german cooperation
DEUTSCHE ZUSAMMENARBEIT

Implemented by:
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

In cooperation with

International Symposium on

Marine Litter and Coastal Ecosystem Nexus (MariNEX)

29-31 January, 2025

BOOK OF ABSTRACTS

Fisheries and Marine Resource Technology Discipline (FMRT)
Khulna University, Khulna, Bangladesh

INTERNATIONAL SYMPOSIUM

ON

Marine Litter and Coastal Ecosystem Nexus (MariNEX)

Book of Abstracts

29-31 January, 2025

Fisheries and Marine Resource Technology Discipline (FMRT)
Khulna University, Khulna
Bangladesh

Published by	Fisheries and Marine Resource Technology (FMRT) Discipline, Khulna University, Khulna, Bangladesh
Publication Date	January, 2025
Organized by	Fisheries and Marine Resource Technology (FMRT) Discipline, Khulna University, Khulna, Bangladesh; in association with SCIP Plastics Project, Bauhaus-Universität Weimar, Germany
Supported by	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) on behalf of the German Federal Ministry for Economic Cooperation and Development
Sponsored by	Khulna University, Khulna, Bangladesh

Layout and formatting	Dr. Shikder Saiful Islam
Cover photography	GIZ BD / Fahad Kaizer
Printed by	Sakib Offset Press, 48 Khan Jahan Ali Road, Khulna, Bangladesh
Publisher	Khulna University, Khulna, Bangladesh

ISBN: 978-984-35-7091-8

Not for sale

EDITORIAL

Marine pollution, particularly plastic debris, has emerged as a critical global challenge with profound consequences for marine ecosystems and human well-being. The alarming rate of plastic waste generation and its subsequent entry into the oceans poses a significant threat to biodiversity and the health of our planet. Bangladesh, ranking sixth globally in plastic and polythene pollution, faces significant challenges from the influx of plastic waste into the Bay of Bengal. The degradation of coastal ecosystems, including vital mangrove forests, further exacerbates the problem, impacting the livelihoods of coastal communities who heavily rely on these resources.

Recognizing the critical role of healthy marine ecosystems in supporting sustainable fisheries, the Fisheries and Marine Resource Technology (FMRT) Discipline at Khulna University, Bangladesh, in collaboration with the SCIP plastics project at Bauhaus-Universität Weimar, Germany, organizes the International Symposium on Marine Litter and Coastal Ecosystem Nexus (MariNEX). This symposium aims to address key technical questions related to marine litter and its impacts; showcase global best practices in mitigating marine pollution, with a focus on the intersections of marine litter, forestry, fisheries, and community resilience and facilitate partnerships and cooperation among academia, practitioners, industry, and policymakers to develop effective solutions.

Following a global call for abstracts, we received an overwhelming response with over 240 registrations and approximately 210 abstract submissions. A rigorous review process, conducted by the Editorial Team in consultation with the International Scientific Committee, carefully selected 51 abstracts for oral presentations across four thematic sessions, including plenary and keynote addresses. These presentations will be conducted across four thematic sessions with 30 presentations taking place in the main venue and 21 presentations occurring concurrently in a separate room in a 'lightning session' format, allowing for a greater number of oral presentations. The remaining 158 abstracts will be presented as posters.

This book of abstracts provides a glimpse into the diverse perspectives and innovative research being conducted worldwide to address the marine litter crisis. We are confident that MariNEX will serve as a valuable platform for knowledge sharing, collaboration, and the development of effective solutions to safeguard our oceans and coastal communities.

We extend our sincere gratitude to all speakers, panelists, and participants for their valuable contributions and to the Organizing Committee for their tireless efforts in bringing this symposium to fruition.

Editorial Team
January 2025

ACKNOWLEDGMENT

The International Symposium on Marine Litter and Coastal Ecosystem Nexus (MariNEX) is a collaborative effort made possible through the joint organization of the Fisheries and Marine Resource Technology (FMRT) Discipline of Khulna University, Bangladesh and SCIP plastics project at Bauhaus-Universität Weimar, Germany.

We extend our sincere gratitude to all members of the Symposium Organizing Committee for their invaluable contributions in designing and preparing this event. We also express our deepest appreciation to the members of various sub-committees for their tireless efforts in ensuring the smooth execution of MariNEX.

The organizers express their deep sense of gratitude and heartfelt thanks to the Honorable Vice-Chancellor of Khulna University for his continuous guidance and for the generous financial, administrative, and logistical support provided by the University.

We gratefully acknowledge the overall logistical and technical support received from the German Federal Ministry for Economic Cooperation and Development (BMZ) through Integrated Management of the Sundarbans Mangroves and the Marine Protected Area of Swatch of No Ground in Bangladesh (SoNG) project, implemented by GIZ Bangladesh.

ABOUT THE SYMPOSIUM

Marine pollution poses a significant threat to the health of our oceans and the well-being of our planet. This multifaceted challenge stems from a range of human activities, including the rampant generation of plastic waste, industrial discharges, agricultural runoff, and the release of pollutants from land-based sources. South Asia, with an alarming annual generation of 334 million tons of solid waste, contributes significantly to this crisis, with 70-80% of this waste, including 12% plastic, ultimately entering our oceans. Bangladesh, ranking sixth globally in plastic and polythene pollution, faces significant challenges from the influx of plastic waste into the Bay of Bengal, highlighting the urgent need for collective action to address this critical issue.

The pervasive presence of microplastics, constituting a significant portion of marine litter, is of particular concern. These tiny particles infiltrate the food chain, impacting the health and reproduction of marine organisms, disrupting the delicate balance of the ecosystem, and ultimately posing a threat to human health. The degradation of coastal ecosystems, including vital mangrove forests, further exacerbates the problem, impacting the livelihoods of coastal communities who heavily rely on these resources.

In light of these challenges, the International Symposium on Marine Litter and Coastal Ecosystem Nexus (MariNEX) aims to address the critical issue of marine pollution and its impacts on the BoB's coastal and large marine ecosystem. The symposium will explore the full spectrum of land-based activities that contribute to marine litter, examine the consequences for coastal communities, and explore innovative solutions for a healthier ocean.

MariNEX serves as a premier international forum for showcasing global best practices in exploring the Intersections of Marine Litter, Forestry, Fisheries, and Community Resilience. It facilitates partnerships and cooperation among academia, practitioners, industry, and policymakers to develop effective solutions for marine litter prevention, reduction, and removal.

The symposium covers a range of topics, including:

- Sources, pathways, and fate of marine litter
- Effects of marine litter on coastal biodiversity and ecosystem services
- Socio-economic and human health implications of marine litter
- Policies and governance frameworks for marine litter management
- Innovative solutions and technologies for marine litter prevention, reduction, and removal

Scheduled to be held in Khulna, Bangladesh, a coastal city grappling with multiple challenges from marine litter, coastal erosion, salinity intrusion, flooding, and climate change, MariNEX will provide an opportunity for participants to learn from the local context and experiences. The symposium will foster valuable networking and collaboration among academia, government agencies, development partners, and stakeholders from diverse disciplines and backgrounds worldwide.

Index

PPU 39	Antagonistic effects of Tulsi (*Ocimum tenuiflorum*) on specific pathogen of mud crab (*Scylla olivacea*) collected from Bagerhat	209
PPU 40	Antagonistic effects of *Moringa oleifera* on specific pathogen of mud crab (*Scylla olivacea*) collected from Khulna	210

Abstracts for Oral Presentation

KEYNOTE Mangrove Forests - Driving and Driven, Connected and Connecting

Martin Zimmer

Leibniz Centre for Tropical Marine Research and University of Bremen, 28359, Bremen, Germany
Email: martin.zimmer@leibniz-zmt.de

Situated at the interface of land and sea, mangrove forests are connected with both marine and terrestrial ecosystems - this comes with both positive and negative effects on ecosystem structure and equilibrium. Through numerous and diverse interactions, the floral, faunal and microbial inhabitants of mangrove forests drive a plethora of ecosystem processes. These translate into multiple ecosystem services and goods and benefits to local societies and humankind worldwide, such as the provisioning of natural resources, e.g., food, protecting coastlines from storm surges, and contributing to climate change-mitigation and -adaptation. At the same time, (unsustainable) human use of these services poses threats on mangrove communities and drives them off their ecological equilibrium towards degradation and loss of integrity. The exchange of organisms and matter through trajectories of connectivity with adjacent marine and terrestrial ecosystems along the coastal and intertidal ecotone imports and exports drivers of ecosystem processes as well as stressors, such as pollutants or a surplus of nutrients. While the former enhances ecosystem service-provisioning by mangrove forests, the latter impair ecosystem processes that underlie these services. Considering the above drivers of both ecosystem services and degradation, sound governance and adaptive coastal management, including the sustainable use of mangrove forests and their goods and services, as well as conservation and (re-)establishment of mangrove forests, are pivotal for ensuring, maintaining, and enhancing their role in climate change-mitigation and -adaptation towards long-term resilience of socio-ecological systems of tropical coasts.

OP 01 The Big Challenges with Big Data in Marine Debris Modelling

Kamal Ranatunga*

Center for Marine Science and Technology, Department of Zoology and Aquatic Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka
Email: ranatunga@sci.sjp.ac.lk

The exponential growth of information technology and advancements in remote sensing have ushered in the era of big data, revolutionizing ocean data acquisition and analysis, including marine debris. Leveraging big data technologies, researchers can now utilize satellite imagery, remote sensing, and sensor networks to gather comprehensive and spatially-temporally resolved data on marine debris distribution. Advanced analytics, machine learning algorithms, and predictive modeling techniques can identify patterns and trends, enabling a deeper understanding of debris sources, transport mechanisms, and hotspots. This integrated approach not only enhances prediction accuracy but also provides valuable insights for policymakers to develop effective mitigation strategies. However, the accuracy and reliability of big data significantly influence the validity of these predictions. Inaccurate or biased data can lead to flawed models, resulting in misleading predictions and ineffective policy actions. Integrating heterogeneous data sources presents significant challenges, requiring robust data validation, continuous monitoring, and the development of adaptive algorithms to address data uncertainties. A prime example of the limitations of relying solely on global metadata is the case of Sri Lanka, which was erroneously ranked among the top five countries globally in terms of plastic waste leakage into the ocean. This misclassification stemmed from significant uncertainties in the source data and the model parameters used for the ranking. Furthermore, the over-reliance on beach surveys for data collection introduces biases, as these surveys often concentrate on easily accessible hotspots while neglecting inland waterways, which are major contributors to marine debris. Therefore, while big data offers immense potential for advancing marine debris prediction, ensuring data accuracy and reliability is paramount. Model predictions based on global metadata should be rigorously validated through robust and unbiased empirical surveys to generate more precise baseline data and improve the accuracy of predictions. By addressing these challenges, we can fully harness the potential of big data to effectively mitigate the impacts of marine debris pollution.

OP 02 Plastic and Other Anthropogenic Debris in Beach and Marine Habitats with Its Prevalence in Fish off the Saint Martin's Island, Bangladesh

Kazi Ahsan Habib[1]*, Md. Jayedul Islam[1], Md. Nazmus Sakib[1], Md. Abu Talha[1], Shilpi Sarkar[2], Mir Mohammad Ali[3], Md. Faijul Alam Siddik[4] and Sk. Ahmad Al Nahid[5]

[1]Aquatic Bioresource Resource Lab, Department of Fisheries Biology and Genetics, Sher-e-Bangla Agricultural University, Dhaka 1207, Bangladesh; [2]Department of Zoology, Jahangirnagar University, Savar, Dhaka-1342, Bangladesh; [3]Department of Aquaculture, Sher-e-Bangla Agricultural University, Dhaka 1207, Bangladesh; [4]Channel 24, 387 (south) Tejgaon I/A, Dhaka-1207, Bangladesh; [5]Department of Fisheries Resource Management, Chattogram Veterinary and Animal Sciences University, Khulshi-4225, Chattogram, Bangladesh.
*Email: habibka@sau.edu.bd

Plastics and debris have emerged as significant global pollutants, posing serious threats to the marine environment. This study investigated the presence and distribution of these pollutants on Saint Martin's Island (SMI) in Bangladesh. There were two primary objectives: 1) we assessed the abundance and distribution of different anthropogenic debris comprising large/macro plastic (MaP; Size: ≥5 mm) and other debris (MDB) materials on both beach and underwater habitats, 2) the concentration of microplastic (MP) was measured in beach sand, marine waters, and three coral-associated fish species (*Epinephelus coioides*, *Lutjanus bohar*, and *Parastromateus niger*). A total of 10,153 marine debris items (MaP and other debris) were collected, weighing a combined 212.81 kg. The densities of MDB on the beachfront ranged from 0.077 to 0.446 items/m². In underwater habitats, 116 items of thirteen different types of MDB were found, with densities ranging from 0.12 to 1.18 items/m. A beach cleaning initiative was conducted, resulting in the collection of 2549 MDB items weighing 62.35 kg from 10 sites. To raise awareness, two giant sculptures of a coral fish and a sea turtle were created using discarded items, promoting the principles of reduce, refuse, reuse, and recycle. Regarding micro-level pollution MP concentration in beach sand samples ranged from 51.67 to 278.33 particles/kg of sand, equivalent to 1225.65 to 6213.02 particles/m². The average MP concentration in marine water samples was 0.03 particles/m³, ranging from 0.014 to 0.059 particles/m³. The average size of MPs found in fish species ranged from 24-1000 µm, 540-940 µm, and 150-200 µm in *E. coioides*, *L. bohar*, and *P. niger*, respectively. Five types of microplastic polymers were identified in sand and water samples: Polyethylene (PE), Polypropylene (PP), Polystyrene (PS), high-density polyethylene (HDPE), and low-density polyethylene (LDPE), with PE being the most dominant (32%). This study provides a comprehensive assessment of plastic (macro and micro) and other anthropogenic debris pollution in SMI for the first time. These findings will be crucial in developing effective strategies to mitigate the environmental challenges facing this recently declared Marine Protected Area.

OP 03 Effect of Environmental Parameters on Seasonal Abundance and Diversity Of Macro-Benthos in Pasur River Estuary, Bangladesh

Md. Abu Sayed Jewel* and Bithy Khatun

Department of Fisheries, Faculty of Fisheries, University of Rajshahi, Rajshahi-6205, Bangladesh.
*Email: abujewel75@gmail.com

Macro-benthos is key element ultimately used for bio-assessment of aquatic ecosystem status and also play significant role to the aquatic food web. The main intention of this present study is to explore a baseline information of the macro-benthic assemblages and using them as indicator in further research work for estuarine water. Seasonal samples were collected from January‟ 2022 to December‟ 2022 including three different seasons. Hydrological and soil samples were collected by following the standard guidelines. Every environmental parameter showed ($P < 0.01$) significant seasonal differences. Water temperature, transparency, salinity, alkalinity, TDS were significantly higher during premonsoon, whereas pH, DO, NO_3^--N and PO_4^{3-}-P were maximum in post-monsoon season and minimum in the time of monsoon except DO. During the study period silt was dominated in the study area followed by clay and sand. For organic matter maximum and minimum value were noticed in post-monsoon and monsoon season respectively. PCA biplot of the environmental parameters explained 49.4% and 39% variability of the data, thus accounting for 88.40% of cumulative data variability. A total of 47 species belonging to 35 families of macro-benthos were collected during the study period. Species accumulation curves by rarefaction indicate post-monsoon to be more speciose (41) than pre-monsoon (34) and monsoon (27). Significantly higher species density was also recorded in post-monsoon season (545 ind./m^2) followed by pre-monsoon (214 ind./m^2) and monsoon season (63 ind./m^2). Species diversity and evenness were significantly higher in post-monsoon and lower in monsoon period. ANOSIM indicated remarkably difference in species assemblage of Pasur River estuary among the seasons ($R = 0.72$, $P = 0.000$) which was reflected in non-metric multidimensional scaling (NMDS) plot. SIMPER analysis detected *Dendronereis aestuarina* was the most contributory species for overall average dissimilarity among the seasons. Interaction between environmental parameters and macro-benthic community composition of Pasur River estuary were determined by using canonical correspondence (CCA) analysis. Among the environmental variables, DO and percentage of silt concentration in the bottom were positively correlated with *Pristina acuminata, Lumbrineris* sp*., Cossura coasta, Capitella capitata, Neritina violacea, Laccotrephes griseus, Hydrometra butleri, Gomphus* sp*.* and *Libellula* sp. From the present research findings, it can be stated that the assemblage of macro-benthos is largely influenced by environmental parameters in Pasur River estuary.

OP 04 Integrated Assessment of Pollution Dynamics and Ecological Impacts in the Rupsha-Pashur River System and the Sundarbans Mangrove Ecosystem

SM Mustafizur Rahman*, Sheikh Fahim Faysal Sowrav, Nafis Imtiaj Hossain, Md. Ujayer Ahmed Hasib, Md. Mahfuz Mazumder, Md. Amit Hasan and Nawsin Alam

[1]Departmemt of Oceanography & Hydrography, BSMR Maritime University, Bangladesh
*Email: mustafizur.ocn@bsmrmu.edu.bd

The Sundarbans mangrove forest, a UNESCO World Heritage Site, faces numerous threats, including pollution from the surrounding river systems. This study investigates the pollution dynamics of the Rupsha-Pashur River system, a major tributary of the Ganges, and assesses its ecological impacts on the Sundarbans mangrove ecosystem. This study conducted a multidisciplinary assessment of pollution dynamics in the Rupsha-Pashur River system, investigating its ecological impacts on the Sundarbans mangrove ecosystem. Water and sediment samples were collected from nine stations across the system, considering spatial and tidal variability. Analysis revealed moderate to high levels of heavy metals, including lead, cadmium, and chromium, primarily attributed to industrial discharges and vessel activities. As shown in the figure, total petroleum hydrocarbons (TPH) levels were elevated, particularly near boat routes, indicating significant vessel contributions. Nutrient concentrations, including nitrate and phosphate, were also elevated, primarily due to agricultural runoff and urban inputs. Dissolved oxygen (DO) levels exhibited spatial and temporal variations, influenced by tidal mixing and organic decomposition. The study observed declines in phytoplankton diversity and significant ($p < 0.001$) impacts on phytoplankton density in areas with higher pollution loads. These findings highlight the critical need for the implementation of sustainable pollution management strategies to safeguard the ecological integrity of the Sundarbans, a globally significant mangrove ecosystem.

OP 05 Climate-Resilient Strategies for Sustainable Shrimp Farming in Bangladesh

Syed Hafizur Rahman[1*], Saroj Kumar Mistry[1,3], Sumaiya Tabassam Joty Mony[2], Shikder Saiful Islam[2] and Md. Golam Sarower[2]

[1]Department of Environmental Sciences, Jahangirnagar University, Bangladesh
[2]Fisheries and Marine Resource Technology Discipline, Khulna University, Bangladesh, [3]Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh
*Email: hafizsr@juniv.edu

Shrimp farming is a crucial economic sector in Bangladesh, contributing significantly to export earnings and rural livelihoods. However, the industry faces escalating challenges, with climate change emerging as a primary concern. As one of the most vulnerable nations to climate change, Bangladesh is witnessing rising temperatures, erratic rainfall patterns, and prolonged droughts, which exacerbate salinity levels and disrupt water quality parameters such as temperature, pH, dissolved oxygen, and alkalinity. These changes severely impact shrimp farming by reducing feed intake, stunting growth, and triggering disease outbreaks. Heavy rainfall further complicates shrimp farming by lowering dissolved oxygen levels, causing sharp fluctuations in pH and salinity, and promoting the emergence of new diseases. Conversely, higher temperatures degrade water quality and availability, compounding the stress on shrimp. In response, many farmers resort to using aqua drugs, chemicals, feed additives, and antibiotics to combat these challenges. However, these interventions often yield limited success, highlighting the urgent need for more effective and sustainable solutions. Emerging technologies such as biofloc, aqua mimicry, and synbiotics offer promising alternatives to address the climate-induced challenges in shrimp farming. Synbiotics improve water quality, enhance, shrimp growth, gut health and disease resistance, making them a viable solution for climate-resilient shrimp farming practices. To achieve sustainable shrimp farming in coastal Bangladesh, the integration of advanced technologies like synbiotics with community-based adaptation strategies is essential. This includes raising awareness among farmers about climate change impacts and the benefits of adopting resilient farming practices. Strengthening farmer knowledge and capacity through targeted training programs can facilitate the transition to sustainable aquaculture practices. Moreover, policy support and research initiatives are necessary to scale these innovations and ensure widespread adoption. This study underscores the importance of climate-resilient strategies in safeguarding the future shrimp. By combining technological advancements with grassroots adaptation efforts, the shrimp farming sector can enhance its resilience to climate change, ensuring sustainable production, improved livelihoods, and long-term environmental stewardship.

OP 06 Marine Litter from Ghost Fishing Gear in the Bay of Bengal: Challenges for Sustainable Coastal and Marine Resources of Bangladesh

Md. Sazedul Hoque*, Md. Mahmudul Hasan and Md. Khairul Islam

Department of Fisheries Technology, Faculty of Fisheries, Patuakhali Science and Technology University, Dumki, Patuakhali-8602, Bangladesh
*Email: sazedul.fst@pstu.ac.bd

The southern coastal districts of Bangladesh, particularly Patuakhali and Cox's Bazar, are renowned for their significant contribution to the national fish catch, particularly hilsa and shrimp, from the Bay of Bengal. However, artisanal gillnet and seine net fisheries, which dominate the fishing sector, contribute significantly to the accumulation of Abandoned, Lost, or Discarded Fishing Gear (ALDFG), commonly known as "ghost gear," in the Bay of Bengal. This study aimed to investigate the prevalence of marine litter, particularly from ghost gear, in two coastal sites: Kuakata in Patuakhali and Najirartak & Doriarnagar in Cox's Bazar. Three groups of stakeholders, including local youth, daily fishers, and deep-sea artisanal fishers (totaling over 100 members), were involved in the collection of ALDFG. Over 4000 kg of ALDFG was collected across both sites, with local youth demonstrating the highest level of participation. A questionnaire survey conducted among 200 fishers in both locations revealed a high awareness of ALDFG and its co-occurrence with other marine debris, such as plastics and polyethylene. To mitigate the impact of marine litter from ghost gear, the study implemented a multi-pronged approach, including promotional awareness campaigns, beach cleaning drives, provision of necessary inputs, and training programs for relevant stakeholders. Effective policy implementation, coupled with increased awareness among fishers, is crucial for minimizing the impact of marine litter from ghost gear, improving the health of the coastal and marine ecosystem, and safeguarding the livelihoods of coastal fishing communities in the Bay of Bengal, Bangladesh.

OP 07 Hypoxia in Coastal Waters: Ecological Consequences and Adaptive Responses in Aquatic Animals

Md. Golam Sarower[1]*, Alokesh Kumar Ghosh[1] and Md Saydur Rahman[2]

[1]Fisheries and Marine Resource Technology Discipline, Khulna University, Bangladesh
[2]School of Integrative Biological and Chemical Sciences, University of Texas Rio Grande Valley, Texas, USA
*Email: sarower@fmrt.ku.ac.bd

Hypoxia, a recurring seasonal phenomenon in estuaries and coastal regions, has become increasingly prevalent over the last four decades due to eutrophication from anthropogenic inputs. Hypoxic conditions, often called "dead zones," mostly result from agricultural runoff enriched with nitrogen and phosphorus. Globally, over 400 coastal zones, including the Bay of Bengal, now experience hypoxia, covering approximately 250,000 km². The ecological consequences and effects of hypoxia are significant, especially for marine life, notably affecting the reproductive and physiological activities of teleost fishes. At hypoxic sites, the development of ovaries and testes is significantly impaired, resulting in reduced fecundity and decreased sperm production in Atlantic croaker. For instance, croaker species in the northern Gulf of Mexico exhibit endocrine disruptions linked to elevated reactive oxygen species (ROS), nitric oxide synthase, and other stress-related factors (Fig). Hypoxia also induces structural changes in fish gills, such as reduced epithelial thickness and increased respiratory surface area. In juvenile crabs, hypoxia activates the Hypoxia-Inducible Factor (HIF) pathway, leading to metabolic shifts and increased antioxidant activity. Transcriptomic analyses reveal thousands of differentially expressed genes in hypoxia-sensitive and hypoxia-tolerant groups, predominantly affecting pathways like oxidative phosphorylation, apoptosis, and MAPK signaling. These molecular responses highlight the adaptive mechanisms that underpin hypoxia tolerance. The escalating prevalence of hypoxic zones underscores the urgent need for mitigating eutrophication and understanding its complex effects on aquatic ecosystems to preserve biodiversity and ecosystem functionality.

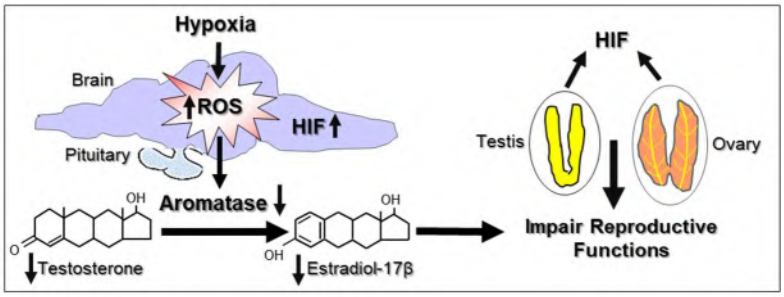


Figure: Graphical summary of upregulation of reactive oxygen species (ROS) and hypoxia-inducible factor (HIF), and downregulation of brain aromatase and plasma steroid hormone levels and impairment of gonadal development in teleost fishes after environmental exposure to hypoxia.

OP 08 Closed-Recirculating Aquaculture System (C-RAS) for Sustainable Management of Fish Farming and Marine Ecosystem

Akihiro Takemura[1,2]*, Yafan Zhu[2], Kodai Fukuknaga[2] and Yuji Hiratsuka[2]

[1]Department of Chemistry, Biology and Marine Science, University of the Ryukyus, 1 Senbaru, Nishihara, Okinawa 903-0213, Japan; [2]Research Promotion Organization, University of the Ryukyus, 1 Senbaru, Nishihara, Okinawa 903-0213, Japan; *Email: takemura@sci.u-ryukyu.ac.jp

The escalating impacts of global warming and marine pollution have significantly challenged traditional open-sea aquaculture, necessitating a shift towards more sustainable land-based systems. Closed-Recirculating Aquaculture Systems (C-RAS) offer a promising solution by cultivating aquatic species in controlled, closed environments where water is continuously recycled. This approach minimizes environmental impact on coastal areas, reduces exposure to microplastics, and enables precise control of rearing conditions for optimal fish growth. Our research focuses on developing and optimizing C-RAS technology for the cultivation of the Malabar grouper (Epinephelus malabaricus), a commercially valuable species in Okinawa. By investigating the biological characteristics of this species, such as photoreception and osmoregulation, we have identified strategies to maximize growth potential. For example, we have successfully enhanced growth and appetite by utilizing blue LED light exposure and rearing in low-salinity water. These innovative techniques not only promote rapid growth but also contribute to the production of high-quality, safe, and consumer-friendly fish. This presentation will delve into the advantages of C-RAS technology, discuss our efforts in optimizing environmental control for enhanced growth, and explore the development of non-invasive health assessment methods for fish in these systems. These advancements contribute significantly to the development of sustainable and environmentally responsible aquaculture practices.

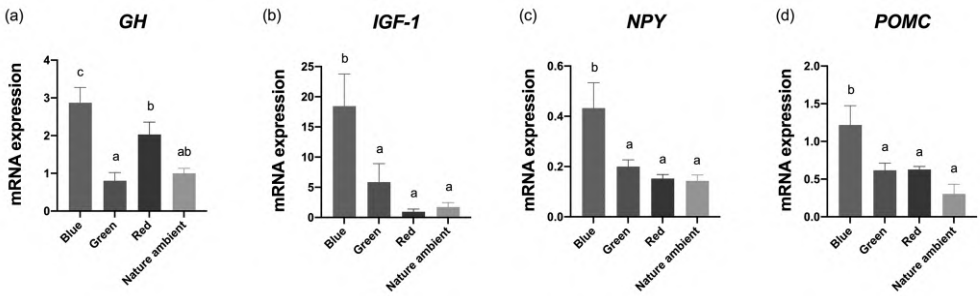


Figure: Transcript levels of growth hormone (*GH*) in the pituitary, insulin-like growth factor (*IGF-I)* in the liver, neuropeptide Y (*NPY*) and pro-opiomelanocortin (*POMC*) in the brain (diencephalon) of the Malabar grouper under different LEDs (red, green and blue) and ambient light condition.

OP 09 Citizen Science-Based Monitoring of Land-Based Macroplastic Pollution in the Coastal Areas of Bangladesh: A Quality Control Approach

Subrata Sarker[1]*, Nabanita Das[1], Abu Bokkar Siddique[1], Shashowti Chowdhury Riya[1], Md. Azizul Fazal[1], Faisal Sobhan[1] and Gawsia Wahidunnessa Chowdhury[2]

[1]Department of Oceanography, Shahjalal University of Science and Technology, Sylhet 3114, Bangladesh
[2] Department of Zoology, University of Dhaka, Dhaka 1000, Bangladesh
*Email: subratasrk-ocg@sust.edu

Plastic pollution poses a significant threat to the health and integrity of coastal ecosystems globally. This study aimed to investigate the distribution of land-based macroplastic pollution in the coastal areas of Bangladesh and enhance our understanding of associated risks. To address this, we employed a citizen science approach utilizing an Android application to collect data on land-based macroplastic pollution along the Bangladeshi coastline. From December 2022 to December 2023, approximately 3600 photographs of plastic items were collected from 215 citizen scientists across 580 km of the Bangladeshi coastline. A total of 43 distinct types of land-based plastic items were identified. Single-use plastics accounted for 58.2% of the reported items, while disposable plastics comprised 41.8%. Spatial analysis revealed significant variability in the distribution of plastic items along the coastline, with evidence of spatial clustering in certain areas. The findings of this study provide valuable reference data and a baseline for future research on plastic pollution in the Bangladeshi coastal environment. Furthermore, this study demonstrates the effectiveness of a citizen science approach for collecting high-quality data on plastic pollution.

OP 10 Hydrogen Blending Strategies for CO_2 Emission Reduction in C3H8/Air Counterflow Diffusion Flames

Akter Hossain[1]*, Mohammed Abdur Rahman[2] and Sarder Firoz Ahmmed[3]

[1]Bangabandhu Sheikh Mujibur Rahman Science and Technology University, Pirojpur, Bangladesh
[2]Department of Mathematics, National University, Gazipur-1704, Dhaka, Bangladesh
[3]Mathematics Discipline, Khulna University, Khulna- 9208, Bangladesh
*Email: dahossain.tu@gmail.com

Climate change, driven primarily by the combustion of fossil fuels, poses a significant threat to the global environment, particularly marine ecosystems. The combustion of hydrocarbon fuels is a primary source of CO_2 emissions, intensifying global warming and triggering profound effects on marine ecosystems. The elevated CO_2 levels lead to ocean acidification, temperature fluctuations, and food chain disruptions, threatening marine biodiversity and driving many species toward extinction. Therefore, reducing CO_2 emissions is a crucial event for addressing climate change and preserving ecological balance. This study employs numerical simulations to investigate strategies for reducing CO_2 emissions in C3H8/Air counterflow diffusion flames by blending hydrogen (H_2) into the propane (C3H8) fuel stream. The numerical analysis solves the governing equations for mass, momentum, energy, chemical species transport, and the equation of state using a detailed combustion chemistry model incorporating 350 elementary reactions and 53 species. One-dimensional (1D) and steady-state numerical computations are performed using the OPPDIF (a Fortran Program for Computing Opposed-Flow Diffusion Flames) code with appropriate boundary conditions, and a grid adaptation technique to ensure maximum accuracy in the simulated results. The numerical results demonstrate that increasing the hydrogen fraction in the fuel stream (C3H8) significantly alters the thermal and chemical structure of the diffusion flames, leading to a substantial reduction in CO_2 emissions and its precursors. This research highlights hydrogen blending as a promising strategy to reduce CO_2 emissions in diffusion flames, supporting global decarbonization efforts. Besides, this study provides valuable insights into the chemical reaction pathways contributing to CO_2 reduction, offering viable solutions to mitigate climate change, protect marine ecosystems, and advance sustainable, cleaner combustion technologies to address energy demands.

OP 11 Assessment of Microplastic Abundance, Characteristics, and Polymers in Fish from the Saint Martin's Island, Bangladesh

Md. Maheenur Mizan Khan, Khondoker Maksumul Alam and Md. Abdullah Yousuf Al Harun*

Environmental Science Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: harun@es.ku.ac.bd

Microplastic pollution has emerged as a critical environmental concern, significantly impacting freshwater and marine ecosystems. This study investigated the prevalence and characteristics of microplastics in four commercially important fish species (*Johnius argentatus*, *Otolithoides pama*, *Loligo edulis*, and *Portunus pelagicus*) frequently consumed by residents of Saint Martin's Island, Bangladesh's sole coral island. Microplastics were detected in all fish samples analyzed, with varying levels of abundance. Demersal species exhibited higher microplastic burdens compared to benthic species. The most common microplastics observed were white in color and ranged in size from 0.01 to 4.7 mm. Fibers constituted the dominant type (80%), followed by films and fragments. Fourier Transform Infrared (FTIR) spectroscopy identified rayon, nylon, and polyethylene as the major polymer types. These findings highlight the potential ecological risks associated with microplastic pollution in the marine environment of Saint Martin's Island, particularly the threat of bioaccumulation in marine organisms. Further research with larger sample sizes encompassing fish, water, and sediment is necessary to comprehensively assess microplastic contamination in this ecologically sensitive region.

OP 12 Biopolymers from Fish Waste: A Green Recycle Approach

Shaikh Jamal Uddin*

Pharmacy Discipline, Life Science School, Khulna University, Khulna-9208, Bangladesh
*Email: uddinsj@pharm.ku.ac.bd

Sustainable resource utilization and waste management are critical for a circular economy. This study, for the first time, systematically optimized the extraction of gelatin, chitosan, and collagen from *Macrobrachium rosenbergii* shell waste, a significant waste stream from the aquaculture industry in Bangladesh. Extraction was optimized using response surface methodology (RSM) with a 3-factors, 3-levels central composite design (CCD), investigating the effects of HCl concentration, extraction time, and temperature. The optimized conditions resulted in a significant increase in yield compared to conventional methods, with yields of 6.16% for gelatin, 1.8% for collagen, and 48% for chitosan. Characterization revealed desirable physicochemical properties for all extracted biopolymers. In vivo studies demonstrated that chitosan exhibited dose-dependent antibacterial activity against *S. aureus, B. subtilis, E. coli*, and *P. aeruginosa*. Furthermore, chitosan treatment significantly lowered plasma levels of total cholesterol (TC), triglycerides (TG), LDL-cholesterol (LDL-C), VLDL-cholesterol (VLDL-C), and liver enzymes (ALT, AST, ALP) in a high-fat-high carbohydrate diet-induced obese rat model, likely through up-regulation of hepatic LDL receptor mRNA expression as revealed by RT-PCR analysis. This research demonstrates the potential of valorizing fish waste into high-value biopolymers, contributing to a more sustainable and circular aquaculture industry while mitigating environmental pollution.

