant Professor and Head, Department of Fisheries Resource Management,
The Neotia University

Email: **vikas.pathak@tnu.in**
Contact: **+91-7007703250**

### Dr. Suman Karmakar

Assistant Professor and Head, Department of Aquatic Environment Management,
The Neotia University

Email: **suman.karmakar@tnu.in**
Contact: **+91-8537001719**

### Dr. Khemraj Bunkar

Assistant Professor and Head,
Department of Fisheries Economics, Extension and Statistics
The Neotia University

Email: **khemraj.bunkar@tnu.in**
Contact: **+91-8828265313**

### Ms. Aditi Banasure

Assistant Professor (Ad-hoc G-I), Department of Fisheries Engineering and Technology
The Neotia University

Email: **aditirambhau.banasure@tnu.in**
Contact: **+91-7057332287**

### Ms. Pujadebi Bera

Assistant Professor (Adhoc G-I),
Department of Aquaculture
The Neotia University

Email: **pujadebi.bera@tnu.in**
Contact: **+91-9547552636**

# **Activities** at Division of Fisheries Sciences

## Outstanding Award to Prof. H.S Murthy

Prof (Dr) H. Shivananda Murthy, Dean and Chair Professor, has been honoured with the **Outstanding Academic Performance Award 2025** at the **International Conference: CRISEA-2025** held at **Goa University, Goa** during **February 24 to 26, 2025**, for his overall contributions in Animal & Fisheries Sciences. The conference was organised by Goa University, ATDS Society and various other Universities.


### Participation in the International Conference as Guest of Honour:

Prof (Dr) H. Shivananda Murthy, Dean and Chair Professor was the Guest of honour of the Inaugural Ceremony of the **International Conference: CRISEA-2025 held at Goa University, Goa during February 24 to 26, 2025. Prof H S Murthy also delivered a key note address in the above conference. Prof Murthy also Chaired a Technical session in Agriculture, Animal and Fisheries science in the above conference**



**Dr. Neeraj Pathak**, Head In-Charge of the Faculty of Fisheries Science, Head (Dept of Fish Processing Technology) has been **honoured with the Emerging Scientist Award at the International Conference** held at Goa University from February 24 to 26, 2025. The event, organized in collaboration with participants from 18 countries, recognized his outstanding contributions to the field. Additionally, Dr. Pathak co-chaired the technical session on Animal and Fisheries Science, further demonstrating his expertise and leadership in the domain.


**Dr. Khemraj Bunkar** delivered a lecture on the Faculty of Fisheries Science at the **NeoCon Teachers' Meet in Kakdwip on February 8, 2025.** He emphasized the significance of fisheries science and the excellent career prospects it offers students. He enlightened teachers and parents on how this rapidly growing sector holds great promise for students' futures. Additionally, he highlighted the excellence of the Faculty of Fisheries Science at The Neotia University.


The faculty members of Fisheries Science at The Neotia University visited the Faculty of Fishery Sciences at West Bengal University of Animal and Fisheries Sciences (WBUAFS), Garia, for an in-depth discussion with their counterparts. The visit aimed to understand the development of various laboratories, explore available instruments, and draw insights for enhancing their own division. Meaningful interactions were held with Dr. Supratim Chowdhury and Dr. Swarnadyuti Nath (Dept. of FPT, WBUAFS), Dr. N.A. Talwar (Dept. of FEG, WBUAFS) and Dr. T.J. Abraham (Dept. of AAHM), making the visit an insightful and enriching experience.


# 1. Department of Fish Processing Technology

**Final year B.F.Sc. graduate students undergoing hands-on training in the preparation and quality evaluation of value-added fishery products as part of their Experiential Learning Program (ELP) under the guidance of Dr. Neeraj Pathak. The image captures the practical session focused on developing technical skills in fish papad preparation and assessing its quality parameters.**

# 2. Department of Aquaculture

The Department of Aquaculture, Faculty of Fisheries, TNU, continued its routine harvesting operations. In Pond 2 and Pond 4, record-sized IMC specimens (approximately 10 kg) were harvested, resulting in a total catch of 84.723 kg. Additionally, the Duck-cum-Fish demonstration unit produced 61 eggs, generating total revenue of Rs. 19,340 in January and February, 2025. Final-year BFSc students are currently undergoing training in the Experiential Learning Program (ELP) under the mentorship of Dr. Hakim Mudasir (Head of Department) and Miss. Pujadebi (Assistant Professor). These students are engaged in four business model projects: Development of low-cost ornamental fish feed; Breeding of ornamental fish species and aquaria manufacturing; Scientific preparation of fish pond and Culture of live fish food organisms.

# 3. Department of Fisheries Engineering and Technology

A visit by B.F.Sc. students to the Department of Marine Engineering, School of Maritime Studies, under the mentorship of Ms. Aditi Banasure from the Department of Fisheries Engineering and Technology. The B.F.Sc. students were also made to operate the dragnet in the pond no. 4 under the Department of Fisheries Engineering and Technology.



# 4. Department of Fisheries Resource Management and Department of Aquatic Environment Management

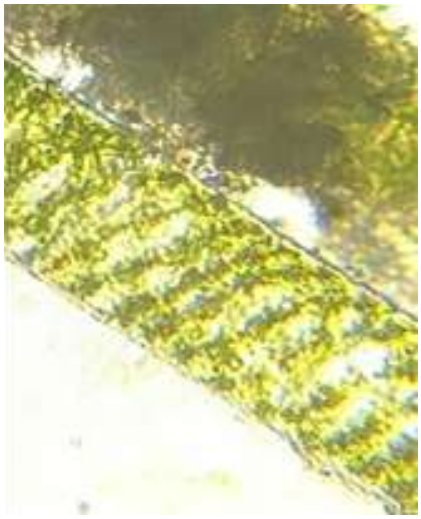
Dept. of AEM and Dept. Of FRM, The Faculty of Fisheries Science, The Neotia University jointly organized World Wetlands Day 2025 on February 5th, emphasizing the theme **"Protecting Wetlands for our Common Future."** The event featured insightful addresses by **Dr. H.S. Murthy, Dean & Chair Professor, TNU,** and **Dr. T.K. Ghoshal, Regional Head & Principal Scientist, ICAR-CIFE, Kolkata,** who highlighted the ecological significance of wetlands and the need for conservation efforts. Engaging activities like a **poster presentation and a debate competition** encouraged student participation and awareness. The celebration successfully underscored the importance of wetlands in biodiversity conservation and sustainable development under the guidance of chief organizers Dr. Vikas Pathak and Dr. Suman Karmakar.

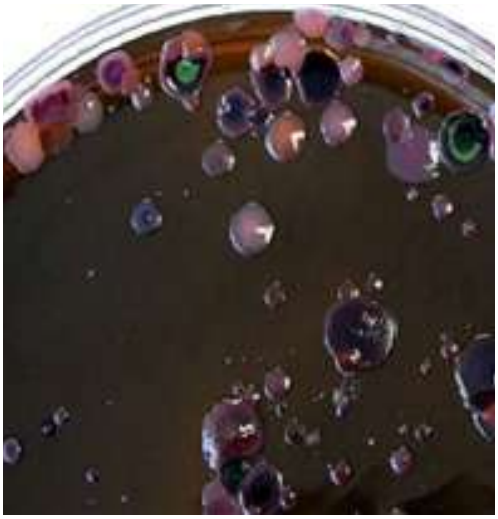

# 5. Department of Fisheries Economic Extension and Statistics

Students are engaged in Consumer survey (Faculty members of TNU), Socio-economic survey of fish farmers and Market survey in fish market under the mentorship of Ms. Camelia Chattopadhyay, Dept. of Fisheries Extension, Faculty of Fisheries Science.


# 6. Department of Aquatic Animal Health Management

Dr. Avishek Bardhan, Head of the Department of AAHM, guided students through various laboratory assessments on antimicrobial resistance in common fish pathogens and the observation of aquatic microflora from our division ponds. The students actively participated in these experiments and achieved promising results.





Article - 1

# Carbon Footprint of **Global Seafood Trade**

**Avishek Bardhan**

*Department of Aquatic Animal Health Management, Faculty of Fisheries Science, The Neotia University, Sarisha, Diamond Harbout-743368*

Picture yourself enjoying a dish of mouthwatering fish and chips. Have you ever wondered how the fish got to your plate? That voyage creates a carbon trail that stretches from the ocean floor to your dinner table. The carbon footprint of the worldwide fish sector will be examined in this article. We'll inspect anything that contributes to pollution, including your neighbourhood store and fishing boats.