OP 13 Recovery and Characterization of Calcium-Rich Mineral Powders from Fish and Shrimp Waste: A Smart Valorization of Waste to Treasure

Mst. Aspriya Rahman Antu and Monjurul Haq*

Department of Fisheries and Marine Bioscience, Jashore University of Science and Technology, Jashore 7408, Bangladesh
* Email: mr.haq@just.edu.bd

Sustainable waste management and resource recovery are crucial for a circular economy in the aquaculture sector. This study comprehensively characterized the physicochemical, nutritional, and functional properties of calcium-rich powders obtained from fish (mackerel tuna, pangas) and shrimp waste. The study employed optimized extraction and processing techniques to maximize the recovery of valuable biomaterials. Significant protein content was observed in all powders, with shrimp shell powder (SSP) exhibiting the highest protein content (37.78%). Ash content was high in pangas bone powder (PBP) and tuna bone powder (TBP) at around 62.80%. Amino acid analysis revealed the presence of 14 different amino acids. SSP demonstrated the highest water holding capacity (WHC) and oil holding capacity (OHC). FE-SEM analysis revealed distinct microstructures, while EDX analysis confirmed the presence of high levels of calcium and phosphorus in the powders. All detected heavy metal concentrations were within acceptable limits. The recovered powders exhibited significant antioxidant activity. The findings demonstrate the potential of these powders for various applications, including animal feed, biocomposites, and as a source of calcium and other essential minerals in food supplements. This research contributes to the development of sustainable and value-added utilization of fish and shrimp waste, promoting a more circular and environmentally friendly aquaculture industry.

OP 14 Microalgae-Induced Molting Efficacy, Enzyme Activity and Histological Improvement in Freshwater Prawn (*Macrobrachium rosenbergii*) Larval Development: A Comprehensive Study

H M Rakibul Islam[1#]* Md. Shoebul Islam[1#], Md. Touhidul Islam[1], Md. Iqramul Haque[1], Mst. Aziza Begum[1,2], Mizanur Rahman Washim[1], Md. Shariful Islam[1], ASM Tanbirul Haque[1], Md. Harunor Rashid[3], Md Shahidul Islam[1] and Anuradha Bhadra[3]

[1]Bangladesh Fisheries Research Institute, Shrimp Research Station, Bagerhat-9300, Bangladesh
[2]Bangladesh Civil Service, Kishoreganj, Bangladesh; [3]Bangladesh Fisheries Research Institute, Mymensingh-2201, Bangladesh
*Emai: rakib.bfri@gmail.com

This research, pioneering in its nature, examined the impact of microalgal supplements on the larval developmental processes and mass production of Freshwater Prawn (*Macrobrachium rosenbergii*) post-larvae (PL) within a conventional prawn hatchery. Overcoming the obstacles in Bangladesh's prawn PL production since 2011 was the prime concern of this experiment. Six 3000L cemented tanks constituted the two treatments and a control group in replicates. In Treatment 1 (T1), microalgal supplementation was administered at a concentration of 4 ppm, consisting of 2 ppm of spirulina and 2 ppm of black algae powder, four times daily; conversely, Treatment 2 (T2) received the identical dosage six times daily while the control tank (C) did not receive any algal supplementation. Nearly 87000 freshly hatched larvae were stocked in each tank. Significantly higher ($p<0.05$) PL production was found in T2 followed by T1 and C. Analogously, a substantially higher survival rate was recorded in T2 (93.59±2.82%) followed by T1 (86.28±3.58%) and C (62.42±0.75%). Amylase enzyme activity was found significantly higher ($p<0.05$) in T2 followed by T1 and C. Protease and lipase enzyme activity were found significantly higher ($p<0.05$) in the treatments than the control, however, no significant difference within the treatments was observed. In contrast, SOD activity recorded significantly higher ($p<0.05$) in the control group than in the treatments. The well-organized and continuous distribution of the hepatopancreas and muscle tissues indicated improved health conditions in PL from treatment tanks, contrasting with irregular distribution and less organized muscles in control PL. The findings demonstrated that the application of 4 ppm microalgae 6 times a day can significantly increase healthy PL production in prawn hatcheries.

OP 15 Pathways of Plastic Waste into Water Bodies – Imagination, Perception, Reality Check

Thomas Haupt[1*] and Eckhard Kraft[1]

[1]Bauhaus-Institute for Infrastructure Solutions (b.is), Chair of Resource Management, Bauhaus-Universität Weimar, Weimar 99423 Weimar, Germany
*Email: thomas.haupt@uni-weimar.de

Plastic waste has emerged as a pressing environmental issue, especially in countries experiencing rapid urbanization and industrial growth. The widespread availability and low cost of plastic products have led to their excessive use. Combined with inadequate waste management systems, this has resulted in significant environmental and health impacts. Macroplastics clog drainage systems, leading to urban flooding during monsoons. The rivers and wetlands, essential for the country's biodiversity, are becoming increasingly polluted. Ultimately, they end up in the oceans as Microplastics, threatening marine life and food security. In order to protect maritime habitats and achieve long-term reduction of marine debris, the main entering pathways of plastics from land into aquatic systems will have to be stopped. Municipal waste management systems need to be sustainably redesigned with regard to plastic prevention strategies and demand- and resource-oriented collection and disposal in order to prevent large-scale pollution at source. The respective development should always take local conditions and opportunities into account and involve stakeholders in the planning process. History has shown in countless examples that the unconditional adoption of concepts and technologies does not necessarily lead to success but regularly fails. It can be assumed that in most cases the challenges are recognised by both the population and the responsible authorities. Littering is difficult to ignore but is often accompanied by helplessness. Improper handling is either a result of a lack of awareness, unclear responsibilities, weak infrastructure or insufficient financial resources, often as a mixture of all aspects, therefore a complex problem. Profitable parts of waste management are usually covered by the private or informal sector (recycling shops, waste collectors, waste pickers) which must be taken into account when making changes. When approaching the topic, actors tend to view the situation from a very personal, specialised perspective without placing it in an overall context. This includes sector-specific and industrial processes. In addition, social content is separated from the technical, conceptual content. A collaborative effort from the government, industries, and citizens would be desirable at this point and would lead to decisive action and sustainable practices. The presentation uses examples, mostly in Bangladesh, to provide an insight into the complex issue of waste treatment, the players involved and the challenges at selected locations outside the actual treatment chain and attempts to show the path from assumption to reality.

OP 16 Best Available Data and the Challenge of Quantifying Plastic Waste Flows

Senta Berner [1*], Sourav Saha[2], Pangkaj Kumar Mahanta[2], Swadhin Das[2] and ASM Rokkibuzzaman[2], Eckhard Kraft[1]

[1]Chair for Resource Management, Faculty of Civil and Environmental Engineering, Bauhaus-Universität Weimar
[2]Department of Civil Engineering, Khulna University of Engineering & Technology
*Email: senta.berner@uni-weimar.de

Based on current estimates, most marine plastic litter originates from land-based sources, making interventions in municipal solid waste management a priority in the fight against marine pollution. To identify emission hotspots and adequately evaluate the environmental impact and cost-effectiveness of any interventions or preventive measures, it is vital to understand how plastic waste flows migrate from the point of generation to their final destination. However, monitoring and especially quantifying (plastic) waste flows poses various challenges. This study compiles the findings from existing literature and experiences from a 3-year research project in Khulna, Bangladesh. It investigates the best available datasets, identifies critical data bottlenecks to determine plastic waste flows and evaluates datasets based on the FAIR principles and metadata availability. As previous research has shown, the main challenges in municipal solid waste data are a lack of standardized methods, inconsistencies in estimation approaches, data silos, the involvement of the informal sector and rapidly changing urban environments. Experiences from the research project confirmed these findings. A particular difficulty resulted from the vastly differing population estimates for Khulna City, ranging from 720,000 people according to the latest census (BBS 2022) to 1.3 million, as estimated by the ward councillor offices (Ward Counc. 2022). Consequently, the absolute plastic waste generation varies between 17 and 32 tonnes per day equally. With infrastructure developments depending on these numbers, the study finds that developing sound databases and validation processes and understanding how to deal with uncertainties transparently is essential to ensure the environmental, financial and social sustainability of interventions.

OP 17 Port-Based Marine Litter Dynamics: Addressing Plastic Waste from Vessels for Coastal Ecosystem Health in the Bay of Bengal

Trisa Das[1*], Niloy Das[1], Mst. Farzana Rahman Zuthi[1], Sudip Kumar Pal[1], Sharmin Rahman[2] and Md. Al Amin[2]

[1]SCIP Plastics Project, Department of Civil Engineering, Chittagong University of Engineering and Technology (CUET), Chattogram-4349, Bangladesh
[1]SCIP Plastics Project, Department of Civil Engineering, Khulna University of Engineering and Technology (KUET), Khulna, Bangladesh
*Email: trisa.das.td@gmail.com

Marine pollution, especially from plastic debris, poses significant threats to biodiversity, aquatic health, public well-being, and economic stability. Annually, approximately 11 million metric tons of plastics are introduced into the ocean, and an estimated 200 million metric tons presently exist in marine ecosystems. The Bay of Bengal, one of the most biologically productive marine ecosystems globally, receives about 0.2 million metric tons of plastic waste annually from Bangladesh. Plastic pollution affects more than 60% of seabirds and 100% of sea turtles, leading to life-threatening issues such as reduced fitness, impaired nutrient absorption, and decreased feeding efficiency, all critical for survival. In Bangladesh, the Chattogram and Mongla ports are critical sources of marine litter, with land-based and sea-based sources substantially contributing to the pollution. This study aims to investigate the sources and pathways of marine plastic litter, with a particular focus on port areas. Based on the findings, local ships are one of the significant sources of marine plastic pollution due to insufficient waste management systems. The findings will aid stakeholders in pinpointing hotspots of marine plastic pollution and developing a sustainable waste management strategy.

Figure: Sources of marine litter

OP 18 Transitioning to Jute: A University-Based Framework for Plastic Waste Reduction in Bangladesh

Farjana Khan, Md. Ajijur Rahman*, Nushrat Nureen, Mst. Farzana Rahman Zuthi and Asiful Hoque

SCIP Plastics Project, Department of Civil Engineering, Chittagong University of Engineering and Technology (CUET), Chattogram-4349, Bangladesh.
*Email: u1701114@student.cuet.ac.bd

Bangladesh's strategic location in the Ganges-Brahmaputra-Meghna Delta presents unique challenges in plastic waste management, ranking 10th globally in marine pollution despite relatively low per capita plastic waste generation. This positioning, combined with inadequate waste management infrastructure, creates an urgent need for sustainable alternatives. This study introduces a campus-based model for implementing jute products as a sustainable substitute for plastic, leveraging the heritage of Bangladesh as a traditional jute-producing nation. The research adopts a systematic approach beginning with a comprehensive analysis of existing case studies and campus-specific needs assessment through targeted surveys, followed by the development of a sustainable implementation framework incorporating awareness campaigns and jute product distribution. The university campus serves as an ideal testbed due to its controlled environment, diverse population, and manageable scale, enabling strategic deployment of jute alternatives within the university environment, including students, staff, and campus businesses. The model emphasizes continuous improvement through iterative implementation and regular feedback mechanisms, with effectiveness measured through quantitative and qualitative assessment of adoption rates and plastic reduction via structured surveys. This pilot study aims to achieve measurable reductions in plastic usage while developing scalable strategies for broader urban implementation. By evaluating the feasibility and impact of replacing plastic with jute products, the conceptual model seeks to contribute valuable insights into practical measures for reducing plastic pollution and promoting sustainability in educational institutions and beyond.

OP 19 Chemical Use and Its Determinants in Commercial Tilapia Farming in Bangladesh: A Cross-sectional Study

Shafiq Rheman[1]*, Laura Khor[2], Sabrina Hossain[1], Jérôme Delamare-Debouteville[2] and David Verner-Jeffreys[2]

[1]Department of Sustainable Aquaculture, WorldFish Bangladesh
[2]Department of Sustainable Aquaculture, WorldFish, Penang, Malaysia
*Email: s.rheman@cgiar.org

Chemicals used in aquaculture, including antibiotics, disinfectants, biocides, and other therapeutic agents, can significantly affect the surrounding environment and disrupt the interconnected One Health sectors, encompassing human, animal, and environmental health, as well as food safety. However, there is limited understanding of the extent and key factors influencing chemical use in aquaculture farms in Bangladesh. To address this knowledge gap, we conducted a retrospective cross-sectional study in November 2022, surveying 116 commercial tilapia farms in Mymensingh, a major tilapia production hub in Bangladesh. The pond-level questionnaire was deployed to collect data from one randomly chosen pond per farm where tilapia farming was conducted during the last production cycle. A total of 68.1% of farmers reported 251 instances of aquamedicine administration involving 61 different products, with the majority (54.6%) being antimicrobial agents, including antibiotics, antiparasitics, and disinfectants, applied in the selected ponds. Approximately 46.6% of the farmers interviewed experienced fish mortality in their ponds and the two primary causes of fish mortality identified by respondents were water quality issues (85.2%) and pathogen infections (66.7%). Univariate logistic regression analysis revealed that the likelihood of using any chemical inputs was approximately twenty-four times higher (OR 23.8, 95% CI: 4.9-116.3, $p<0.05$) on the ponds where clinical signs of illness were present and five times higher in polyculture commercial tilapia farming techniques (OR 5.3, 95% CI: 1.1-26.2, $p<0.05$). Frequent use of chemical products, particularly antimicrobial agents, could have significant risks to both environmental, animal and human health. This practice may contribute to the development of antimicrobial resistance (AMR) and the contamination of aquatic ecosystems with harmful residues. To mitigate these impacts, it is essential to promote preventive measures such as improved water quality management and biosecurity practices, while ensuring the responsible and judicious use of antimicrobials in aquaculture.

OP 20 Advancing Low-Trophic Extractive Mariculture (LTME) in Coastal and Marine Environments for a Thriving Blue Economy in Bangladesh

Md Asaduzzaman*

Department of Marine Bioresource Science, Faculty of Fisheries, Chattogram Veterinary and Animal Sciences University, Khulshi 4225, Chattogram
*Email: a_zamanbau@yahoo.com

Bangladesh, with its extensive and diverse coastal and marine environments, is poised to leverage low-trophic extractive mariculture (LTEM), as a key component of a sustainable blue economy. LTEM species are aquatic creatures residing at lower trophic levels in the marine food web. Marine LTEM species comprise an array of organisms, classified into three principal categories: (1) dissolved nutrient absorbers (seaweeds); (2) filter-feeding bivalves (oysters, mussels, and clams); and (3) deposit feeders (sea urchins and sea cucumbers). Considering the national interest, this study aimed to provide a comprehensive assessment of the status of LTEM in Bangladesh, while addressing the challenges and proposing future strategies to enhance its development. To attain the aim, we followed a mixed approach, combining an intensive literature review, key informant interviews, field research experiences, and key stakeholders' workshops. This study synthesized four key challenges, which were further sub-divided into several thematic issues, of which eight for technical, five environmental, five socio-economic, and two regulatory and policy constraints, revealing systemic inefficiencies such as poor suitability mapping, technological limitation, weak value chains, poor coordination among stakeholders, and insufficient research investment. These issues contribute to knowledge gaps, inconsistent practices, and hinder the development of effective regulatory frameworks, limiting market access, product quality, and export potential. To unlock the above barriers, twelve thematic areas of interventions and enabling outcomes were identified, such as (1) effective marine spatial planning, (2) proven technology tailored to local conditions, (3) skilled manpower to carry out LTEM effectively, (4) high community engagement, (5) climate resilience and adaptation, (6) horizontal expansion of LTEM, (7) diversified LTEM product development, (8) improved market access and values, (9) enhanced economic profitability of LTEM activities, (10) fostering national and international collaboration, (11) environmental sustainability, and (12) sustainable LTEM growth in Bangladesh. These twelve thematic areas of intervention were further refined during plenary discussions in the workshops to form a detailed roadmap for the period 2025–2035. The roadmap outlines a series of sequential actions and identifies key actors for each thematic areas, emphasising on addressing the barriers to LTEM development. By shifting from a project-focused approach to a systems-oriented strategy, the framework integrates stakeholder perspectives and lessons learned to strengthen the LTEM sector of Bangladesh.

OP 21 Polystyrene Microplastics as Microbial Substrates: Characterization of Biofilm Forming Bacteria and *Sinisalibacter aestuarii* sp. nov. Isolated from Estuarine Sediments in Tokyo Bay

Shaikh Tareq Arafat[1,2], Shiori Hirano[1], Anju Sato[1], Katsunori Takeuchi[1], Tetsuya Yasuda[1], Takeshi Terahara[1], Moriyuki Hamada[3] and Takeshi Kobayashi[1]

[1]Graduate School of Marine Science and Technology, Tokyo University of Marine Science and Technology, 4-5-7 Konan, Minato-ku, Tokyo 108-8477, Japan
[2]Fisheries and Marine Resource Technology Discipline, Khulna University, Sher-E-Bangla Road, Khulna 9208, Bangladesh
[3]NITE Biological Resource Center, National Institute of Technology and Evaluation, 2-5-8 Kazusakamatari, Kisarazu, Chiba 292-0818, Japan

Email: shaontareq@gmail.com

In this study, fundamental characteristics of polystyrene microplastics attached bacteria in aquatic environments has been assessed. The strains were isolated by enrichment culture of estuarine sediments with polystyrene pellets and identified by 16S rRNA gene sequencing. Among the isolated strains twenty-four bacterial strains were characterized. Most of the strains were able to form high biofilm on polystyrene pellets. Several characteristics such as enzymatic activity, antibacterial susceptibility, and degradation ability of high-molecular-weight compounds were examined. Among the tested thirteen antibacterial compounds, all the examined strains (nine strains) were susceptible to tetracycline but not to kanamycin and all selected strains were susceptible to several antibacterial compounds. An Opportunistic pathogen *Brevundimonas diminuta* was also found on the substrate. However, hydrolyzation of casein and gelatin were observed by *Bowmanella yangjiangensis* and *Brevundimonas diminuta*. Another high biofilm-forming bacterium designated as strain B-399^T was also isolated and clustered in the genus *Sinisalibacter* based on 16S rRNA gene sequences phylogenetic analysis. The strain B-399^T has low sequence similarity (96.94 %) to known species (*Sinisalibacter lacisalsi* X12M-4^T). Genome sequencing analyses shows that the average nucleotide identity and digital DNA–DNA hybridization values between strains B-399^T and *S. lacisalsi* X12M-4^T were 79.54 and 22.30 %, respectively, which confirms that strain B-399^T represents a novel species of the genus *Sinisalibacter*. Different chemotaxonomic features were almost corresponding with those of the genus *Sinisalibacter* for which the name *Sinisalibacter aestuarii* sp. nov. was proposed. This biofilm forming bacteria on polystyrene is catalase-oxidase positive, can reduces nitrate, produces indole, and slightly hydrolyses aesculin. The study suggests that biofilm forming bacteria on MPs react with several enzymes including proteins, lipids, and carbohydrate hydrolysis enzymes which are also crucial for the environmental aspect. Finally, the results propose that the pathogenicity and antibacterial susceptibility of bacteria on MPs should be considered carefully.

OP 22 Combating Marine Litter and Supporting Sustainable Honey Production in the Sundarbans Mangrove Ecosystem

Abdull Manan Mat Jais[1]*, Reezal Ishak[2], Musfirah Zulkurnain[3] and Md Ahsanul Haque Swapon[4]

[1]Abmanan Biomedical Sdn Bhd, TG1-7, UPM-MTDC Technology Center, 43400 UPM Serdang, Selangor, Malaysia; [2]UniKL MESTECH, A11-1, Jalan TKS1 Taman Kajang Sentral, 43000 Kajang, Selangor, Malaysia; [3]Food Technology Division, School of Industrial Technology, Universiti Sains Malaysia, 11800 Penang, Malaysia; [4]Department of Entomology, Faculty of Agriculture, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur 1706, Bangladesh
*Email: abdullmanan_matjais@yahoo.com

The Sundarbans, a UNESCO World Heritage Site since 1997, is the world's largest mangrove ecosystem. About 62% of this forest is under anthropogenic and climatic stress, including increasing threats from marine litter. This unique ecosystem supports a rich cultural heritage such as traditional honey collection practices. As Geographical Indicator, this honey is renowned for its high quality. Honey production primarily relies on the giant rock bees *Apis dorsata* and *A. mellifera*. This insect is a key pollinator sustaining the ecosystem and safe-guarding authenticity, originality and pureness of the honey where collecting require passion, skills, experiences and endurances. However, despite various efforts, there is lack of regulatory, monitoring, detection technique for measuring or determining purity, and addressing doubt, suspicious and fake honey in the market. This study aimed to establish a comparative baseline for honey quality by analyzing samples from the Sundarbans, Bangladesh, and wild jungles of Malaysia, sourced from reputable beekeepers and suppliers. The analysis included proximate composition, organic material, and assessments of steroid, phenolic, flavonoid, and antioxidant content, along with pH, moisture, and Brix Index. Results demonstrated that all honey samples were safe for human consumption, exhibiting natural dietary composition and potential biomedical benefits. These findings suggest a well-preserved environmental condition and a high degree of integrity among the honey suppliers. While eliminating counterfeit honey in the market may be challenging, this study provides valuable biochemical data that can contribute to the development of reliable methods for authenticating pure honey. This study provides a valuable case study for future research, strategic planning, and sustainable development initiatives in the Sundarbans, aiming to promote a harmonious coexistence between honey production, biodiversity conservation, and livelihoods. Understanding the impact of marine litter on honeybee populations and their role in ecosystem health is crucial for developing effective mitigation strategies in the Sundarbans. The findings of this study can contribute to the broader goals of conservation by highlighting the interconnectedness between human activities, marine litter, and the health of coastal ecosystems.

OP 23 Ideal Protein Concept in Aquafeed as the Strategies to Reduce Microplastics Contamination in Aquaculture

Romi Novriadi*

Department of Aquaculture, Jakarta Technical University of Fisheries (Politeknik Ahli Usaha Perikanan), Ministry of Marine Affairs and Fisheries, Republic of Indonesia, Jl. Raya Pasar Minggu, Jati Padang, Jakarta – 12520, Indonesia
*Email: novriadiromi@yahoo.com

Fish meal is one of the primary protein sources in feed formulation for aquaculture because it has higher digestibility, palatability, attractive flavor, growth-promoting and immune-boosting effect to the aquaculture species. Consequently, the use of fish meal in the aquaculture industry has increased significantly, until recently, it is estimated that aquaculture uses 73% of total fishmeal globally. However, concerns related to the use of fish meal are not only because, in principle, the use of fish as a raw material for fish feed violates the principle of sustainability, but there is a concern that fish meal is also as a vector for carrying microplastics to the aquaculture production system, which are eventually deposited in the fish's body and threaten human health. The most frequently recovered plastic polymers in fishmeal are polypropylene (PP), polystyrene (PS), and polyethylene (PE), and the concentration of these microplastics is higher than the levels found in capture fisheries. For responsible and sustainable aquaculture, it is essential to protect consumers from consuming fish contaminated with microplastics, and one way is to eliminate the inclusion of fish meal in the diet formulation. The most efficient way to formulate fish meal-free is to use the ideal protein concept, where the use of alternative proteins to replace FM should able to meet the demand on the bio-availability of amino acids, fatty acids, carbohydrates, vitamins, minerals, and energy for growth, metabolism and also maintain physiological processes during the culture period. Substituting fish meal with alternative ingredients will undoubtedly impact the palatability and the balance of amino acids in feed. Through the Ideal protein concept, alternative protein sources, such as advanced soy products and corn advance products, can be used in the diet formulation by using proper blending strategy in combination with *limiting nutrients*, such as lysine, methionine, and threonine. The study results showed that the Ideal protein concept could be an effective strategy to reduce microplastic contamination in aquaculture by allowing the use of alternative protein sources without negatively affect the growth performance of fish or shrimp, but at the same time can significantly reduce the microplastics contamination in the final product.

OP 24 Exploring Mud Crab Fisheries and Habitat Dynamics in the Sundarbans Mangrove Forest, Bangladesh: Insights into Distribution and Fishing Practices

Md. Sherazul Islam[1*], Mohammad Mahfuzur Rahman[2], Md. Kamrul Islam[1], Mst. Sharmin Nahar[1], Ramisa Anjum[1], Farhana Afrin Neha[1], Rahima Afroz Rumpa[1], Sathi Nondi[1], Humayara Munia[1] and Sadek Ahmed Maruf[1]

[1]Department of Fisheries and Marine Bioscience, Jashore University of Science and Technology, Jashore-7408, Bangladesh
[2]Department of Climate and Disaster Management, Jashore University of Science and Technology, ashore-7408, Bangladesh
*Email: tuhinkk@yahoo.com

Mud crabs (*Scylla olivacea*) are an economically important species in the Sundarbans mangrove ecosystem, supporting the livelihoods of coastal communities. Understanding the interplay between habitat characteristics and mud crab populations is crucial for sustainable management and conservation. This study investigated the relationships between habitat features and mud crab populations in the Sundarbans over three years (2021–2023). Data were collected from 24 forest stations across four administrative ranges using baited longlines and traps. The findings reveal that salinity gradients strongly influenced crab distribution and abundance. High-salinity zones, characterized by low land elevation, clay loam soil, and vegetation dominated by species such as Pashur (*Xylocarpus mekongensis*), Kholshi (*Aegiceras corniculatum*), and Tiger Fern (*Acrostichum aureum*), exhibited higher catch per unit effort (CPUE) of 3.02 ± 0.77 individuals/hr/gear and supported juvenile recruitment. Moderate-salinity zones, dominated by Sundari (*Heritiera fomes*), Goran (*Ceriops decandra*), Golpata (*Nypa fruticans*), and Kewra (*Sonneratia apetala*), were crucial for sustaining mature crab populations with a lower CPUE of 1.07 ± 0.93 individuals/hr/gear. In these zones, mature females with the highest mean gonadosomatic index (GSI) of 16.26 were observed. Low-salinity zones exhibited a slightly higher CPUE of 1.32 ± 0.79 individuals/hr/gear. Population dynamics analysis revealed male dominance, while mature females were more prevalent in moderate and low-salinity zones, highlighting the need for focused conservation efforts to protect female populations. This study underscores the critical role of habitat-specific factors in shaping the distribution, size, and reproductive dynamics of S. olivacea. The findings emphasize the need for targeted conservation efforts, including the establishment of marine protected areas in high-salinity zones, restrictions on fishing during breeding seasons, and the development of sustainable harvesting practices to ensure the long-term viability of mud crab populations and the overall biodiversity of the Sundarbans.

OP 25 Comparative Genomics of the Dinoflagellate Microbiome Bacterium *Alcanivorax*

Shikder Saiful Islam[1,2]*, Andrew Bridle[2], Frederick De Boever[3], David Green[3] and Christopher Bolch[2]

[1]Institute for Marine and Antarctic Studies, University of Tasmania, Hobart, Tasmania, Australia
[2]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
[3]Scottish Association for Marine Science, Oban, Scotland, United Kingdom
*Email: shikdersaiful.islam@fmrt.ku.ac.bd

Laboratory cultures of many marine phytoplankton contain hydrocarbon-degrading bacteria of the genus *Alcanivorax* that exhibit growth promoting properties for phytoplankton, but how these bacteria support or enhance phytoplankton growth is currently unknown. To elucidate potential mechanisms of interaction, we undertook a comparative study of more than 150 *Alcanivorax* complete or near complete (>70%) genomes and meta-genomes, including genomes of 12 strains newly isolated from four species of the dinoflagellate *Gambierdiscus*. Genome phylogenies based on >140 core metabolism genes resolved *Alcanivorax* into six clusters with high functional gene conservation within clusters, but exhibited different genome sizes, %GC content, codon density, average and maximum length of coding sequences, and the number of mobile genetic elements. Four *Gambierdiscus*-associated genomes clustered with the majority of other algal-associate strains, related to but distinct from a cluster containing *A. borkumensis* SK2, the type strain of the genus, typically associated with oil contaminated sediments. Comparative genome analysis showed that *A. borkumensis* SK2 cluster genomes contain additional pathways for alkane degradation, alginate biosynthesis and nitrate reduction. In contrast, algal associate strains have larger genomes containing additional pathways that appear specific adaptations to phycosphere microenvironments and for interaction with host algal cells, including additional pathways to manage environmental and oxidative stress, amino acid and fatty-acid transport, transport/uptake of iron and biopolymers, and different genes associated with flagellar biosynthesis. We further examined the potential role of oxidative stress as an interactive mechanism using *Alcanivorax*-*Gambierdiscus* co-cultures. Algal-associate *Alcanivorax* strains (and mixed culture microbiomes) significantly reduce reactive oxygen/nitrogen concentration (RON/RNS) in *Gambierdiscus* cultures, increased capacity of *Gambierdiscus* for non-photochemical quenching (NPQ) at saturating light intensities (measured using PAM fluorometry), indicating that *Alcanivorax* alleviates photo-oxidative stress of host dinoflagellate cells.

OP 26 Community-based Organizations to Control Marine Littering in Bangladesh

Md. Wasiul Islam* and Shakil Ahmed

Forestry and Wood Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: wislam@fwt.ku.ac.bd

Marine littering poses a significant threat to the marine environment, coastal ecosystems, and the livelihoods of coastal communities in Bangladesh. This challenge arises from a complex interplay of factors, including inadequate infrastructure, weak regulations, and unsustainable human behaviors. Addressing this issue requires a multi-pronged approach that integrates local actions, national policies, and regional cooperation. This presentation explores the crucial role of Community-Based Organizations (CBOs) in combating marine littering. CBOs, established under various frameworks such as the Ecologically Critical Area Management Rules, 2016, and Protected Area Management Rules, 2017, possess unique strengths in addressing this challenge. These include Public-Private Partnerships (PPPs), Community Cyclone Preparedness Committees, Youth-led eco-clubs, cooperative models, microfinance groups, Community-Based Disaster Risk Management (CBDRM) frameworks, Integrated Coastal Zone Management (ICZM) initiatives, and NGO-led frameworks. CBOs can effectively contribute to marine litter control by i) Improving governance and enforcement: actively participating in policy formulation and monitoring; ii) Leveraging technology: utilizing mobile applications, social media, and other digital tools for data collection and citizen science initiatives; iii) Promoting sustainable tourism: advocating for eco-friendly tourism practices and reducing plastic consumption; iv) Implementing circular economy principles: promoting waste reduction, reuse, and recycling initiatives within coastal communities; v) Building capacity: organizing training programs and workshops for community members on responsible tourism practices; vi) Fostering community engagement: organizing beach clean-ups, awareness campaigns, and community-led initiatives to address marine litter; and vii) Strengthening waste management infrastructure: advocating for and supporting the development of improved waste management. Effective coordination among diverse CBOs and strong institutional support are crucial to ensure the successful implementation of these strategies and effectively combat marine littering in the coastal areas of Bangladesh.

OP 27 Microplastics in Marine Fishes from Different Feeding Habits and Trophic Zones of Bangladesh

Muhammad Abdur Rouf*, Joya Biswas, Srabanti Das Ankhi, and Shaikh Tareq Arafat

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: rouf@fmrt.ku.ac.bd; roufku@yahoo.com

The study aimed to compare the abundance and types of MPs in the gills, gastrointestinal tracts (GITs), and muscles of some marine fishes with varying feeding habits and trophic zones in Bangladesh. For this, two planktivorous species (*T. toil* and *S. longiceps*), three carnivorous (*P. chinensis*, *L. indicum*, and *P. niger*), two pelagic (*C. dussumieri* and *S. fimbriata*) and three benthopleagic (*E. muticus, P. maculatus, O. pama*) species, were studied (n = 90) following combined digestion with H_2O_2 and KOH as well as polymer types detection by Micro-FTIR analysis. A total of 1291 (673+618) particles with a remarkable number in the muscles (433 =240+193) were detected in all parts of the studied species. The number of MPs in planktivorous fish (avg. 4.08 $\pm$ 1.59 items/g) was higher than the carnivorous fish (avg. 3.00 $\pm$ 1.73 items/g) and the MPs in pelagic fish (avg. 6.99 $\pm$ 1.44 items/g) was higher than the benthopelagic fish (avg. 3.82 $\pm$ 1.92 items/g) (p<0.05). Among the various shapes and sizes, fiber shape and size below 0.5 mm were dominant in all types of fish. In the case of color, black was dominant in plantivorous and carnivorous fishes while white color was dominant in both pelagic and benthopelagic fishes. Moreover, the major polymer was nylon6 in planktivores, polyethylene in carnivores, and ABS (Acrylonitrile Butadiene Styrene) in both pelagic and benthopelagic fishes. It suggests, the possible sources of pollution could be land based plastic dumping, high fishing activities, and industrial discharges. Overall, the results will be helpful for marine environment and fisheries management in Bangladesh.

OP 28 Exploring the Effects of Microplastics Towards the Intestinal Alteration, Percentage Survival, and Liver Transcriptome in Asian Seabass *Lates calcarifer* Fingerlings

Aziz Arshad* and Mohd Fadhil Syukri Ismail

Department of Aquaculture, Universiti Putra Malaysia, 43400 Serdang Selangor, Malaysia
*Email: azizar.upm@gmail.com

Microplastics (MP) are micro plastic pieces ranging in size from 1µm to <5 µm in diameter, water soluble, and can exist either as primary state or secondarily developed due to plastic degradation process. They are well known by now and largely reported to pose significant environmental and ecological risks in the aquatic system. Degraded microplastics tend to accumulate compoundedly over years of settlement in the aquatic habitat, subsequently contaminating the living organisms in it, and finally over time get into the food chain as a result of the excessive discharge of plastic trash that continually being deposited from various domestic sources and industry. Our study focused on the impact of MP to local popular Asian seabass *Lates calcarifer* fingerlings. We evaluated the impacts of dietary polyethylene MP on the growth, survival, and histological health of Asian seabass (*Lates calcarifer*) fingerlings. Fingerlings were initially exposed to MP concentrations of 0, 1, 10, and 100 ppt (parts per thousand) for 16 days period. Survival rates, and intestinal histology were assessed. Results revealed that higher MP concentrations led to decreased weight gain, specific growth rate, and percentage survival. Histopathological analyses indicated severe intestinal alterations, including reduced villus height, increased villus diameter, and tissue degeneration. Transcriptomic profiling further highlighted oxidative stress and immune response pathways activated in response to MP exposure. These findings underscore the detrimental effects of MP on the health and early life development of *L. calcarifer* fingerlings, emphasizing the need for mitigation strategies to curb microplastic pollution in aquatic ecosystems.

OP 29 Truss Morphometry-Based Stock Identification of Grey Mullet, *Liza Parsia* from Three Rivers of Sundarbans Estuary, Bangladesh: Implications for Sound Management and Conservation

Sarower Mahfuj[3]*, Md. Asadujjaman[1], Md. Nuruzzaman Khan[2], Wasim Akram[2], Sk Injamamul Islam[3], Md Musfike Meraz[4] and Wasim Sabbir[2]

[1] Department of Aquaculture, Khulna Agricultural University, Khulna-9100, Bangladesh
[2] Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
[3] Department of Fisheries and Marine Bioscience, Jashore University of Science & Technology, Jashore-7408, Bangladesh
[4] Environmental Science Discipline, Khulna University, Bangladesh
***** Email: sa.mahfuz@gmail.com

Understanding management policies of the target species are scientifically required for accurate stock identification in fisheries science. The aim of the current study was to assess the stock identification of goldspot mullet, *Liza parsia*, utilizing truss-based morphometric characteristics. Fish samples were obtained from the Pashur, Shibsa, and Kholpetua rivers in the Sundarbans estuary, Bangladesh. Truss morphometric data were applied to univariate analysis of variance (ANOVA), principal component analysis (PCA) and canonical variate analysis (CVA). Using univariate analysis of variance, 26 of the 28 transformed truss morphometric parameters showed statistically significant variations among the stocks. Utilizing the PCA, axis-1 explained 78.5% and axis-2 6.5% respectively describing 100% total variation. In the CVA study, the first CVA was responsible for 81.5% and the second CVA for 18.5% among-group variability. Stocks were entirely intermingled creating a dense cluster within intra-stock levels based on PCA and CVA. Additionally, 61.3% original groups and 50.0% cross-validated assemblies were categorized into their appropriate samples using the classification results based on CVA. These results suggest that there is a unique stock of fish from the three rivers in the Sundarbans estuary. The appropriate organizations should work together to manage this fishery in order to collect the resource in a sustainable manner. This study may help with the creation of conservation plans for *L. parsia* by taking more scientific approaches.

OP 30 Coastal Clean-up Initiatives to Quantify Abandoned, Lost and Discarded Fishing Gears (ALDFG) and other Marine Debris in the Southern Region of Bangladesh

Md. Sazedul Hoque*, Ikrama Ibn Latif, Rakhi Sana and Md. Mahmudul Hasan

Department of Fisheries Technology, Faculty of Fisheries, Patuakhali Science and Technology University, Dumki, Patuakhali-8602, Bangladesh.

*Email: sazedul.fst@pstu.ac.bd

Abandoned, Lost and Discarded Fishing Gear (ALDFG), commonly known as 'ghost gear' is an emerging global concern because of its substantial negative impacts on the environment and economy. This study investigates the current status of ALDFG and other marine plastic debris, their causes and impacts in the southern coastal region of Bangladesh. A total of 16 clean-up events were conducted in Patuakhali (6), Barguna (2) and Bhola (8) districts, where a total 2911.38 kg of ALDFG and 246.45 kg of other debris were collected by the volunteers. The study showed that the quantity of collected ALDFG was comparatively higher in Bhola (68.36%) than Patuakhali (28.48%) and Barguna (3.15%). Plastic was most common among debris collected other than fishing nets. During the total 93 hours of collection by 170 volunteers, the average ALDFG collection by each volunteer was 12.43 kg in Patuakhali, 4.45 kg in Barguna, and 24.86 kg in Bhola. A total of 48.75 km^2 area was covered where average ALDFG was 39.48 g/m^2 in Patuakhali, 14.13 g/m^2 in Barguna and 95.45 g/m^2 in Bhola. This study revealed that a wide range of mesh size in fishing net and netting materials are used in consequence fishing practice produces a variety of macro-to-micro plastic litters in the coastal and marine environment. Most of the ghost gear was caused by extreme weather events (like cyclone, storm) although some fishermen's traditional and irresponsible practices also contributed. ALDFG or Ghost gear has detrimental effects on the coastal and marine biodiversity. The study suggested that control and preventive measures of ALDFG/ghost gear can be initiated through raising awareness, setting policies and regulating and enforcing them effectively, understanding the end-of-life fishing gear, increasing disposal facilities and recycling techniques consequences. These control and preventive measures may help to achieve a safe and sustainable coastal and marine ecosystem in the Southern coastal region of Bangladesh.

OP 31 Marine Fish Contamination by Microplastics in Xiamen Bay: Environmental Impacts and Human Health Concerns

Md Mazharul Islam[1,2,3,6]*, A B M Sadique Rayhan[1,2,3], Jingwen Shi[2,4], Chunhui Wang[4], Wang Jun[5], Ke Hongwei[2,4] and Minggang Cai[1,2,3,4]

[1]Coastal and Ocean Management Institute, Xiamen University, Xiamen-361102, China
[2]State Key Laboratory of Marine Environmental Science, Xiamen University, Xiamen-361102, China
[3]College of Environment and Ecology, Xiamen University, Xiamen-361102, China
[4]College of Ocean and Earth Science, Xiamen University, Xiamen-361102, China
[5]Department of marine biology, Xiamen Ocean vocational college, Xiamen-361102, China [6]Department of navigation, Marine Fisheries Academy, Chittagong-4000, Bangladesh
*Email: cptmazhar@stu.xmu.edu.cn

Microplastics (MPs) have become a significant environmental concern in marine ecosystems, with implications for both marine life and human health. This study investigated MPs contamination levels in nine marine fish species from Xiamen Bay in the East China Sea. MPs were detected in the gills, gastrointestinal tracts (GIT), and muscular tissues of all 27 fish samples, with an average ingestion rate of 13.4±4.6 items/ind.$10g^{-1}$. The quantity of MPs exhibited considerable variation between species, ranging from 5.9±4.6 to 19.6±4.8 items/ind.$10g^{-1}$. Pelagic species exhibited more significant amounts of MPs particles (14.9±2.2 items/ind.$10g^{-1}$) than demersal species (12.7±5.4 items/ind.$10g^{-1}$). Carnivorous species also demonstrated higher amounts of MPs compared to planktivorous species. Fiber shape (86%) and black color (72.9%) MPs constituted the majority of the types identified, especially within the 500-1000 µm range. Fourier-transform infrared spectroscopy indicated that polyethylene (PE, 24.3%), polyethersulfone (PES, 21.3%), and acrylic (19.1%) were the predominant polymers associated with industrial runoff. Correlation analysis revealed significant negative correlations among length, girth, and body weight to the average MPs concentration ($r=-0.249$ to -0.817, $P>0.0001$). The risk evaluation classified MPs contamination as moderate, and the Polymeric Hazard Index (PHI) indicated significant risks associated with polyvinyl chloride (PVC) and resin. The results underscore the need for effective methods and regulatory measures to combat MPs pollution in areas affected by urban runoff and industrial discharges. Future research should explore the long-term ecological and health effects of MPs in marine food webs.

OP 32 Effect of Stocking Density on Growth Performance of Mono-Sex Tilapia *(Oreochromis Niloticus)* with Cherry Tomato (*Solanum Lycopersicum*) in A Recirculating Aquaponic System

Md. Shah Alam Sarker[1*] Md. Abdul Gafur[1] and Md. Amzad Hossain[2]

[1]School of Agriculture and Rural Development, Bangladesh Open University, Gazipur-1705, Bangladesh
[2]Department of Aquaculture, Faculty of Fisheries, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur-1706, Bangladesh
*Email: drsarkersard@bou.ac.bd

An experiment was conducted to evaluate the effect of stocking density on the growth performance of mono-sex tilapia (*Oreochromis niloticus*) integrated with cherry tomato (*Solanum lycopersicum*) in a recirculating aquaponic system. The 12-week study was carried out under four treatments, each with two replications. Stocking densities of tilapia were 30, 40, 50, and 60 fish per tank for treatments T1, T2, T3, and T4, respectively. Each tank had a water volume of 300 liters, and water was continuously recirculated through a vegetable growing tray (0.15 m^3), which was planted with six cherry tomato plants. The fish in all treatments were fed commercial feed twice daily. Water quality parameters were monitored throughout the experiment, with temperature ranging from 22.2 to 30.5°C, pH from 7.56 to 8.24, ammonia levels from 0.2 to 2.0 mg/L, and dissolved oxygen from 5.10 to 6.50 mg/L. These parameters were maintained within acceptable ranges for both fish and plant growth. At the end of the trial, significant differences were observed in growth and production metrics across treatments. T1 (30 fish per tank) resulted in the highest average weight gain, final length, specific growth rate (SGR), and survival rate compared to the higher stocking densities. Additionally, T1 achieved superior net yields for both fish and cherry tomato biomass. As stocking density increased, growth performance and survival rates declined, likely due to heightened competition for resources and reduced water quality. The findings of this study indicate that a stocking density of 30 fish per tank, equivalent to 100 fish per cubic meter, is optimal for achieving balanced and efficient production of both fish and plants in a recirculating aquaponic system. This density ensures adequate growth conditions, minimizes stress on the fish, and maximizes the integration benefits of aquaponics. The study underscores the importance of managing stocking density to optimize the sustainability and productivity of aquaponic systems. Further research is recommended to explore long-term effects and scalability under varying environmental conditions.

OP 33 Sustainable Use of Seafood Waste Produced at Processing Plants in Southwest Bangladesh: Challenges and Potential

Md. Asadur Rahman* and Md. Mehedi Alam

Department of Fishery Resources Conservation and Management, Khulna Agricultural University, Khulna-9100, Bangladesh
*Email: asadurrahman.fisheries@gmail.com

The fish and shellfish processing industries contribute significantly to foreign exchange earnings. The waste generated by these industries poses a potential threat to the environment. Sustainable management and utilization of this waste are essential to mitigate environmental pollution while the national economy gets a boost. By converting this waste into value-added products, we can maximize profits and create employment opportunities, ultimately improving livelihoods and enhancing environmental sustainability. Processing plant waste was previously dumped, causing environmental harm. Currently, the waste is being sold to small traders. About 67% of respondents of this study believe that effective waste management practices are achievable. With adequate knowledge and support, they could independently process the waste and derive economic benefits. At present, fish and shellfish waste processing industries only dry the waste and sell it locally or export it abroad. Fish and shellfish waste are in high demand for use in cattle and fish feed mills due to their low-cost, high-value protein and calcium content. However, the quality of available fish oil and fishmeal often needs to catch up to local requirements, leading 55% of feed mill respondents to import them from abroad. This sector faces a range of challenges, such as lack of drying equipment, shortage of raw materials, environmental hazards, lack of space for sun drying, lack of information and planning, lack of training, lack of association, lack of cost-benefit analysis and reluctance of related stakeholders. The findings and recommendations of this study are crucial for developing policy guidelines and addressing the challenges associated with sustainable utilization of fish and shellfish processing waste. These efforts will help unlock the sector's full potential, ensuring economic and environmental benefits.

OP 34 Silent Use of Destructive Fishing Gears in Bangladesh: Ecological Impacts and Strategic Roadmap for Sustainable Fisheries Management

Md. Mehedi Alam*, Niels O. G. Jørgensen and Mohammad Mahfujul Haque

Department of Fishery Resources Conservation and Management, Khulna Agricultural University, Khulna-9100, Bangladesh
*Email: mehedifrcm@kau.ac.bd

Bangladesh is ranked second in the global inland capture fisheries due to its extensive water networks, but lately, a slowdown in catch growth has been evident, largely due to the widespread use of destructive fishing gear. In this study, we employed an automated content analysis to extensively review printed and online newspaper articles reporting on applied destructive fishing methods and their impacts over the past decade (2014–2024). To validate the achieved data, direct observations, key informant interviews and focus group discussions were included. The study identified widespread use of five common destructive fishing methods (different types of nets, electric fishing and application of chemicals) across the country. A total of 60 fish species and 6 crustaceans were documented as being captured by destructive procedures. Among the fish species captured using destructive methods, approximately 26% are classified as threatened, falling into categories such as vulnerable, endangered, or critically endangered. Destructive fishing gear not only endangers target fish but also disrupts fish eggs, fry and juveniles, as well as several non-target species, including mammals, waterfowl and various vertebrates, and they may also pose health risks to humans. Addressing these impacts necessitates a strategic roadmap that includes enforcement of existing regulations, a robust policy framework, implementation of science-based management practices, and active engagement of stakeholders.

OP 35 Spatial Differences of Microplastic Pollution at Four Sea Beaches in the Bay of Bengal, Bangladesh

Rimu Das[1]*, Debasish Pandit[2], Joyanta Bir[3] and Md. Habibur Rahman[1]

[1]Department of Oceanography, Khulna Agricultural University, Khulna-9100, Bangladesh [2]Department of Fishery Resources Conservation and Management, Khulna Agricultural University, Khulna-9100, Bangladesh [3]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: rimudas@kau.ac.bd

Microplastics (MPs) pollution has become a growing concern in the coastal and marine environments, with potential impacts on marine organisms and human health. This study aimed to investigate the spatial differences of MP pollution at four popular beaches in the Bay of Bengal of Bangladesh. A total of 20 water samples were collected from four sea beaches, spanning the period from September to December 2023. Overall, 452 MPs were counted from the collected water samples, with 29% observed at Kattoli Beach, 26% at Patenga Beach, 24% at Anowara Beach, and 21% at Banshkhali Beach. The abundance of MPs at Kattoli Beach was significantly higher ($p < 0.05$) compared to other beaches. MPs ranging from 1-5 mm in size were identified as the most prevalent in the study areas. Anowara Beach exhibited a dominant composition of fibers (53%), Banshkhali Beach was characterized by particles (55%), and Patenga Beach and Kattoli Beach displayed a high abundance of fragments (65% and 56%, respectively). The pollution load index ranged from 1.25-1.49 with the highest index values at Kattoli Beach, followed by Patenga, Anowara, and Banshkhali Beach. The results from this study will be evident as a guide to efficient environmental health of the beaches and proper management of the coastal and marine ecosystems of Bangladesh.

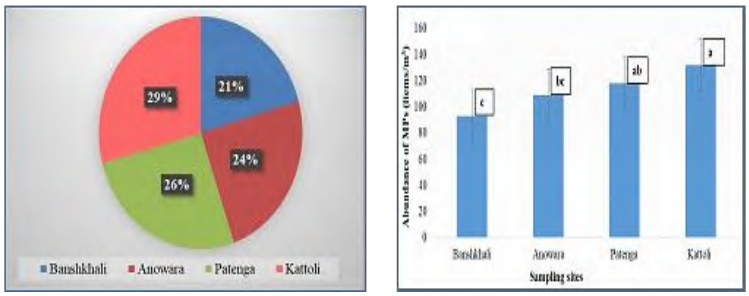


Figure: Abundance and distribution of microplastics in different sea beaches of Bangladesh

OP 36 The Interplay between Ecosystem Services and Household Asset Accumulation in Coastal Bangladesh

Sadia Tasneem* and Md. Nasif Ahsan
Economics Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: phd231502@ku.ac.bd

Coastal Bangladesh, a region renowned for its rich biodiversity and diverse ecosystem services, is facing increasing threats from climate change and natural disasters. This study examines the intricate relationship between multiple ecosystem services, such as agriculture, fisheries, and mangroves, and household asset accumulation in Southern and South-Central Coastal Bangladesh. By examining the diverse ways in which coastal communities rely on these ecosystem services, this study aims to understand how they contribute to household assets and resilience. A questionnaire survey was conducted from 1 February 2014 to 28 February 2015 to collect data from 1500 households. Using data from the Survey for Assessing Health, Livelihoods, Ecosystem Services, and Poverty Alleviation in Populous Deltas, this study employed a Random-Effects Generalized Least Squares (RE-GLS) regression analysis to assess the impact of various factors on asset accumulation, including fishing income, employment status of the household head, mangrove-related income, and education level. The findings reveal that fishing income and employment status of the household head significantly contribute to the total household assets. However, higher education level and participation in mangrove-related income are negatively associated with asset accumulation. This suggests that while education may offer opportunities beyond traditional livelihoods, it may not always lead to immediate asset growth. Additionally, mangrove-related activities, although potentially providing income, may not always translate into significant asset accumulation, highlighting the need for sustainable management practices to maximize benefits and this income can be highly variable due to factors like weather patterns, resource availability, and market fluctuations. This uncertainty may lead to difficulty in asset accumulation as well as categorization of the assets as productive or nonproductive. This study addresses a critical research gap by examining the intricate relationship between multiple ecosystem services, including agriculture, fisheries, and mangroves, and household asset accumulation in coastal Bangladesh. By analyzing the diverse ways coastal communities depend on these ecosystem services, this research provides valuable insights into the factors influencing household resilience and poverty reduction in a region highly vulnerable to climate change and natural disasters. Understanding the specific pathways through which ecosystem services impact asset accumulation is essential for developing effective policies that promote sustainable livelihoods and poverty reduction.

OP 37 Integrating Business and Education for Sustainable Marine Litter Management: A Pathway to Innovative Practices

Md. Mamunur Rashid [1,2]* and M M Abdullah Al Mamun Sony[2]

1Lion Jahangir Alam Manik Mohila College, Nokhali-3825, Bangladesh
2CMN& DRR program, ChangeMaker Nexus, Khulna-9000, Bangladesh
*Email: s.mamunurrashid@gmail.com

Abstract Marine litter significantly impacts coastal ecosystems, threatening biodiversity, livelihoods, and sustainable economic practices. Addressing this challenge requires innovative strategies that bridge education, business, and management practices. This study describes the role of entrepreneurial and managerial education in equipping future leaders with the skills to transform marine litter into business opportunities. Using a multi-disciplinary approach, the study analyzes secondary data from global and regional case studies, educational curricula, and policy frameworks to identify best practices in sustainable marine waste management. The problem centers on the limited integration of business-oriented solutions in addressing marine litter and the gap in educational programs targeting practical applications of environmental management. By leveraging theories of sustainability education and circular economy, this research highlights how entrepreneurial education can foster innovative practices such as upcycling and social entrepreneurship among students and community leaders. Key findings demonstrate the success of collaborative programs where academia and business sectors co-develop solutions for marine litter, turning environmental risks into economic opportunities while promoting ecological resilience. This study emphasizes the importance of embedding sustainability and environmental management in business education curricula. It advocates for a paradigm shift where students and professionals are empowered to lead transformative efforts in marine ecosystem preservation through innovative business practices, turning litter into livelihoods and fostering a cleaner ocean.

OP 38 Feeding Habits and Plastic Ingestion of Commercial Mud Crabs (*Scylla* spp.) and Short Mackerel Fish (*Rastrelliger brachysoma*) from Tropical Estuarine Environment, Thailand

Sukree Hajisamae[1]*, Kay Khine Soe[1], Sofiyudin Maae[1], Pornpimon Chuaduangpui[2], Zeehan Jaafar[3], Sitthisak Jantarat[1], Siriporn Pradit[4] and Jarunee Chaiyvareesajja[2]

[1] Faculty of Science and Technology, Prince of Songkla University, Pattani 94000, Thailand
[2] Faculty of Natural Resources, Prince of Songkla University, Songkhla 90110, Thailand
[3] Faculty of Science, National University of Singapore, 14 Science Drive 4, 117543, Singapore
[4] Marine and Coastal Resources Institute, Prince of Songkla University, Songkhla 90110, Thailand
*Email: sukree.h@psu.ac.th

Plastic pollution has emerged as a major threat to marine ecosystems, with increasing evidence of microplastic ingestion by marine organisms. This study presents the investigation into microplastic ingestion by three sympatric mud crab species (Scylla olivacea, S. paramamosain, and *S. tranquebarica*) and a commercially important pelagic fish species, the short mackerel (*Rastrelliger brachysoma*), from the Andaman Sea and the Gulf of Thailand. Stomach content analysis of 1,622 *Scylla* spp. revealed a mean stomach fullness index (FI) of 2.1±1.1. Plastic particles were detected in 22.1% of the total crab sample (n=358), with species-specific prevalence rates of 22.1%, 19.4%, and 33.3% for *S. olivacea, S. paramamosain*, and *S. tranquebarica*, respectively. Spectroscopic analysis (ATR-FTIR) identified polyethylene (PE) as the dominant polymer type (88.5%), with green particles being most prevalent (60.3%). Analysis of 541 *R. brachysoma* specimens, characterized as planktivorous with a trophic level of 2.39 and a diet breadth of 0.27, indicated a diet primarily composed of diatoms (46.80%), calanoid copepods (15.85%), and dinoflagellates (13.95%). Plastic particles constituted a minor fraction (0.35%) of ingested items, with an average of 2.70 ± 16.62 particles/fish. Blue particles were most frequently observed, followed by green, red, and unidentifiable fragments. Prey selectivity analysis (-0.9) suggests incidental ingestion of plastics by *R. brachysoma*. While the observed plastic ingestion levels may appear low, the presence of these contaminants in commercially important seafood species raises concerns about potential human health risks through bioaccumulation and biomagnification in the food chain. These findings highlight the need for further research to assess the long-term impacts of microplastic ingestion on the health of these species and the overall health of the marine ecosystem.

OP 39 Disaster Risk Reduction in Coastal Areas of Bangladesh: Moving from Sexual Minorities' Marginalization to Their Inclusion

Musammat Mahzebin[1,2] and Tuhin Roy[3]

1Doctoral student, Sociology Discipline, Khulna University, Khulna-9208, Bangladesh
2Assistant professor, Department of Humanities and Business, Khulna University of Engineering & Technology, Khulna-9203, Bangladesh
2Professor, Sociology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: mahzebin@hum.kuet.ac.bd

In the last few decades, Bangladesh has achieved significant progress in reducing the danger of natural disasters. However, the authorities have frequently failed to sufficiently meet the needs of all those affected by the tragedy, including socially stigmatized groups like gender minorities. In the face of natural disasters, nonheterosexual or bigendered people are particularly vulnerable due to the prevalence of heteronormative norms and values in both daily life and during disasters. Resources and protective measures designed exclusively for "men" and "women" present challenges and discomforts for these groups; for instance, in our nation, evacuees must register as either men or women in order to enter shelters. Even national and international policies for disaster risk reduction have overlooked the needs of these groups. Crisis response and disaster risk reduction often overlook their needs and capacities. This study delineates why these people are ignored in Disaster Risk Reduction (DRR) strategies and policies and what their sufferings are due to social norms in the different phases of the disaster period in the cyclone-prone regions of Dacope, Mongla, and Shyamnagar Upazilas from Khulna, Bagerhat and Satkhira District, South-Western coastal areas of Bangladesh.

OP 40 A Remote Sensing Approach to Identify the Impact of Community Carbon Footprint on Coastal Carbon Ecosystem in the Bagerhat Coast of Bangladesh

M. R. Ashikur[2]* and Mohammad Azharul Islama[1]

[1]Department of Oceanography & Hydrography, Bangabandhu Sheikh Mujibur Rahman Maritime University, Bangladesh
[2]Institute of Bay of Bengal & Bangladesh Studies, Bangabandhu Sheikh Mujibur Rahman Maritime University, Bangladesh
*Email: ashik.ibbbs@bsmrmu.edu.bd

This study investigates the influence of community carbon footprint on the coastal carbon ecosystem (CCE) in Bagerhat, Bangladesh, over a period of three decades (1994–2024), with particular emphasis on Rampal and Mongla Upazilas. CCEs, which include mangroves, tidal marshes, and seagrass meadows, serve as vital carbon sinks, sequestering as much as 738.9 Mg C ha^{-1}, which notably exceeds the carbon storage capabilities of terrestrial forests. Nonetheless, unchecked industrial growth, increasing urban development, and widespread deforestation have intensified habitat loss, diminishing carbon capture and worsening CO_2 emissions. The objectives of the study comprised, investigating temporal and spatial transformations in coastal landscapes and CCEs over 15-year intervals, determining CF impacts on ecosystem degradation. The study utilized Landsat data from 1994, 2009, and 2024, along with the InVEST carbon model and sophisticated GIS techniques, to quantify carbon stocks, analyze land-use changes, and assess Land Surface Temperature (LST). Data on vegetation biomass and atmospheric CO_2 concentrations, gathered from 62 monitoring stations, were integrated for validation, resulting in a Kappa coefficient of 0.87. The findings revealed a 27.68% decrease in carbon storage, accompanied by a 7.73% reduction in vegetation cover, while built-up areas experienced a 21.74% increase. Analysis of land surface temperature indicated a rise of about 2.5°C over a period of thirty years, associated with urban growth and a decrease in vegetation ($R^2 > 0.8$). Increased CO_2 emissions were detected in proximity to industrial areas, which further diminishes the CCE's ability to function effectively as a carbon sink. The research provides practical insights for decision-makers, environmental advocates, and climate urban planners.

OP 41 Enhancing Sustainable Tiger Shrimp (*Penaeus monodon)* Production through Synbiotic Culture Systems in Semi-Intensive Farming

Saroj Kumar Mistry[1,4]*, Ruma Khatun[2], Shikder Saiful Islam[2], Md. Asadujjaman[3], Md. Golam Sarower[2] and Syed Hafizur Rahman[4]

[1]Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh
[2]Fisheries and Marine Resource Technology Discipline, Khulna University, Bangladesh
[3]Department of Aquaculture, Fisheries and Ocean Sciences, Khulna Agricultural University, Khulna, Bangladesh
[4]Department of Environmental Sciences, Jahangirnagar University, Bangladesh
*Email: sarojfmrt@gmail.com

Sustainable aquaculture is critical to meeting global seafood demand while minimizing environmental impacts and addressing climate-induced challenges. Synbiotic culture system combines probiotics (beneficial microorganisms) and prebiotics (compounds that nourish probiotics) to enhance functionalities in biological systems. This study was conducted in a semi-intensive shrimp farm in Dumuria, Khulna, Bangladesh, to assess the potential of synbiotic technology to enhance growth performance, disease resistance, and cost-effectiveness in semi-intensive *Penaeus monodon* farming, providing a sustainable solution for aquaculture under changing environmental conditions. The experiment included three treatments, each with three replications: treatment 1 (T_1, 1×10^9 CFU probiotic *Bacillus*), treatment 2 (T_2, 1×10^9 CFU probiotic *Bacillus* + 1 ppm rice bran) and control (no probiotic *Bacillus* and prebiotic rice bran). All groups used the same specific pathogen free (SPF) post-larvae (PL), stocking density (14 PL/m²), feed, and monitoring parameters, including water quality, salinity, temperature, pathogen levels, shrimp growth, survival rate, production, feed conversion ratio (FCR), and disease resistance. Shrimp samples were collected every two weeks throughout the experiment for growth performance analysis and health assessments, with pathogenic bacteria cultured on selective agar media. Weather data were recorded through an on-site weather station. After 152 days, shrimp production was significantly higher in T_2 (6113 ± 128 kg/ha), representing a 24% and 15% increase compared to the control (4915 ± 60 kg/ha) and T_1 (5236 ± 118 kg/ha). T_2 also exhibited the highest specific growth rate (SGR, 2.72%), the lowest FCR (1.48 ± 0.04), and a 20% reduction in production costs. The T_2 showed an enhanced survival rate and increased resistance to *Vibrio* outbreaks, likely due to improved immunity and gut health facilitated by synbiotic action. Adverse environmental conditions, such as prolonged rainfall and fluctuations in water temperature and pH, increased *Vibrio* prevalence in the Control and T_1, leading to reduced shrimp survival rates (9% and 6% lower, respectively, compared to T_2). These findings highlight the potential of synbiotic technology to enhance shrimp growth, production, and disease resilience in semi-intensive farming systems, contributing to sustainable and climate-resilient shrimp farming practices.

OP 42 Monitoring of Organochlorine Pesticides by Polyurethane Foam-Passive Air Samplers in Bangladesh: Source Apportionment and Spatial Distribution

Aklima Nargis [1,2,3], Minggang Cai [1], Ahsan Habib [2,3] and Gan Zhang [2]

1 Coastal and Ocean Management Institute & State Key Laboratory of Marine Environmental Science, Xiamen University, Xiamen, 361005, China
2 State Key Laboratory of Organic Geochemistry, Guangzhou Institute of Geochemistry, Chinese Academy of Sciences, Guangzhou, 510640, China
3 Department of Chemistry, University of Dhaka, Dhaka, 1000, Bangladesh
*Email: anargisdu@yahoo.co.nz

Bangladesh is one of the most populated countries in the world. Rapid industrialization and urbanization in the last decades have caused the emission of pollutants into the environment. The aim of the study was to assess Organochlorine Pesticides ($\sum_{27}$OCPs) in air by using PUF-PASs at 24 sites in 6 metropolitan cities named Dhaka, Chittagong, Khulna, Bogra, Sylhet and Mymensingh in Bangladesh during December 2017 to September 2018. The concentrations of $\sum_{27}$OCPs were higher in the monsoon (average: 0.75 ng/m^3) than those in the winter (0.73 ng/m^3) and pre-monsoon (0.64 ng/m^3). Among the OCP congeners, $\sum_6$DDT were significantly contributed the amount of OCPs in all the seasons. The concentrations of $\sum_6$DDT were within a range of 49- 97% in winter; 78 - 98% in pre-monsoon; 18 - 97% in monsoon respectively. In addition, dieldrin, a-chlordane and g-chlordane were also elevated the level of OCPs. Among the HCH isomers and HCB also contributed the total OCPs in all the seasons. An abnormal high concentration with the mean value of 6.05 ± 4.27 ng/m^3 were found at site-6. It is mentioned that there are many chemical fertilizers and pesticides warehouses at the vicinity of site-6. The concentration of OCPs was 0.98 ± 1.39 ng/m^3 at site-11 (Chittagong) because of DDT warehouse. The concentrations of OCPs at the municipal (site-3) and medical (site-4) solid waste dumping places were found to be 1.19 ± 1.67 and 1.70 ± 2.39 ng/m^3, respectively. OCP coverage in two urban areas 1 and 5 in Dhaka was 0.63 ± 0.88 and 0.77 ± 1.09 ng/m^3 were found. In particular, pesticides organochlorines were used in Bangladesh to boost plant production and eliminate vector diseases. To meet local needs, the country's DDT production industry was started in the Chittagong Chemical Complex (CCC) (Chittagong) area in 1966. The concentrations of OCPs in Khulna were relatively elevated at sites-15 (1.37 ± 1.94 ng/m^3) and 16 (1.05 ± 1.48 ng/m^3). Site-15 is an urban site with many warehouses for different goods such as food grains, chemical fertilizers and pesticides etc. while site-16 is a sub-urban where its surrounding is mainly agricultural activities. However, because of persistence in the environment and the composition of bioaccumulation, as well as biomagnification, it can enter a person through a food chain even if the use and production of OCPs has been banned globally since the 1990s.

OP 43 Arsenic Apportions in Water, Sediments and Small Indigenous Fish from the Lower Megna River in Bangladesh: Spatiotemporal and Morpho-trophic Impact with Human Health Risk

Shyamal Kumar Paul[1], Moshiur Rahman[2], Nusrat Jahan[1], Debasish Saha[1] and Bhakta Supratim Sarker[1]

[1]Department of Fisheries and Marine Science, Faculty of Science, Noakhali Science and Technology University, Noakhali, 3814, Bangladesh
[2]International Studies in Aquatic Tropical Ecology (ISATEC), University of Bremen, Bibliothekstraße 1, 28359 Bremen, Germany
*Email: shyamal@nstu.edu.bd

Consuming aquatic food has many advantages, but bioaccumulating hazardous metals like arsenic in fish can increase human health risks. Arsenic was analysed using Inductively Coupled Plasma Mass Spectrometry (ICP-MS) from Water, Sediment, and ten selected edible SIS fish muscle tissues from Lower Meghna River which is known as one of the highest arsenic-prone areas in Bangladesh. The samples were collected considering three seasons (Pre-Monsoon, Monsoon and Post-Monsoon) and three sampling zones (Upper-part, Mid-Part and Lower-part). Arsenic concentrations were recorded within the standard limits in water and sediment samples, but some fishes exceeded the WHO limit for human consumption. The water and sediment were non-polluted, and the fish muscle tissues were not bioaccumulative. Water, sediment, and fish concentrations of arsenic significantly vary for seasonal changes ($p<0.05$) but not for spatial variations ($p>0.05$). Bivariate Lanier Regression indicates a positive relationship ($R2>0.5$) between water and sediment and Fish arsenic accumulation. Morphometrically, accumulation does not vary in length at maturity but in the body shape and the presence of scales in the fish. However, benthic fish with carnivore feeding habits accumulate more as than pelagic and beta-pelagic omnivores. Children were shown to be more sensitive than adults in the case of the human health risk assessment. HI and HQ values were acceptable for water and sediment but not for fish (HI and HQ >1). Similarly, CR values for water and sediment were between 10-6 and 10-4, safe from cancer risk. Nevertheless, cancer risk arises due to fish consumption (CR>10-4).

OP 44 The Concentration of Heavy Metals in Mud Crab (*Scylla Olivacea*) and Possible Human Health Assessment in Sundarbans, Bangladesh

Mst. Sharmin Nahar*, Md. Kamrul Islam, Kazi Marufa, Md. Tanvir Ahmed, Mst. Aspriya Rahman Antu and Md. Sherazul Islam

Department of Fisheries and Marine Bioscience, Jashore University of Science and Technology, Jashore-7408
*Email: ms.nahar@just.edu.bd

Heavy metal bioaccumulation has been discovered in mangrove crabs, most of which are poisonous to animals, and are potential human carcinogens. Mud crabs (*Scylla olivacea*), a vital protein source, are currently being negatively impacted by industrialization, leading to elevated levels of heavy metals. The purpose of this study was to quantify heavy metal levels in muscle tissues of crabs collected from four administrative ranges of Sundarbans (Chandpai, Sharonkhola, Khulna, and Shatkhira), and assess the human health risks associated with eight heavy metals such as Fe, Pb, Zn, Cd, Cu, Cr, Ni, and As. Muscle tissues from adult mud crabs were separated and frozen; samples were dried, crushed, and treated according to conventional protocols. The study was conducted using inductively coupled plasma-optical emission spectrometry (ICP-OES). Heavy metal levels in muscle tissues were arranged in decreasing order: Fe > Zn > Cu > Ni > Cr > Pb > As > Cd. The findings revealed that all metal concentrations in mud crab samples were below the acceptable limit, indicating that consuming these meals would offer no significant health concerns to consumers. The metals estimated daily intake (EDI) fell within the preliminary tolerated daily intake (PTDI) for the mud crab species under study. To assess non-carcinogenic health risks, the target hazard quotient (THQ) and hazard index (HI) was calculated, whereas the target cancer risk (TR) was used to assess carcinogenic risks. This study found that mud crabs from the study sites were non-toxic (THQ and HI < 1) and long-term consumption is unlikely to offer major health problems (TR = 10−7 -10−5) due to carcinogenic or non-carcinogenic effects. These findings are expected to serve as the foundation for designing preventative and curative programs for a polluted coastal or mangrove water body by continuously monitoring and assessing heavy metal levels in mangrove rivers or wetlands and shellfish tissues in the vicinity.

OP 45 Population Dynamics and Exploitation Patterns of the Mud Crab *Scylla olivacea* in the Sundarbans Mangrove Forest, Bangladesh

Md. Kamrul Islam[1]*, Mohammad Mahfuzur Rahman[2], Sadek Ahmed Maruf[1], Ramisa Anjum[1], Farhana Afrin Neha[1], Rahima Afroz Rumpa[1], Sathi Nondi[1], Humayara Munia[1], Mst. Sharmin Nahar[1] and Md. Sherazul Islam[1]

[1]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
[2]Department of Climate and Disaster Management, Jashore University of Science and Technology, ashore-7408, Bangladesh
*Email: kiabir.just@gmail.com

This study examines the population dynamics of the mud crab *Scylla olivacea* in the Sundarbans mangrove forest, focusing on recruitment patterns, growth parameters, mortality rates, exploitation rates, and carapace width-body weight (CW-BW) relationships. Over a three-year period (January 2021–December 2023), crab samples were collected using baited longlines and traps from both territorial and deeper forest areas of the Sundarbans. Carapace width (CW) frequency data was analyzed to determine population characteristics. The CW-BW relationship indicated that male crabs exhibited a greater body weight increase rate ($b = 3.11$, $R^2 = 0.89$) compared to females ($b = 2.37$, $R^2 = 0.85$), with both sexes showing negative growth allometry ($P < 0.005$), deviating significantly from isometric growth ($b = 3$). The asymptotic carapace width (CW_∞) was estimated at 131.5 mm for males and 120.8 mm for females, with growth coefficients (k) of 0.49 yr^{-1} for males and 0.42 yr^{-1} for females. The total mortality (Z), natural mortality (M), and fishing mortality (F) rates were calculated as 1.99 yr^{-1} and 1.64 yr^{-1}, 0.69 yr^{-1} and 0.70 yr^{-1}, and 1.30 yr^{-1} and 0.94 yr^{-1} for males and females, respectively. Recruitment patterns revealed a bimodal distribution, with a constant young population throughout the year and a significant recruitment peak for males from March to June and females from May to August. The Virtual Population Analysis (VPA) indicated that crabs were primarily captured at smaller sizes (60-90 mm). The estimated exploitation rate (E) for males was 0.65, exceeding the optimal sustainable limit ($E = 0.50$), while females were slightly under the limit ($E = 0.48$). The findings suggest that male crabs are under considerable exploitation pressure, highlighting the need for management strategies that address male populations to ensure the sustainable exploitation of this valuable resource.