Consider those enormous fishing vessels out at sea. They require a great deal of gasoline! Different quantities are used by seiners, longliners, and trawlers. Larger boats consume more gasoline. More carbon is released into the atmosphere when more fuel is burned. The seabed is also impacted differently by various boats and techniques. Fish cultivation, or aquaculture, also requires energy. Water is kept heated by heaters and flowing by pumps. Energy is also needed to feed the fish. Some aquaculture practices, such recirculating aquaculture systems, may have a greater environmental effect than others, like open net cages. This is because to the high energy requirements of recirculating systems. The environmental impact of various fish farms varies.

## Impact of Fishing Gear and Practices

Certain fishing techniques are more dangerous than others. Heavy nets are dragged over the seafloor during bottom trawling. Carbon trapped in the sediment is released as a result. Habitats and marine life are impacted by destructive actions. Additionally, it prevents the seabed from naturally absorbing carbon.

## The Cold Chain's Contribution: Transportation and Refrigeration Emissions

How does keeping seafood fresh affect the planet? Transporting and cooling it uses a lot of energy. Seafood gets around a lot! Fish are transported all over the world via cargo ships and airplanes. With a lot of gasoline, this can travel a long way. Emissions increase with its distance of travel. Aeroplanes might not be as good as small boats (Pandey et al., 2011). Seafood must be kept cool. Fish is kept fresh by refrigerated trucks and refrigeration facilities. However, these systems consume a lot of energy. Furthermore, certain refrigerants are potent greenhouse gases. It's a difficult equilibrium. Although they are less dangerous, modern refrigerants still use energy.

## From Sea to Plate: Processing and Packaging's Environmental Impact

What happens to seafood before it hits the shelves? Processing and packaging also add to the carbon footprint.

Fish are cleaned, filleted, canned, and smoked at processing facilities. Energy is required for each of these stages. Fuel and electricity are needed for cooking, cleaning, and packing. All of this contributes to the overall emissions. The carbon footprint is affected by the method of processing (Caro, 2018).

Consider the entire package. Seafood is protected by cardboard, plastic, and Styrofoam. However, these materials have an effect on the environment. Although it is available, sustainable packaging is not always utilized. To implement better packaging, more work must be done.

## Regional Variations in Carbon Footprint

Does it matter where your seafood comes from? Yes! The carbon footprint varies by region.

The carbon footprints of seafood from North America, Europe, and Asia varies. Energy sources, transportation, and fishing regulations differ. Environmental regulations are more stringent in some areas. Dirtier energy is used in other areas. The ultimate carbon footprint is impacted by this.

## Sustainable Sourcing Initiatives and Their Impact

There are places that are doing things correctly. They are fishing in a sustainable manner. The Marine Stewardship Council (MSC) and other certifications are beneficial. Carbon footprints are decreased by these initiatives. They demonstrate that sustainability is achievable.

## Reducing Your Seafood Carbon Footprint: Actionable Tips

What can you do to help? There are many ways to reduce your impact.

Choose local seafood. Seek out certificates related to sustainability. Make wise decisions. Your carbon footprint can be reduced. Making smarter decisions has a significant impact.

Don't throw away seafood. Buy only what you intend to consume. Smaller servings ought to be served at restaurants. Emissions are reduced by reducing garbage. Consuming with awareness benefits the environment. Encourage companies who are dedicated to sustainability. Change is driven by your desire. Find out where your neighbourhood store sources their seafood. Promoting sustainable fishing practices has an impact.

## Conclusion

The global seafood trade has a significant carbon footprint. Transportation, refrigeration, and processing all contribute. But, by making informed choices, we can reduce our impact. Let's embrace sustainable seafood habits. Together, we can protect our oceans and the planet.

### References:


1. Pandey, D., Agrawal, M., & Pandey, J. S. (2011). Carbon footprint: current methods of estimation. Environmental monitoring and assessment, 178, 135-160.

2. Caro, D. (2018). Carbon footprint. In Encyclopedia of ecology (pp. 252-257). Elsevier.

Article - 2

# Influence of climate change and economic progress on the catches of small pelagic fisheries

**Dr. Ying Zhang**

*Institute of Marine Development, Ocean University of China, Qingdao, China; and School of Management, Ocean University of China, Qingdao, China*

## Introduction

Marine capture fisheries are vital for the livelihoods of millions and the nutrition of billions, contributing significantly to global food security and economic development. Small pelagic fish-like anchovies, sardines, and herrings make up 30% of global catches, serving as essential protein sources for humans and as inputs for aquaculture, animal feed, and fish oil. However, rising fishing pressure and climate events like ENSO and AMO impact their populations, requiring sustainable management. While research often focuses on regional climate effects or ecosystem-based fisheries management, there remains a gap in understanding the combined influence of climate change and economic development on global small pelagic fisheries (Fang and Zhang, 2025).

This article investigates the relationship between climate variability and economic factors in small pelagic fisheries, focusing on three key questions: (1) the synchronization of ENSO and AMO fluctuations with small pelagic fish catches, (2) the distinct effects of climate change and economic development on catch levels, and (3) the relative influence of climate phenomena versus economic factors. Using a long-term dataset from 1963 to 2021, the study analyses catch trends for 11 small pelagic fish species through machine learning techniques and generalized additive models (GAMs). Catch data were sourced from the FAO Fishery Catch Database, while climate indices for ENSO and AMO were obtained from NOAA. The species examined include Peruvian anchovy, Chilean

jack mackerel, Indian oil sardine, South African anchovy, Pacific saury, Arctic capelin, European anchovy, European pilchard, Atlantic herring, Atlantic mackerel, and Gulf menhaden.

## The dominant driving role of economic development on small pelagic fisheries

Small pelagic fisheries play a crucial role in global socio-economic development, but rising demand and overfishing have led to fluctuating catches and fishery collapses. Economic factors drive these trends, influencing fishing intensity and resource management. For instance, the Peruvian anchovy fishery collapsed in the 1970s due to overfishing, recovering only after stricter regulations in 2008. While sustainable fisheries policies since the 1980s have promoted conservation, market demand and international trade continue to increase fishing pressure, threatening marine ecosystems. Effective management strategies, such as stricter quotas, marine protected areas, and seasonal bans, are essential for maintaining fish stocks. Governments should implement scientific monitoring systems, promote sustainable fishing technologies, and encourage alternative livelihoods to reduce over-reliance on fisheries and enhance long-term sustainability.

## Effects of ENSO on Small Pelagic Fisheries

ENSO significantly influences global fishery resources, with its effects more pronounced in equatorial and Southern Hemisphere fisheries. El Niño generally reduces catches of small pelagic species, while La Niña has a positive impact, except for species like Chilean jack mackerel and Atlantic herring. Severe La Niña events can disrupt fish reproduction, while El Niño weakens the equatorial undercurrent, altering fish migration and reducing primary productivity. Species like Peruvian anchovy and Indian oil sardine suffer declines during El Niño due to weakened upwelling and lower ocean productivity. ENSO also affects regional ecosystems by altering ocean-atmosphere circulation patterns. For example, El Niño decreases upwelling in the Gulf of California, reducing fishery productivity, but enhances phytoplankton growth in the Gulf of Mexico due to increased storm-driven deep-water mixing. Some species, like Gulf menhaden, benefit from El Niño due to warmer temperatures, reduced predation, and nutrient-rich runoff from the Mississippi River (Briones et al., 2006).

## Perspectives

The impacts of climate change and economic development on small pelagic fisheries are complex, varying by species and region due to different adaptive capacities and ecological requirements. Economic development enhances fishing efficiency but also necessitates robust management to prevent overfishing, with catch quotas and ecosystem-based management crucial for sustainability. Fish species respond differently to environmental changes, with ENSO and AMO influencing catch fluctuations, further exacerbated by extreme climate events like hurricanes. This study highlights the need for integrated socioeconomic and ecological strategies to ensure sustainable fisheries. Future research should explore regional variations, migration patterns, cross-regional cooperation, and the effects of climate change on a broader range of fish species, incorporating physical, chemical, biological, and economic perspectives for refined management strategies.

**References:**


1. Fang, X., & Zhang, Y. (2025). The impact of climate change and economic development on the catches of small pelagic fisheries. Marine Policy, 175, 106631.

2. Briones, R., Garces, L., & Ahmed, M. (2006). Climate change and small pelagic fisheries in developing Asia: the economic impact on fish producers and consumers. In Climate Change and the Economics of the World's Fisheries. Edward Elgar Publishing.


Article - 3

# Women, Water, and Wealth: **The Future of Wetland Fisheries**

**Saikat Naskar, Tista Haldar**

*BFSc 1st year, Faculty of Fisheries Sciences, The Neotia University, Sarisa, Diamond Harbour-743368*

## Introduction

Wetland fisheries play a crucial role in sustaining livelihoods, ensuring food security, and promoting biodiversity. Women are at the heart of these ecosystems, contributing significantly to fish farming, processing, and trade. However, their efforts often go unrecognized due to socio-economic and cultural barriers. Empowering women in wetland fisheries not only enhances their economic independence but also strengthens community resilience and sustainable resource management. By providing access to technology, markets, and financial support, we can unlock new opportunities for women, ensuring that wetlands continue to provide wealth for generations to come (Lekshmi et al., 2020).