OP 46 A Review on Acute Hepatopancreatic Necrosis Disease (AHPND) A Devastating Threat to Shrimp Industry

Shamima Sultana[1*], Jamil Ahmad Shilpi[2], Shaikh Jamal Uddin[2] and Ghausiatur Reza Banu[1]

[1]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh

[2]Pharmacy Discipline, Khulna University, Khulna-9208, Bangladesh

*Email: shamima@fmrt.ku.ac.bd

Shrimp is one of the important export food commodities and become second largest export item of Bangladesh. Every year our country exported shrimp to Europe (85%), USA (7-8%) and rest to Japan and middle-east countries. However, this sector face production losses due to disease outbreak which consider the primary reason behind that. Acute hepatopancreatic necrosis disease (AHPND) is a comparatively new *Vibrio* spp. affected disease causes global annual loss about 7 billion dollars. This review is an attempt to compile comprehensive information about this disease. This disease outbreak first came into sight in China during 2009 and spread out several other Asian countries, Latin America and USA. Usually, clinical signs and mortality starts with in one month post stocking which causes about 40-100% mortality. AHPND affected species are *Penaeus monodon*, *Litopenaeus vannamei, Macrobrachium rosenbergii* and model species *Artemia franciscana* where causative agents are *Vibrio parahaemoliticus, V. harveyi*, *V. owensii, V. campbellii* and *V. punensis.* The reason behind pathogenicity is toxin gene pirABvp which belong to a plasmid which contain two clusters of conjugative transfer gene that admit possible horizontal gene transfer between bacterial species. Several researchers claimed that morphological and functional characteristics degenerate, disrupted and dysfunction as species affected by causative agent which could be identified by histopathology, molecular tests, immunoassay and bioassay. Besides that, a clear geographical variation observed in VpAHPND strains. As preventive strategies, improve biosecurity assisted with specific pathogen free post larvae, pathogen free clean water and sediment, reduced organic load and so on. Additionally, researcher suggested to use phage therapy, probiotics and natural products to control this disease as causative agent already developed resistance to certain antibiotics. This review suggested to conduct future research on finding out specific virulence factor as well as development of alternative controlling agent to combat these diseases.

OP 47 Microplastic Contamination in Coastal Aquaculture: A Multi-Stakeholder Perspective on Challenges and Mitigation Strategies

Hatim Albasri*

Research Center for Fisheries, National Research and Innovation Agency, Indonesia
*Email: hatim.albasri@brin.go.id

Microplastic contamination poses a significant threat to coastal aquaculture ecosystems. Despite growing scientific evidence, current policies and regulations inadequately address this issue, primarily focusing on positioning aquaculture as a point source of marine plastic pollution. This study, involving a multi-stakeholder analysis across 15 countries with over 45 experts, emphasizes the urgent need for a more comprehensive approach. Our research reveals that microplastics enter the aquaculture system through various pathways, including fishmeal, commercial and trash fish feed, and the surrounding environment (water and sediments). While microplastic contamination levels vary across countries, establishing reliable contamination levels remains challenging due to the lack of standardized measurement methods and agreed-upon minimum thresholds. Field research in Vietnam and Indonesia confirms the presence of microplastics in water, sediment, fish, shrimp, feed, and meal samples. Blue, green, black, yellow, and white were the most common colors, with fragments and fibers being the dominant shapes. Water samples exhibited the highest microplastic concentrations (0.1702 to 1.031 particles/m^3), followed by feed, fishmeal, and sediments. Fish and shrimp samples contained significantly lower levels of microplastics. The study highlights the limitations of current scientific knowledge and regulatory measures in addressing microplastic contamination in aquaculture. Therefore, a multi-pronged approach is crucial, 1) Short-term strategies: investigate sources and types of microplastics, encourage voluntary industry initiatives to reduce microplastic contamination, develop standardized methodologies for microplastic research; 2) Long-term strategies: develop guidelines for safe levels of microplastic contamination in aquaculture and its products, establish certification programs for sustainable aquaculture practices. This multi-stakeholder analysis underscores the urgent need for coordinated action among scientists, policymakers, and industry stakeholders to mitigate microplastic contamination and ensure the long-term sustainability of coastal aquaculture.

OP 48 Poison Fishing and Its Effect on Aquatic Organisms and Aquatic Environment in the Sundarbans, Bangladesh

Babu Kumar Roy*, Shila Khanam, Sk Arif Ahmmed Rubel, Shikder Saiful Islam and Muhammad Abdur Rouf

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: bkroy.ku@gmail.com

Poison fishing in the Sundarbans, and its associated effects on aquatic organisms and aquatic environment are destroying the biodiversity with a red alarming signal in Bangladesh. This study covered surveys in the four ranges of Sundarbans through questionnaire, Key Information Interview (KII), Focus Group Discussion (FGD), and a laboratory experiment was conducted in the wet laboratory of Khulna University. This study recorded that the fishermen and poachers used eight types of poison, of which the most frequently used poison was Ripcord (group: cypermethrin) and the most detrimental poison was Sumithion 50 EC (group: phenitrothion). The probit analysis from the lab experiment data on long whiskers catfish (*Mystus gulio*) with Ripcord estimated the LC_{50} of 0.073 mlL^{-1}. Application of Ripcord moderately changed the NH_3 (from 0.25 mgL^{-1} to 1 mgL^{-1}), but there were no remarkable changes in other parameters (DO, pH and Hardness) compared to the initial record during poison fishing in laboratory condition. This study also addressed the effects of Ripcord with different doses (0 mlL^{-1}, 0.025 mlL^{-1}, 0.05 mlL^{-1}, 0.075 mlL^{-1}, 0.1 mlL^{-1}, 0.125 mlL^{-1}, 0.15 mlL^{-1}, 0.175 mlL^{-1}, 0.2 mlL^{-1} and 0.25 mlL^{-1}) on the behavioral changes of fish such as swimming, gulping, feeding and aggregation. The fish did not show significant behavioral changes in first 30 minutes from the concentration 0 mlL^{-1} to 0.1 mlL^{-1} doses, which was significant at the concentrations 0.125 mlL^{-1} to 0.25 mlL^{-1} with a great change like mortality (100%), cessation of movement (100%), high gulping (100%), no aggregation (90-100%) and no intake of feed (100%) in next 30 minutes. The result of this study would excel the awareness policies of the Sundarbans Fisheries Management.

OP 49 Innovation of Starch-based Bioplastic as A Potential Alternative to Widely Used Polyethylene

Ali Hussain Muhammad[1]*, Md. Nazrul Islam[1], Saleh Md. Musa[2] and Nishat Binty Nazim[1]

[1]Forestry and Wood Technology Discipline, Khulna University, Khulna-9208, Bangladesh
[2]Forestry and Biodiversity advisor, GIZ, Bangladesh
*Email: ahmuhammad39@gmail.com

The study was designed to prepare bioplastic from potato (*Solanum tuberosum* L.) starch by chemical modification. Bioplastic was manufactured from potato starch with acitic acid and glycerol (20 and 5%). The solution was sandwiched between metal plates maintaining a uniform thickness and left in the oven at 60º C for 8 hours to get a dried plastic sheet. Jute stick powder having the ratio of 2, 4 and 6% was added to the solution for improving the mechanical properties. Physical, mechanical and biological properties including water absorption, tensile strength, tear strength, and biodegradability were assessed following the ASTM standards. Bioplastic having 6% jute stick powder showed the higher tear and tensile strength of 29.37 Mn.m2 /g and 56.32 MPa, respectively. Biodegradability analysis showed that 6% jute stick powder mixed bioplastic degraded completely in soil within 6 weeks which was faster than others. The result of the study indicated that potato starch-based bioplastic has the potentiality to replace the synthetic plastic because of its physical, mechanical, and biodegradable nature.

OP 50 Plastic Pollution Research and Outreach activities in Bangladesh: global, regional and local initiatives

Gawsia Wahidunnessa Chowdhury[1]*, Subrata Sarker[2], Md. Nazmul Hasan Niloy[1] and A. N. M. Samiul Huda[2]

[1]Department of Zoology, University of Dhaka, Dhaka, Bangladesh
[2]Oceanography, Shahjalal University of Science and Technology, Sylhet, Bangladesh
*Email: gawsia@gmail.com

The *Sea to Source: Ganges* Expedition led by the National Geographic Society and supported by organizations in India and Bangladesh, focused on understanding and addressing plastic pollution in the Ganges Rivers. Our goal was to trace the journey of plastic waste from land to the ocean and work with local communities to find solutions to this global issue. Data were collected through interviews, environmental samples, and technologies to track plastic wastes. We also developed educational programs titled: *Teachers for Planet Earth* to teach students and teachers about the problem. We performed community workshops, engaging in policy discussions, and studying how reduced fishing activity affected plastic waste flow. Our research on plastic pollution in Bangladesh and the Ganges River system provides a comprehensive understanding of the crisis and current state of plastic pollution in Bangladesh's aquatic systems, revealing significant research gaps. In the Sundarbans mangrove forest, we documented the trophic transfer of microplastics. We also arranged rapid characterization of macroplastic input and leakage in the Ganges River basin. Our large-scale study of the Ganges River demonstrated that billions of microplastics are released into the Bay of Bengal daily. Using GPS tracking, we followed plastic bottles to understand movement from land to sea. Plastic pollution from abandoned fishing gear was reported and we assessed microplastics in air, water, and sediment along the Ganges, finding higher levels in densely populated areas, with rayon as the dominant polymer. We further explored the intersection of plastic pollution, climate change, and biodiversity loss how these issues connected in vulnerable ecosystems. We researched the issue of plastic pollution from fishing nets and multi-film sachets in Bangladesh, focusing on creating a gender-inclusive value chain. Our study explored the feasibility of establishing large-scale net recycling businesses in Cox's Bazar and Charfesson, involving women. Recommendations included creating a gender-equitable recycling enterprise, addressing high-interest microcredit issues, and integrating plastic waste into national mitigation policies. We developed a Single-Use Plastic (SUP) Ban Implementation Plan focusing on community engagement and overcoming barriers, particularly in the tourism sector. Our Waste Management Plan emphasizes a structured approach to reduce plastic in the Sundarbans, implementing alternatives, and strengthening recycling efforts. We also integrated citizen science in our waste management plan.

OP 51 Analysis of Age and Oxidation Degree of Microplastics in Marine Surfaces Around Japan

Murat Celik[a*], Yang Zijiang[a], Haodong Xu[a], Haruka Nakano[b], Atsuhiko Isobe[a], Keiichi Uchida[a], Takumi Imajo[a], Hisayuki Arakawa[a]

[a]Tokyo University of Marine Science and Technology, 5-7, Konan-4, Minato, Tokyo 108-8477, Japan

[b]Center for Ocean Plastic Studies, Research Institute for Applied Mechanics, Kyushu University, 6-1 Kasuga-Koen, Kasuga 816-8580, Japan
*Email: 8muratcelik@gmail.com

This comprehensive study evaluates the carbonyl index (CI) of microplastics (MPs) collected from different coastal regions around Japan, with an emphasis on the oxidative degradation due to UV radiation. Initial findings revealed minimal differences between the mean CI of polyethylene (0.69±0.34) and polypropylene (0.70±0.34). Subsequent detailed analysis focused on small (50–350 µm) and large microplastics (>350 µm) from Tokyo Bay and the Tokai region. The smaller microplastics exhibited significantly higher CI values (2.47±0.18, 2.71±0.28), suggesting greater oxidation compared to larger ones (CI values of 0.36, 0.97), indicating extensive exposure and degradation. This negative correlation between size and CI underscores the advanced aging of smaller particles. These results not only highlight the variability in microplastic deterioration across different marine environments but also underscore the importance of robust environmental management strategies to mitigate the impacts of microplastic pollution.

Abstracts for Poster Presentation

PPF 01 *In Vivo* Anxiolytic, Sedative, and Anti-Schizophrenic Activity of Ethanol Extract of *Aegiceras corniculatum* (L.) Blanco Leaves

H. M. Shadid Hossain Snigdha* and Shaikh Jamal Uddin

Pharmacy Discipline, Khulna University, Khulna-9208, Bangladesh

*Email: shadidhossain89@gmail.com

Aegiceras corniculatum (L.) Blanco, locally known as Khalsi, is widely distributed in the Sundarbans. Pulverized leaves of the plant were subjected to ethanol extraction, and the extract (ACEE) was subsequently used for evaluating anxiolytic, sedative, and anti-schizophrenic activities at 250 mg/kg and 500 mg/kg in the mice model. The anxiolytic activity was performed using the open-field test, swing test, hole cross test, tail suspension test, and marble bury test, and the results stipulated that ACEE had a vigorous anxiolytic effect in comparison with an invariably recognized anxiolytic agent, Diazepam. The sedative activity was appraised using a Thiopental-sodium induced sleep time test, dark light test, and forced swim test. ACEE at 500 mg/Kg showed specified noteworthy sedative action with a 26.95% decrease in latency period and a 17.86% increase in sleep duration. Furthermore, ACEE at 500 mg/Kg expressed the highest dark residence time (154.83±8.23 seconds), while the experimental animals treated with the same dose with Diazepam and Flumazenil exhibited the highest immobility (140.83±4.76 seconds). The anti-schizophrenic test was assessed using the marble bury, dust removal, and swim test. A combination of ACEE at 500 mg/Kg with Olanzapine reduced the number of buried marbles (1.66±0.33), the amount of removed dust (9.33±2.27 gm), and the increased time to reach the destination (60.17±8.41 seconds) through the swimming which, at length, reversed the action of the D-dopamine. Although the plant's traditional uses against neurodegeneration are lamentably limited, several GC-MS analyses and *in silico* studies of the leaf extract have identified Corniculatolide A and 11-O-methylcorniculatolide A as potent anxiolytic and sedative compounds because of their interactions with the $GABA_A$ receptor. Overall, the findings suggest that in the future, *Aegiceras corniculatum* (L.) Blanco leaf extract will be a potential source of anxiolytic, sedative, and anti-schizophrenic chemicals.

PPF 02 Integrated Multi-Trophic Aquaculture (IMTA): Enhancing Growth, Production, Immunological Responses and Environmental Management in Aquaculture

Alokesh Kumar Ghosh[1]*, Abul Farah Md. Hasanuzzaman[1], Shikder Saiful Islam[1], Md. Golam Sarower[1], Saroj Kumar Mistry[2], Shaikh Tareq Arafat[1] and Khandaker Anisul Huq[1]

[1]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
[2]Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh
*Email: alokesh_ku@yahoo.com

Aquaculture is among the most rapidly expanding industry globally, and its significant contribution to feeding the increasing world population has been established. However, the rapid progress in aquaculture is accompanied by environmental pollution marked by elevated levels of nitrogen and phosphorus. The idea of Integrated Multi-Trophic Aquaculture (IMTA) has been introduced as a sustainable approach to mitigate the environmental impacts of aquaculture and promote long-term ecological balance. The IMTA is a farming method that entails the simultaneous cultivation of several organisms, emphasizing the reutilization of by-products from one species as inputs for another (Figure). IMTA systems are generally economically more effective than mono- and polyculture farming, as they improve animal growth and water quality, hence influencing all facets of aquaculture. We explore many facets of the IMTA system concerning growth, immunological response, and water quality characteristics that collectively influence production and economic viability of IMTA. The analysis of study clearly indicates that IMTA may significantly improve the growth and production of fed species, as well as the immune response of cultured species. The review indicated that nitrogenous and phosphorus wastes were significantly diminished in the IMTA system, with enhancements in other water quality parameters. The findings underscore the significance of IMTA as a sustainable substitute for conventional aquaculture through the provision of economic and environmental advantages while fostering adaptability in aquaculture system.

PPF 03 Microplastics in Rivers: An Emerging Concern for Coastal River Ecosystems

Asif Adnan*, Samiha Islam Shanta, Simu Akter and A S M Al Imran

Environmental Science Discipline, Life Science School, Khulna University, Khulna-9208, Bangladesh
*Email: asif.adnanes20@gmail.com

Microplastics (MPs) in rivers pose a great concern for coastal ecosystems. Their increasing presence in coastal ecosystem processes disrupts the quality and quantity of resources. The Rupsha River, located in the southwest Bengal Delta, is a good example of these effects. In the last two decades, the abundance and distribution of microplastics in Rupsha River have strongly increased and are ongoing. The purpose of this study was to focus on microplastics pollution and its impact on the river ecosystem by identifying the source, distribution, and characterization such as size, shape, and color. Additionally, this study assessed the relationship between land use patterns and microplastics abundances. The study considered 28 river water samples from eight sampling sites (4 sites contain 5 duplicate locations and another 4 sites contain 2 duplicates), followed by digestion, filtration and light microscopic inspection to identify the microplastics. Results show that fiber (59%) and filament (38%) type microplastics were predominant in the Rupsha River. The 73% microplastics size ranged from 1 µm to 400 µm, while 39% from 400 µm to 800 µm, 15% from 800 µm to 1200 µm and 12% were > 1200 µm. The dominant microplastics colors were blue and red. Remarkably, higher microplastics abundance has been found in river stretches close to railway stations, bridges, river crossing areas (ghats), markets, factories, and industrial areas. These areas may be the possible sources of areas and pathways of microplastic pollution in the Rupsha River. The abundance of microplastics in river water was positively correlated with possible source areas. Therefore, this study establishes a baseline for assessing microplastics pollution and its impact on river ecosystems in Bangladesh.

PPF 04 Development of the Transportation System for Brood Mola (*Amblypharyngodon mola*) Fish: Enhancing Captive Breeding in Bangladesh

Md. Sharif Mia*, Shyamal Kumar Paul and Debasish Saha

Department of Fisheries and Marine Science, Noakhali Science and Technology University, Noakhali-3814, Bangladesh
*Email: sharif.nstu13@gmail.com

Transportation of the SIS species mola (*Amblypharyngodon mola*) in a living condition is a significant problem for expanding its captive breeding and carp polyculture. The study aimed to develop a suitable transportation system with a high survival rate from February 2024 to November 2024. Four different systems: 1. Open system (T1-T2 pond water treatments; T3-T4 tube-well water treatments); 2. Closed system (C1-C2 pond water treatments; C3-C4 tube-well water treatments); 3. Water exchange system (P1-P2 pond water treatments; P3-P4 tube-well water treatments); 4. Anesthesia systems (H1-H2 pond water) and D0 (controlled) were planned for successful transportation. Each treatment had three replications. A plastic bucket (25L) and polyethylene beg (40×20 inch) were used as water holding facilities. *A. mola* was collected from a natural source. Ten samples of each treatment were measured by weight and length. Aerator (6.34 L/min airflow), Oxygen tablet (Chemical agent: Sodium percarbonate), closed system oxygen amount 25 L, and anesthesia (2-phenoxyethanol) dose rates of 0.1 and 0.2 mg/L were used. Approximately 66% of water was changed every two-hour interval in the water exchange system. The water quality parameters such as temperature, dissolved oxygen, pH, total dissolved solids, ammonia, and salinity were measured initially and during the experimental period of all treatments with 1-hour intervals. The results exhibited that the survival rate had a significant difference ($p<0.05$) between treatments. The descending order of survival rate was T2 (83.67±2.08%) > P2 (75±2.65%) > T4 (71±2%) > P1 (71±2%) > T1 (69±2%) > T3 (69.67±2.08%) > C1 (68.33±3.26%) > C3 (64±3%) > P3 (63.67±2.08%) > P4 (63.34±3.06%) > H1 (55±3.61%) > H2 (47.33±3.21%) > C2 (43.56±2.69%) > C4 (40.66±1.77%) > D0 (12±3.61%) based on DMRT. This study showed that total weight correlates significantly ($p<0.05$) with the survival rate. In the open system, treatment T2 (83.67±2.08) exhibited the highest survival rate, whereas the closed system treatment C4 (40.66±1.77%) had the lowest survival rate. There was a significant ($p<0.05$) correlation of survival rate with temperature, DO, ammonia, and pH on the 2-tailed test and insignificant with TDS and salinity of the four systems. This study supports farmers, hatchery owners, and fish traders to expand their business by introducing a more efficient transportation system.

PPF 05 Investigating the Role of Abandoned, Lost and Discarded Fishing Gear on Marine Plastic Pollution

Md. Sazedul Hoque*, Debojit Basu Abhra and Md. Mahamudul Hasan Ratul

Department of Fisheries Technology, Patuakahli Science and Technology University, Dumki, Patuakhali, Bangladesh.
*Email: abhrafsh@gmail.com

Marine ecosystems are vital for sustaining biodiversity, regulating climate, and supporting livelihoods through fisheries and tourism. ALDFG is one of the most serious issues affecting marine ecosystems, which causes habitat destruction, entangles marine life, and contributes to plastic pollution. To better understand the drivers of fishing gear loss and its impacts, we interviewed 300 fishermen from Kuakata, Chittagong, and Cox's Bazar. In Kuakata and Cox's Bazar, different types of nets are used in artisanal fishing, including trawling nets, Chandi Jal, Lal Jal, Lomba Jal, and Benthi/Set Bag Nets. Commercial fishing in Chittagong, however, is conducted mainly with trawling and shrimp nets. Regional variation in gear losses was highly significant. The highest average loss per month in Kuakata was recorded for Lomba Jal with 76 ± 18 kg per month, while in Cox's Bazar, Benthi/ Set Bag Nets recorded losses of 60 ± 25 kg/month. The other dominant net type that faced considerable losses was Chandi Jal, with losses of 64 ± 15 kg/month in Kuakata and 16 ± 4 kg/month in Cox's Bazar. Trawling nets also showed considerable losses: 54 ± 17 kg/month in Kuakata and 27 ± 24 kg/month in Chittagong. These variations stem from differences in fishing practices and technologies across regions. Causes that were identified to lead to gear loss were mostly linked to underwater obstruction, unfavorable weather conditions, and operations issues. Among various fishing gears, chandi jal has a greater impact on marine biodiversity due to its transparent color and thin threads, which increase the likelihood of entangling marine organisms. The present study, therefore, highly recommended a series of interventions in enhancing gear maintenance, crew training for gear management, and a decrease in trip length, thus reducing ALDFG. ALDFG cannot be addressed by fishers or policymakers alone but by collaboration and cooperation to conserve marine ecosystems, including sustainable fishing methods.

PPF 06 Community-Led Water Poverty Assessment in the Climate-Affected Coastal Zones of Bangladesh

Sadhon Chandra Swarnokar* and S.K. Reason

Environmental Science Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: sadhon@es.ku.ac.bd

Water stress has emerged as a critical global challenge due to the growing mismatch between water demand and supply. The southwest coastal region of Bangladesh faces severe challenges in ensuring water security due to climate change-induced vulnerabilities, salinity intrusion, and limited freshwater availability. We applied the Water Poverty Index (WPI) to assess water scarcity at the community level in six sub-districts of southwestern coastal Bangladesh: Dumuria, Paikgacha, Rampal, Mongla, Shyamnagar, and Assasuni. The WPI integrates five key dimensions, including resource, access, capacity, use, and environment to evaluate water poverty comprehensively. The research highlights significant variations in water poverty across the study areas, with Mongla and Rampal displaying critical water shortages. Factors such as reliance on saline-contaminated shallow tube wells, limited rainwater harvesting infrastructure, and high costs of deep tube wells exacerbate the situation. Despite some community-driven interventions, such as rainwater harvesting, pond and sand filters, socioeconomic constraints, and environmental stressors persist as major barriers. The findings demand an urgent need for sustainable water management strategies, including enhanced community participation, affordable technology for water treatment, and targeted policy interventions to address socio-economic inequities. This study may contribute to the development of holistic, scalable approaches to mitigate water poverty and improve resilience in climate-vulnerable coastal communities.

PPF 07 Plastics as Vectors for Chemical Pollutants in Marine Environments of Southeast Asia, South Asia, and East Asia: A Comprehensive Systematic Review

Md. Abdullah Al Mamun Hridoy[1]*, Andleeb Masood[2], Chiara Bordin[3], Fatima Zahra Tagri[4], Irfan Ullah[5] and Baki Azeez Olalekan[6]

[1]Department of Fish Biology and Genetics, Faculty of Fisheries, Sylhet Agricultural University, Sylhet-3100, Bangladesh; [2]School of Physical Science and Technology, Southwest Jiaotong University, Chengdu, 611756, China; [3]Department of Computer Science, UiT, The Arctic University of Norway, 6050, Langnes, 9037, Tromsø, Norway; [4]Institute of Marine Environment and Bioresources Management, Université Chouaïb Doukkali El Jadida, Souss-Massa-80020, Morocco; [5]Centre for Environmental Sustainability and Water Security, Research Institute for Sustainable Environment, Universiti Teknologi Malaysia, 81310, UTM Skudai, Johor Bahru, Malaysia; [6]Research Centre for Experimental Marine Biology and Biotechnology, University of the Basque Country, 48620 Plentzia, Bizkaia, Spain.
*Email: aamhridoy.fisheries@student.sau.ac.bd

Plastic pollution, particularly microplastics, has emerged as a critical environmental challenge. These tiny particles contribute to marine ecosystem degradation and act as carriers for hazardous chemical pollutants, including heavy metals, persistent organic pollutants (POPs), and endocrine-disrupting chemicals (EDCs). As these pollutants infiltrate the food chain, they pose serious threats to both marine life and human health. This review seeks to investigate the role of plastics, especially microplastics, in transporting pollutants within marine environments across Asia, emphasizing the urgent need for targeted policy interventions to combat this escalating issue. A systematic review was performed to evaluate the role of plastics as vectors for chemical pollutants in Asian marine ecosystems. This review encompassed studies published between January 2000 and October 2024. The initial search yielded 1,062 articles, of which 746 were subsequently screened based on the established criteria. A detailed review led to the inclusion of 227 studies that met all criteria for analysis. Research on marine plastic pollution is expanding worldwide, with strong collaboration among Asian countries such as South Asia, South-East Asia, and East Asia. Nevertheless, there are still significant gaps in our understanding of how plastics adsorb and desorb pollutants, particularly under varying environmental conditions. Future research should focus on long-term monitoring, advanced detection techniques, eco-toxicological studies, and policy-oriented investigations into the socio-economic aspects of plastic pollution, integrating environmental science, economics, and sociology to inform effective regulations and public awareness initiatives.

PPF 08 Variations in Carbon and Nitrogen Ratio among Leaves of Five Mangrove Species in the Sundarbans Mangrove Forest, Bangladesh

Neyamat Hossen*, Md. Minarul Islam and Md. Kamruzzaman

Forestry and Wood Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: aminibn2016@gmail.com

Leaves of mangrove trees are a key nutrient source for both terrestrial and marine ecosystems. The carbon-to-nitrogen ratio (C:N) serves as a valuable indicator for assessing the quality of mangrove leaves as litter and food, while also providing insights into nutrient limitation or facilitation within these ecosystems. This study investigates variations in the CN ratio across five common mangrove species in the oligohaline zone of the Sundarbans, Bangladesh: *Heritiera fomes, Bruguiera sexangula, Excoecaria agallocha, Avicennia officinalis, and Xylocarpus mekongensis*. Significant variation was observed in the mean carbon content between species, with *B. sexangula* showing 13.35±0.28 mg g^{-1} and *X. mekongensis* at 11.84±0.27 mg g^{-1}. While carbon content changes from young to senescent stages were generally minor, a more pronounced shift was noted at the senescent stage for all species except *X. mekongensis,* which showed a gradual increase in carbon content. Nitrogen content, on the other hand, displayed a gradual decline in *H. fomes* and *A. officinalis*, with the latter showing a slight increase at the old stage before dropping to its lowest level at senescence. This suggests nutrient reallocation in these species prior to leaf shedding, indicating efficient nitrogen conservation. These fluctuations resulted in notable variation in CN ratios, with *B. sexangula* exhibiting the highest ratio and *X. mekongensis* the lowest. The lower CN ratio in *X. mekongensis* is likely due to greater nitrogen availability, leading to increased nitrogen release through litterfall.

PPF 09 Extent of Microplastics in Estuarine Fish Species from Coastal Riverine Ecosystem of Bangladesh

Md. Mahmudul Hasan[1]*, Md. Rashed Khan Manon[2], Md. Mahmudul Hasan[2], Md. Arifur Rahman[2] and Md. Sazedul Hoque[1]

[1]Department of Fisheries Technology, Patuakahli Science and Technology University, Dumki, Patuakhali, Bangladesh; [2]Department of Fisheries Biology and Genetics, Patuakahli Science and Technology University, Dumki, Patuakhali, Bangladesh.
*Email: md.mahmudulhasanpstu@gmail.com

Plastic pollution poses a notable concern for the aquatic environment especially coastal river ecosystems of Bangladesh. Fish and shellfish species can be contaminated by tiny plastic particles known as microplastics (MPs) (<5 mm). The objective of the research was to evaluate both the abundance of microplastics in the muscle, gut, and gills of three estuarine fish species, Threadfin Sea catfish (*Arius arius*), Neglected Grenadier Anchovy (*Coilia neglecta*), and Flathead Grey Mullet (*Mugil cephalus*), collected from the coastal river of Patuakhali, and to compare the polymer composition of these microplastics among the same fish species using FTIR. Microplastics in fish samples (n=9 per species) were extracted following alkali (KOH) and peroxide (H_2O_2) based two-step digestion followed by vacuum filtration and microscopic identification. MP results represented via four sizes (<0.5, 0.5-1, 1-5 and >5 mm), five colors (black, red, pink, transparent and blue), four shapes (filament, round, irregular, angular) and three visual characteristics (fiber, fragment and particle). Comprehensive analysis revealed significant variations in MP contamination levels among the species. *Arius arius* exhibited the highest total MP count with 1169 particles, followed by *Mugil cephalus and Coilia neglecta* with 565 and 557 particles, respectively. The number of MPs per gram of tissue also varied, with *Coilia neglecta* showing the highest concentration in the GIT (53.23 ± 34.39 MPs/g), while *Arius arius* had the highest in gills (18.01 ± 5.78 MPs/g). Microplastics less than 0.5 mm (46.71% to 88.95%), black in color (42.76% to 82.98%), and filament and fiber shapes (26.31% to 72.37%) were dominant. This study found a significant number of MPs/g across all tested samples. The FTIR analysis identified polyethylene (PE) as the most prevalent plastic type, accounting for 55% in *Arius arius*, 50% in *Coilia neglecta*, and 35% in *Mugil cephalus*. Polypropylene (PP) followed with 25% across all species, while polyester (PET) ranged from 15% to 20%. Ethylene-vinyl acetate (EVA) was detected as 15% in *Mugil cephalus*, and non-plastic substances contributed about 5% in all cases. The findings of the study raised concerns about the potential risk of MPs in fish from coastal riverine ecosystems that pose a threat to human health by transferring through the food chain.

PPF 10 Microplastic Contamination in Oyster (*Crassostrea madrasensis*) from the Eastern Coast of Bangladesh

Khandaker Injamamul Hoque* and Md. Shajjadur Rahman

Department of Oceanography, Shahjalal University of Science and Technology, Sylhet, Bangladesh
*Email: injamamlabib31@gmail.com

The issue of microplastic contamination has received significant attention in recent years due to its potentially harmful impacts on marine life and human health, leading to an increased focus on tackling this environmental concern. This research aimed to investigate the prevalence of microplastics (MPs) in Bay of Bengal oysters (*Crassostrea madrasensis*) as a response to the global concern over plastic waste in marine environments. Microplastics, due to their small size, pose a significant risk as they can be consumed by aquatic organisms, particularly filter-feeding organisms like oysters. The presence of microplastics in seafood raises concerns regarding food safety, necessitating an urgent evaluation of potential risks to human health. This study quantified microplastics in oysters sourced from both the Moheskhali region and Coast Ghat, while also assessing qualitative attributes such as size and shape under a microscope. The findings revealed an average of 2.25±0.34 microplastic pieces per oyster. Importantly, the study established a noteworthy positive correlation between microplastic abundance and oyster weight. Among the observed microplastics, fiber-shaped pieces were the most prevalent (96 pieces), followed by fragments and particles. The distribution analysis indicated that 60% were blue, 25% red, and 16% white in color. MPs in the size range of 0.1 mm - 0.5 mm were prevalent (39%), while sizes extending from 1 mm - 5 mm constituted a lower portion (20%). Utilizing ATR-FTIR spectroscopy, 25 microplastic pieces were analyzed, confirming the presence of various types, including polypropylene, polyethylene, polyvinyl chloride and Nylon-6. Notably, polypropylene emerged as the most abundant, constituting 28% of the microplastics found. These results emphasize the critical need for heightened awareness and immediate action to address and mitigate microplastic contamination within marine ecosystems caused by human activities.

PPF 11 Unraveling the Effects of Pesticides on Fish: A Focus on Growth, Immune Functions, and Reproductive Performance

Alokesh Kumar Ghosh*, Shikder Saiful Islam, Abul Farah Md. Hasanuzzaman, Md. Rashedul Islam, Md. Shahin Parvez, Wasim Sabbir, Khandaker Anisul Huq and Md. Golam Sarower

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: alokesh_ku@yahoo.com

The extensive application of pesticides in agriculture has become a critical environmental issue in contemporary times. These chemical substances present significant risks to aquatic life, particularly fish, because of their harmful effects. Organophosphates, pyrethroids, and neonicotinoids are some of the most harmful groups of pesticides, exhibiting diverse toxicological effects among a variety of fish species. This review analyses the various consequences of pesticides on fish, emphasizing their growth, immunological functions, and reproductive performance. Pesticides can negatively impact the growth of fish by affecting metabolic processes, impeding gastrointestinal absorption, and modifying hormonal control. The chronic effect to sub-lethal doses of pesticides has been demonstrated to reduce growth rates, physiological state, and feed utilization efficiency in several fish species. The defense mechanism of fish is particularly vulnerable to pesticides, which can induce immunosuppression, hence heightening their vulnerability to infections. Pesticides disrupt innate and adaptive immune responses by modifying cytokine production, affecting phagocytic function, and diminishing critical immunoglobulin levels, resulting in increased outbreaks of disease in fish populations. Pesticides behave as endocrine-affecting chemicals (EDCs), altering the hormonal mechanisms that control gonadal development, gametogenesis, and spawning. Disruption in reproductive systems results in diminished fertility, impaired sperm motility, aberrant embryonic development, and altered sex ratios. Considering the ecological and economic importance of fish, it is essential to comprehend and alleviate the detrimental impacts of pesticides. This study underscores the critical necessity for on-going research and legislative measures to mitigate the widespread effects of pesticides on fish and their ecosystem.

PPF 12 Contamination of Coastal and Marine Bird Species With Plastics: Global Analysis and Synthesis

Golam Kibria[1]*, Joya Biswas[2] and Md. Nazmul Ahsan[2,3]

[1]Global AM Pollution Watch Program, Australia, STEM College, RMIT University, Australia
[2]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna, Bangladesh
[3]Khulna Agricultural University, Khulna, Bangladesh
*Email: kibriagolam0@gmail.com

Microplastic (MPs) pollution caused coastal and marine bird species contamination in 39 locations/countries across the seven continents. The research carried out by the author (published in the Marine Pollution Bulletin, September 2024) found that low, medium and high plastic ingestion occurred in bird species across the globe (Kibria, 2024). Fulmars, shearwaters, petrels, albatrosses, gulls, and kittiwakes (all marine/seabirds) were found contaminated with plastics in several locations in the world. Bird species belonging to the Procellariidae, Laridae, Diomedeidae (by taxonomy), piscivorous, molluscivorous, and cancrivorous (by feeding habits) were most contaminated with plastics. Microplastic, mesoplastic and macroplastic (by sizes), PP, PE, PS, PET, PAN and PVC (by types), fragments, pellets, fibres, foams, sheets, threads, fishing lines and films (by shapes) and white, blue, green, black, clear, red and yellow (by colours) were the most common plastics ingested by birds. The ingestion of plastics can cause direct harm to birds, resulting in death. In addition, plastic-derived toxic chemical additives and plastic-adsorbed toxic chemicals would be additional stressors causing both lethal and sublethal effects that can cause more significant harm to birds' health.