## Role of Women in Wetland Fisheries

Women play a vital role in wetland fisheries, actively contributing to fishing, harvesting, small-scale fishing, shellfish gathering, and aquatic plant collection. They are also involved in post-harvest activities such as cleaning, drying, smoking, and selling fish in local markets. Beyond these roles, women lead community-based resource management and promote sustainable fishing practices, ensuring the long-term health of aquatic ecosystems. Their contributions support family livelihoods by generating income and meeting nutritional needs (Said, 2019). Empowering women in

wetland fisheries not only strengthens economies but also preserves ecosystems and enhances food security for future generations.

## Problems faced by the women

- **Limited access to resources:** Women often lack access to essential resources like credit, fishing gear, and suitable boats, restricting their involvement in fishing activities.
- **Gender-based discrimination:** Women may face discrimination in decision-making processes, ownership of resources, and access to training and education opportunities.
- **Lack of recognition:** Women's contributions to wetland fisheries, such as fish processing and marketing, are often undervalued and overlooked, leading to limited economic empowerment.
- **Heavy workload:** Women often bear the primary responsibility for household chores and childcare, in addition to their work in fisheries, resulting in a heavy workload and limited time for other activities.
- **Vulnerability to climate change:** Climate change impacts, such as droughts and floods, can disproportionately affect women, who often have less access to resources and information to adapt to these changes.

## Empowerment Strategies for Women

- **Capacity Building & Skill Development:** Provide training in sustainable fishing, aquaculture techniques, and financial literacy to enhance women's expertise.
- **Access to Resources & Technology:** Ensure women have equal access to fishing equipment, land, credit, and modern processing technologies.
- **Market Linkages & Entrepreneurship:** Support women in establishing direct market connections, cooperatives, and value-added fish products for better income.
- **Policy & Legal Support:** Advocate for gender-inclusive policies that recognize and protect women's rights in fisheries.
- **Community Participation & Leadership:** Encourage women's involvement in fisheries governance, cooperatives, and decision-making bodies.

## Conclusion

Empowering women in wetland fisheries is key to sustainable development, economic growth, and environmental conservation. By ensuring equal access to resources, markets, and decision-making, women can drive positive change in fisheries. Investing in their skills and leadership will not only improve livelihoods but also secure the future of wetlands as thriving ecosystems. **Stronger women, healthier waters, and greater wealth for all!** By integrating gender-inclusive policies and promoting women's leadership in fisheries governance, we can enhance productivity, food security, and environmental sustainability.

### References:


1. Lekshmi, B., Sharma, S., Sutar, R. S., Parikh, Y. J., Ranade, D. R., & Asolekar, S. R. (2020). Circular economy approach to women empowerment through reusing treated rural wastewater using constructed wetlands. Waste Management as Economic Industry Towards Circular Economy, 1-10.

2. Said, L. R. (2019). Woman entrepreneurs in rural wetlands: Overcoming resistance to change. Woman entrepreneurs in rural wetlands: Overcoming resistance to change, 118.


Article - 4

# **Climate change** and its impact on whales

**Saikat Naskar, Tista Haldar**

*BFSc 1st year, Faculty of Fisheries Sciences, The Neotia University, Sarisha, Diamond Harbour-743368*

## Introduction

Whales, as some of the largest and most majestic creatures in the ocean, are deeply affected by climate change. Rising global temperatures, ocean acidification, and changing food availability are altering their habitats, migration patterns, and survival rates. As the climates crisis intensifies, whales face increasing challenges that threaten their populations and disrupt the delicate balance of marine ecosystems.

## Rising ocean temperatures and habitat loss

One of the most significant impacts of climate change on whales is the rise in ocean temperatures. Many whale species, such as humpbacks and blue whales, rely on cold, nutrient-rich waters for feeding and breeding. However, warming oceans are forcing these animals to migrate further in search of suitable habitats. Some

species, like the North Atlantic right whale, struggle to find sufficient food as their usual feeding grounds shift due to changing ocean currents (Tulloch et al., 2019).

Additionally, warmer waters contribute to habitat loss, particularly in polar regions, where whales such as the beluga and bowhead depend on sea ice for survival. The rapid melting of Arctic ice disrupts their environment, making them more vulnerable to predators and human activities such as increased shipping and oil exploration.

## Ocean acidification and food chain disruptions

Climate change is also driving ocean acidification, which indirectly affects whales by disrupting the food chain. As carbon dioxide levels rise, seawater becomes more acidic, impacting krill and plankton populations—small organisms that form the foundation of marine ecosystems. Baleen whales, including blue and fin whales, rely on these tiny creatures for sustenance. A decline in krill populations can result in malnutrition and lower reproduction rates for these massive marine mammals.

## Changes in migration patterns

Whales have evolved to follow specific migratory routes, often traveling thousands of miles between feeding and breeding grounds. However, climate change is disrupting these patterns, forcing some species to alter their traditional routes or extend their migrations in search of food. These shifts expose whales to new threats, including increased interactions with human activities such as fishing, shipping, and underwater noise pollution.

For example, gray whales along the Pacific coast of North America have been stranding at higher rates in recent years, possibly due to food shortages caused by changing ocean conditions. Longer migrations also demand more energy, further weakening whale populations already struggling to find sufficient food.

## Increased human threats

As whales adapt to changing ocean conditions, they face increasing risks from human activities. Warming temperatures have led to the expansion of commercial fishing into previously less accessible waters, raising the likelihood of whale entanglement in fishing gear. This is a major threat to species like the North Atlantic right whale, which is critically endangered due to frequent entanglements (Kebke et al., 2022).

Additionally, melting ice is opening new shipping routes in the Arctic, leading to increased vessel traffic. Ship strikes have become a growing concern, as they can cause fatal injuries to whales. Noise pollution from ships and industrial activities further disrupts whales' ability to communicate, navigate, and locate prey, adding to the challenges they face in a changing ocean.

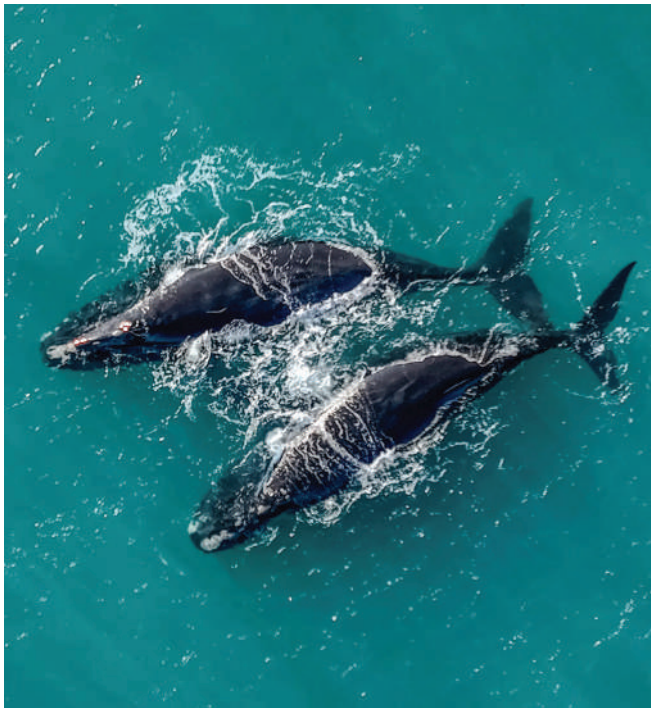
## Conclusion

Climate change poses a significant threat to whale populations worldwide. Rising ocean temperatures, acidification, food shortages, and increased human activities are forcing whales to adapt in ways that may not be sustainable in the long run. Protecting these marine giants requires global action to reduce carbon emissions, enforce stricter regulations on shipping and fishing, and invest in conservation efforts. By addressing climate change, we can help ensure that whales continue to thrive in our oceans for generations to come.

**References:**


1. Tulloch, V. J., Plagányi, É. E., Brown, C., Richardson, A. J., & Matear, R. (2019). Future recovery of baleen whales is imperiled by climate change. Global change biology, 25(4), 1263-1281.

2. Kebke, A., Samarra, F., & Derous, D. (2022). Climate change and cetacean health: impacts and future directions. Philosophical Transactions of the Royal Society B, 377(1854), 20210249.

Article - 5

# The impact of climate change on **wetland fishery**

**Madhumita Halder, Anushri Maity, Akangsha Majumder, Ranit Acharya**

*BFSc 2nd year, Faculty of Fisheries Science, The Neotia University, Sarisha, Diamond Harbour-743368*

## Introduction

Wetlands are among the most productive ecosystems on Earth, providing critical habitats for diverse species, including fish, birds, and plants. They also support millions of people by sustaining wetland fisheries, which offer essential food, income, and cultural identity for many communities. However, climate change poses an increasing threat to the health and productivity of these ecosystems, with severe consequences for both biodiversity and human livelihoods. One of the primary drivers of climate change is global warming, which refers to the rise in Earth's average temperature (Mohanty et al., 2010). Human activities, such as the excessive use of refrigerators and air conditioners that emit greenhouse gases, as well as the burning of fossil fuels, contribute significantly to this issue. These activities trap heat in the atmosphere, causing temperatures to rise and triggering a range of climate change impacts.

## Impacts of global warming:

**Rising Water temperature:** Higher temperature can stress fish species, affecting their growth, reproduction and survival rate.

**Changes hydrology:** Droughts and reduced rainfall seen which affecting wetland, reducing habitat and fish breeding grounds.

## Impacts of Climate Change on Wetland Fisheries

1. **Changes in Water Temperature and Quality:** Rising temperatures are forcing many fish species to migrate to cooler, deeper waters. For instance, cod in the Baltic Sea have shifted northward, moving into areas once dominated by Arctic fish species (Brander, 2010). Warmer waters can also

increase metabolic rates, reduce growth, and raise mortality rates among fish populations.

2. **Changes in Water Availability:** Wetland fisheries rely on seasonal flooding and water retention, but climate change is disrupting these natural cycles.
3. **Increased Flooding:** More intense and frequent rainfall is leading to excessive flooding. While wetlands are adapted to periodic flooding, extreme or unpredictable floods can disrupt fish breeding cycles, destroy habitats, and wash away fish stocks, threatening wetland fisheries.
4. **Sea Level Rise:** Coastal wetlands are particularly vulnerable to rising sea levels, which can cause saltwater intrusion. This alters the salinity of freshwater wetlands, making them unsuitable for many fish species and disrupting the delicate balance of these ecosystems.
5. **Changes in Precipitation Patterns:** Unpredictable precipitation patterns are severely affecting wetland fisheries. More frequent and intense floods and droughts are altering wetland hydrology, impacting fish habitats and survival.
6. **Changes in Aquatic Vegetation:** Climate change influences aquatic plant life by altering water levels and temperatures. Excessive nutrient runoff can trigger harmful algal blooms, depleting oxygen levels and harming fish health. Shifts in vegetation composition impact food availability and fish shelter, affecting overall fish populations.
7. **Thermal Stress:** Many fish species are adapted to specific temperature ranges. Rising water temperatures can cause thermal stress, leading to reduced growth rates, lower reproductive success, and increased mortality, threatening fish stocks.
8. **Increased Disease Outbreaks:** Warmer waters create ideal conditions for pathogens and parasites, increasing disease outbreaks among fish.
9. **Excessive Rainfall:** Climate change is altering atmospheric circulation patterns, leading to extreme precipitation. This disrupts wetland ecosystems by affecting water levels, sedimentation, and nutrient cycles.

## Additional Ecological Impact

- **Loss of Biodiversity:** Wetlands are rich in biodiversity, but climate change is putting many species at risk, negatively affecting fish populations and overall ecosystem balance.
- **Habitat Degradation:** Climate change accelerates habitat loss through erosion, sedimentation, and vegetation decline, reducing food and shelter availability for fish.
- **Disruption of Food Webs:** Changes in species abundance and distribution disrupt the natural food web, affecting fish populations and overall ecosystem stability.
- **Spread of Invasive Species:** Rising temperatures and changing environmental conditions encourage the spread of invasive species, which can outcompete native fish, disrupt ecosystems, and threaten wetland fisheries.

## Adapting to Climate Change in Wetland Fisheries

1. **Monitoring Fish Populations:** Regular assessments help track climate impacts on fish stocks and inform adaptive management strategies.
2. **Implementing Catch Limits:** Regulating harvest levels prevents overfishing and supports the long-term sustainability of fish populations.
3. **Protecting Critical Habitats:** Conservation of wetlands ensures the resilience of fish populations and maintains ecosystem health.
4. **Investing in Research and Innovation:** Advancing climate-resilient fisheries through research and technological development enhances sustainability and adaptation efforts.

## Conclusion

Climate change poses significant challenges to wetland fisheries, threatening the health and productivity of these vital ecosystems and the livelihoods of the communities that depend on them. Addressing these challenges requires urgent action to enhance the resilience of wetland ecosystems, support sustainable fisheries management, and promote climate-resilient livelihoods.

### References:


1. Mohanty, B., Mohanty, S., Sahoo, J., & Sharma, A. (2010). Climate change: impacts on fisheries and aquaculture. Climate change and variability, 119, 978-53.
2. Brander, K. (2010). Impacts of climate change on fisheries. Journal of Marine Systems, 79(3-4), 389-402.

Article - 6

# Disappearing Wetlands: How Human Activities Are Silencing Nature's Lifeline

**Prabir Das, Aritra Brahma, Ritesh Dhuriya**

*BFSc 2nd year, Faculty of Fisheries Science, The Neotia University, Sarisha, Diamond Harbour-743368*

## Introduction

Wetlands are areas where water covers the soil, either permanently or seasonally. They include marshes, swamps, bogs, and mangroves, each with its unique character and role in the ecosystem. These waterlogged wonders are biodiversity hotspots, home to 40% of the world's species. They act as natural sponges, absorbing floodwaters and replenishing groundwater supplies. They also sequester carbon, helping to mitigate climate change, and provide livelihoods for millions of people through fishing, agriculture, and tourism (Trenberth, 2018). But wetlands are more than just ecological powerhouses—they are also places of profound beauty and tranquillity. Imagine the stillness of a marsh at dawn, the air thick with the scent of damp earth, the water mirroring the sky as herons glide silently overhead. These landscapes have inspired poets, artists, and dreamers for centuries. Yet, today, they are under siege.

## Human impacts in Wetland Destruction

The loss of wetlands is not a natural phenomenon. It is a direct result of human activities that prioritize short-term gains over long-term sustainability. Here are some of the key ways we are harming these fragile ecosystems:

1) **Urbanization and Infrastructure Development:** As cities expand, wetlands are often the first casualties. They are drained, filled, and paved over to make way for roads, housing, and industrial complexes. In the last century, the world has lost more than 50% of its wetlands, with urbanization being a major driver. For example, the Everglades in Florida, once a vast expanse of pristine wetlands, has been reduced to half its original size due to urban sprawl and agricultural development.

2) **Pollution:** Wetlands are natural filters, but they can only handle so much. Industrial waste, agricultural runoff, and untreated sewage are poisoning these ecosystems. Chemicals like pesticides and fertilizers seep into wetlands, causing algal blooms that deplete oxygen levels and kill aquatic life. Plastic pollution is another growing threat, choking waterways and harming wildlife. The Ganges River in India, which flows through numerous wetlands, is now one of the most polluted rivers in the world.

3) **Climate Change:** While climate change is a global phenomenon, its impact on wetlands is particularly severe. Rising sea levels are inundating coastal wetlands, while droughts are drying up inland ones. Warmer temperatures also disrupt the delicate balance of these ecosystems, affecting the plants and animals that depend on them. For example, the Sundarbans, a vast mangrove forest shared by India and Bangladesh, is under threat from rising seas and increased salinity.

4) **Overexploitation of Resources:** Wetlands are often seen as a free resource, leading to overharvesting of fish, timber, and other goods. In some regions, wetlands are mined for peat, a fuel source that takes thousands of years to form. This not only destroys the wetland but also releases stored carbon into the atmosphere, exacerbating climate change (Ge et al., 2021).

## Conservation and Restoration

Despite the grim picture, there is hope. Around the world, efforts are underway to protect and restore wetlands. Governments, NGOs, and local communities are working together to create protected areas, enforce regulations, and promote sustainable practices. For example, the Ramsar Convention, an international treaty, has helped to designate over 2,400 wetlands of international importance, covering more than 2.5 million square kilometres. Restoration projects are also making a difference. In the United States, the Everglades Restoration Plan aims to revive the natural flow of water through the ecosystem, benefiting both wildlife and people. In China, the government has launched a massive reforestation campaign to restore degraded wetlands and combat desertification. These efforts show that with commitment and collaboration, it is possible to reverse the damage.

## Conclusion

Wetlands are more than just ecosystems—they are lifelines for the planet. They sustain biodiversity, protect communities, and inspire wonder. Yet, they are disappearing at an alarming rate, victims of human greed and shortsightedness. The loss of wetlands is not just an environmental issue; it is a moral one. It is a reflection of our relationship with the natural world and the legacy we leave for future generations. The good news is that it's not too late to change course. By valuing wetlands and taking action to protect them, we can ensure that these vital landscapes continue to thrive. After all, the story of wetlands is not just about loss—it's about resilience, restoration, and hope. And it's a story we all have the power to shape.