PPF 13 Fine Root Dynamics in the Polyhaline Zone of the Sundarbans Mangrove Forest, Bangladesh

Md. Minarul Islam* and Md. Kamruzzaman

Forestry and Wood Technology Discipline, Khulna University, Khulan-9208, Bangladesh
*Email: minarul180522@gmail.com

Mangrove trees dedicate a large portion of their biomass to their root systems, which contributes to the high net primary productivity (NPP) of mangrove forests. The production and decomposition of fine roots (less than 2 mm in diameter) make a significant contribution to the carbon cycle in forest ecosystems. Fine root production (FRP) comprises a large component of the NPP. Estimates of fine root production using ingrowth cores are strongly influenced by decomposed roots in the cores during the incubation period and should be accounted for when calculating fine root production (FRP). In contrast to its contribution, very few studies have been done to assess its role in the carbon dynamics of the Sundarbans ecosystem. The objectives of the present study were to determine the variation of fine root production and decomposition in different seasons. For aiming the objectives ingrowth core method and litterbag method were adopted. We estimated fine root biomass, production, and fine root decomposition at different time intervals and different calculation methods were also used in the Sundarbans Reserve Forest (SRF). The average above-ground biomass carbon and below-ground biomass carbon of the mangrove stands was 184.5 ± 37.3 Mg ha^{-1} and 161.2 ± 36.2 Mg ha^{-1}. Mean fine root biomass (FRB) and Fine root necromass (FRN) packed 3.25 ± 0.21 Mgha^{-1} and 1.84 ± 0.051 Mgha^{-1} in the study area. Ingrowth cores and root litter bags were installed and collected after different seasons. We calculated fine root production and decomposition by using Fujimoto's equation. By using Fujimoto's method, the fine root production rate was estimated at 0.71 g m^{-2} d^{-1} in monsoon, 0.57 g m^{-2} d^{-1} in summer, and 0.47 g $m^{-2}d^{-1}$ in the winter. Seasonal fine root production presented a cyclic behavior, with higher values in monsoon and winter showed lower values. Fine root decomposition rate was 0.0032 gm d^{-1} in summer, 0.0023 gm d^{-1} in monsoon, and 0.0014 gm d^{-1} in winter. Decomposition and mortality were highest in summer. Fine root production and decomposition showed clear seasonal variations. Fine root production and decomposition mainly depend on soil temperature, warm temperatures, enough rainfall, abundant litter input, microbial diversity, mycorrhizal association, etc. The production and breaking down of fine roots vary with the seasons, although there is no discernible seasonal development of the tree stands that is controlled by fine root production. Our findings aligned with the results of other authors that environmental factors like soil temperature, moisture content, and nutrient content affect fine root production and breakdown at the regional level.

PPF 14 Effect of Mustard Oil Cake Treated with Formaldehyde on Growth and Production of Mono-Sex Tilapia Reared in Cage

Md. Shah Alam Sarker[1]*, Md. Rashadul Islam Sabuj [1] and Md. Al-Amin Sarker[2]

[1]School of Agriculture and Rural Development, Bangladesh Open University, Gazipur-1705, Bangladesh
[2] Department of Fisheries, Rajshahi University, Rajshahi-6205, Bangladesh
*Email: drsarkersard@bou.ac.bd

The current study aimed to evaluate the effects of fermented mustard oil cake (FMOC), treated with formaldehyde, on the growth and production of mono-sex tilapia (*Oreochromis niloticus*) reared in a cage culture system. This research was conducted in the ponds of Bangladesh Open University, Gazipur, from March to May 2021, to explore FMOC as a potential alternative feed ingredient for sustainable aquaculture practices. A total of 225 tilapia fry were randomly distributed into three dietary treatments: a control group (C) and two experimental groups (T1 and T2). In the control group, fish were fed 100% commercial feed. In T1, the diet consisted of 85% commercial feed and 15% FMOC, while T2 included 70% commercial feed and 30% FMOC. Fish were fed at 10% of their body weight twice daily for 90 days. Water quality parameters, including temperature, dissolved oxygen, pH, and ammonia levels, were monitored regularly to maintain suitable conditions. The average water quality metrics were within optimal ranges, with no significant variations observed among the treatments ($p > 0.05$). However, significant differences were found in growth performance metrics such as weight gain, feed conversion ratio (FCR), and specific growth rate (SGR). The highest values for these parameters were recorded in T2, which contained 30% FMOC, while the control group exhibited the lowest performance. Survival rates were uniformly high across all treatments, with no statistically significant differences ($p > 0.05$). The study demonstrated that FMOC could effectively replace up to 30% of commercial feed without compromising fish growth or health. The inclusion of FMOC in the diet (T2) resulted in improved growth performance and feed efficiency, likely due to the enhanced nutritional quality of the fermented mustard oil cake. These findings suggest that FMOC, treated with formaldehyde, can be a cost-effective and sustainable alternative feed ingredient for mono-sex tilapia in cage culture systems. This research highlights the potential of utilizing FMOC to reduce feed costs and promote eco-friendly aquaculture practices. Further studies are recommended to examine the long-term effects of FMOC on fish health and its scalability in commercial aquaculture operations.

PPF 15 Impacts of Microplastic on Fisheries and Seafood Security — Global Analysis and Synthesis

Golam Kibria[1]*, Joya Biswas[2], Sobnom Mustari[2] and Md. Nazmul Ahsan[2,3]

[1]Global AM Pollution Watch Program, Australia, STEM College, RMIT University, Australia
[2]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna, Bangladesh
[3]Khulna Agricultural University, Khulna, Bangladesh
*Email: kibriagolam0@gmail.com

Microplastics (MPs) pollution impacts seafood organisms, including fish, sharks, shrimps, lobsters, crabs, oysters, mussels, and seaweeds, across the globe (seven continents, see Figure). The research carried out by the author (published in the Science of the Total Environment, December 2023) found that MPs contaminated 926 seafood species comprising 895 finfish, 09 crustaceans, 20 molluscs and 02 seaweeds (Kibria, 2023). Seafood from Asia was found to be most contaminated with MPs. The ingestion of MPs can reduce fish growth and fish fitness, leading to reduced yield/fish production. MPs may bioaccumulate in fish skin, gills, stomachs, liver, intestine, and muscles, as well as dry fish and canned fish. Hence, consuming MP-contaminated fresh fish, whole fish, dried fish or canned fish poses risks as it may be a pathway of MP transfer to humans. MPs can increase the health risks to seafood fish consumers since there is a probability that high-risk pollutants adsorbed on MPs (heavy metals, pesticides, and oil compounds) can transfer to humans via the food chain. Several chemicals adsorbed onto MPs are carcinogenic (cancer-causing). Preventive and safety measures are suggested to reduce the exposure of MPs to humans.

Fig. 1. Microplastic contamination of fish, crustaceans (shrimps, prawns, crabs or lobsters), molluscs (mussels, oysters) and seaweeds across the globe. Note: red dots • = fish; yellow dots • = shrimps, prawns, crabs or lobsters; black dots • = mussels, or oysters and green dots • = seaweeds.

PPF 16 Species Composition, Biomass, and Net Primary Productivity of Mangrove Species in the Polyhaline Zone of Sundarbans Reserve Forest in Bangladesh

Sakib Anjum*, Tanvir Islam and Md. Kamruzzaman

Forestry and Wood Technology Discipline, Khulna University, Khulan-9208, Bangladesh
*Email: sakib240521@gmail.com

The study presents the first estimates of biomass and productivity for mangrove forests along the polyhaline zone of the Sundarbans Reserve Forest (SRF), Bangladesh. This study was conducted over one year from September 2022 to September 2023. Stand structure, above and below-ground biomass changes, and litterfall production were measured within a 700 m^2 sample plot. *Excoecaria agallocha* has maintained its stand dominance and suffered the highest tree mortality. The total Above-ground biomass (AGB) and Below-ground biomass (BGB) of the studied stand were 414 and 365.5 Mg ha^{-1}, respectively. Among the total biomass of the trees, 53 % was allocated to AGB and 47 % to BGB. Regarding a species-wise contribution of biomass allocation, *Avicennia officinalis* showed the highest score, and *Sonneratia apetala* was the lowest. The mean annual litterfall was 5.15 Mg ha^{-1} yr^{-1}, with the maximum litterfall in winter or dry season and late summer or rainy season. The mean AGB increment, and Above-ground net primary productivity (AGNPP) were 10.9 and 19.8 Mg ha^{-1} yr^{-1}, respectively. Total net primary productivity (NPP) was estimated at 29.9 Mg ha^{-1} yr^{-1} over the observed period. The results placed in the Sundarbans mangrove forest showed that mangrove communities with similar height and diameter produced different biomass production with different basal areas. This study demonstrated that the root biomass was large enough and the mean ratio of above/belowground biomass was estimated to be 1.3. Mangrove communities growing at the polyhaline zone of the Bangladesh Sundarbans showed high biomass and net primary production indicating their ecological and conservation significance that may be considered in future decision-making processes for the area as well as in understanding the role of Sundarbans mangrove forest on mitigating the effect of global warming.

PPF 17 Fishing Gears and other Marine Debris in the Southern Coastal District of Bangladesh

Md. Sazedul Hoque*, Rakhi Sana, Ikrama Ibn Latif and Md. Mahmudul Hasan

Department of Fisheries Technology, Faculty of Fisheries, Patuakhali Science and Technology University, Dumki, Patuakhali-8602, Bangladesh.

*Email: sazedul.fst@pstu.ac.bd

This study investigates the status of marine debris especially discarded fishing net and their causes and impacts in the southern coastal district of Bangladesh. A score sheet was prepared to collect data from clean-up events which were conducted in Patuakhali, Barguna and Bhola. During clean up event about 300 kg of discarded fishing net and 250 kg of other debris were collected by the volunteers. Comparatively, the quantity of collected discarded fishing gears were: Bhola (68.36%) > Patuakhali (28.48%) > Barguna (3.15%). Plastic was most common among debris collected other than fishing nets. During the total 93hr collection by the 170 volunteers, per person average discarded fishing net collection were higher in Bhola 24.86 kg followed by Patuakhali 12.43 kg, Barguna 4.45 kg. A total of 48.75 km^2 area were covered where concentration of discarded fishing net existed: Bhola 95.45 g/m^2 > Patuakhali 39.48 g/m^2 > Barguna 14.13 g/m^2. This study revealed that wide range of mesh size in fishing net and netting materials are used in consequences fishing practice produces variety of marine debris in the coastal and marine environment of Bangladesh. Most of the fishing nets debris caused by extreme weather events (like cyclone, storm), end of life fishing gears and irresponsible practices of fishers. The study suggested the control and preventive measures of fishing net-based marine debris are to raise awareness, set policies and regulations and enforce them effectively, know properly the end-of-life fishing gear, increase disposal facilities and recycling techniques consequences a safe and sustainable coastal and marine ecosystem, rich marine biodiversity can be achieved by avoiding the fishing net-based marine debris in the Southern coastal Bangladesh.

PPF 18 Microplastic Pollution and Risks (Book Summary)

Golam Kibria[1]*, Joya Biswas[2], Tanvir Akash[2] and Md. Nazmul Ahsan[2,3]

[1]Global AM Pollution Watch Program, Australia, STEM College, RMIT University, Australia
[2]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna, Bangladesh
[3]Khulna Agricultural University, Khulna, Bangladesh
*Email: kibriagolam0@gmail.com

This book "Microplastic Pollution and Risks: Toxicity, Ecosystems, Water, Food, Air and Human health" covers the following aspects: i. Sources, occurrences, and transport pathways of microplastics to the environment; ii. Chemistry, toxicity and ecotoxicity of plastics; iii. Microplastic contamination of surface waters, drinking waters, soils, sediments, agricultural food, seafood, air, and human organs; iv. Risks of microplastic in the context of phytotoxic effects on agricultural crops, ecotoxic effects on seafood (fish) and toxic effects on humans; v. Linkages among microplastic pollution, climate change and sustainable development goals; and vi. Control and management of microplastic pollution. The book has been structured as a combination of research, text, reference, and extension book and written in simple and plain English to benefit a wide range of technical and non-technical readers worldwide.

PPF 19 Micro and Meso Plastic Contamination in Water, Sediment, and Fish: A Study of Aquaculture Ponds in Northern Bangladesh and Health Risk Assessment

Shyamal Kumar Paul*, Md. Sohel Rana and Debsish Saha

Department of fisheries and Marine Science, Noakhali Science and Technology University, Noakhali
*Email: mailto:shyamal@nstu.edu.bd

Plastic pollution, caused by accumulating waste in oceans and waterways, poses a global concern due to its impact on aquatic species and ecosystems. Three districts in northern Bangladesh were selected, and nine culture ponds were randomly chosen from each district to collect fish **(***Mystus cavasius***,** *Clarias batrachus***,** and *Ompok pabda*), water and sediment samples**.** This study established baseline data on plastic pollution in aquaculture ponds by analyzing debris in water, sediment, and fish using stereomicroscopy and FTIR. It examined plastics in the GIT and mussels of fish, identifying their type, size, and color, while also assessing the Polymer Hazard Index (PHI), Contamination Factor, and Pollution Load Index (PLI). The abundance of plastic particles in pond waters and sediments ranged from 5.60 ± 4.32 items/L to 20.20 ± 0.60 items/L and 66.67 ± 1.96 items/kg dry weight to 306.67 ± 1.31 items/kg dry weight, respectively. The results also showed that the contamination of fish species with micro- and mesoplastics maintained the following hierarchy: *Clarias batrachus* (16.56 ± 1.56 items/individual) > *Ompok pabda* (13.89 ± 3.20 items/individual) > *Mystus cavasius* (10.56 ± 1.73 items/individual). In all fish species, plastic accumulation was more in the gastrointestinal system than in muscle tissue. Specifically, plastic concentrations in the GIT ranged from 7.72 ± 0.83 to 8.69 ± 2.30 items/g in *Mystus cavasius***,** 10.70 ± 0.89 to 14.22 ± 1.13 items/g in *Ompok pabda*, and 14.51 ± 1.51 to 16.25 ± 1.82 items/g in *Clarias batrachus*. In contrast, plastic concentrations in muscle tissue were lower, ranging from 0.92 ± 0.20 to 1.49 ± 0.42 items/g in *Mystus cavasius***,** 0.81 ± 0.20 to 1.26 ± 0.53 items/g in *Ompok pabda*, and 1.08 ± 0.24 to 1.55 ± 0.56 items/g in *Clarias batrachus***.** A majority of ingested plastic particles were fibers (> 80%), violet in color (> 30%) and of size <0.5mm (> 75%). Polymer types were diverse with PA (30%) and PE (25%). The components of the identified microplastics were PS, PE, PTE, and PU, whereas the components of the mesoplastics were PTE, PES, PA, PE, and PP. PE and PET were prevalent in both cases. An examination of the risk level by the Polymer Hazard Index (PHI) showed that plastic pollution fell into discrete hazard classifications for various kinds of polymers, varying from grade I (<1) to grade IV (100–1000). The CF ($1 \leq CF < 5$) and PLI (>1) values revealed significant pollution status throughout northern districts. Our study paves the way for future research to clarify variables influencing the occurrence, distribution, and likely risk assessment of cultured aquatic organisms.

PPF 20 Identification of Diet and Food Preferences of the Black Sea Urchin (*Echinothrix diadema*) and Its Significant Impact on Marine Ecosystems

Sadek Ahammed Maruf*, SK. Ashif Rahman and M. Aminur Rahman

Fisheries and Marine Bioscience Department, Jashore University of Science and Technology, Jashore -7400, Bangladesh,
*Email: ahmedmaruf.just@gmail

A study was conducted to determine the diet composition and food preferences of the blue-black sea urchin *Echinothrix diadema* and its impact on marine ecosystems. Sea urchins are intriguing marine creatures that hold an important place in marine ecosystems. Their distinctive structure, feeding habits, and ecological roles contribute significantly to the overall health of ocean environments. *Echinothrix diadema* was captured from Chera Dwip (Chera Island) at Saint Martin Island within the Cox's Bazar region of Bangladesh in monthly intervals for 6-month from October 2022 to March 2023. *Echinothrix diadema* is one out of the four sea urchins that were mainly found in Saint Martin's Island. In total, 67 live individuals of *E. diadema*, weighing from 102.77 to 566.43 g, as well as various types of green, brown and red algae were collected and then preserved in 10% formaldehyde solution for analysis. Ten algal species were identified from the gut contents of *E. diadema* by using a compound microscope. In the first step of analysis, the mean percentage frequency of occurrence (F_i) of the most important food items in the stomachs were: *Ulva clathrate* (11.91%) and *Sargassum platycarpum* (11.42%), followed by digested food (12.33%), unidentified species (11.80%), *Cladophora glomerata* (10.33%), *Dictyota dichotoma* (8.32%), *Polysiphonia ulleungensis* (7.11%), *Antithamnion nipponicum* (7.71%), *Neosiphonia tongatensis* (5.45%), *Leveillea jungermannioides* (5.01%), *Hypnea cenomyce* (4.62%), debris (2.94%) and *Neosiphonia harveyi* (2.04%), respectively. The percentage volumetric abundance (V_i) of the most important food items in the gut content were: *Sargassum platycarpum* (20.44%), followed by *Ulva clathrate* (18.95%), *Cladophora glomerata* (16.71%), *Dictyota dichotoma* (13.03%), digested food (8.59%), *Polysiphonia ulleungensis* (7.31%), unidentified species (3.86%), *Antithamnion nipponicum* (3.44%), *Leveillea jungermannioides* (3.21%), *Hypnea cenomyce* (2.16%), *Neosiphonia tongatensis* (1.27%), debris (0.69%) and *Neosiphonia harveyi* (0.35%) in this order during the 6-month study. Overall diet composition of *E. diadema* ranked by simple resultant index (%Rs), *Sargassum platycarpum* (15.93%) and *Ulva clathrate* (15.43%) were the major food items. Investigating their feeding habits, distinctive physical characteristics, and ecological roles will enhance efforts to protect ocean biodiversity and ensure the sustainable management of marine resources for future generations.

PPF 21 Ingestion of Microplastics by the Mud Crab (*Scylla serrata*) from the Northern Bay of Bengal

Md Shajjadur Rahman* and Md Sazzad Hosen Lotion

Department of Oceanography, Shahjalal University of Science & Technology, Sylhet, Bangladesh
*Email: shajjadshishir92@gmail.com

In this study, three fishing grounds in Cox's Bazar, Bangladesh, were selected for assessing micro-plastic (MP) contamination in mud crabs (*Scylla serrata*). MPs were examined in the crabs' gills and guts using μ-FTIR, saline flotation, and alkali digestion. The tissues of mud crabs that were gathered from three fishing locations were digested using 10% KOH. MPs were filtered, examined under a microscope, then separated using NaCl floatation. By using μ-FTIR, the chemical makeup of MPs was verified. To reduce contamination, experimental procedures were meticulously regulated. Relationships between crab characteristics and MP abundance were evaluated using statistical techniques, such as linear regression. With diameters ranging from 0.09 mm to 13.42 mm, the study found 148 MPs, primarily microfibers of polypropylene (PP), polyvinyl chloride (PVC), and polyethylene terephthalate (PET). According to the results, Moheshkhali had the greatest MP detection rate (30%), while Moheshkhali-2 had the lowest (21%). MPs were present in all crabs but absent in muscles. Guts contained higher MP concentrations than gills, indicating differential tissue accumulation. Fiber-shaped MPs dominated, with PET as the most common polymer at some sites. Regression analyses revealed strong positive correlations between MP abundance and body weight, and gut weight (R = 0.94, 0.95, respectively). The morphological changes in fibers were noted under long KOH exposure. The results show that mud crabs were significantly contaminated with MP, which raises questions regarding the safety of seafood and ecological hazards. Crabs ingesting MPs may have a wide range of negative effects on their physiological and biochemical activities. Furthermore, humans may consume MPs when eating crabs, increasing the risk of MP exposure in the human digestive tract. Accordingly, more strategies and regulations should be applied to reduce MP contamination in aquatic animals and habitats.

PPR 01 Fish Waste to Wealth: Reuse and Circular Economy Prospect in Coastal Bangladesh

Pallabi Howlader[1]*, Joyanta Bir[2] and Ghausiatur Reza Banu[2]

[1]Department of Fisheries (DoF), Ministry of Fisheries and Livestock, Dhaka, Bangladesh
[2]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: pallabi.ku@gmail.com

Fish waste and by-products are rich in valuable nutrients and organic matter. In coastal area of Bangladesh, fisheries are a primary livelihood; generating significant fish waste includes heads, scales, viscera, crustacean shells, and unsold fish often underutilized and contributing to marine litter. Thus, people face dual challenge of managing marine litter, which alternatively could be an opportunity to transform fish waste and by-products into valuable resources through sustainable waste management practices. This abstract examines the dual concepts of waste to wealth and possible transforming to circular economy within the context of utilizing fish by-products. In this context, this review highlights existing practices and innovative solutions such as composting, biogas production, and enzymatic hydrolysis, which can transform fish waste into bio fertilizers, animal feed, and biochemical compound like chitosan from shrimp shell and fish scale. By converting fish waste into valuable products and promoting local entrepreneurship and resource efficiency, these practices not only reduce marine litter as well as environmental pollution but also create economic opportunities and enhance community livelihoods. The study also emphasizes the importance of stakeholder collaboration, including government support, industry engagement, and community participation, to achieve sustainable waste management, aquatic organism's disease control and circular economy objectives in Bangladesh's coastal regions. In summary, the incorporation of waste to wealth strategies for fish by-products offers a feasible pathway for enhancing environmental sustainability, promoting community resilience, and encourages circular economy practices in the coastal communities of Bangladesh. The successful execution of these strategies necessitates innovative solutions, supportive policies, and the active involvement of all stakeholders to achieve lasting advantages for the environment and local economies.

PPR 02 Elasmobranch Fishery in the Northern Sundarbans Mangrove of Bangladesh: Threats to Biodiversity Conservation

Md. Enamul Hoq[1]*, Saha Pran[2], Masood Siddique[2] and M Mukhlesur Rahman[2]

[1]Arannayk Foundation, 572/K Matikata ECB Chattar, Dhaka-1206, Bangladesh
[2]Center for Natural Resource Studies, House #13, Road #17, Block-D, Banani, Dhaka-1213, Bangladesh
*Email: hoq_me@yahoo.com

A unique habitat for estuarine nurseries and coastal fisheries, the Sundarban mangrove forest supports the livelihoods of thousands of local peoples in the south-western Bangladesh. Nevertheless, little is known about its shark and rays, due to few species-specific research on their biology, habitat, ecology and species composition. This study aims to evaluate local exploitation patterns and the significance of sharks and rays in small-scale fisheries harvests by analyzing data on landings from small-scale fisheries in the northern Sundarbans. We also conducted interviews with local fishermen to record their understanding on the elasmobranch species and their distribution in the Sundarbans. This study identified three sharks and eleven rays species during a one-year study in the mesohaline zone of the northern Sundarbans under the Khulna district. The identified species were *Carcharhinus leucas, Pristis pristis, Scoliodon laticaudus, Brevitrygon imbricata, Brevitrygon walga, Gymnura poecilura, Himantura bleekeri, Himantura leoparda, Himantura uarnak, Pastinachus gracillicaudus, Pateobatis uarnacoides, Urogymnus lobistoma, Urogymnus polylepis* and *Glaucostegus granulatus*. All ray species landed in the dominant nearshore gillnet fishery showed very low mean individual weight (<0.5 kg), indicating that catches were dominated by juveniles. Aside from endangered large-tooth sawfish and granulated guitarfish (*P. pristis* and *G. granulatus*), the honeycomb stingray (*H. uarnak*), was the most frequently landed ray species in the region by weight and number. The peaks in abundance were during post-monsoon (September-November). While the Wildlife Protection Act (2012) restricts the catch in and around the Sundarbans, the Fisheries Act of Bangladesh does not include any restrictions on the capture of sharks and rays. Coastal and estuarine habitats are safe havens for many shark and ray species to feed, breed, and develop away from predators. While the function of mangrove habitat is well studied for taxa such as teleost fishes, limited attention has been directed towards the taxa of elasmobranchs. The fishers' community should be made aware of the negative consequences of illegal elasmobranch catching and trade, as most people appear to be unaware of biodiversity conservation.

PPR 03 Coastal Ecosystems at Risk: The Plastic Pollution Crisis

Anti Islam [1]*, Sanjoy Saha[1], Mohammad Raqibul Hasan Siddique[1] and Md. Raihan Ali[1,2]

[1]Institute for Integrated Studies on the Sundarbans and Coastal Ecosystems (IISSCE), Khulna University
[2]Biotechnology and Genatic Engineering Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: anti@iissce.ku.ac.bd; antiislam03@gmail.com

The coastal ecosystems of Bangladesh, including the Sundarbans, are crucial for biodiversity protection, climate resilience, and livelihoods. However, these ecosystems are increasingly threatened by plastic pollution, with visible debris and microplastics disrupting marine life, degrading mangroves, and impacting human health through bioaccumulation and toxic exposure. Our survey in various locations (Dacope, Chadpai, Shyamnagar and Munshiganj) of Khulna and Satkhira region revealed strong community awareness of the issue, with most respondents supporting bans on plastics and polythene due to their harmful environmental impacts and human health hazards. However, the lack of initiatives by governmental or non-governmental organizations to combat this crisis highlights an urgent need for action. Encouragingly, community members expressed willingness to adopt alternatives and will participate in mitigation efforts if they are trained and supported. This study emphasizes the need for robust policy enforcement, efficient waste management, and community engagement through cleanup programs and awareness campaigns. Innovations like bioplastics and circular economy models might play a pivotal role in reducing plastic pollution. The findings underline a shared responsibility to protect Bangladesh's coastal ecosystems and their critical functions for future generations.

PPR 04 *In Vivo* and *In Silico* Study of Anxiolytic, Sedative, and Anti-Schizophrenic Activities of *Aegiceras corniculatum* (L.) Blanco: A Coastal Gem from Mangrove Ecosystems

H. M. Shadid Hossain Snigdha* and Shaikh Jamal Uddin

Pharmacy Discipline, Life Science School, Khulna University, Khulna-9208, Bangladesh

*Email: shadidhossain89@gmail.com

Aegiceras corniculatum, commonly known as Khalsi, is a coastal mangrove plant widely distributed in the intertidal regions of the Sundarbans. Pulverized leaves of the plant were subjected to ethanol extraction, and the extract (ACEE) was subsequently used for evaluating anxiolytic, sedative, and anti-schizophrenic activities at 250 mg/kg and 500 mg/kg in the mice model. The anxiolytic activity was performed using the open-field test, swing test, hole cross test, tail suspension test, and marble bury test, and the results stipulated that ACEE had a vigorous anxiolytic effect in comparison with an invariably recognized anxiolytic agent, Diazepam. The sedative activity was appraised using a Thiopental-sodium induced sleep time test, dark light test, and forced swim test. ACEE at 500 mg/Kg showed specified noteworthy sedative action with a 26.95% decrease in latency period and a 17.86% increase in sleep duration. Furthermore, ACEE at 500 mg/Kg expressed the highest dark residence time (154.83±8.23 seconds), while the experimental animals treated with the same dose with Diazepam and Flumazenil exhibited the highest immobility (140.83±4.76 seconds). The anti-schizophrenic test was assessed using the marble bury, dust removal, and swim test. A combination of ACEE at 500 mg/Kg with Olanzapine reduced the number of buried marbles (1.66±0.33), the amount of removed dust (9.33±2.27 gm), and the increased time to reach the destination (60.17±8.41 seconds) through the swimming which, at length, reversed the action of the D-dopamine. Furthermore, *in silico* studies of the leaf extract have identified Corniculatolide A and 11-O-methylcorniculatolide A as potent anxiolytic, sedative and anti-Schizophrenic compounds because of their interactions with the $GABA_A$ receptor and Dopamine receptor D_2. Overall, the findings suggest that in the future, *Aegiceras corniculatum* (L.) Blanco leaf extract will be a potential source of anxiolytic, sedative, and anti-schizophrenic chemicals.

PPR 05 Mangrove Community Health and Biodiversity in the Potential Coastal Mangrove Sites of Bangladesh

Fatematuj Johora Anni*, Md. Al-amin Mollah, Md. Shahriar Liku, S. M. Rubaiot Abdullah and S. M. Feroz

Forestry and Wood Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: fatematujjohoraanni@gmail.com

Forest community structure mainly attributed to forest species composition and diversity. Monitoring mangrove health by the application of Remote Sensing technology improves biodiversity and structure of mangrove ecosystem which are the key components of Mangrove Health Index (MHI). This research is conducted in six coastal mangrove sites which lie sharply on the coastal belt starting from South-West (Patharghata, Barguna) to South-East (Sitakundu, Chottogram) part of Bangladesh. A grid-based systematic sampling with cluster plot design was adopted. All mangrove species including associate species were identified to species level for tree classes (tree, sapling, seedling) to measure girth at breast height (GBH) and height (H) of all trees, and cut-wood trunk, canopy coverage and plastic waste cover were also recorded. A total of 15 species belonging to 25098 individuals have been investigated from 236 sampling plots (10 m x 10 m) of four study sites (Haringhata Eco Park, Tengragiri Wildlife Sanctuary, Bara Baisdia Coastal Plantation & Char Kukrimukri Wildlife Sanctuary). *Excoecaria agallocha* and *Sonneratia apetala* are the most dominant and abundant species in the study sites in terms of importance value index. In addition, a significant abundance of *Heritiera fomes* with other true mangrove and associate species in a dense coverage of *Acanthus ilicifolius* (Hargaza) in Tengragiri WS and Char Kukrimukri WS created a natural forest like Sundarbans mangrove forest. The value of Mangrove Health Index (MHI) showed that 4.38 %, 92.37 % and 3.25 % plots have poor, moderate and excellent health state, respectively in the study sites. This result indicates that mangrove community health is mainly moderate in the coastal area. The diversity indices (Shannon's index, Simpson's index and Pielou's evenness index) showed low diversity in the study areas, because these plantation forests had low species richness and low evenness value that made low species diversity. Plastic waste coverage and cut wood stumps are found higher along the coast. This may be resulted from natural calamities and\or tidal inundation as well as illegal encroachment. In addition, plastic/inorganic waste is one of the threats that cover the forest floor and negatively affects the community's regeneration ability in the area. Mangrove community in the study sites showed mainly moderate canopy coverage (88.5 % - 91.5 %). It is found that the status of species richness and diversity, and mangrove health index are similar in the study sites. It can be concluded that species richness and diversity may have positive relation to make similar health index and canopy coverage in the whole coastal mangrove community.

PPR 06 Impact of Biofloc and Traditional Culture Systems on Nutritional Composition of Giant Freshwater Prawn (*Macrobrachium rosenbergii*)

Rahima Afroze Rumpa*, Md. Kamrul Islam, Sadek Ahmed Maruf, Ramisa Anjum, Farhana Afrin Neha, Sathi Nondi, Humayara Munia, Mst. Sharmin Nahar and Md. Sherazul Islam

Fisheries and Marine Bioscience, Jashore University of Science and Technology, Jashore 7408, Bangladesh
*Email: rumpajust0404@gmail.com

Aquatic habitat parameters influence the nutritional composition of aquatic organisms. The present research investigates the changes in the nutritional composition of giant prawn, *Macrobrachium rosenbergii* cultured in biofloc and traditional culture systems. Biofloc technology (BFT) is an eco-friendly, sustainable aquaculture method that enhances water quality and nutrient recycling, potentially improving the nutritional quality of aquatic organisms. Proximate composition of prawns, including crude protein, lipid, moisture, and ash content, was analyzed from both systems. Prawns were cultured in two identical tanks (biofloc and normal), and data were collected after 90 days. Results showed that prawns cultured in the biofloc system had significantly higher protein (18.5%) and lipid content (2.8%) compared to those from the traditional culture system (16.2% and 2.1%, respectively). Moisture content was lower in biofloc prawns (75.4%) than in normal culture prawns (78.1%), indicating that the biofloc system improved the flesh quality of prawn. Ash content was marginally higher in biofloc prawns (1.5%) than in normal culture (1.3%). These results suggest that biofloc technology positively impacts the proximate composition of freshwater prawns, particularly by enhancing protein and lipid accumulation. The findings highlight the nutritional benefits and sustainability of biofloc systems compared to traditional methods, recommending biofloc as a viable alternative for improving prawn yield and quality.

PPR 07 Phytochemical, Antioxidant, and Antibacterial Potential of Seaweeds: Insight into Larval Development of *Macrobrachium rosenbergii*

Md. Shoebul Islam[1*#], HM Rakibul Islam[1#], Md Iqramul Haque[1], ASM Tanbirul Haque[1], Md. Ariful Islam[1], Md. Harunor Rashid[2], Md. Shahidul Islam[1] and Anuradha Bhadra[2]

[1]Bangladesh Fisheries Research Institute, Shrimp Research Station, Bagerhat-9300, Bangladesh
[2]Bangladesh Fisheries Research Institute, Mymensingh-2201, Bangladesh
[#]Equally contributed as first author
*Email: rakib.bfri@gmail.com

Seaweeds, an abundant natural resource in Bangladesh, offer promising potential for enhancing prawn aquaculture through their bioactive properties. This study evaluated the phytochemical composition, antioxidant, and antibacterial activities of crude extracts from three seaweed species—*Hypnea musciformis, Ulva intestinalis*, and *Gracilaria tenuistipitata*—and investigated their efficacy as immune modulators and molting promoters for prawn larvae. The seaweeds were collected from Saint Martin's Island, and their extracts were obtained using acetone, methanol, and ethanol solvents. Phytochemical screening revealed bioactive compounds, including alkaloids, flavonoids, and phenols, with flavonoid content in *Ulva intestinalis* reaching 3.46 mg catechin/g dry powder in acetone extracts. Antioxidant assays demonstrated notable scavenging activities; for example, DPPH scavenging was highest in *Gracilaria tenuistipitata* ethanol extracts (42.28%), while *Hypnea musciformis* acetone extracts showed the highest ABTS scavenging activity (35.62%). Antibacterial tests against *Vibrio parahaemolyticus* revealed inhibition zones for all *Ulva intestinalis* and *Gracilaria tenuistipitata* extracts, underscoring their antimicrobial potential. In larval trials, diets supplemented with 4 ppm seaweed extracts (T_1: *Hypnea musciformis*; T_2: *Gracilaria tenuistipitata and* T_3*: Ulva intestinalis*) and Spirulina powder enhanced molting and enzymatic activities. The highest molting rate was observed in larvae treated with *Ulva intestinalis.* Besides it showed significantly improved digestive enzyme activities, with amylase reaching 15.6 mg maltose/g/h and protease at 9.2 mg/g/h. These results highlight the potential of seaweed extracts as eco-friendly alternatives for improving larval development, immunity, and sustainability in aquaculture.

PPR 08 Assessing Heavy Metal Levels and Potential Human Health Risks in Lobsters and Crabs from Cox's Bazar (Saint Martin) and Patuakhali of Bangladesh

Md. Mominul Islam*, Anusree Biswas, Sadek Ahammed Maruf and Md Kamrul Islam

Department of Fisheries and Marine Bioscience, Jashore University of Science and Technology, Jashore 7408, Bangladesh.
*Email: mominulislamcyt@gmail.com

The study assessed the levels of heavy metals and potential human health risks in lobsters and crabs from cox's bazar (Saint Martin) and Patuakhali in Bangladesh. The pervasive and often unnoticed threat of heavy metal contamination in marine ecosystems poses significant health risks to aquatic life and humans. This study investigates the alarming presence of hazardous metals such as mercury (Hg), lead (Pb), cadmium (Cd), and chromium (Cr) in lobsters and crabs, two of the most prized seafood species in Bangladesh. These coastal regions, renowned for their vibrant marine life and fishing industries, are increasingly impacted by industrial pollution, agricultural runoff, and waste discharge, all contributing to the contamination of the Bay of Bengal's waters. Lobsters and crabs, as top predators in the marine food web, accumulate heavy metals through bioaccumulation, making them a source of potential toxicity for humans. Using state-of-the-art analytical techniques, this study measures and compares the concentrations of these metals in crustacean samples, revealing troubling levels that exceed international safety standards for seafood consumption. Beyond simply quantifying contamination, the research explores the broader public health implications, assessing the risks posed to consumers who regularly eat seafood from these regions. The findings underscore the urgent need for comprehensive monitoring of marine pollution, stricter regulations on industrial waste, and more robust food safety measures. With high levels of metals like mercury and arsenic linked to severe health conditions such as neurological damage, kidney failure, and cancer, the study stresses that the contamination of lobsters and crabs in Cox's Bazar and Patuakhali represents a hidden but critical health crisis. This study is a wake-up call for policymakers and the public, highlighting the invisible danger of marine pollution and its direct impact on human health. The research advocates for sustainable fishing practices, improved waste management, and greater consumer awareness to mitigate the risks posed by heavy metal contamination. By bringing to light the silent threats lurking beneath the surface, this work aims to spark change in how seafood safety is approached in Bangladesh and beyond, ensuring a healthier future for both humans and the marine environment.