### References:


1. Trenberth, K. E. (2018). Climate change caused by human activities is happening and it already has major consequences. Journal of energy & natural resources law, 36(4), 463-481.

2. Ge, W., Deng, L., Wang, F., & Han, J. (2021). Quantifying the contributions of human activities and climate change to vegetation net primary productivity dynamics in China from 2001 to 2016. Science of the Total Environment, 77

Article - 7

# Extreme Weather Conditions in Fisheries: How cyclone and flood destroying wetlands and how fish production is hampered

**Binayak Maiti, Sourashis Sengupta, Soumili Halder**

*BFSc 2nd Year, Faculty of Fisheries Science, The Neotia University, Sarisha, Diamond Harbour-743368*

## Introduction

Wetlands are among the most productive ecosystems on Earth, providing essential services such as water filtration, flood control, and habitat for a diverse range of species, including fish. Fisheries, which rely heavily on healthy wetland ecosystems, are a critical source of livelihood and food security for millions of people worldwide. However, extreme weather events, such as cyclones and floods, are increasingly threatening these ecosystems. Climate change has exacerbated the frequency and intensity of these events, leading to significant ecological and economic consequences. This article examines the impact of cyclones and floods on wetlands and fish production. It delves into the mechanisms by which these extreme weather events degrade wetland ecosystems, disrupt fish habitats, and reduce fish populations. The article also discusses the broader implications for fisheries and food security, emphasizing the need for adaptive management strategies to mitigate these impacts (Walsh et al., 2016).

## The Role of Wetlands in Fisheries

Wetlands are vital for fish production due to their unique ecological characteristics. They serve as

breeding, nursery, and feeding grounds for many fish species. The complex structure of wetlands, including submerged vegetation, shallow waters, and nutrient-rich sediments, provides ideal conditions for fish to thrive. Additionally, wetlands act as natural filters, improving water quality and supporting healthy aquatic ecosystems. Fish production in wetlands is influenced by several factors, including water quality, habitat availability, and food resources. Any disruption to these factors can have cascading effects on fish populations and, consequently, fisheries. Extreme weather events, such as cyclones and floods, are among the most significant threats to wetland ecosystems and fish production.

## How Cyclones and Floods Destroy Wetlands

Cyclones and floods can cause severe physical and ecological damage to wetlands. The mechanisms of destruction include:

1) **Physical Destruction of Habitat:** Cyclones, with their strong winds and storm surges, can uproot vegetation, erode soil, and alter the physical structure of wetlands. Floods, on the other hand, can inundate wetlands, leading to sedimentation and changes in water flow patterns. These physical changes can destroy critical fish habitats, such as submerged vegetation and shallow water zones, which are essential for breeding and feeding.

2) **Salinization of Freshwater Wetlands:** Storm surges associated with cyclones can introduce saltwater into freshwater wetlands, leading to salinization. This process can alter the chemical composition of the water, making it unsuitable for many freshwater fish species. Salinization can also affect the growth of aquatic plants, which serve as food and shelter for fish.

3) **Nutrient Overload and Eutrophication:** Floods can wash large amounts of nutrients, such as nitrogen and phosphorus, from agricultural lands into wetlands. While nutrients are essential for aquatic ecosystems, excessive amounts can lead to eutrophication. This process results in algal blooms, which deplete oxygen levels in the water and create dead zones where fish cannot survive.

4) **Disruption of Hydrological Cycles:** Cyclones and floods can alter the natural hydrological cycles of wetlands. Changes in water flow patterns can lead to the loss of seasonal flooding, which is crucial for maintaining wetland ecosystems. Disruption of these cycles can affect the reproduction and migration patterns of fish, leading to declines in fish populations.

## Impact on Fish Production

1) **Loss of Breeding and Nursery Grounds:** Wetlands serve as critical breeding and nursery grounds for many fish species. The destruction of these habitats by cyclones and floods can lead to a decline in fish recruitment, reducing the number of juvenile fish that survive to adulthood. This loss of recruitment can have significant implications for fish populations and fisheries.

2) **Changes in Species Composition:** The physical and chemical changes caused by cyclones and floods can alter the species composition of fish communities. Some species may be more resilient to these changes, while others may be unable to adapt. This shift in species composition can affect the overall productivity and biodiversity of fisheries.

3) **Reduced Food Availability:** The destruction of aquatic vegetation and the disruption of food webs by cyclones and floods can reduce the availability of food for fish. This reduction in food resources can lead to slower growth rates, lower reproductive success, and increased mortality among fish populations.

4) **Increased Vulnerability to Disease:** The stress caused by extreme weather events can weaken fish, making them more susceptible to diseases. Additionally, the changes in water quality and habitat conditions can create environments that are conducive to the spread of pathogens. Disease outbreaks can further reduce fish populations and hamper fish production.

## Cyclone Amphan and its Impact on Fisheries in India and Bangladesh

Cyclone Amphan, which struck in 2020, severely affected coastal fisheries in India and Bangladesh. The storm surge destroyed aquaculture ponds, washed away fishing boats, and caused massive economic losses for fishers. The destruction of mangroves further exacerbated habitat loss, leading to reduced fish stocks in the region.

## Conclusion

Extreme weather conditions pose significant threats to global fisheries, affecting fish populations, fishing operations, and aquaculture. The socio-economic consequences of these challenges highlight the need for urgent adaptation strategies. By adopting climate-resilient fishing practices, enhancing aquaculture sustainability, and implementing effective policies, fisheries can mitigate the risks associated with extreme weather and ensure their long-term viability. The destruction of wetlands due to cyclones and floods, along with the subsequent decline in fish production, underscores the importance of proactive climate adaptation measures.

### References:


1. Knutson, T.R., McBride, J.L., Chan, J., Emanuel, K., Holland, G., Landsea, C., Held, I., Kossin, J.P., Srivastava, A.K. and Sugi, M., 2010. Tropical cyclones and climate change. Nature geoscience, 3(3), pp.157-163.

2. Walsh, K.J., McBride, J.L., Klotzbach, P.J., Balachandran, S., Camargo, S.J., Holland, G., Knutson, T.R., Kossin, J.P., Lee, T.C., Sobel, A. and Sugi, M., 2016. Tropical cyclones and climate change. Wiley Interdisciplinary Reviews: Climate Change, 7(1), pp.65-89.


Article - 8

# Blue Carbon in Wetlands: An Essential Approach to Mitigating Climate Change

**Binayak Maiti, Sourashis Sengupta, Soumili Halder**

*BFSc 2nd Year, Faculty of Fisheries Science, The Neotia University, Sarisha, Diamond Harbour-743368*

## Introduction

Coastal wetlands—comprising mangroves, salt marshes, tidal forests, and seagrass meadows—serve as significant carbon sinks, proficiently capturing and sequestering substantial amounts of carbon dioxide ($CO_2$) within their biomass and sediments. Referred to as "blue carbon" ecosystems, these environments are instrumental in combating climate change by decreasing greenhouse gas emissions and maintaining stable carbon levels in the atmosphere. Recent studies highlight the considerable potential of conserving and restoring wetlands as nature-based strategies for addressing global warming. This article explores the science behind blue carbon, the worldwide potential of coastal wetlands, the effects of restoration initiatives, and the necessary policy frameworks for their conservation. Blue carbon ecosystems capture carbon by means of plant growth and the deposition of organic matter in saturated soils, where decomposition occurs more slowly due to limited oxygen availability. Research indicates that tidal wetlands sequester carbon at rates as much as 55 times greater than tropical rainforests, which highlights their critical role in long-term carbon storage.

## Essential Wetland Ecosystems and Their Carbon Sequestration Potential

1) **Mangroves:** These coastal forests, resilient to saltwater, function as significant carbon sinks while providing protection for shorelines against erosion and storm surges. They sequester carbon both in their above-ground biomass and within the soil, thanks to their extensive root systems that trap organic material and sediments, effectively securing carbon in the soil for centuries.

2) **Salt Marshes:** Located in temperate and polar regions, salt marshes are capable of accumulating carbon in their peaty soils, characterized by slow decomposition rates owing to periodic tidal inundation. These ecosystems have the capacity to store as much as 917 tonnes of carbon per hectare.

3) **Seagrass Meadows:** Seagrasses play a crucial role in capturing carbon through their biomass and sediments, with certain species developing substantial sediment deposits that accumulate over thousands of years. Although they cover only a minor area of the ocean floor, their impact on carbon sequestration in marine environments is remarkably significant.

4) **Tidal Freshwater Wetlands and Supratidal Forests:** Recent research indicates that these often- overlooked wetlands, which are affected by tidal movements but have reduced salinity levels, serve as significant carbon sinks as well. Tidal forested wetlands, particularly those characterized by the presence of Melaleuca and cypress trees, have the capacity to sequester as much as 800 megagrams of carbon per hectare.