PPR 09 The Mud Crab (*Scylla olivacea*) Fishery Concerning the Physio-Chemical Properties of Two Coastal Sub-Districts in Bangladesh

S.M Dolanur Karim* and Subrata Mondal

Fisheries and Marine Bioscience, Jashore University of Science and Technology, Jashore 7408, Bangladesh.
*Email: smdolenurkarim377663@gmail.com

The species *Scylla olivacea* is one of the most potential export-oriented seafood trades, particularly as a live marine product in Bangladesh. Due to high demand and good prices in international markets, the species has been overfished for the last one decade. The trade of the mud crab is completely based on the harvest from the wild resources. The present study was conducted in south-western coastal habitats to know the production of mud crab, physic-chemical parameters, and the relation between production and physic-chemical parameters in the two sud-districts of coastal Bangladesh. The study carried out two selected sites of the mangrove ecosystem, located at Paikgacha upazila under Khulna district and Kaligonj upazila under Satkhira district. The present study~~.~~ tried to gather rainfall, salinity, pH, DO and Mud crab production data from the respected authority for the last decade to analyze and draw the scenario of the fishery concerning the physic-chemical properties. The water temperature ranged from 16.35 to 31.01°C between 2023 and 2024. Dissolved oxygen (DO) ranged from 4.38 to 8.54 mg/L between 2023 and 2024. PH ranged from 6.45 to 8.88 between 2023 and 2024. The salinity ranged from 6 to 16.5 ppt in Khulna district and 8.5 to 20 ppt in Satkhira district between 2021 and 2022. In both districts, the salinity was high in 2021 and 2022. The values of salinity were high in June (21 ppt) and July (22 ppt) in Khulna and Satkhira respectively Rainfall ranged from 1267 mm to 2594 mm in the Khulna district and 1295 mm to 2140 mm in the Satkhira district between 2021 and 2022. In both districts, rainfall was high from May to September. A little fluctuation in rainfall was evident in the case of yearly comparison in mangrove areas. The salinity of Satkhira was higher than Khulna in the yearly comparison of mangrove areas. A fluctuation was also noticed in the case of monthly comparison of salinity. The production of mud crabs increased yearly in both districts in the last few years from 2020-21 to 2023-24. The production of mud crabs in Khulna and Satkhira was high in July and September respectively. The seasonal production of mud crab was high in both districts during monsoon. In the catch composition of male and female crabs, males were captured high in both cases. In the comparison of the yearly production of mud crab between Khulna and Satkhira from 2021-2022 to 2023-2024, the production of Khulna was higher than Satkhira. The production of female crabs in Khulna was also higher than in Satkhria and male production in Satkhira was higher than in Khulna. In relation to physical-chemical parameters, the production of mud crabs in mangrove areas~~, it~~ was observed high when rainfall (1200- 1400 mm) and salinity (14-16 ppt) being optimum levels in monsoon.

PPR 10 Effects of Stocking Density on Growth Performance of Freshwater Prawn in Biofloc System under Zero Water Exchange.

Lubna Akter *, Md. Kamrul Islam, Sadek Ahmed Maruf, Ramisa Anjum, Farhana Afrin Neha, Rahima Afroz Rumpa, Sathi Nondi, Humayara Munia, Mst. Sharmin Nahar and Md. Sherazul Islam

Department of Fisheries and Marine Bioscience, Jashore University of Science and Technology, Jashore - 7408, Bangladesh.
*Email: nomanlubna1920@gmail.com

Biofloc technology has been successfully implemented for several fish species, but not for Indoor prawn culture in Bangladesh. This study evaluated the effect of stocking densities on the productive performance of the freshwater prawn *Macrobrachium rosenbergii* post larvae (PL) in a biofloc system. The experimental units consisted of vertical cylindrical polythene tanks with 1000L water capacity. PLs with an initial weight of 0.18±0.03 g, were randomly distributed in the experimental tanks at different stocking densities (200, 300 and 400 PL/m^3) and reared for 60 days. Water quality variables (Temperature, Ammonia, Nitrate, Nitrite, pH, floc volume, Alkalinity, DO) were monitored regularly using specific equipment. Prawns stocked at the density of 200 PL/m^3 showed higher survival (75%). The total biomass at the harvest time was significantly higher for higher Stocking density (400 PL/m3). However, the stocking densities evaluated did not affect the weight and length of prawns. Taking into account the highest survival, 200PL/m^3 is the recommended density for growing *M. rosenbergii* in the biofloc system.

PPR 11 Antibacterial Activity of *Meretrix meretrix* from the Estuarine Ecosystem of Bangladesh

Ritu Rani Das, Md. Parbez Hasan and Md. Mostafizur Rahman Mondol*

Department of Fisheries, University of Rajshahi
*Email: mostafiz_bau@yahoo.com

Innate immune mechanism in invertebrates is known to protect these organisms against potential pathogens. This study is the first report on antibacterial activity of *M. meretrix* in Bangladesh. During the study period**,** methanol**,** ethyl acetate, chloroform extracts of *M. meretrix* and commercial antibiotic Kanamycin were screened for antibacterial activity. The extracts were obtained from the tissue of the bivalve and tested against four pathogenic bacteria. They are *Escherichia coli, Shigella boydii*, *Bacillus subtilis* and *Staphylococcus aureus**.*** Methanol, ethyl acetate and chloroform extract of *M. meretrix* and commercial Kanamycin displayed positive activities against four species of bacteria. The inhibition zone of methanol extract ranged from 17 mm to 22 mm. The minimum inhibition zone was 17 mm against *Escherichia coli* and maximum inhibition zone was 22 mm against *Staphylococcus aureus.* The inhibition zone of ethyl acetate extract ranged from 14 mm to 21 mm. The minimum inhibition zone was 14 mm against *Escherichia coli* and maximum inhibition zone was 21 mm against *Bacillus subtilis*. The inhibition zone of chloroform extract ranged from 21 mm to 23 mm. The minimum inhibition zone was 21 mm against *Bacillus subtilis* and maximum inhibition zone was 23 mm against *Shigella boydii*. The inhibition zone of commercial antibiotic Kanamycin ranged from 22 mm to 26 mm. The minimum inhibition zone was 22 mm against *Shigella boydii* and the maximum inhibition zone was 26 mm against *B. subtilis.* The obtained data suggest that *M. meretrix* is the potential candidate of antibacterial agents.

PPR 12 Seasonal Distribution of Microplastic Contamination in Sediment from the South-East Coast of Bangladesh

MD Shajjadur Rahman[1]*, Faisal Sobhan[1], Showmitra Chowdhury[2] and Md. Hasibul Hasan Hridoy[1]

[1]Department of Oceanography, Shahjalal University of Science and Technology, Sylhet 3114, Bangladesh.

[2]Bangladesh Oceanographic Research Institute (BORI), Cox's Bazar, Bangladesh.

*Email: hasibulhridoy15@gmai.com

It is a global concern that microplastics (MPs) are increasing in sediment day by day. Therefore, this study aimed to investigate conditions of MPs pollution in sediments at Maheshkhali and Sonadia Island of Bangladesh into two different seasons. A total of 624 MPs were found in the pre-monsoon and 708 MPs during post-monsoon season from the two areas respectively. Three diverse shapes (filament, round, irregular) microplastics were detected in the sediments, filament was found maximum in Maheshkhali (68%) and Sonadia (65%). The types of microplastics were predominantly fibers (64-77%), followed by film, fragments, foams and beads. Else to this, 6 colors of MPs were found in both places; black (27-29%), white/transparent (25-27%), blue (21-23%), brown (12-15%), red (7-10%) and yellow (1-3%) were the significant of them. Polypropylene was the most abundant polymer followed by polyethylene (PE), polyethylene terephthalate (PET), ethylene vinyl acetate (EVA), nylon6, polyvinylchloride (PVC), polyurethane (PU), acrylonitrile butadiene-styrene (ABS), polymethyl pentene (PMP); polypropylene was found at highest percentage (41-45%) in the Southeast region. Disturbance-induced resuspension and vertical transport have significant effects on small-sized microplastics (0.05 mm–5. 00 mm), indicating their potential to migrate and redistribute via resuspension at different temporal and spatial scales, particularly in estuaries where several river flows meet in the coastal areas, especially discharge from the upper regions. Microplastic abundance in the sediments in the post- monsoon were slightly higher than those from the pre- monsoon and the monsoon season promotes the accumulation of smaller microplastics in the sediment along the river-flow direction but not for the pre monsoon.

PPR 13 Socio-Economic Status of Crab Farmers and Crab Cultivation Scenario in Batiaghata, Khulna, Bangladesh

Sadia Islam Mou*, Sabiha Yasmin and Abduallah-Al-Masud

Environmental Science Discipline, Khulna University, Khulna-9208
*Email: sadia@es.ku.ac.bd

Crab farming has emerged as a significant aquaculture practice in Bangladesh due to its high demand and export value. This study focuses on the socio-economic conditions, current status, and environmental impacts of crab farming in Batiaghata Upazila, Khulna District. A survey of 100 crab farmers was conducted to gather data on demographics, crab farming practices, and associated challenges. The majority of farmers around 96% were male with a significant proportion of 59% in the 21-40 years age group. Most farmers combined crab farming with other activities, such as fish culture and agriculture. The average annual income from crab farming ranged between 70,000-100,000 tk. Additionaly, 99% of farmers had access to electricity, while 74% used sanitary latrines, indicating an improving standard of living. The study found that most crab farmers sourced their seeds from the wild, primarily from the Sundarbans, and used natural feeds, with a small percentage using commercial or prepared feeds. The size of crab farms ranged from less than 1 bigha to more than 20 bighas. The survey also highlighted the lack of formal training and financial support, as most farmers had not received loans or training. Challenges in crab culture, including disease outbreaks, water quality management, and flood inundation, were significant constraints. Environmental impacts were also noted, with increased salinity, land-use changes, biodiversity loss, and deforestation attributed to the expansion of crab farming. The findings suggest that while crab farming has improved the livelihood of many farmers, it also presents environmental challenges that require sustainable management practices. The results emphasize the need for better training facilities, financial support, and policy interventions to ensure the continued success and sustainability of the crab farming industry in Bangladesh.

PPR 14 Modeling the Role of Whale Populations in Phytoplankton Blooms and Climate Regulation

Shantunu Mondal*, Rifah Tasnia and Md. Haider Ali Biswas

Mathematics Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: shantunu181214@gmail.com

Whales play a pivotal role in marine ecosystems by facilitating nutrient cycling, particularly through the release of nutrient-rich fecal plumes, which promote phytoplankton growth. Phytoplankton serves as the foundation of the marine food web and plays a significant role in global carbon sequestration by absorbing atmospheric carbon dioxide. But microplastics are making difficulties by damaging the whale's food chain and blocking the lights from reaching phytoplankton, which decreases the efficiency of photosynthesis. This study develops a mathematical model to analyze the complex interactions between whale populations, phytoplankton blooms, and climate dynamics. The model incorporates whale population dynamics, phytoplankton growth, microplastics and carbon sequestration. Analytical analysis shows the existence of solutions of the model. Numerical simulations reveal the time series analysis of the system, highlighting the potential cascading effects of declining whale populations on primary production and climate regulation. The results underscore the importance of whale conservation as a mechanism to sustain marine biodiversity and mitigate climate change. This work provides a quantitative framework to inform ecosystem-based management rstrategies and address anthropogenic threats to marine and global systems.

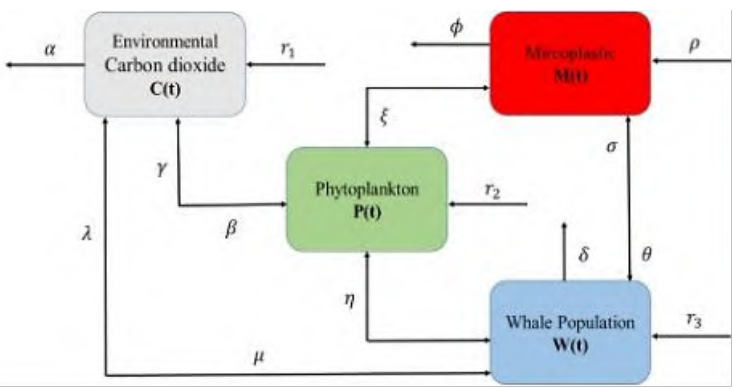


Figure: The schematic of the mathematical model with the impacts of whale

PPR 15 Bridging Policy and Practice Gaps in Marine Litter Management: A Call for Integrated Solutions

Sheikh Anwar Hossain[1,2]*, Musammat Mahzebin[1,3], M M Abdullah Al Mamun Sony[2,4] and Tuhin Roy[1]

[1]Sociology Discipline, Khulna University, Khulna-9208, Bangladesh
[2]CMN & DRR Program, Change Maker Nexus, Khulna-9000, Bangladesh
[3]Department of Humanities and Business, Khulna University of Engineering & Technology, Khulna-9203, Bangladesh
[4]University of Debrecen, Debrecen, Hungary
*Email: ahossain.anwar@gmail.com

Marine litter has emerged as a critical environmental issue, severely impacting coastal ecosystems, biodiversity, and livelihoods. Despite growing international attention, significant gaps remain between policy formulation and on-ground implementation. This study investigates the gaps between policy frameworks and practical efforts in marine litter management, emphasizing challenges in stakeholder engagement, resource allocation, and community participation. By analyzing secondary literature, international conventions, and regional policy reports, the study highlights inconsistencies in enforcement mechanisms, limited cross-sector collaboration, and the absence of adaptive local models tailored to community needs. Furthermore, it explores how these gaps hinder efforts to promote circular economy approaches, such as waste-to-value initiatives and sustainable livelihood programs, particularly in disaster-prone coastal areas. The research applies the Institutional Analysis and Development (IAD) framework to evaluate governance challenges and identify strategies for harmonizing policy objectives with practical interventions. Findings of this study underscore the need for integrated, inclusive, multi-stakeholder approaches aligning policy goals with grassroots initiatives. The study calls for capacity-building programs, improved monitoring systems, and adaptive policy designs to address these gaps and ensure the sustainable management of marine litter. Bridging this divide is essential for creating resilient coastal communities and achieving broader environmental sustainability goals.

PPR 16 Identifying Areas of Intervention to Improve Waste Collection in Bangladesh

Sourav Saha[1]*, Senta Berner[2] and Swadhin Das[3]

[1] Department of Civil Engineering, Khulna University of Engineering & Technology
[2] Chair for Resource Management, Faculty of Civil and Environmental Engineering, Bauhaus-Universität Weimar.
[3]Department of Urban and Regional Planning, Khulna University of Engineering & Technology
*Email: sourav.cekuet2012@gmail.com

Waste collection is critical in minimising environmental and public health risks, especially in urban environments. Effective waste collection systems are also essential for preventing marine litter, as they reduce the leakage of plastics and other debris into waterways and, ultimately, the ocean. This study outlines interventions to enhance waste collection in Khulna City Corporation (KCC), Bangladesh, focusing on plastic waste reduction and overall system optimisation. A systematic 4-step assessment revealed key challenges, including inadequate waste containment at open secondary transfer stations (STS), inefficiencies in vehicle design and route planning, and a lack of reliable data on waste generation rates and population dynamics. The climatic conditions in Bangladesh further exacerbate issues, necessitating frequent collection and minimising retention times to prevent environmental and health hazards. Although stratified random sampling proved to be a robust approach to estimating waste generation rates and composition, there are still critical data gaps, particularly concerning population and income information. The identified discrepancies in population estimates significantly impact waste generation projections, necessitating improved data collection and analysis methods. Finally, the study outlines possible interventions, addressing both immediate operational inefficiencies, such as optimised collection routes, and long-term environmental goals.

PPR 17 From Assessment to Interventions – Challenges in Upgrading Disposal Sites in Bangladesh

Pangkaj Kumar Mahanta[1]*, Senta Berner[2], Saptarshi Mondal[1], Syeda Tasnova Imam[1] and Tushar Ali[1]

[1] Department of Civil Engineering, Khulna University of Engineering & Technology
[2] Chair for Resource Management, Faculty of Civil and Environmental Engineering, Bauhaus-Universität Weimar.
*Email: pangkaj1001058@scip.kuet.ac.bd

Landfilling is a widely used and cost-effective method for disposing of municipal solid waste, but it presents significant environmental and public health risks. To guide improvements or closure of disposal sites, structured assessments are essential. In Bangladesh, no official landfill assessment or classification system exists. To address this, a pilot system was developed and applied at the Rajbandh disposal site of Khulna City. The system draws on findings from Europe and Africa and aligns with the 2021 Solid Waste Management Rules. It evaluates disposal sites across 17 categories, customised to the context of Bangladesh. The framework acknowledges that landfill sites can transition between open-crude dumps and open-controlled sites and even achieve the status of sanitary landfills. Currently, the Rajbandh site faces various challenges and has shown poor performance across the investigated categories, particularly regarding the site's containment. Furthermore, the investigation revealed various challenges in data reliability. Critical are data gaps on waste mass flows entering the site and recovered materials, as well as gaps in understanding plastic emissions from water and wind erosion. Thus, it was proposed that a temporary weigh-bridge and emission monitoring plan be implemented to improve the underlying database for future intervention. Additionally, recommendations were issued to ensure a buffer zone around the waste body, to improve embankments surrounding the site and to establish a sanitation facility to improve working conditions on-site. Whereas buy-in from the municipality was easily achieved for the latter, operational or technical interventions to reduce emissions are less successful. Nevertheless, the interventions drawn from assessment results lay the foundation for improved site management and the further development of the site is currently being closely monitored and documented with drone images.

PPR 18 Stand Structure, Species Composition and Carbon Accumulation in the Polyhaline Zone of the Sundarbans Mangrove Forest, Bangladesh

Tanvir Islam*, Sakib Anjum and Md. Kamruzzaman

[1]Forestry and Wood Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: rrokon702@gmail.com

Mangrove stand structure may have a direct impact on the conditions and functioning of mangrove ecosystems, and it can modify the distribution and richness of fauna in these habitats. The mangrove ecosystem throughout the polyhaline zone of Sundarbans Mangrove Forest (SMF) was chosen for research on stand structure, biomass accumulation, and carbon storage. Field data were collected from seven sample plots measuring an area of 700 m^2. We examined species diversity, diameter class distribution vs. biomass carbon, and species-specific contributions to total biomass carbon. *Excoecaria agallocha* has maintained its dominance (42.4%, relative density) of the stand. The mean above and below-ground biomass carbon stock of the mangrove community was 197.1 and 173.2 Mg ha^{-1} yr^{-1}, respectively. *Avicennia officinalis* accounted for only 16.7% individually, contributing over 45% to the total biomass carbon while *Xylocarpus mekongensis* was the second-highest contributor. The majority of the tree's diameter were around 10 -15 cm, but their share of the total above-ground biomass carbon is only 12%. In comparison, a significant amount of biomass carbon is contributed by tree species with a diameter of 35 to 40 cm, which account for only 3.9% of all trees, but account for 17.8% of the total above-ground biomass carbon. Mangrove communities growing in the polyhaline zone of the SMF have significant species diversity and considerable carbon stock. These findings should be incorporated in future decision-making processes for the area and contribute to a better understanding of the SMF's function in reducing the effects of global warming.

PPR 19 Nutritional Composition and Antioxidant Activities of *Meretrix meretrix* from the Estuarine Ecosystem of Bangladesh

Maria Khatun, Md. Foysal Hossain and Md. Mostafizur Rahman Mondol*

Department of Fisheries, University of Rajshahi, Rajshahi, Bangladesh
*Email: mostafiz_bau@yahoo.com

Today, there is an increasing interest in antioxidants and natural antioxidant are preferred over synthetic antioxidants. There are many methods that measure the antioxidant effect of these DPPH (2,2-diphenyl-1-picrylhydrazyl) removing assay is the most putative, popular and commonly used to determine antioxidant ability. The present study was undertaken to investigate the antioxidant activity and nutritional composition of hard clam, *Meretrix meretrix* during July, 2021 to June, 2022. Samples were collected from Burigoalini river of Shyamnagar upazila under Satkhira district of southern Bangladesh. During the study period, the nutritional composition in the dry tissue of *M. meretrix* was protein 54.23 to 58.25%, lipid 3.18 to 5.1%, carbohydrate 18.64 to 21.49 %, moisture 5.24 to 6.25 %, ash 9.51 to 11.96 % and fiber 2.25 to 3.21%. Protein content was high during monsoon and low during post-monsoon. Carbohydrate content was high during post-monsoon and low during monsoon season. Lipid content was high during monsoon and low during pre-monsoon period. In the present study methanol and ethyl acetate extracts of *M. meretrix* and ascorbic acid (used as standard) were screened for testing antioxidant activity against DPPH (2,2-diphenyl-1-picrylhydrazyl). Tissue extracts of *M. meretrix* showed a potential antioxidant activity. Methanol extract showed more effective scavenging activity of free radicals than ethyl acetate extract. The IC_{50} value 7.5µg/ml was recorded for methanol extract, 20µg/ml for ethyl acetate extract and 2µg/ml standard ascorbic acid. With increasing extracts concentration, antioxidant activities significantly increased, indicating the strength of the bioactive components that give the substance its antioxidant properties. *M. meretrix* can be an excellent source of dietary protein and having medicinal value. This study results will supply valuable information on nutritional quality and antioxidant properties of the bivalve which may be helpful for the enhancement of consumption and use of *M. meretrix* in Bangladesh.

PPR 20 Distribution Patterns of Sedimentary Biochemical Parameters at Vertical Layers of The Shrimp Farm's Bottom Sediment

Md. Ariful Islam[1]*, Md. Iqramul Haque[1], Rabina Akther Lima[1], Md. Shoebul Islam[1], H M Rakibul Islam[1], Md. Touhidul Islam[1], Md Harunor Rashid[2], Md. Shahidul Islam[1] and Anuradha Bhadra[2]

[1]Bangladesh Fisheries Research Institute, Shrimp Research Station, Bagerhat-9300, Bangladesh
[2]Bangladesh Fisheries Research Institute, Mymensingh-2201, Bangladesh
*Email: arifulbau@gmail.com

Nutrients remain in the bottom sediment of an aquatic habitat. Their release and mixing into water influence the biological cycle of an ecosystem including inevitable nutrients such as carbon (C), nitrogen (N), and phosphorus (P), which underlie diverse biogeochemical processes, and control water quality and ecosystem production. Considering the importance of sediment nutrients for aquatic ecosystems, the study was conducted to assess the availability and vertical dispersion of sedimentary chemical parameters and microbiome properties at the bottom sediment. The samples were collected from the improved extensive shrimp farms of the Bagerhat, Khulna, and Satkhira regions. The sediment column was segmented into three layers viz. upper layer (top 0.5 ft), middle layer (0.5 ft to 1 ft), and bottom layer (considering 1 ft depth to 1.5 ft depth). Most of the adjuvant minerals and nutrient components like phosphorus, sulfur, zinc, boron, manganese along with the total organic matter, total-N, calcium, magnesium, and potassium were available up to the middle layer of the sediment column. The trace element composition was mostly sighted to the bottom layer of the sediment column. From the metagenomic analysis, it was found that most of the beneficial microorganism groups like *Bacillus spp.*, *Brevibacillus spp.*, *Delftia sp.*, *Stenotrophomonas sp.*, as well as *Desulfobacteriota* phylum groups bacteria were abundant in the middle column of the sediment samples which also indicate the pro-production environment of the shrimp farms up to 1 ft. depth of bottom sediment. The findings indicate that higher sedimentation resists heavy metal exposure to the water column which suggests bottom sediment depth should be kept at a maximum of 1 ft to ensure the pro-health minerals and nutrient composition for shrimp culture.

PPR 21 Genetic diversity of Asian seabass (*L. calcarifer*) in coastal rivers of Bangladesh based on mitochondrial DNA

Ashim Kumar Ghosh[1,2*], Saikat Bain[2], Md. Ali Ahasan Setu[3], Dr. Md. Golam Sarower[2]

[1]Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh
[2]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
[2]Jashore University of Science & Technology, Jashore, Bangladesh
*Email: ashim.dof@gmail.com

The Asian seabass *Lates calcarifer* is one of the most commercially important species worldwide. Farming practice of this species is relatively new in Bangladesh and it is gaining prime preference among the consumers due to its taste, nutritive values and high flesh content compared to other commercially available species. The lack of genetic and genomic resources has slowed the enhancement and exploration of its breeding potential. This study used genetic analysis to investigate the genetic connections and relationships of six different populations of this species. A total of 180 samples were collected from six coastal rivers in Bangladesh, and used a partial genome sequence of a fragment of the cytochrome c oxidase 1 gene for their haplotype network analysis. The analysis included the calculation of diversity and complexity indices, with a particular focus on haplotype branch diversity (HBd). All tools were implemented in R and available in the package pegas. The resulting dataset included 147 individuals partitioned into 29 haplotypes and 6 classes of haplotypes. Haplotype 1 was the most frequent haplotype containing 98 individuals, existing in all six populations. Haplotype diversity (Hd) and nucleotide diversity (Pi) ranged from 0.22 to 0.9 and from 0.0006 to 0.006 within the population. The study revealed haplotype diversity of 0.55 and a branch diversity of 0.51 between the population with an estimated HBd value of 0.28. The analysis of molecular variance (AMOVA) indicated that 14.63% variance was among populations while 85.36% was within populations, suggesting a low level of genetic differentiation among six populations (FST = 0.14639, P = 0). These results provide valuable insights into the genetic and topological diversity of Asian seabass, highlighting interesting and contrasting patterns which can be used in future breeding efforts. This genetic analysis approach can be an essential tool to better understand the relationships and diversity of fish species.

PPM 01 A Review on the Gut Microbiomes of Shrimp and Their Interactions to Enhance Host Innate Immunity

Sumaia Sidratin Muntaha*, Asifa Ashrafy, Abul Farah Md. Hasanuzzaman, Ghausiatur Reza Banu and Shikder Saiful Islam

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: muntaha170624@gmail.com

The gut microbiome of shrimp plays a crucial role in shaping their overall health and immune responses. Shrimp gut microbiomes are composed of a complex community of bacteria, archaea and fungi, which contribute to nutrient metabolism, disease resistance, and overall host performance. Several factors such as diets, environmental conditions and host genetics may influence the diversity and community composition of gut microbiome. The interactions between the gut microbiome and the innate immune system of shrimp are of significant interest due to their potential to enhance disease resistance, immunity (e.g., antimicrobial peptides, activation of immune cells, and regulation of inflammatory pathways) and promotion of overall health. This review summarizes that Proteobacteria, Bacteroidetes, Actinobacteria are the dominant taxa in the gut healthy penaeid shrimp. Understanding the dynamic relationship between the gut microbiome and host innate immunity holds great promise for the development of sustainable strategies to improve shrimp health and disease management. Manipulating the gut microbiome through probiotic supplementation, prebiotic administration, or dietary intervention may have promising results in enhancing shrimp's innate immune responses and disease resistance, particularly reduce the number of pathogenic bacteria such as *Vibrio* spp. Moreover, advances in molecular techniques, such as 16S rRNA gene sequencing, whole genome sequencing and metagenomics, have provided deeper insights into shrimp gut microbiome's composition and functional potentials like their contribution in different metabolic pathways towards the physiological mechanisms of shrimp. This review provides an insight into the current knowledge on gut microbiomes of shrimp and their interactions with the host's innate immunity. It also highlights the potential challenges and future directions in gut microbiome research in shrimp. Further research and exploration of these intricate interactions will pave the way for sustainable and environment friendly approaches to shrimp aquaculture.

PPM 02 Effect of Non-Starch Polysaccharide Enriched Alternative Ingredients on Growth, Phenotypic Traits and Proximate Composition of Nile Tilapia (*Oreochromis niloticus*)

Saikat Bain[1]*, Bipul Kumar Dey[2], Md. Shahin Parvez[1], Sharmin Aktar[1], Sheikh Mustafizur Rahman[1] and Md. Nazmul Ahsan[1]

[1]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
[2]Aquaculture and Fisheries group, Wageningen University, Netherlands
*Email: surjo.kufmrt@gmail.com

The study was conducted to explore the potential of utilizing non-starch polysaccharides (NSP) from cost-effective, plant-based ingredients for Nile tilapia. Eight experimental diets (D1 to D8) were formulated and manufactured with varying levels of NSP (13.1–29.8%) and starch (22.1–32.0%), protein (27.5–34.3%), fat (5.0–14.7%), while maintaining a similar gross energy value (Table 1). Juvenile Nile tilapia (initial weight: 40±2.1 g) were stocked at 3 fish/m² in 24 ponds with randomly assigned diets in triplicates and the fish were hand-fed daily for 43 days at a rate of 5-6% of body weight. After harvest, experimental diets didn't affect significantly (P>0.05) the water quality and productivity, proximate composition, coloration and morphology of the fish. Fish fed the diet D6 (contained 15.4% NSP, 30.8% protein) achieved the highest growth performances (weight gain, daily gain, specific growth rate and survival) and feed utilization (FCR and PER) compared to the fish fed all other diets. Fish fed the diets D2, D4, D5, D7 and D8 (contained 13.1–21.6% NSP 27.5–33.7% protein) demonstrated similar growth performances and feed utilization compared to the reference diet D3 (contained 15.1% NSP 34.3%), while diet D1 (contained 29.8% NSP 30.0% protein) obtained significantly (P<0.05) lowest performances compared to all other diets. This study recommends using D6-D8 diets containing 15.4-17.8% NSP 27.5-31.6% protein, considering NSP values and protein cost for optimal growth and feed efficiency of Nile tilapia.

PPM 03 Evaluation of Hatching Success and Naupliar Development of *Artemia* Cysts Available in Bangladesh Markets

Israt Jahan*, Mst. Afia Humaira, Romana Akter Shapla, Hridoy Saha, Sumaiya Tabassam Joty Mony, Tania Sultana Mohona, Sheikh Mustafizur Rahman, Mst. Muslima Khatun and Shikder Saiful Islam

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: isratjahanjyoti199920@gmail.com

The brine shrimp, *Artemia*, is a widely used live feed in marine fish and shellfish larviculture. Since no natural populations of Artemia exist along the coastal regions of Bangladesh, the shrimp hatchery and larval culture industry relies entirely on imported Artemia cysts from various countries. Consequently, evaluating the seed quality and hatching performance of these cysts is crucial for farmers. This study aimed to evaluate the hatching rates of three different *Artemia* cyst strains: *Artemia* sp. GSL_RG (sourced from the Great Salt Lake, branded as Red Jungle), *Artemia* sp. A4B (introduced in Bangladesh under the Artemia4Bangladesh (A4B) project), and *Artemia* sp. GSL_DC (sourced from the Great Salt Lake, branded as Dancing Crane). In this regard, the hatching performance of three *Artemia* seeds was observed at different hatching periods under optimal conditions of temperature, salinity and light. Representative samples were collected during the hatching periods to analyze the hatching rates of three *Artemia* strains. For *Artemia* sp. GSL_RG, the percentages after 8hr, 12hr, 24hr & 30hr were 44.8%, 64.5%, 67.8% and 63.1%, respectively (Fig). In the case of *Artemia* sp. A4B, no hatching was observed after 8 hours, but hatching rates reached 41.5%, 86.9%, and 64.3% at 12, 24, and 30 hours, respectively. Conversely, no hatching was recorded for *Artemia* sp. GSL_DC during the first 40 hours (Fig). Hatching percentages for this strain were 26.6%, 42.4%, and 39.2% after 44, 72, and 94 hours, respectively. In addition, to its superior hatching performance, *Artemia* sp. A4B nauplii exhibited higher growth and reproductive performance compared to the other two strains. In conclusion, the enhanced hatching and larval development capacities of *Artemia* sp. A4B cysts make them a more suitable strain for adoption in the aquaculture industry in Bangladesh.

PPM 04 Dietary Supplementation with Nutmeg (*Myristica fragrans*) extract: Impacts on Growth and Immune Responses in Giant Freshwater Prawn (*Macrobrachium rosenberigii)*

Farhana Nasrin*, Halima Tus Sadia, Shaikh Shaon Ahmmed, Uttam Adhikary and Alokesh Kumar Ghosh

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: Farhanakabir791@gmail.com

The current research explored the effects of the ethanolic extract of *Myristica fragrans* (nutmeg, also known as Joyfol) on the immune resistance, antioxidant activity, and growth performance of freshwater prawn *Macrobrachium rosenbergii*. After a screening test of 24 readily available spices (using 4 solvents), *Myristica fragrans* was identified as one of the active spices against *Vibrio parahaemolyticus in vitro*, and the appropriate dosage were determined by calculating the LC_{50} after a toxicity test using brine shrimp. A total of 135 prawns, each with an initial weight of 2.0 ± 0.25 g, were randomly placed in nine fiberglass tanks, with 15 prawns in each. The control group (C) received a diet without nutmeg, while the other groups were given the same diet with 0.25 g/kg (0.025%) as treatment 1 (T1) and 0.5 g/kg (0.05%) as treatment 2 (T2) of nutmeg extract with three replications. The prawns were fed at 5% of their body weight daily for four weeks. The results showed that the T1 group (0.25 g/kg diet) significantly outperformed the other groups in growth performance, including higher Final Weight (FW), Average Weight Gain (AWG), Specific Growth Rate (SGR) and the lowest FCR. The T1 group also showed better immune responses with improved Total Haemocyte Count (THC), Differential Hemocyte Count (DHC), Hemolymph Clotting Time (HCT), Superoxide Anion Production, Respiratory Burst activity (RBs) and Pro-phenol oxidase activity (proPO) compared to the control and T2 groups. Ultimately the most effective dose of nutmeg extract for improving growth and boosting immune responses in prawns appears to be 0.25 g/kg. This study highlights the potential of spice-based additives in environmentally friendly aquaculture methods, providing a natural substitute to improve aquatic species health and productivity.

PPM 05 Role of Multispecies Probiotics on Gut Microbiota Modulation of Indian Major Carps in Polyculture System

Rashib Hosen* and Shamima Sultana

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: rashibhosen@gmail.com.

The goals of the present research were to examine the effect of multispecies probiotics on gut microbiota modulation as well as on growth rate of Indian major carp species in a polyculture system. Two treatments were multispecies feed and water probiotics and a control with three replications were stocked with *L. rohita*, *C. catla*, and *C. mrigala* at a ratio of 2:1.06:1 for this purpose and daily fed at the rate of 3% body weight throughout the study period. The results of the present study showed that the mean hardness, turbidity, conductivity, ammonia, nitrate, and nitrite were significantly improved by water probiotics and feed probiotics respectively. The gut bacterial analysis disclosed that total heterotrophic bacterial loads were higher in control than water and feed probiotics in *L. rohita* and *C. mrigala* respectively, expects *C. catla*. Additionally, results also depicted that feed and water probiotics significantly effectively reduce *Vibrio* spp. and eliminate *Pseudomonas* spp. though no difference (*p=1.00*) between two types of probiotics. However, water and feed probiotics could not able to lessen total load of *Bacillus cereus* in gut though no difference between feed probiotics and water probiotics treated treatments in case of *C. mrigala*. Moreover, it also explicit zed that feed and water probiotics could able to improve the mean relative weight gain (*p=0.001*) and specific growth rate (*p=0.001*) of Indian major carp species significantly, despite that no effect was found in case of mean survival (*p=0.940*) and production rate (*p=0.825*) of Indian major carp polyculture system at 5% level of significance.