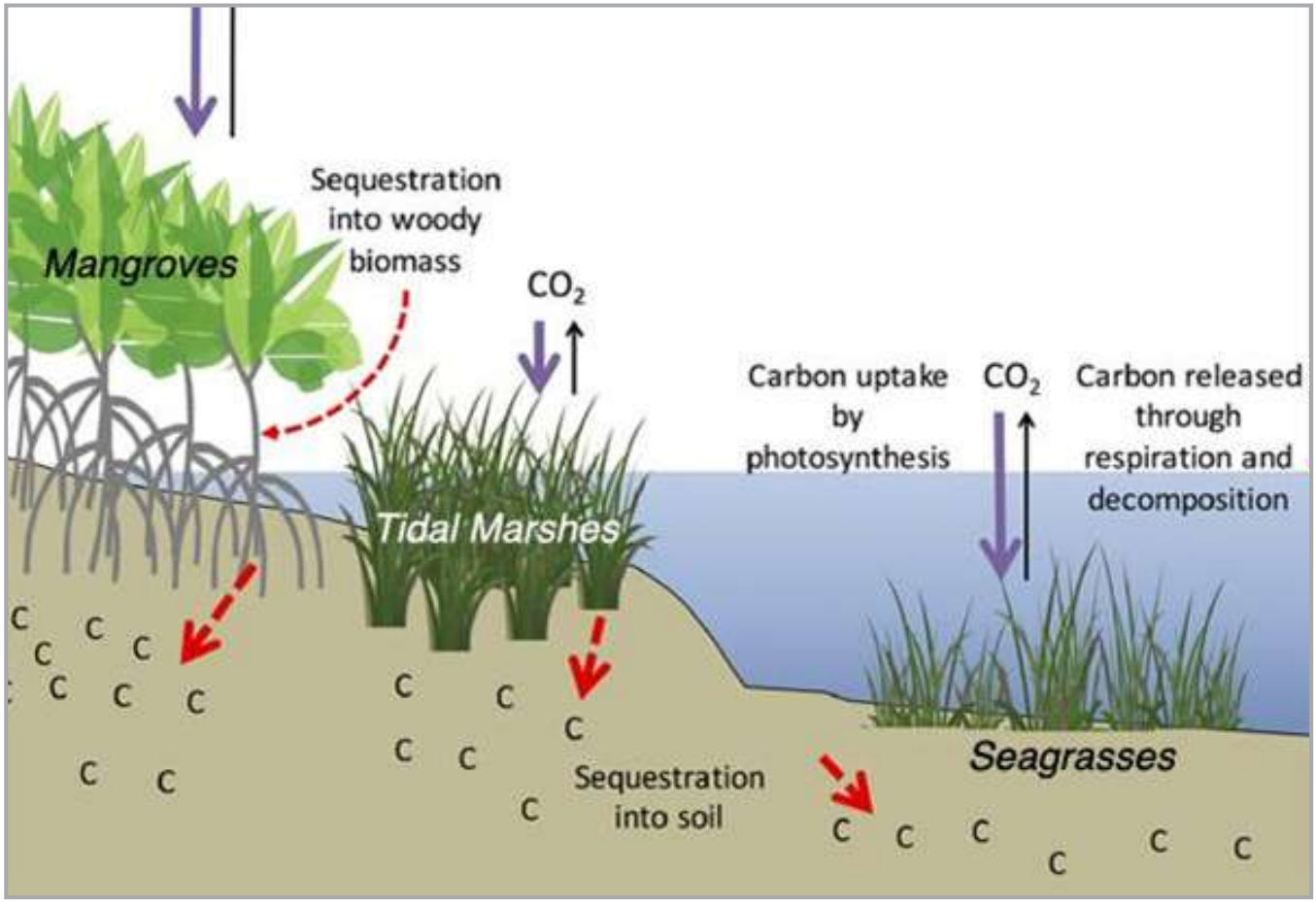



*Figure1- Essential Wetland Ecosystems and Their Carbon Sequestration Potential*

## Global Carbon Sequestration Potential:

Recent studies indicate that tidal wetlands around the world sequester roughly 53.65 teragrams (Tg) of carbon each year, representing nearly 30% of the organic carbon deposited in ocean sediments. As sea levels rise, this capacity is projected to grow, with increasing wetland areas providing additional opportunities for carbon burial. In Australia, Melaleuca forests are estimated to store between 57 and 430 megagrams (Mg) of carbon per hectare, while below

ground reserves can reach as high as 800 Mg per hectare (Duarte et al., 2013).

## Threats to Blue Carbon Ecosystems

**Coastal Development:** Urban expansion and infrastructure initiatives can lead to the destruction of wetlands or sever their tidal connections, thereby diminishing their ability to sequester carbon.

**Aquaculture and Agriculture:** Converting land for aquaculture or agriculture can drain wetlands, accelerating the breakdown of organic matter and releasing previously stored carbon.

**Pollution:** Nutrient runoff and industrial contaminants can alter the biogeochemical makeup of wetlands, potentially leading to increased methane emissions.

**Climate Change:** Extreme weather events, rising sea levels, and shifting precipitation patterns can disrupt the functionality of wetland ecosystems; however, some wetlands may respond by migrating further inland.

## Policy and Global Action

**International Frameworks and Agreements**: Incorporating blue carbon into national climate strategies, such as Nationally Determined Contributions (NDCs) under the Paris Agreement, can provide incentives for the conservation of wetlands. Additionally, the Ramsar Convention offers a structure for wetland preservation, with more than 780 designated Ramsar sites that are home to blue carbon ecosystems (Breithaupt et al., 2012).

**Carbon Markets and Financing Restoration:** Projects focused on blue carbon can facilitate the generation of carbon credits for emissions trading programs, thereby drawing investments for wetland restoration initiatives. These endeavors not only curtail emissions but also contribute to enhanced biodiversity, improved fisheries, and increased coastal resilience.

**Local and Community-Based Conservation:** Empowering local communities to oversee the management and protection of wetlands can foster sustainable livelihoods while preserving carbon reserves. Initiatives led by communities, such as mangrove restoration projects, have shown considerable success in areas like Southeast Asia and West Africa.

## Conclusion

A key component of global climate resilience, blue carbon ecosystems maintain biodiversity, safeguard coastlines, and offer an affordable, natural method of sequestering carbon. In addition to being essential for the environment, protecting and rehabilitating these ecosystems is also a vital step in reaching the goals set forth by the global climate. Wetlands' full potential as climate change friends can be realized through advancing research, encouraging global collaboration, and incorporating blue carbon policies into legislative frameworks.

### References:


1. Duarte CM, Losada IJ and Hendriks IE et al. The role of coastal plant communities for climate change mitigation and adaptation. Nat Clim Chang 2013; 3: 961–8.

2. Breithaupt JL, Smoak JM and Smith TJ et al. Organic carbon burial rates in mangrove sediments: strengthening the global budget. Glob Biogeochem Cycles 2012; 26:2012GB004375.


Article - 9

# Components & work of **Chinese Circular hatchery**

**Dip Sahoo**

*BFSc 3rd Year, Faculty of Fisheries Sciences, The Neotia University, Sarisha, Diamond Harbour-743368*

## Introduction

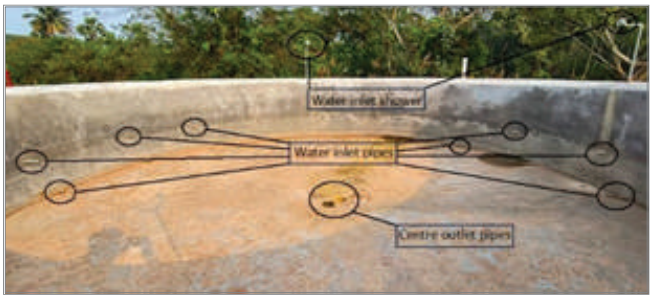
In the dynamic realm of aquaculture, hatcheries play a pivotal role in the controlled propagation and cultivation of aquatic species. The efficiency and sustainability of a hatchery depend on a careful orchestration of various components that collectively contribute to the success of the facility. As we embark on an exploration of these crucial hatchery components, it becomes evident that the intricate balance between technological innovation, environmental consciousness, and scientific expertise is essential to meet the growing demand for sustainable and responsible aquaculture practices. From energy sources to water management systems, each component plays a unique role in shaping the future of hatcheries, ushering in an era where ecological considerations & technological advancements harmoniously coexist. Let's delve into the intricacies of these components, unravelling the layers that constitute the foundation of modern hatchery operations.

## Components of Chinese Circular Hatchery

**Water stocking pond:** It is a water stocking pond from where the desirable water taken, sometime also we use underground water stock to use in the hatchery.

**Overhead Tank:** This is the tank where the water is stocked before use in hatchery. Usually, it is present in a certain hight from the hatchery.

**Breeding tank:** Breeding tank or spawning pool is a circular tank, which is the largest circular tank in the hatchery. It has a depth of 1.2 meter and has a diameter of 7 meter. On the floor of the tank there have some water inlet pipe diameter of 3 inch at 450 angles at the floor level. At the centre there are 3 outlet pipe diameters of 3 inch (G.I. pipe) in which one pipe is attached to the egg collection chamber and other two is attached to the incubation pool. The floor have a slope to the central outlet (1:35). At the top of the side wall some fountains /shower is attached, which make a rain like environment in the spawning pool. Here the brood fish is released after injecting the pituitary hormones. After curtain time the eggs are released in the water. After that the egg mixed water is forwarded to the incubation tank or egg collecting tank as per demand.





**Incubation hatching tank:** It is smaller than the breeding / spawning pool. It has the diameter of 3meter and has a hight of 1m & at the centre there is one more circular structure with a diameter of 1 meter and also the hight is 1meter. There is a present of net on the wall of the inner circle. The mesh size of the net is depending on different size of the eggs of different fish species. At the centre of the bottom there is a outlet pipe with a diameter of 3inch (G.I. pipe) which carried out the extra water from the pool. At the bottom there is 6 numbers of duck mouth inlets fixed centrally in the outer tank. The outer tank is attached to the spawn collecting chamber directly with 3inch dia. pipe. The egg loaded water is entered to the outer chamber and the water is drained out through the central outlet pipe leaving the eggs in the outer chamber of the incubation tank. The eggs continued their circular motion with the help of duck mouths. When the spawns are released from the egg-cell they are carried out to the spawn collecting tank.

## Spawn collecting tank & egg collection chamber

it is a combined tank where the egg collection chamber & the spawn collecting chamber is present. The size of egg colleting chamber is (2.5*2) meter with a depth of 1 meter & the size of spawn collecting chamber is (3*2) meter with a depth of 1 meter. In some hatchery there is only one chamber which is used as both egg collection and spawn collection. The spawns are come through the pipe to the tank there is a filter present made up of nets, by which the spawns are filtered and the excess water is drained out. From here the spawns are distributed to nursery ponds as per demand.


## Conclusion

Chinese carp hatcheries play a pivotal role in supporting the aquaculture industry by providing a controlled environment for the reproduction and early development of carp species. With a rich history and continuous advancements in hatchery technologies, China has emerged as a global leader in carp production. The hatcheries not only contribute significantly to the domestic demand for fish but also play a crucial role in international markets. The success of Chinese carp hatcheries can be attributed to their integration of traditional knowledge with modern techniques, rigorous management practices & research-driven innovations.

Article - 10

# Promoting fish safety and quality: a shift to sustainable seafood consumption

**Neeraj Pathak and H Shivananda Murthy**

*Faculty of Fisheries Science, The Neotia University, Sarisha, West Bengal*

## Introduction

Fish and seafood are important ingredients in a healthy diet, contributing protein, omega-3 fatty acids, vitamins and minerals. But ensuring their quality and safety is a significant challenge for the global seafood industry. And as concerns over foodborne diseases, chemical contaminants, and environmental degradation mount, it is important that it is closely monitored and controlled so as to ensure consumer trust and protect public health. This article will highlight some recent fish quality and safety developments, issues that can cause concern, and novel solutions.

## Quality and safety issues in fisheries

- **Microbial Contamination**

Consumers of seafood are particularly vulnerable to bacterial infections like Salmonella, Vibrio, Listeria, and E coli. Inadequate food handling and storage, such as storing unwashed vegetables for long periods of time at high temperatures, increases bacterial colonies and the risk of causing foodborne illness.

- **Contamination by Heavy Metals**

Heavy metals (mercury, lead, cadmium), pesticide residue, and persistent organic pollutants (POPs) are bioaccumulated by fish due to environmental contamination. Long-term exposure to such toxins can lead to severe health issues including cancer and neurological diseases.

- **Histamine and Other Biogenic Amines Poisoning**

Incorrect preservation of fish contributes to histamine accumulation in consumers, which can lead to allergic reactions, particularly for scombroid species such as tuna and mackerel.

- **Antimicrobial resistance (AMR) is a condition caused by overuse of antibiotics**

Antimicrobial resistance caused by the overuse of antibiotics in aquaculture has rendered antibiotics ineffective against many bacterial infections in both humans and fish.

## Continued development of new fish safety systems

Latest preservation technologies such as high-pressure processing (HPP), modified atmosphere packing (MAP) and natural bio-preservatives (synergistic plant-based antimicrobials, etc.) can be applied for extending the shelf-life of fish with minimum loss of quality. Industry 4.0 smart sensors paired with intelligent packaging can detect the minute signs of spoiling in real time, notifying customers and retailers of deteriorating fish.

- **Using Blockchain Technology for Traceability:** In seafood supply chains, utilizing blockchain technology also increases transparency and traceability, enabling customers to track the movement of fish from the ocean to their plate and ensuring authenticity and safety.
- **Faster Detection Methods:** NGS, real-time PCR, and innovative biosensors rapidly and accurately identify chemical and microbiological contaminants in the marine product.

## Regulatory framework and consumer awareness

Governments and international agencies such as the European Food Safety Authority (EFSA), the World Health Organization (WHO), and the Food and Agriculture Organization (FAO) have issued strict guidelines for safety and quality of seafood. This may be furthering good practices in fish production and management, such as Hazard Analysis and Critical Control Points (HACCP) system and Good Aquaculture Practices (GAP). A key aspect in mitigating health risks is also educating customers on how to prepare and store fish and buy it from trusted purveyors.

## Conclusion

Keeping fish safe and of high quality is important for the continued operation of the seafood industry, and the health of the general public. The use of modern preservation techniques, traceability systems and tough regulatory measures can help eliminate issues such as microbiological contamination, heavy metal accumulation and antibiotic resistance. Consumer education and the promotion of sustainable fishing will also help seafood safety. Continuous research and innovation are needed to keep health risks low, and to provide consumers around the globe access to high-quality seafood.

**References:**


1. Food and Agriculture Organization (FAO). (2020). The State of World Fisheries and Aquaculture 2020. FAO.
2. Huss, H. H. (1995). Quality and quality changes in fresh fish. FAO Fisheries Technical Paper. No. 348. FAO.


# A special study and survey report on Village Adoption Programme, Faculty of Fisheries Science, TNU

**Date- 25/01/2025**

- Village - **Ramnagar** • Post Office - **Kalatalahat** • Postal Code - **743504** • Sub District - **Diamond Harbour 2**
- District - **South 24 Parganas**



## Introduction

This report presents a survey on the socio-economic status of Ramnagar village, located in the Falta block of South 24 Parganas, West Bengal. The study aims to analyze the demographic structure, occupational patterns, income levels, education, and living conditions of the villagers.

## Demographic Profile

1. **Total Population:**
   Approximately 2500-3000
   (Voter- approx. 1700-1800)
2. **Literacy Rate:**
   **100%**
3. **Age Distribution:**
   - 0-14 years: **30%**
   - 15-59 years: **55%**
   - Above 60 years: **15%**
4. **Economic Activities**

   **Primary Occupation:**
   - Agriculture: **10%**
   - Fisheries & Aquaculture: **10%**
   - Daily Wage Labor: **40%**
   - Small Business & Trade: **20%**
   - Service Sector: **20%**
5. **Education and Literacy**
   - Primary School Enrollment: **85%**
   - Dropout Rate: **0%**
   - Higher Education Enrollment: **15%**

## Health facilities

- AshSheefa Hospital, Nainan Rd; Falta; West Bengal 743504, 9.7 KM from Ramnagar Police Station.
- Falta Gramin Hospital, Falta Rd; Bishra; West Bengal 743504, 6.6 KM from

## Challenges and Issues

- Frequent flooding and water-logging
- Unemployment and seasonal labor migration

## Recommendations

- Skill development programs for youth and women
- Promotion of sustainable aquaculture and agriculture practices
- Improved educational facilities and vocational training
- Strengthening of local SHGs for better financial inclusion

# News and Events

Climate change is wreaking havoc in fisheries. Lets check out some interesting news and events owing to climate change in aquaculture

1

**Climate change is shrinking fish.** Global warming increased competition for food in the 2010s, leading to decreased fish weight in important fishing area. Fish weight in the western North Pacific Ocean dipped in the 2010s due to warmer water limiting food supplies, according to a new study at the University of Tokyo.

2

Focusing on four key nutrients important to human health - calcium, iron, omega-3 fatty acids and protein - scientists argue that **nutrient availability in seafood has been declining** since 1990 and will further decline by around 30 per cent by 2100 in predominately tropical, low-income countries with 4°C of warming.