PPM 06 Diversity Assessment of Fish Species in Relation to Gear in the Rupsha River of Khulna District, Bangladesh

Nittya Sarker* and Mst. Muslima Khatun

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh.
*Email: nittya01793@gmail.com

The key objective of the present study was to evaluate the fish diversity in relation to gear studied in the Rupsha River under Khulna district from June 2022 to May 2023. The Rupsha River has been characterized with a large number of species: a total 68 species of which 40 species has been determined as bycatch species that represent 13 orders. Among these 60 species, the most abundant species was *P. stridulans* (18.73%), dominant order was Perciformes (27.94%), and rare and very rare species were recorded as 32.36% and 17.64%, respectively. Approximately, 11 types of fishing gears including 4 gill nets were recorded in the expermental sites. This study reports that *behundi jal* was the most effective gear based on the findings of species richness (47±3.055), CPUE (4.810±0.212) kg/gear/haul, abundance (383.91±30.77), and weight (29.83±2.23) kg. However, *fash jal* was the most selective gear (capturing 13% bycatch fish) and *current jal* was the most destructive gear (capturing 41% bycatch fish). The current study revealed that the exploited fish species of small sizes had the possibility to grow larger up to their maturity. Species selectivity by gear was determined by a classification analysis based on a similarity matrix. At a similarity of 90%, four groups were differentiated by the cluster dendrogram. Overall annual diversity values of (H), (1-D) and (J) were found as 2.897, 0.911 and 0.722, respectively. During this study, the highest abundance, weight, and CPUE were documented in monsoon while winter had the highest incidence of capturing bycatch species. The present study recommends adjusting mesh size of fishing gears for gear selectivity to protect the diversity of the Rupsha River.

PPM 07 Effects of Hydrolysate-Based Diet on Growth, Digestive Enzyme and Nutritional Profile of *Lates calcarifer*

Mahir Faisal Rahi*, SM Nahid Jobayer, Pial Paul, Md. Mahmudul Hasan, Md. Golam Sarower, Md. Moshiur Rahman, Md Shahin Parvez and Sheikh Mustafizur Rahman

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: mahirrahi2@gmail.com

Fish protein hydrolysates (FPHs) serve as feed attractants because they contain free amino acids and peptides that improve feed palatability and encourage the uptake of biological nutrients because of their great digestibility, superb texture and viscosity, and extremely small particle size. In this study, FPHs were prepared using proteolytic enzymes at the optimal temperature and pH, digesting various fish waste components such as heads, trimmings, fins, frames, bones, scales, and viscera. A 6-week feeding trial was conducted to assess the impact of FPH on the growth performance, survival, digestibility (amylase and protease activity), feed conversion ratio (FCR), economic analysis of diets, and body composition in juvenile seabass (*Lates calcarifer*). Four experimental diets with equal nitrogen content (50% protein) were prepared: diet 1, diet 2, diet 3, and diet 4 were enriched with 0%, 10%, 20%, and 30% FPH, respectively. A commercially diet, known as Nutrila (India), specifically formulated for seabass juveniles (50% protein), was included as control (diet 5). Twenty fingerlings were randomly distributed into triplicate groups in 50-liter tanks with continuous aeration. They were fed experimental diets at a rate of 6% of their body weight thrice daily. Results indicated that dietary FPH levels significantly influenced the growth, survival, digestibility, and FCR of seabass juveniles. Diets with 10% FPH supplementation exhibited significantly increased total weight gain, relative weight gain, specific growth rate, and survival compared to other tested diets. Improved FCR and fish body composition were also observed in fish consuming the diet with 10% FPH Fish body composition showed no significant differences except diet 5 at the end of the experiment. Fish fed the 10% FPH-incorporated diet had the highest amylase activity, while the protease activities of the studied diets were identical. An economic analysis revealed that the cost per kilogram of fish production was significantly lower in diet 4 ($ 0.61), followed by diet 3 ($ 0.65), diet 2 ($ 0.67), diet 1 ($ 0.70), and diet 5 ($ 1.5). Overall, the findings of this study have demonstrated that incorporating a small amount of FPH into the diet of seabass juveniles increases feed intake, enhances growth performance and survival, improves digestibility, and reduces FCR as well as feeding costs.

PPM 08 Molecular Adaptations to Osmoregulatory Stress in *Seabass*: Scrutinizing the Expression of Candidate Genes Involved in Resilience to Salinity Variation

Md. Mahmudul Hasan*, Md. Ridwanul Islam Rishad, Mahir Faisal Rahi, Pial Paul, SM Nahid Jobayer, Md. Shamim Hasan, Md. Golam Sarower and Sheikh Mustafizur Rahman

Fisheries and Marine Resource Technology Discipline, Khulna University, Bangladesh
*Email: tusharmahmudul12@gmail.com

Salinity fluctuations pose significant challenges to marine organisms, impacting their growth, osmoregulation, hormonal control, and energy metabolism. Euryhaline teleosts, such as seabass, exhibit remarkable adaptability to a wide salinity range by modulating molecular mechanisms that maintain internal ionic and osmotic balance in osmoregulatory organs such as the gill, kidney, and intestine. This adaptive capacity is maintained by several molecular mechanisms such as hormonal regulation by different gene expressions, osmotic balance, and ion transporters such as sodium-potassium pump (NKA), Na+/K+/2Cl– cotransporter (NKCC), Na+/H+ exchanger 3 (NHE3), Na+/Cl– cotransporter (NCC), and cystic fibrosis transmembrane conductance regulator (CFTR) are essential for ion transport processes. Gill ionocytes, the principal cells for ion uptake in freshwater and ion excretion in seawater, are heavily involved in osmoregulation. Additionally, aquaporin genes (e.g., AQP1, AQP3) facilitate passive water uptake via ion reabsorption, compensating for osmotic water loss. Growth hormone (GH) and insulin-like growth factor 1 (IGF-1) are critical in osmoregulation, acting on gill tissues by modulating their responsiveness to cortisol and increasing the number of cortisol receptors. These hormones, along with heat shock protein 70 (HSP70), influence the activity of Na+/K+-ATPase and the distribution of chloride cells. Salinity stress also affects the expression of interleukin-1 beta (IL-1β), C-reactive protein (CRP), and transforming growth factor (TGF), highlighting the intricate molecular pathways linking osmoregulation and immune responses. The expression patterns of major gill transporters, such as NKA and NKCC, exhibit heightened activity under extreme salinity conditions, while lower expression levels are observed under habitual salinity conditions in Asian seabass. This review explores the molecular adaptations underpinning osmoregulation in seabass, focusing on the expression of candidate genes that drive physiological plasticity in response to salinity changes. Understanding these molecular mechanisms provide insights on strategies to mitigate environmental stressors. By examining the latest findings on gene expression patterns, this review elucidates the molecular framework supporting osmoregulatory resilience in seabass, contributing to broader insights into ecological and evolutionary processes in marine species.

PPM 09 DNA Marker-Based Study of Molluscan Diversity along Coastal Regions of Bangladesh

Md. Ridwanul Islam*, Shikder Saiful Islam and Md. Golam Sarower

Fisheries and Marine Resource Technology Discipline, Khulna University, Bangladesh
*Email: rrislam40@gmail.com

Molluscs play a pivotal role in coastal ecosystems, serving as habitats for various ecologically significant gastropod and bivalve species. This study investigated molluscan diversity and distribution across the coastal regions of Bangladesh, employing DNA markers to achieve precise species identification. This study aims to provide a comprehensive understanding of the species composition, richness, and distribution patterns within these critical habitats. Sampling covered four coastal areas, yielding 114 live mollusc samples and shells. Morphological identification revealed eight distinct species, comprising one bivalve and seven gastropods. However, morphological methods alone often face limitations due to cryptic species and intraspecific variations. To address these challenges, DNA marker technology was applied, specifically targeting the 16S rRNA gene for molecular identification. DNA sequencing and comparative analysis using reference sequences from the NCBI nucleotide database confirmed the identity of three gastropod species with high accuracy: *Pythia plicata, Neritina gagates*, and *Neritina violacea*. The sequences exhibited >95% similarity with the reference data, underscoring the reliability of DNA markers in complementing traditional taxonomic approaches. To quantify species richness and evaluate distribution patterns, biodiversity indices were calculated. These results suggested that molluscs populations in the studied coastal areas are heterogeneously distributed, with certain species dominating specific habitats. The observed dominance of a few species raises concerns about ecosystem stability. Such an imbalance can increase the vulnerability of these habitats to environmental changes, such as pollution, climate shifts, and habitat destruction. The findings emphasize the need for conservation strategies to mitigate potential ecological disruptions and protect the biodiversity of these coastal regions. This study highlights the significance of integrating molecular tools with morphological methods to enhance biodiversity assessments. The use of DNA markers not only improved the accuracy of species identification but also provided critical insights into the ecological health of molluscan populations. By establishing baseline data on molluscan diversity and distribution, this research contributes to ongoing efforts to monitor and manage coastal ecosystems in Bangladesh. Future studies should expand the scope to include temporal variations and explore the broader ecological implications of environmental stressors on mollusc communities and their habitats.

PPM 10 Diversity and Distribution of Estuarine Crustaceans in the Bay of Bengal: Insights from DNA Barcoding Techniques

Md. Adnan Sajib* and Md. Golam Sarower

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: adnansajib.ku@gmail.com

The Bay of Bengal and its vast coastal regions harbor a rich biodiversity, including numerous species of fish and invertebrates, many of which remain undocumented. Accurate species identification is fundamental to understanding biodiversity and the ecological roles of these organisms. In recent years, DNA barcoding has emerged as a powerful molecular tool for species identification, offering a rapid and standardized method based on short, conserved DNA sequences. This study aimed to investigate the diversity and distribution of estuarine crustaceans across the Bay of Bengal and quantify their abundance using molecular and morphological approaches. Sampling was conducted in four locations: Batiaghata, Noliyan, Kaliganj, and Kuakata. Morphological analysis identified 21 crustacean species, while DNA barcoding using the 16Sar and 16Sbr molecular markers confirmed the identity of two additional species (*Parapenaeopsis sculptilis* and *Machrobrachium equidens*). To assess biodiversity and community structure, the study utilized three indices: Simpson's Index (D), Shannon-Wiener Diversity Index (H), and Evenness Index (J). Simpson's Index values ranged from 0.807 at Kaliganj to 0.972 at Noliyan, with all values close to 1, indicating low species diversity across the four communities. The Shannon-Wiener Diversity Index revealed a maximum value (H_{max}) of 1.794 at Batiaghata, suggesting relatively higher diversity, while Kuakata exhibited the lowest value at 1.207. Evenness Index values ranged from 0.673 at Kuakata to 1 at Batiaghata, indicating varying levels of species dominance and distribution uniformity. The results suggest that crustacean communities in the Bay of Bengal are dominated by a few species, reflecting low biodiversity and uneven species distribution. These findings have significant ecological implications, as low diversity and dominance by a few species can render communities more susceptible to environmental disturbances, such as habitat degradation and climate change. This study underscores the importance of integrating DNA barcoding with traditional morphological approaches for accurate species identification and biodiversity assessment. By providing baseline data on crustacean diversity and distribution, it contributes to our understanding of the ecological health of estuarine ecosystems in the Bay of Bengal. Future research should expand sampling efforts to include temporal variations and investigate the impact of environmental factors on crustacean diversity and ecosystem stability.

PPM 11 Effects of Water Temperature on the Biological Parameters of Orange Mud Crab (*Scylla olivacea*): Implications for Hatchery Operations and Farming

Wasim Akram* and Md. Lifat Rahi

Fisheries and Marine Resource Technology Discipline, Life Science School, Khulna University, Khulna – 9208, Bangladesh
*Email: wasimakram.ku@gmail.com

Gradual increase of water temperature is inevitable owing to the climate change events that can have strong effects on organisms, escalating to higher levels of biological organizations such as populations and communities (including aquaculture production). The current study tested the effects of five different temperature levels (28℃, 30℃, 32℃, 33℃ and 34℃) on selected physiological, biological and also the expression of five targeted candidate genes of mud crab. The growth performance (in the form of mean body weight) ($p < 0.05$) of mud crab (*Scylla olivacea*) was significantly affected by the experimental temperatures, with the higher growth rate and survival was observed at 30℃ (reaching to 5.86g). The lower growth rate and survival was observed at 34℃ because of thermal stress on mud crab biology with higher O_2 consumption and also higher hemocyte counts (41 to 49 million cells/ml). Development of a particular gender/sex was also found to be affected by the temperature regimes; higher proportions of males (56 – 62%) were obtained at 33°C and 34°C while (54%) females were obtained at 28°C. Hemolymph glucose (≈49 – 52 µg/ml for control while 56 – 96 µg/ml for the treatments) and stress hormone (serotonin) levels (≈70 – 73 ng/ml for control and 73 – 106 ng/ml for the temperature treatment groups) were increased with increasing temperatures levels. Expression of the four selected candidate genes showed temperature specific differential changes; 1.5–2-fold lower expression of tall-like receptor, alpha-amylase, CHH and Proctolin genes were observed at control condition, despite of all the temperature (30°C, 32°C, 33°C and 34°C) showed significantly higher relative expression of heat shock protein (HSP70) over the control (28℃). Results of this study clearly indicate that different temperature levels impose stress at different orders of magnitude on experimental mud crab. Findings also suggest that mud crab deploy different biological responses to cope with the stress imposed by the rising temperature levels. Therefore, this study provides important clues to develop hatchery seed of mud crab (by maintaining optimum temperature to reduce larval mortality) that will help to improve the farming of this species.

PPM 12 Effects of Microplastics on Phenotypic Traits and Fish Behavior in Asian Walking Catfish *Clarias batrachus* Fingerlings

Jannatul Fartheus*, Sheikh Mustafizur Rahman, Md. Moshiur Rahmna, Md. Shahin Parvez, Sharmin Aktar and Tania Sultana Mohona

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: rajkumary16637@gmail.com

Microplastics (MPs) pollution have become a major concern in aquatic ecosystems, with potentially profound effects on the behavior and physiology of aquatic organisms. This study was conducted to investigate the effects of MPs on phenotypic traits and behavioral characteristics on *C. batrachus* fingerlings by comparing observations made in the presence and absence of MP exposure. Fish were assigned in T1 (no MPs), T2 (MPs in water), T3 (MPs in feed) and in T4 (MPs in both feed and water) for 45 days. Each treatment group had three replications, and each replication included 25 fish. The phenotypic traits included body weight, standard length, total length, eye diameter, dorsal fin length, body depth, while behavioral characteristics encompassed erratic swimming, lethargic behavior, feeding behavior, isolation group, attracting behavior etc. Results revealed significant impacts of MPs exposure on the phenotypic traits of *C. batrachus* fingerlings (Fig. 1). The growth rate of fingerlings exposed to MPs was reduced in T2, T3, T4 compared to that of control group T1, indicating a potential impairment of development. Furthermore, behavioral observations indicated altered activity levels and feeding behavior in fingerlings, exposed to MPs. Fish in MPs incorporated feed and water, displayed reduced activity and decreased feeding efficiency compared to control group. Overall, this study provides evidence of the detrimental effects of MPs exposure on phenotypic traits and behavioral characteristics of *C. batrachus* fingerlings. These findings highlight the urgent need to address MPs pollution in aquatic environments to safeguard the health and ecological integrity of freshwater fish populations.

PPM 13 Comparative Analysis of Morphometric, Meristic Traits, and Body Composition in *Anabas testudineus* from Wild, Pond, and Biofloc Systems

Fahmida Mahbub*, Sudip Debnath, Md. Moshiur Rahman, Sheikh Mustafizur Rahman, Md. Nazmul Ahsan, Anup Kumar Karmokar and Md. Shahin Parvez

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: fahmidamoon.ok@gmail.com

Understanding variations in morphological traits and body compositions linked to rearing habitats is crucial for determining the well-being of a particular fish species. The climbing perch (*Anabas testudineus*) is a commercially and nutritionally important fish species. The present study was conducted to investigate intraspecific variations in morphological and meristic traits, length-weight relationship, condition factor, and body compositions of perch collected from different water sources such as ponds, natural water bodies (wild), and biofloc culture system. The principal component analysis (PCA) was conducted to find out whether some morphological traits were mostly associated with a particular source of fish. In PCA, PC1, PC2, and PC3 were able to explain 58.32% of the total variability among 15 measured morphological traits, demonstrating that most of these traits were positively associated with water sources (Fig). Body weight of perch increased significantly (P<0.001) with the increase of standard length in fish obtained from all sources. Biofloc reared fish had a significantly higher condition factor (1.92, P<0.01) than that of fish obtained from pond (1.79) and wild (1.77). The Chi-square analysis for body color revealed significant variation among fish collected from different sources. Significant differences were also observed in body compositions among fish sources (P<0.05). Fish collected from biofloc had the highest whole-body protein content (20%) followed by that of wild (18%) and pond fish (16%). These variations in morphometric and meristic traits, condition factors, and body compositions underscore the adaptive responses of perch to different rearing environments, indicating the need for habitat-specific management strategies to ensure the species' well-being and sustainable aquaculture practices. The study's insights into trait variability can inform conservation efforts by identifying critical habitat features for protection and guiding the optimization of aquaculture systems to enhance fish health and production efficiency.

PPM 14 Comparison on Culture Management, Production Performance and Economics of Traditional and Cluster-Based Farming Systems of *Penaeus monodon*

Payel Akter*, Md. Rashedul Islam, Md. Golam Sarower, Md. Shahin Parvez and Avijit Bala

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna -9208 Bangladesh
*Email: payelfmb705@gmail.com

The present studies were conducted to evaluate the culture and production of shrimp (*Penaeus monodon*) produced under different cultural systems of shrimp cluster in Paikgachha, Dumuria and Batiaghata upazila of Khulna. Primary and secondary data were collected through semi-structured questionnaire, interview and focus group discussion (FGD). In this study, 30 traditional shrimp farm and 30 cluster shrimp farms of 10 farmers were selected to determine. The efficacy of cluster farming approach on shrimp production and its management. The field survey found that the total production was 427 per hector/ year in traditional culture system and 670 per hector/year in cluster culture system. The gher (pond) size was 8-15 hectre or more for TCS, and 10-12for CCS system. The water quality parameters were balanced in CCS but TCS, most of the farmers were unconscious about water parameters. Lime was applied in TCS (20kg/ha), in CCS (22kg/ha)) and for fertilizer TCS (Urea+TSP= 30kg/ha), CCS (Urea+TSP=15kg/ha) which was found very much variable for TCS system. Only 31% TCS farmer stocked PCR tested PL which was above 65% in improved system. About 80% cluster culture farmers practiced nursing of PL before stocking for grow out in culture ponds which was < 20% in TCS system and this was the key management strategy that largely reduced disease occurrences.TCS farmers practiced multiple stocking beyond any stocking density but the average stocking density was 10,000-12,000 PL/ha, 1300-15000 PL/ha for CCS.These findings indicate that disease has been significantly reduced than the previous years due to improved management practices which results higher production in cluster culture system. The cost benefit ratio is 1:0.81 in traditional culture system and the cost benefit ratio is 1:2.75 in cluster culture system. The survivality rate is more in cluster than the traditional culture system. From the result of present study, it is clear that fish production and financial benefit in cluster culture system were higher. The present findings reveal that CCS system is more suitable and profitable system than TCS.

PPM 15 Fish Diversity of Mollar Beel in Gopalganj sadar, Bangladesh

Avijit Bala*, Md. Rashedul Islam and Sania Payel

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna- 9208 Bangladesh
*Email: avijitbala752@gmail.com

The study was conducted to know the fish diversity of Molla Beel that covers an area of ten villages such as Nizra, Mollakandi, Routhkhamar, Arpara, khagail, Ghosgati, Chandradigila, Nischindipur, Polshi, Taltala. A questionnaire survey was conducted to collect the information on fish diversity. A total of 40 respondents were interviewed face to face with a semi-structural question. Most of them had a primary educational background (class 1-5) and some of them with different level of (SSC and HSC) higher education. Different NGOs, banks, money lenders as well as their neighbors and relatives provide them credit for different purposes. A total of 50 different fish species are found according to the locals. Fishers use different gears to catch them. Indiscriminate uses of destructive fishing techniques and use of agricultural pesticides are responsible for recent reduction of abundant fish. The respondents have to change their occupation due to seasonal or other purposes. The economic condition of most of the respondents is at all below the poverty line. They face many health risks as influenza, gastric, injury of insects and snakes, physical pain, food poisoning etc that create obstacles to continue their general functions. Respondent shows a large variety of professions where aqua trade contributes the largest percentage. The total beel management is under the authority of government. Local resource users exploit fishes all the year round without any obligation. The local government sometimes cheats the fishers from having help from the government. The family condition of some respondents is very much poor. They face many difficulties. So, they need more institutional, organizational, technicall and credit support for their betterment.

PPM 16 Microplastics Alter Growth, Enzymatic Activities and Proximate Composition in *Heteropneustes fossilis*) Fingerlings

Sharmi Umma Habiba*, Sheikh Mustafizur Rahman, Tania Sultana Mohona, Md. Moshiur Rahman, Md. Shahin Parvez and Sharmin Aktar

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: sharmibd15@gmail.com

Microplastic (MP) poses a threat to the ecological system and their presence especially in the water has an adverse impact on fish health and ecosystem. Microplastics are responsible for the contamination of all food chains, from the smallest planktivorous organisms to the largest fish, reaching the highest trophic levels including humans. A study was conducted to explore the effects of MP on phenotypic traits (weight, total length, standard length, head length, barbel length, body depth, fin length), behaviour (erratic swimming, lethargic behaviour, cannibalism, feeding behaviour), digestion (amylase, protease) and stress (SOD, catalase), biochemical activities (protein, moisture, ash, lipid) of stinging catfish (*H. fossilis*) fingerlings. Fingerlings were treated for 60 days in glass aquariums under experimental conditions such as treatment 1 (control), treatment 2 (0.1 mg/l MPs in water), treatment 3 (0.5 mg/l MPs in water), treatment 4 (5% cottonseed in feed) and treatment 5 (5% MPs in feed). The findings showed that MP exposed to water at high concentration were more detrimental than fish feed incorporated with MP. Microplastic treated fingerlings *H. fossilis* resulted in higher SOD and catalase activities but lower amylase activities. Proximate composition of MP treated fish varied significantly, while fish behaviour remained insignificant among the treatments. This study shows that MPs exposure negatively affects the morphological and behavioral aspects of *H. fossilis* fingerlings. These results demonstrate how urgently MPs pollution in aquatic ecosystems must be addressed in order to protect freshwater fish populations' health and ecological integrity.

PPM 17 Nutritional Quality Assessment of Nile Tilapia Cultured in Biofloc and Non-biofloc Tank System

Md. Naim Islam*, Sharmin Aktar, Md. Nazmul Ahsan, Sheikh Mustafizur Rahman, Sudip debnath and Md. Shahin Parvez

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: naimislammd773@gmail.com

The present study was conducted to evaluate the proximate composition and amino acid profile of Nile Tilapia raised using biofloc and non-biofloc technology. For this purpose, juvenile tilapia of similar sizes was stocked in both biofloc (BTS) and non-biofloc or clear-water tanks (CTS) in triplicates. The fish in each system were reared for 90 days, with feeding rates of 2-3% for the biofloc group and 4-6% for the non-biofloc group. After the 90-day rearing period, no significant differences ($p>0.05$) were observed in crude protein, ash, or moisture content, but a significant difference ($p<0.05$) was found in lipid content of the whole fish samples reared under both systems. In the proximate composition of fish muscle, while there were no significant differences ($p>0.05$) in crude protein content, significant differences ($p<0.05$) were observed in lipid, ash, and moisture content. The amino acid analysis revealed nearly identical levels of essential amino acids between the two groups. However, the fish reared in BTS showed higher number of non-essential amino acids than CTS. Overall, the findings of this study demonstrate improved nutrient composition in biofloc technology system compared to non-biofloc tank system (CTS).

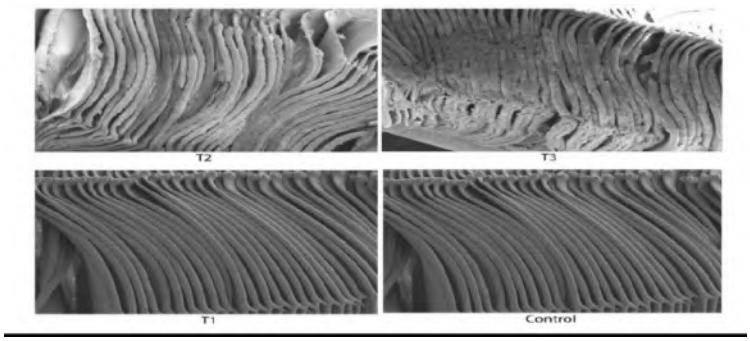
PPM 18 Effect of Heavy Metal in Different Tissues of Experimentally Treated Prawn towards an Assessment of Human Health Risk

S.M. Tanvir Mahdi*, Ghausiatur Reza Banu and Md. Lifat Rahi

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
Email: tmtanim@gamil.com

An assessment of heavy metal contamination in experimentally treated *Macrobrachium rosenbergii* is important since it is susceptible to environmental pollution due to the rapid develpoment and human activities. This study aimed to investigate the heavy metal contamination in gill, muscle and hepatopancreas of *M. rosenbergii* and to estimate the health risk assessment of human consumption. The present study conducted in the wet laboratory of FMRT Discipline using 7 glass tanks, with four treatments namely control (prawn + feed + no treatment), T1 (prawn + feed + 1 ml heavy metal), T2 (prawn + feed + 2 ml heavy metal), T3 (prawn + feed + 3 ml heavy metal. After 30 days of experiment the Concentration of heavy metal in muscle and hepatopancreas were analyzed by the atomic absorption spectrophotometer. The metal concentration was detected in the following order: Cr>Pb>Hg. High concentration of heavy metal found in the hepatopancreas than muscle. The gill structure also hampered by the heavy load of mucus with the rise of heavy metal doses which was examined by scan electron microscopy (Figure 01). Health risk assessment indicates high potential adverse health effect for prawn consumption. All samples contain heavy metal higher than the permissible limit given by the WHO experts. Therefore, experimentally treated prawns are highly risky for human health. So regular monitoring and safety should be maintained for the heavy metal contamination of *M. rosenbergii* for safeguard of human health.

Figure: Gill ultrastructure of *M. rosenbergii* through scan electron microscopy (SEM).



PPM 19 Population Genetic Structure of the Freshwater Tank Goby (*Glossogobius giuris*) using Mitochondrial DNA Marker

Rukaiya Hossain* and Md. Lifat Rahi

Fisheries and Marine Resource Technology Discipline, Khulna University, Bangladesh
*Email: rukaiyahossain0@gmail.com

Natural distribution and dispersal of freshwater fish species are restricted to different barriers (sea water, mountainous barriers). Geographic barrier or isolation plays the main role in population genetic diversity, promotes phenotypic variations and subsequently leads to speciation through process of adaptation. The freshwater tank goby (*Glossogobius giuris*), an ecologically and economically important species, is widely distributed in tropical and subtropical freshwater habitats across South and Southeast Asia, including Bangladesh. The widespread distribution of *G. giuris* in Bangladesh suggests that different populations of this species were connected in the past; providing a vital clue for effective conservation. Despite its significance as a capture fishery, natural abundance of *G. giuris* has been declining due to habitat destruction, overfishing, pollution and environmental changes. This study aimed to document the population genetic structure (genetic diversity) of tank goby (*G. giuris*) using mitochondrial cytochrome oxidase I (COI) gene marker in Bangladesh. In total, 200 fish samples were collected from eight different locations (representing the major river systems) of Bangladesh (25 fish per sampling site). A 560-base pair (bp) fragment of COI gene sequence was amplified for the 200 *G. giuris* samples. DNA sequence data revealed 63 variable sites (11.25%) with 367 haplotypes (of which 95 haplotypes were unique). Different forms of population genetic analysis (e. g., nucleotide diversity, haplotype diversity, pair-wise genetic distance, Tajima's D, Fu's F_S etc.) revealed the highest level of genetic diversity ($P < 0.05$) in the Sylhet Haor region followed by Kaptai Lake and then Chalan Beel. The remaining five populations are found lower genetic diversity with no significant differences among them. Phylogenetic analysis (using maximum likelihood and neighbor joining methods) and haplotype networking identified three major clades (distinct lineages/populations). Shangu River (lineage I) and Kaptai Lake (lineage II) were found to form two distinct clades while Sylhet Haor was grouped with other five populations (lineage III). Findings also suggest that there is continuous gene flow among the populations/river systems of lineage III while no gene flow was evident between lineage I and lineage II. Overall results of this study indicate three major conservation units (effective conservation sites) in Bangladesh for freshwater tank goby (*G. giuris*).

PPM 20 Water and Sediment Quality Analysis in Conventional and Ecological Prawn Farming System

Ikramul Islam Shovqn*, Md. Sanaul Islam and Khandaker Anisul Huq

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: shovonislamku18@gmail.com

The study was carried out to evaluate the variation of water and soil parameter in pond based ecologically enriched farming system. An experiment was conducted in the research ponds of Fisheries and Marine Resource Technology Discipline, Khulna University from January 2023 to March 2024. Samplings were done at fortnightly intervals. There were three treatments and one control, each of which had three replications. The experiment was designed by incorporating rohu *(Labeo rohita)*, mollusk *(Phaeocystis globosa),* aquatic vegetable *(Ipomoea aquatica)* along with main crop prawn *(Macrobrachium rosenbergii),* and tested in different treatments viz C-prawn+rohu, T1-prawn+rohu+mollusk+aquaticvegetables T2-prawn+rohu, and T3-Prawn, rohu+mollusk +aquatic vegetables with specific stocking densities like prawn at 3/m2, rohu at 0.1/m2,, snail at 0.5/m .Same feed was applied in all three treatments and the control. The water and soil quality parameters of the experimental ponds were analyzed. Comparatively better water quality was found in ecologically enriched farming system than the conventional. In conventional system the value of pH, ammonia, nitrite, nitrate and phosphate value were found 7.2, 0.270 ppm, 0.11ppm, 5.04 ppm and 0.134 whereas in ecologically enriched culture system the values were 7.4, 0.143 ppm, 0.079ppm, 4.79ppm, 0.125 ppm. Soil total nitrogen and phosphorous was found comparatively better in ecologically enriched culture system than the control ponds. In conventional culture ponds the value of soil pH, Total Nitrogen and Total Phosphorus were found 7.43, 0.85% and 0.018% where in ecologically enriched culture systems the values were 7.53, 0.75% and 0.015%. After 180 days culture period it was found that prawn growth is higher in ecological enriched culture system (Prawn + Fish + Mollusk + Plant) than the conventional culture system (Prawn + Fish). In case of 3 /m2 stocking density weight was found 35.84±2.95g and 39.21±2.43g in conventional and ecological enriched farming system respectively. Whereas it is found 32.87±2.36g and 34.43±2.68g applying stocking density 4/m2. This result indicates that aquatic vegetables and mollusk can function to reduce water pollutant agent and help enhancing growth.

PPM 21 Abundance and Characterization of Microplastics in Some Marine Fish Species of Different Feeding Habits from Bangladesh

Joya Biswas[1]*, Srabanti Das Ankhi[1], Shaikh Tareq Arafat[1], Subrata Sarker[2] and Muhammad Abdur Rouf[1]

[1]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
[2]Department of Oceanography, Shahjalal University of Science and Technology, Sylhet-3114, Bangladesh
*Email: joya2580biswas@gmail.com

The study aimed to compare the abundance and characteristics of MPs in the gills, gastrointestinal tracts (GITs), and muscles of some marine fish species with varying feeding habits. Two planktivorous species (*T. toil* and *S. longiceps*) and three carnivorous species (*P. chinensis*, *L. indicum*, and *P. niger*) were studied (n = 135) following a combined digestion with H_2O_2 and KOH, and floatation (saline solution) protocols. A total of 673 MPs were identified, with a remarkable number detected in the muscles of all five species. The occurrence of MPs in fish was higher in planktivorous species (avg. 4.08 items/g), than carnivorous species (avg. 3.00 items/g) ($p < 0.05$). Among the various MP shapes, sizes, and colors, fiber shape, size below 0.5 mm and black color were dominant respectively. The major polymer identified by FTIR analysis was polyethylene (PE), followed by ethylene-vinyl acetate (EVA), and polypropylene (PP). This study revealed a concerning amount of MPs in fish of the BoB, especially in the muscle (edible portion) of fish.

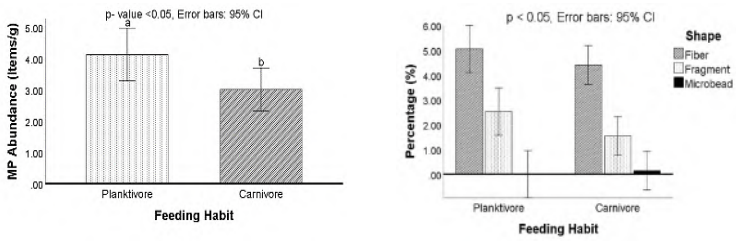


Figure: MP abundance and shapes in planktivorous and carnivorous fish.

PPM 22 Antibiotic Sensitivity of Bacteria Isolated from Tiger Shrimp *Penaeus monodon* Hatchery Water

Anup Sardar*, Nurunnahar Nadira and Abul Farah Md. Hasanuzzaman

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: anupsardar141@gmail.com

Penaeus monodon with its unique flesh taste, is a luxury export commodity fetching a premium price in local as well as international markets. To meet the demand for PLs (post larvae) and to ease the stress on natural stocks, a shrimp hatchery is a prerequisite. Microbiological illnesses, however, seem to be a significant issue in this sector. The study was aimed at identifying the bacteria through biochemical test and profiling antibiotic resistance of *bacteria* being detected in the water samples of four shrimp hatcheries located in Cox's Bazar, Botiaghata, Dacope and Debhata. A variety of representative bacteria was isolated for an antibiotic susceptibility test using selective agar plates. *Vibrio* spp. were found to be representative isolates. . The colonies of *Vibrio* spp. were found in TCBS culture plates, and the *Vibrio* isolates from the Cox's Bazar samples were determined as *Vibrio alginolyticus* ($9.55\pm0.14\times10^5$ cfu/ml), *Vibrio fluvialls* ($9.55\pm0.21\times10^6$ cfu/ml) for the Dacope samples, *Vibrio furnissii* ($3.66\pm0.41\times10^6$ cfu/ml) and *Vibrio parahaemolyticus* ($3.55\pm0.23\times10^5$ cfu/ml) for Debhata samples. Penicillin resistance was demonstrated by all *Vibrio* species. 75% of *Vibrio* species exhibited resistance to erythromycin 50% to ampicillin, 25% to oxytetracycline 25% to nalidixic acid and 25% to azithromycin (Figure 1). *Vibrio alginolyticus* and *Vibrio furnissii* isolates had multidrug resistance pattern (MDR) exhibiting MAR values of 0.41 and 0.17 in respective (Figure 2). It has been evident that the shrimp hatchery's water is very prone to *Vibrio* spp. contamination some of them are likely antibiotic resistant. This study recommends an effective implementation of biosecurity measures.

PPM 23 Study on Growth, Survival, Gill Histology and Physio-Biochemical Activities of Domesticated Asian Sea Bass (*Lates Calcarifer*) Fingerlings under Different Salinity Regimes

Md Shamim Hasan*, SM Nahid Jobayer, Mahir Faisal Rahi, Pial Paul, Md. Mahmudul Hasan, Md. Golam Sarower, Md. Moshiur Rahman, Md. Shahin Parvez and Sheikh Mustafizur Rahman

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna- 9208, Bangladesh
*Email: shamim.kufmrt18@gmail.com

Salinity, a key environmental factor, profoundly impacts the physiology and biological performance of Asian sea bass (*Lates calcarifer*) fingerlings, and therefore, maintaining a proper balance of water and salts within their bodies is crucial for this species. This study explored the ideal salinity for growth and survival of domesticated sea bass fingerlings. Fingerlings were reared in three replications at six salinity levels (0 ppt, 7 ppt, 14 ppt, 21 ppt, 28 ppt, and 35 ppt) for a month with optimal water quality conditions in glass aquaria. Salinity significantly impacted growth, with peak performance at 7 ppt supported by gill histology indicating healthy structure and lower stress enzyme activity (SOD and Catalase). Survival rates declined beyond 14 ppt salinity. High salinity levels (>28 ppt) hindered growth and induced stress, reducing appetite. Behavioral observations noted stress responses at 21 ppt and higher. Proximate composition analysis revealed salinity dependent variations in protein, lipid, ash, and moisture content, with protein content generally at 16%, slightly decreasing at 35 ppt (15.39%). Lipid content increased marginally with salinity, peaking at 35 ppt (1.95%), while moisture content decreased slightly, reaching its lowest at 35 ppt (77.141%) (Table). Salinity influences Asian sea bass physiology, affecting nutrient utilization and energy storage by impacting enzyme activity and gill histology. Clear gill ultrastructure and stable SOD and catalase activity at 7 and 14 ppt suggest lower stress levels. Overall, finding advocate for 7 ppt salinity as optimal for Asian sea bass fingerlings growth, survival, and physiology for successful aquaculture. Maintaining optimal salinity levels is critical for successful Asian sea bass aquaculture, promoting growth, reducing stress, and ultimately enhancing production.