3

Global warming has led to thermal stress affecting blood cells of marine as well as freshwater fish and which has led to changes in blood cell shape and sizes. This phenomenon is called **thermal stress induced poikilocytosis.**

4 **Climate change is expected to favour smaller fish,** who need and expend less energy in response to warming compared with larger fish. Hence the body size is being termed as 'super trait' for fish in regards to global warming in oceans.

5 **Global warming has led to changes in ovulation in fish.** Additionally, increased temperatures can disrupt the final stages of egg maturation and prevent ovulation, a phenomenon observed in various species, including Atlantic salmon.

6 Increase in temperature have led to **changes in retina becoming ten times less sensitive to low-light conditions.**

7 **Hearing sensitivity has been seen to increase** in fish owing to temperature change.

# Students' Corner

*Paintings by **Anushri Maity** (4th Sem)*

*Photography by **Dip Sahoo** (6th Sem)*

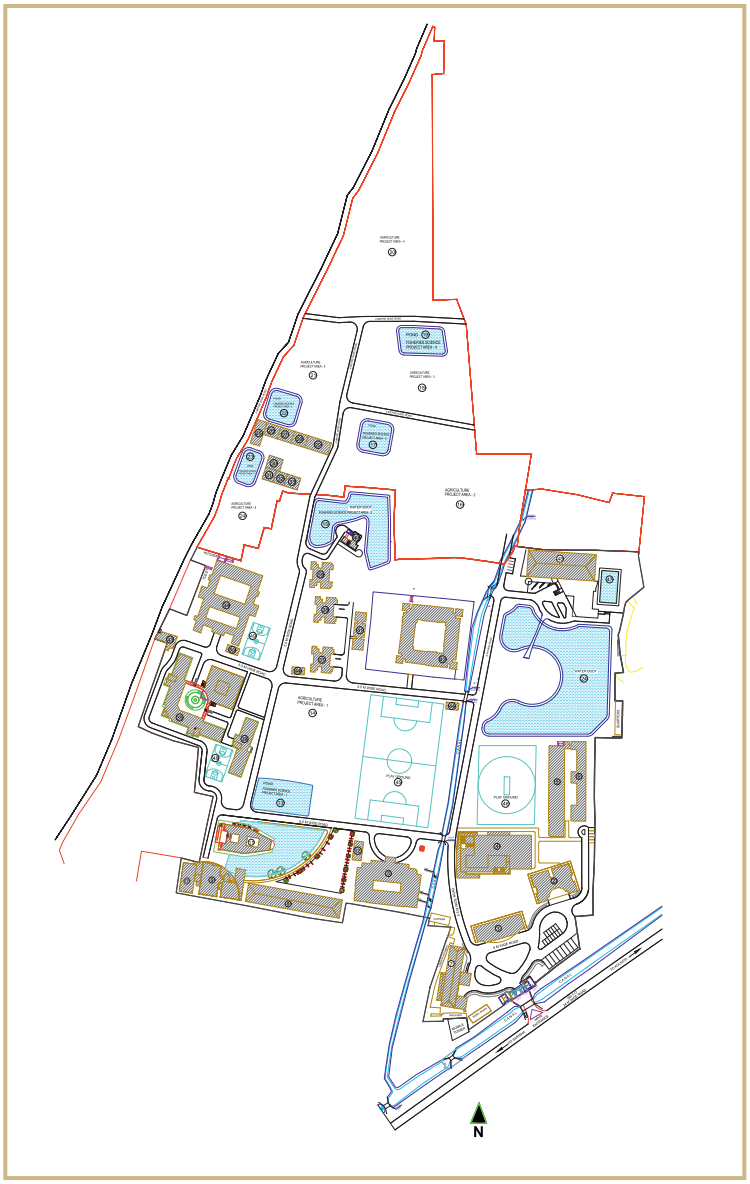
*Photography by **Shoaib Khan** (6th Sem)*

*Photography by **Akangsha Majumder** (4th Sem)*

*Photography by **Rahul Samanta** (2nd Sem)*

***Dip Sahoo** (6th Sem) is receiving 1st prize for discus throwing (Athletic meet 2025, TNU)*

***Dip Sahoo** (6th Sem) is receiving 2nd prize for presenting Extempore (World wetlands day celebration 2025, TNU)*




## LEGEND- BUILDING

**A. ADMINISTRATIVE BLOCK**

1. ADMINISTRATIVE BUILDING (G + V)

**B. ACADEMICS BLOCK**

2. SCHOLASTIC BUILDING - 1 (G + III)
3. SCHOLASTIC BUILDING - 2 (G + II)
4. SCHOLASTIC BUILDING - 3 (G + III)
5. SCHOLASTIC BUILDING - 4 (G + III)
6. SCHOLASTIC BUILDING - 5 (G + III)
7. WORKSHOP BUILDING
8. NEW WORKSHOP BUILDING
9. NEW PHARMACY BUILDING (G + III)
10. PHARMACY BUILDING (G + III)
11. SHIP IN CAMPUS (G + III)

**C. AGRICULTURE & FISHERY SCIENCE BLOCK**

12. POLY HOUSE & NET HOUSE
13. FISHERY SCIENCE PROJECT AREA - 1
14. AGRICULTURE PROJECT AREA - 1
15. FISHERY SCIENCE PROJECT AREA - 2
16. AGRICULTURE PROJECT AREA - 2
17. FISHERY SCIENCE PROJECT AREA - 3
18. AGRICULTURE PROJECT AREA - 3
19. FISHERY SCIENCE PROJECT AREA - 4
20. AGRICULTURE PROJECT AREA - 4
21. AGRICULTURE PROJECT AREA - 5
22. FISHERY SCIENCE PROJECT AREA - 5
23. FISHERY SCIENCE PROJECT AREA - 6
24. AGRICULTURE PROJECT AREA - 6
25. MUSHROOM UNIT
26. FIELD LAB
27. STORE HOUSE
28. SERICULTURE UNIT
29. THRESHING FLOOR
30. BIO GAS PLANT
31. CATTLE SHED
32. VERMI COMPOST PIT
33. BIO FERTILIZER PLANT

**D. RESIDENTIAL BLOCK**

34. BOY'S HOSTEL - 1 & 2 (G + III)
35. BOY'S HOSTEL - 1 & 2 (G + III)
36. BOY'S HOSTEL - 1 & 2 (G + III)
37. OLD STAFF QUARTERS (G + III)
38. NEW STAFF QUARTERS (G + III)
39. NEW STAFF QUARTERS (G + III)
40. DIRECTOR'S RESIDENCE (G + I)
41. OLD STAFF QUARTERS (G + III)
42. GIRL'S HOSTEL - 3 (G + II)

**E. UTILITY & SERVICES BLOCK**

43. ELECTRICAL ROOM
44. PUMP ROOM

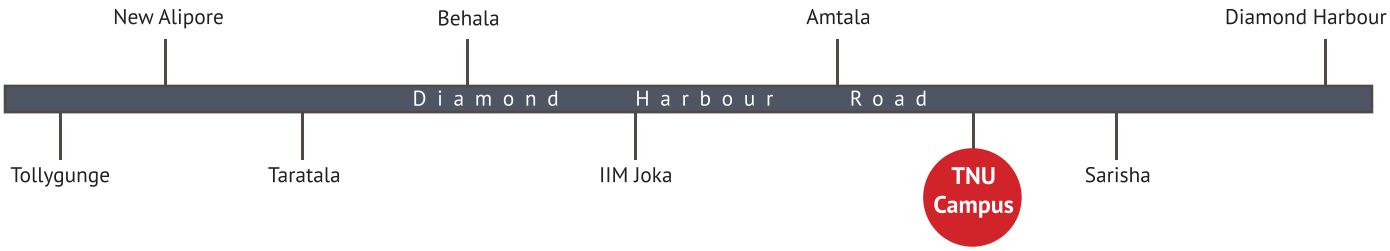
**F. RECREATIONAL BLOCK**

45. FOOTBALL GROUND
46. CRICKET GROUND
47. SWIMMING POOL
48. MULTI PURPOSE HALL
49. BASKETBALL COURT (3 NOS.)

**G. HEALTH BLOCK**

50. MEDICAL UNIT

admadcommunications@gmail.com




AmbujaNeotia

THE NEOTIA UNIVERSITY

ज्ञानम् आत्म प्रदीपाय

Approved Under Sec.2(f) of UGC Act 1956

**Campus:** Sarisha, Diamond Harbour Road, 24 Parganas (S), West Bengal - 743 368
**Head Office:** Vishwakarma, 86C Topsia Road (S), Kolkata - 700 046
**Campus:** +91 70444 46888 / **Head Office:** +91 70444 46999 | **Email:** contact@tnu.in