PPM 24 Heavy Metals in Water and Hilsa Fish (*Tenualosa ilisha*) from the South-West Coast of Bangladesh: Ecological and Health Risk Assessments

Shabrin Nahar Mithila* and Md. Lifat Rahi

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna – 9208, Bangladesh
*Email: mithila180610@gmail.com

Discharge of huge number of industrial effluents is a common phenomenon in developing countries, posing severe threat to ecosystem and human health through biomagnification. Different river systems of Bangladesh continually receive pollutants from different sources. Heavy metals undergo bioaccumulation in aquatic organisms and transmit to the next trophic level which is currently a serious concern. Hilsa (*Tenualosa ilisha*) is the national fish of Bangladesh and represents a major fishery (contributes 11% of total fish production) with ≈1.5 million people directly or indirectly involved. The coastal river systems are the ultimate recipient of all pollutants (heavy metals) from the upstream. Therefore, the present study aimed to determine the major river system specific heavy metal contamination level (As, Cd, Cr, Cu, Mn, Ni, Hg and Pb) in water and different tissues (gill, kidney + liver, and muscle) of Hilsa (*Tenualosa Hilsa*) for a period of three years (October 2021 – September 2024). Sampling was performed bi-monthly in four major river systems of Bangladesh: Kocha River, Payra River, lower Ganges River and Meghna River. Abundance of different heavy metals (both in water and fish tissues) were ranked as Mn>Cr>Cu>Ni>Pb>Cd>Hg>as in the range of 0.0004 – 1.6 ppm. Results revealed that <10% of the water samples showed heavy metal pollution index (HPI) close to 100 indicating hazardous for drinking purpose. All of the fish samples (and different tissues) exhibited HPI significantly below 100 indicating safe for consumption. The heavy metal evaluation index (HEI) analysis revealed that ≈15% of the water samples were in the moderate risk of pollution category (HEI ≤ 20). Of the four river systems, the highest levels of heavy metal concentrations were detected in the Payra River. Hilsa muscle tissue samples were found to have HEI < 10 indicating safety of this fish sourced from the four major river systems of Bangladesh. The non-edible tissues of Hilsa (gill and kidney + liver) had HEI ≤ 15 reflecting moderate level of risk for the non-edible portions of Hilsa. Therefore, Hilsa must be cleaned properly for safe consumption. Although the heavy metal levels of water from the sampled river systems were in a slightly increasing trend yearly, no significant increase was observed. These results imply that currently there is no ecological and health associated risks but, in the future, it might pose risk due to gradual accumulation of heavy metals over the years. Thus, appropriate management plans must be implemented to reduce the discharge of effluents in the aquatic habitats of Bangladesh.

PPM 25 Assessment of Anti-*Vibrio alginolyticus* and *Exiguobacterium qingdaonense* Activity of Seaweed Collected from St. Martin's Island

Nurunnahar Nadira*, Anup Sardar, Alokesh Kumar Ghosh and Abul Farah Md. Hasanuzzaman

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: nadirakufmrt18@gmail.com

Seaweed with unique pharmacological effects including antibacterial have been increasingly studied and assessed for the antimicrobial activities against viral and bacterial infection in aquaculture units. In this study, four seaweeds (*Hypnea spinella*, *Padina australis*, *Chnoospora implexa*, *Sargassum carpophyllum*) collected from St. Martin's Island, Bangladesh, were studied to evaluate their antibacterial activity against a gram-negative bacteria *Vibrio alginolyticus*, and a gram-positive bacterium. *Exiguobacterium qingdaonense* isolated from Mud crab. Crude extracts of each seaweed were prepared using five solvents (water, methanol, ethanol, ethyl acetate, hexane). The extracts were tested for antibacterial activity against bacteria at a dose of 5 mg/disc. At different doses, six commercial antibiotics (Ampicillin, Chloramphenicol, Ciprofloxacin, Tetracycline, Erythromycin, Penicillin G) were also examined. There was no zone detected for the *V. alginolyticus* plates with seaweed extracts while *V. alginolyticus* showed susceptibility to antibiotics ciprofloxacin and tetracycline. On the other hand, there was zone detected in the *E. qingdaonense* plates containing the solvents methanol, ethanol, ethyl acetate, hexane, and *E. qingdaonense* had susceptibility to all antibiotics. Since the ethanol extract of *P. australis* showed the largest inhibitory zone (11 mm) for the *E. qingdaonense* growth, a concentration analysis ranging from 1-10 mg/disc was performed; there was a strong, positive linear relationship between inhibition zone and concentrations. The IC_{50} of this extract was then assessed using the broth microdilution method, ranging from 2.5-0.078125 mg/ml concentrations, and 0.625 mg/ml was determined as the IC_{50} value. The *in vivo* experiment of the toxicity of seaweed extracts on brine shrimp demonstrated that almost half of the extracts (19 out of 40) showed no mortality, putting these extracts forward as applicable in crustacean aquaculture units. Altogether, the results of this study have pointed out the applicability of ethanol extract of *P. australis* seaweed in controlling the growth of bacterium *E. qingdaonense*; nevertheless, more meticulous scientific studies are essential to reveal the inhibitory effects of these seaweeds on other bacteria pathogenic to fish and shellfishes, and to explore the applicability of these seaweeds in sustainable aquaculture production.

PPM 26 Water Quality Analysis in Multi-trophic Culture System with Different Stocking Density of Prawn

Nishat Tusnim* and Khandaker Anisul Huq

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: nishattusnimmithila@gmail.com

The present study was concluded to the water quality analysis in multi-trophic culture system with different stocking density of Prawn. Samples were taken every 15 days from August 2023 to October 2023. Stocking density of Prawn (Macrobrachium rogenbergii) were 2, 3 and 4 respectively. Nine water quality parameters (Temperature, DO, pH, Ammonia, Nitrate, Nitrite, Phosphate, Alkanity, Hardness) were measured from different treatments compare to control at 15 days interval. The temperature of the water varies from 30.44°C to 30.78°C. During the study period, the pH of the water in the experimental pond varied between 6.9 and 8.3, with the water being recorded as alkaline. The highest mean DO measured in the treatment 2 experimental pond was 4.96±0.42 mg/L, while the minimum mean value observed in treatment 1 (4.64±0.38 mg/L).Throughout the study period, the highest and lowest alkalinity mean value found in treatment -2 (47.4±5.13 mg/L), while the lowest mean value was 38.6±4.77 mg/L in treatment 1 followed by Hardness 104.8±9.12 mg/L (treatment 2) and 88.4±4.93 mg/L (treatment 1), followed by nitrate 2.04±0.25 mg/L (treatment -2) and 1.08±0.98 mg/L (treatment-1), followed by nitrite 0.08±0.019 mg/L (in treatment 2) and the 0.069±0.018 mg/L (in the control pond),followed by phosphate 0.12±0.027 mg/l (in treatment-2) and 0.11±0.018 mg/l (treatment-1), followed by ammonia 0.25±0.038 mg/L (in the Treatment 2) and 0.152±0.032 mg/l (control pond).

PPM 27 Mitochondrial DNA Marker Based Population Genetic Structure of Zebrafish (*Danio rerio*) in Bangladesh

Dristi Das* and Md. Lifat Rahi

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: dristidaskst@gmail.com

Zebrafish (*Danio rerio*) is a small indigenous fish species (SIS) of Bangladesh. This fish is regarded as one of the best model animals in the world due to its 70% similarity with human genome. Zebrafish was widely abundant in shallow and clear freshwater habitats; canals, ponds, and rivers close and connected to agricultural areas. In the recent years, abundance of Zebrafish has been sharply decreased due to both natural (climate change) and anthropogenic (agricultural and industrial pollution) stressors. Currently, Zebrafish has been listed as a threatened species in Bangladesh. Therefore, it requires immediate conservation plans to save this ecologically important species. Proper identification of the effective conservation units/sites using molecular markers is the pre-requisite to conserve the wild stocks of Zebrafish. The current study attempted to precisely document the genetic diversity and population genetic structure of Zebrafish using mitochondrial cytochrome oxidase subunit I (COI) gene marker across Bangladesh. In total, 175 fresh Zebrafish samples were collected from seven different locations (representing the major river systems) of Bangladesh (25 fish per sampling site). The 560 base pair (bp) COI gene fragment was used to sequence the 175 *D. rerio* samples. Analysis of the DNA sequences resulted in identification of only 31 variable sites (5.5%) and 79 haplotypes (with 19 unique haplotypes). Different types of population genetic analyses (e.g., nucleotide diversity, haplotype diversity, pair-wise genetic distance, Tajima's D, Fu's Fs etc.) showed the highest level of genetic diversity ($P < 0.05$) in the Sylhet Haor region followed by Chalan Beel and then Sangu River. The other four sampled populations were found to have very low genetic diversity with no significant differences among them. Phylogenetic analysis (using maximum likelihood and neighbour joining methods) and haplotype networking identified three major clades (distinct lineages/populations). Sangu River (lineage I) and Sylhet Haor (lineage II) were found to form two distinct clades while the remaining five populations formed lineage III. Findings clearly indicate that Zebrafish underwent extensive genetic drift and population decline. Results also suggest that there is evidence of gene flow among the populations/river systems of lineage III while no gene flow was evident between lineage I and lineage II. Overall results of this study indicate three major conservation units (appropriate conservation sites/populations) for Zebrafish (*Danio rerio*) in Bangladesh.

PPM 28 Total Bacterial and *Vibrio* spp. Load in the Water of Polyculture System with Tilapia and Without Tilapia

Md. Al-Shahariar* and Abul Farah Md. Hasanuzzaman.

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh.
*Email: shahariart3@gmail.com

Polyculture involves culturing different fish species within a single aquaculture environment and offers multiple advantages, especially improved ecological balance and optimum productivity. Bacterial disease can lead to significant production and profit loss by causing mass mortality of fish stock and increasing production costs. This study was conducted to determine the difference between total bacterial count (TBC) and *Vibrio spp.* count (TVC) in water collected from a polyculture system with and without tilapia. The water samples were collected from the carp polyculture pond of Imperial Fish Farm and Kazi Farm, Koiye Bazar, Dumuria, Khulna. The total bacterial count (TBC) of the water sample from the polyculture system with tilapia ranged from $6.5x10^4$ to $4.8x10^5$ CFU/ml (Figure o1). The total bacterial count (TBC) of the water sample from the polyculture system without tilapia ranged from $7.7x\ 10^4$ to $4.9x\ 10^5$ CFU/ml. There is no significant difference in total bacterial load (TBC) between culture systems ($P<0.05$). The total *Vibrio* spp. count (TVC) of the water sample of the polyculture with Tilapia ranged from $2.00x10^3$ to $9.00x10^3$ CFU/ml (Figure 02). In contrast, the TVC of the water sample collected from the polyculture system without Tilapia ranged between $7.00x10^2$ to $4.00x10^3$ CFU/ml. There is a significant difference in total *Vibrio* spp. load (TVC) in water from a polyculture system with Tilapia and without Tilapia ($P<0.05$). Higher TVC was calculated from the polyculture system with Tilapia than the polyculture system without Tilapia. The resultant information of this study would be useful for developing strategies to control vibriosis in carp and Tilapia polyculture systems as well as the development of a proactive measure and best practices for maintaining a healthy aquatic ecosystem within a polyculture environment.

PPM 29 Influence of Salinity on the Growth Performance of Nile Tilapia (*Oreochromis niloticus*) and Water Spinach (*Ipomoea aquatica*) in Aquaponic Systems: A Sustainable Strategy for Mitigating Coastal Aquaculture Pollution

Md. Nurul Islam*, Shaikh Tareq Arafat and Sharmin Akter

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: smshibber@gmail.com

The widespread use of pollutants, such as pesticides and antimicrobial agents, in traditional aquaculture has led to significant coastal water and soil contamination, impacting marine and terrestrial ecosystems. This study investigates the potential of aquaponic systems as a sustainable and eco-friendly alternative to these harmful practices. The effects of salinity on the growth of Nile Tilapia (*Oreochromis niloticus*) and Water Spinach (*Ipomoea aquatica*) were evaluated under salinity treatments of 0 ppt, 3 ppt, 6 ppt, and 9 ppt over 40 days. Tilapia demonstrated optimal growth in freshwater conditions (0 ppt), while higher salinities significantly reduced their performance. Conversely, Water Spinach achieved its highest yield and leaf area at 6 ppt, with sharp declines at 9 ppt. These findings highlight the contrasting salinity tolerances of the two components, emphasizing the importance of balanced salinity management to optimize productivity. This research underscores the role of aquaponics as an eco-friendly and resource-efficient approach to reducing environmental impacts associated with conventional aquaculture.

PPM 30 Variation in Proximate Compositions of *Otolithoides Pama* Based on Season, Size and Body Parts

Israt Jahan Tissa*and Md. Rashedul Islam

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: tissakif@gmail.com

The Poa fish *Otolithoides pama* is abundantly found in the Bay of Bengal and this fish has significant importance as low-cost source of protein for coastal peoples. This study aims to investigate the impact of size and seasonal variation on the proximate composition across distinct portions of the Poa fish. The lab work was conducted at Fish Nutrition Laboratory of Fisheries and Marine Resource Technology Discipline. Proximate composition of different body portions (head, middle and tail muscle) was determined using standardized laboratory procedures such as the Soxhlet extraction method for lipid content, Kjeldahl method for protein estimation and gravimetric techniques for moisture and ash quantification. Gas chromatography-mass spectrometry analysis was carried out in Jessore University of Science and Technology labratory. Three different sizes, i.e., ≤200g, 200g-400g and ≥400g of three seasons (summer, rainy season, winter) were analyzed to execute the present study. Protein content was found highest in the middle portion of large size (≥400g) fish of rainy season and protein percentage was found to be increased with increasing body size. Highest moisture content was also found in the tail portion of the ≥400g size group of winter season. The highest lipid content was found in the tail portion of the same size group of rainy seasons and the highest ash content was found in the head portion of the small size group of rainy seasons. In the different size groups average protein, moisture, lipid and ash contents ranged from 16-20%, 79-92%, 1.11-2.52% and 1.24-3.14% respectively. Data showed no significant differences in the protein, ash and lipid content of the three-size group of Poa fish.

PPM 31 Integrated Approaches to Mitigate Heavy Metal Contamination through Floating Vegetable and Mollusk Cultivation for Sustainable Prawn Farming

K M Rakibur Hossain* and Khandakar Anisul Huq

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: k.rakib.ku18@gmail.com

Heavy metal contamination, resulting from excessive agricultural practices and pesticide use, poses significant threats to environmental and food safety due to its non-biodegradable and persistent nature. This study aimed to assess the efficiency of aquatic plants and mollusks in mitigating heavy metal contamination in aquaculture systems exposed to the pesticide carbofuran, a widely applied agrochemical in Bangladesh. Using 12 experimental tanks (1000 L each) with four treatment conditions and triplicates, carbofuran was applied at 0.1 ppm (mg/L). Over 12-24 hours, pesticide residues broken down into heavy metals, specifically lead (Pb) and cadmium (Cd), were monitored in water, prawns, mollusks, and aquatic plants. The term nC and pC, implies negative control, and positive control. Results demonstrated that aquatic plants significantly absorbed Pb and Cd, while mollusks exhibited notable bioaccumulation, contributing to reducing heavy metal concentrations in the water column. The findings provide strong evidence for incorporating bioremediation strategies into sustainable aquaculture practices, reducing environmental and health risks while ensuring safer aquaculture products for consumption.

PPM 32 Effects of Pesticide on Physiological, Biochemical and Genetic Traits of Mud Crab (*Scylla olivacea*)

Jannatul Ferdaus Jyoti*, Wasim Sabbir and Md. Lifat Rahi

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: jannat.fmrt.ku@gmail.com

The orange mud crab *(Scylla olivacea)* is a significant crustacean species for coastal farming. Pesticides are critical chemicals mainly used on agricultural land that are washed into the water, causing severe stressful condition on aquatic life and impairing development, metabolism, immunity, and health. The current study examined the effects of pesticide (carbofuran) on physiological (growth and survival rate), biochemical (hemocyte count and hemolymph serotonin level), and genetic traits (relative expression of three candidate gene) in orange mud crab *(Scylla olivacea).* This study involved three experimental groups including control (0.0µg/L), treatment 1 (0.5µg/L) and Treatment 2 (1.0µg/L). Different carbofuran doses had a significant effect on biological traits of mud crab ($p<0.05$). Growth and survival performance were highest in the control group (0.0µg/L) of carbofuran ($P<0.05$). Pesticide (carbofuran) significantly reduced the number of hemocyte cell in crab hemolymph ($P<0.05$). Several treatments raised the levels of haemolymph serotonin compared to control crabs. Expression levels of the three selected genes showed pesticide dose specific differential changes. Treatment groups represented lower expression of growth gene (Alpha-amaylase), immune gene (Toll-Like Receptor), and metabolic gene (Acetyl-Coa Carboxylase) in comparison to control group. The findings of the present study show that pesticide (carbofuran) doses significantly changed biological traits that affected growth of this commercially important crustacean species.

PPM 33 Effect of Temperature and Omega-3 Supplementation on Reproductive Performance of Striped Catfish (*Mystus vittatus*)

Md. Musfiqur Rahman* and Md. Lifat Rahi

Fisheries and Marine Resource Technology Discipline, Khulna University, Bangladesh
*Email: rmusfiq74@gmail.com

The striped catfish (*Mystus vittatus*) is a small indigenous fish species (SIFS), constitute a premium market price and consumer demand due to its delicious taste and nutritive value. Induced breeding in hatcheries and farming practice are well established but facing the challenge of inadequate seed supply and slower growth rate. Therefore, this study investigated the effects of rearing temperature and omega-3 supplementation on some selected reproductive performance of *M. vittatus* over 60 days of experimental trial. Experimental fishes were maintained under two different temperatures (28^{o}C and 30^{o}C) while a single dose of omega-3 was added (1 ml/kg feed): Control (28^{o}C), T1 (30^{o}C) T2 (28ºC + omega-3) and T3 (30^{o}C + omega-3). In total, 600 fishes were maintained under the four experimental groups (150/group) in replicated tanks for this experiment. Omega-3 supplementation (T2 and T3) significantly increased ($P < 0.05$) the growth and fecundity over T1 and control (no significant difference between control and T1, also between T2 and T3). Significantly higher ($P< 0.05$) egg traits (egg size, egg protein and lipid contents) and sperm counts (3.2×10^{9}/ml) were obtained for T2 over the other groups. No significant difference was observed for the fertilization rates (89 – 92%) between the four experimental groups. The highest levels of hatching (76%) and larval survival (52%) performance were obtained for T2 compared to the others (67 – 71% hatching and 41 – 46% larval survival). Significantly higher ($P < 0.05$) male (luteinizing releasing hormone) and female (gonadotropin releasing hormone) reproductive hormones were obtained at T2 compared to the other experimental groups. The lowest levels of reproductive hormones were obtained at T1 (at 30^{o}C). Results clearly indicate that rearing temperature and omega-3 supplementation have important role in reproductive traits and offspring survival of *Mystus vittatus*. Therefore, optimum temperature and omega-3 supplementation must be maintained to ensure quality seed production from hatcheries.

PPM 34 Climatic Abiotic Factor Salinity's Impact on Biology and Physiology of Giant Fresh Water Prawn *Macrobrachium rosenbergii* Culture

Md. Monirul Islam Mridul* and Md. Lifat Rahi

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: mridul17ku@gmail.com

The giant freshwater prawn, *Macrobrachium rosenbergii*, is one of the most significant freshwater crustaceans from an economic standpoint, spreading its culture across tropical and sub-tropical regions. Climate change has significantly altered the world's climatic conditions, leading to saline intrusions in coastal areas and affecting freshwater ecosystems. In coastal areas of Bangladesh, salinity fluctuations have surged by approximately 26% over the last 40 years, impacting aquaculture productivity and affecting aquatic biodiversity. To manage these issues effectively, it is crucial to upgrade methods used to cultivate saline-intolerant species and identify solutions for other current species. Changes in salinity levels can disrupt the osmotic balance in crustaceans, requiring them to use significant energy to regulate their osmotic equilibrium. Therefore, this study was conducted to investigate overall biological changes in *M. rosenbergii* under five experimental conditions including 0‰ (control), 3‰, 6‰, 9‰ and 12‰ for 60 days (Figure). From this experiment it's observed that, the highest growth rate of the *M. rosenbergii* is at 0‰ salinity where don't face any salinity stresses. Except it each t reatment affects the growth rate of this fresh-water species. Hemolymph glucose concentration level has shown a significant ($P \leq 0.05$) difference in different salinity level. Which means addressing different salinity shows immediate and peak reaction at 24^{th} hour then it continues the same throughout the experiment. Added this study has known that the ionic balance of species is consuming more energy rather than normal growth and survivality in case of salinity stress. Ultimately, a significant ($P \leq 0.05$) difference in growth, gene expression and immunity were observed. The higher the degree of salinity the higher the impact on the culture of the *M. rosenbergii*. Different salinity regimes have different level of effect on the physiology and biological activity which leads to survival and growth of *M. rosenbergii.* In culture we have to be careful about salinity level more than or equals to 6 ppt.

PPM 35 Analysis of Macroalgae *(Chara braunii)* Derived Bioactive Compounds to Evaluate Their Effect on Growth Performance and Biochemical Changes in Metabolic Activities in Mono-sex Tilapia (*Oreochromis niloticus)*

Tamanna Fardoshi [1]*, Md. Golam Sarower[1], Sharmin Akhter[1] and Md. Nazmul Hasan Zilani[2]

1 Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
2 Department of Pharmacy, Jashore University of Science and Technology, Jashore-7408, Bangladesh
*Email: tamannafardosi4127@gmail.com

The Braun's stonewort, *Chara braunii*, is a large multicellular macroalgae species that naturally grow in fresh and brackish water bodies in Bangladesh, commonly known as Zajsaula which may enrich with nutrient potentials that can enhance the growth of cultured fish as well as production. However, there is still no initiative to use them as a commercial food source in aquaculture. In this study, a focused effort was made to evaluate the effects of *C. braunii* extract, supplemented in varying percentages with commercial feed, on mono-sex tilapia (*Oreochromis niloticus*), a widely available and commonly consumed protein source in this country. The evaluation included assessments of growth performance, metabolic activities, and histological changes in the intestine. Gas chromatography-mass spectrometry (GC-MS) was performed to profile the bioactive compounds of *C. braunii*, obtaining 4-methoxy-6-methyl-6, 7-dihydro-4h-furo [3, 2-c] pyran (6.97%), heptadecanoic acid, ethyl ester (1.90%), n-Hexadecanoic acid (29.42%), erucic acid (25.23%) as the major bioactive compounds. The proximate composition analysis of *C. braunii* reveals that it contains protein 17.46%, moisture 29.94%, lipid 2.53, and ash 33.02%. To evaluate its efficacy for enhancing growth, metabolic enzyme; protease, superoxide dismutase (SOD), and Catalase (CAT) activity was observed. The implication of this study will significantly influence the common trend of feed sources for the aquaculture industry in Bangladesh which includes cost minimization, faster growth performance as well as higher production rate.

PPM 36 Ethanolic Extract of Coriander (*Coriandrum sativum*) Enhances the Growth and Immune Functions of Giant Freshwater Prawn (*Machrobrachium rosenbergii*)

Halima Tus Sadia*, Shaikh Shaon Ahmmed, Farhana Nasrin, Uttam Adhikary, Ghausiatur Reza Banu, Shikder Saiful Islam and Alokesh Kumar Ghosh

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: sadiamoumita512@gmail.com

The antibacterial, anti-inflammatory, and antioxidant characteristics of coriander make it potential for therapeutic applications. The bioactive components of coriander, such as flavonoids and linalool, may suppress the proliferation of pathogenic bacteria. This study examined the impact of Coriander ethanolic extract (CEE) on the immune systems, antioxidant activities, and growth rates of giant freshwater prawns. Prior to selecting CEE as a dietary supplement, a comprehensive assessment of 24 spices with 4 solvents was performed, revealing that CEE demonstrated the most potent antimicrobial activity against *Vibrio parahaemolyticus* while exhibiting minimal cytotoxic effects on *Artemia* sp. Nine fiberglass tanks were filled with 135 juvenile prawns, each weighing 2 ± 0.25 g, with 15 prawns per tank. A diet devoid of CEE was given to the prawns, constituted the control group (C). The other groups were given the basic diet with CEE1 and CEE2, at doses of 0.25% and 0.5%, respectively with triplicates of each experimental group. The prawns were fed at a rate of 5% of their live body weight for a duration of four weeks. At the end of the four-week trial, 10 prawns were measured from each tank to measure the growth. Prawns treated with the dietary extract (CEE2) showed better growth performance (WG, SGR), as well as better feed utilization efficiency, reflected in lower feed conversion ratio (FCR), compared to the control and CEE1 group. Additionally, the treated prawns (with CEE2) exhibited enhanced immunological responses, with increased total haemocyte count, differential haemocyte count, respiratory burst activity, prophenol oxidase activity, superoxide anion activity, and reduced haemolymph clotting time compared to other groups. Therefore, this study highlights the efficacy of CEE in sustainable aquaculture, providing a natural solution to improve production and health in aquatic organisms.

PPM 37 Analysis of Proximate Composition of Aquatic Weed Paper Sheets Produced from *Alternanthera Philoxeroides* and Changes in Quality and Freshness During Its Storage in Refrigeration and Room Temperature

Mst Fatema*, Sharmin Suraiya and Monjurul Haq

Fisheries and Marine Bioscience, Jashore University of Science & Technology, Jashore-7408, Bangladesh
*Email: fatimabintefaruk0657@gmail.com

Aquatic weed paper sheets were prepared from *Alternanthera philoxeroides* (Malancha) using various combinations of salt, testing salt, and corn flour, and their nutritional and food quality were evaluated. Two types of sheets were produced: boiled and non-boiled. Non-boiled sheets had higher nutritional content, with protein levels ranging from 25.83% (Malancha + Normal salt) to 32.42% (Malancha + Testing salt). Lipid content was highest in Malancha + Corn flour + Testing salt sheets (5.51%), and moisture content was lowest in M + Ts sheets (7.74%). In boiled sheets, protein was highest in M+ Ts (28.89%), and lipid content was highest in M+ Ns (8.72%). Carbohydrate levels were higher in boiled sheets (up to 49.65%) compared to non-boiled sheets (up to 42.25%). The sheets were stored at room temperature (30°C) and refrigerated (3°C) for 90 days. The quality of sheets stored at refrigerated conditions was better preserved, showing slower deterioration compared to room temperature storage. Sensory tests indicated that boiled and non-boiled M+ Ts sheets had the highest overall acceptability. TBV-N values, indicating microbial decomposition, were higher in non-boiled sheets and more pronounced under room temperature conditions. Color analysis revealed that Luminocity and Redness were highest in M+ C+ Ts sheets, while Yellowness was highest in the same sheets in the boiled form. FT-IR analysis showed no significant molecular differences between the sheets. This study concludes that refrigerated storage at 3°C effectively preserves the nutritional and sensory quality of aquatic weed paper sheets.

PPM 38 Population Parameters of *Acanthopagrus datnia* (Hamilton, 1822) in the Coastal Region of Bangladesh

Samiur Rahman* and Muhammad Abdur Rouf

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: samiur.fisheries@gmail.com

Population parameters of Bengal Yellowfin Seabream (*Acanthopagrus datnia*) were estimated, aiming to determine total length-body weight (TL-BW) relationships, growth coefficient (k), mortality (Z, M and F), recruitment and level of exploitation (E) in the Andharmanik River near to the coast of Sundarban. Yearround samples (n =1000) were collected using seine nets and baited traps. Population parameters were measured from TL frequency data using FiSAT-II analyzer. The TL-BW relationship from the study indicated that the increment rate in the BW of the fishes (b = 3.0754; R^2 = 0.9897) exhibited positive growth allometry and the regression model is well fitted. Estimated K value was 0.864 per year addressing slower growth and the total mortality (Z) was 2.09 per year. Remarkably fishing mortality (F=0.45 per year) was found very less than the natural mortality (M=1.64 per year). Recruitment of this fishes exhibits a pattern where young population occurs continuously throughout the year and the major peak of recruitment for the fishes were observed from December to January. The estimated exploitation rate was 0.21 which is less than the maximum permissible limit (E=0.50). Under exploitation with minimum fishing mortality and positive growth allometry of the species suggested that the stock does not require any major management measures to sustain but lower growth coefficient indicates to take initiative for improving the habitat of the species.

PPM 39 Soil Quality Analysis in Integrated Multi-Trophic Aquaculture System with Different Stocking Density of Prawn

Kaniz Fatema Lana*, Md. Sanaul Islam and Khandaker Anisul Huq

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: kanizfatemaku19@gmail.com

The study was carried out to evaluate the variation of soil parameter based on Integrated Multi-trophic Aquaculture system. The experiment was conducted on KU FMRT Pond complex-II. Initial sampling was done on 1st August 2023 and Final sampling was done in 1st October 2023. There were one control and two treatments like Treatment 1 (T_1), Treatment 2 (T_2). Each has three replications; the experiment was designed by incorporating *Labeo rohita* (Rohu), *Amblypharyngodon mola* (Mola), *Pila globosa* (Snail), *Ipomoea aquatica* (Kolmi) along with main culture species *Macrobrachium rosenbergii*. Among of these three ponds, all the cultivate species was present in each pond. Among all the cultivate species, only prawn was at different stocking density 2/m^2 (C), 3/m^2 (T_1), 4/m^2 (T_2). Rest of the cultivate species was at same specific stocking densities between control and treatments pond. The study presents the soil quality variation among the experimental ponds. The lowest and highest soil pH average was found 7.4 in control, 7.5 in T_2 respectively. The maximum and the minimum average of electrical conductivity were found 1.57 (T_2) and 1.19 (C), followed by Organic carbon 1.86 (T_2) and 1.63 (C), Organic matter 3.21 (T_2) and 2.8 (C), Total Nitrogen 0.61 (T_2) and 0.37 (C), Total Phosphorus 0.013 (T_2) and 0.011 (C), Soil texture (Clay) 47 (T_2) and 45 (C), significance level was (p>0.05) during the study period respectively. The findings of the study tell us soil quality variation was high where stocking density was high, and it also tells us how to improve the soil quality in KU pond.

PPM 40 Proximate Composition of Soft-shell Crab (*Scylla* olivacea) from Farms in Satkhira

Md Kabir Hossain* and A. F. Md. Hasanuzzaman

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: kabir.fmrt.ku.2019@gmail.com

The study investigated the proximate composition of soft-shell mud crab (*Scylla olivacea*), a high-value species in Bangladesh, with samples collected from four union (Abadchandipur, Burigoalini, Datinakhali and Kalbari) in Satkhira District. Using AOAC methods, the analysis revealed significant variations in moisture content between Burigualini and Kalbari farms, while protein, lipid, and ash contents showed no significant differences across locations. Protein was highest (74.37±4.86%) in Burigualini and lowest (66.70±0.31%) in Abadchandipur. Lipid was highest (16.66±0.97%) in Kalbari and lowest (9.01±2.18%) in Datinakhali. Ash content peaked at 18.35±2.46% in Burigualini and was lowest (11.17±0.70%) in Abad Chandipur. Moisture content ranged from 87.82±0.74% (Burigualini) to 57.47±3.87% (Abad Chandipur). Salinity significantly affected the composition: highest protein (85.69±4.76%) and lipid (14.57±0.89%) were at 6–11 ppt, while highest ash (16.72±1.35%) and moisture (87.17±0.96%) were at 18–23 ppt. These findings highlight the influence of salinity on crab proximate composition and suggest further studies on seasonal, gender, and production system impacts.

.

PPM 41 Satellite-Based Chlorophyll-a as a Determinant of Fish Abundance in Bangladesh Maritime Zone

SM Mohai Minul Islam Mitul*and Muhammad Abdur Rouf

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: mohaiminku@gmail.com

Chlorophyll-a (*Chl-a*) plays a vital role in attracting fish school as it helps build food chain in the marine environment. This study aims to determine the spatial variability among the fishing grounds as well as to determine relationship between *Chl-a* and catch per unit effort (CPUE). Visible Infrared Imaging Radiometer Suite (VIIRS) monthly level-3 Standard mapped image (SMI) data of *Chl-a* (2022) was used in this study. South patches showed highest (2.18 ± 0.16 mgm^{-3}) average value of *Chl-a* and the lowest (0.38 ± 0.06 mgm^{-3}) was in south of south patches. Statistically significant ($F(3, 34) = 17.201$, $p = .000$) difference among the fishing grounds was found. VIIRS level-3 daily *Chl-a* data in accordance with fishing logbook was used for determining the relationship between *Chl-a* and CPUE. This study showed a significant negative relationship ($p<0.05$) between *Chl-a* and CPUE. This study also revealed that higher catch was found in the region of moderate *Chl-a* concertation (1.10 - 1.92 mgm^{-3}). A further study is required to determine the potential fishing zone in combination with more ocean variables and species wise study is needed to be conducted.

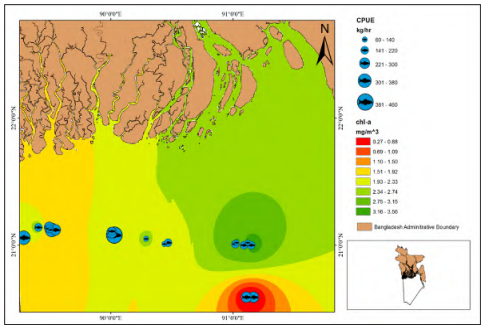


Figure 1.CPUE-*Chl-a* relation mapping Using Fishery data and VIIRS derived *Chl-a*

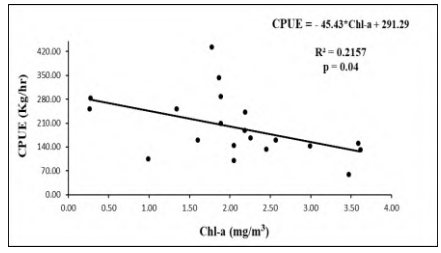


Figure 2. Relationship Between VIIRS-derived *Chl-a* and CPUE

PPM 42 Efficacy of *Cladophora glomerata* Extract on Growth Performance and Morphometric Phenotype of Nile Tilapia

Mohammad Mahbubul Hasan* and Md. Golam Sarower

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: mahbubulhasansohag2020@gmail.com

Seaweeds are an important source of nutrients and bioactive compounds and have a high potential as health boosters in aquaculture. Seaweed can be used in fish feed for their growth, and it can be commercially profitable. This research aimed to evaluate the possible positive effects of feeding Nile tilapia (Oreochromis niloticus) with a diet containing Seaweed (Cladophora glomerata) extract. The experimental design was completely randomized, with three replications one of treatment (n=150) and one control (n=50). A 28-day long study was carried out in rectangular glass tank (72.5cm×37.5cm) with one control, C and one treatment, T with three replications to determine the effect of feed mixed with Cladophora glomerata extract on growth performance and morphometric phenotype of Nile tilapia (Oreochromis niloticus). 50 fishes were stocked in each tank. They were given feed in first week 35%, second week 30%, third week 25%, and fourth week 20% according to their body weight. Higher weight gain was found in treatment tank 730.38222.87 than control tank 600.46266.70. Specific growth rate and FCR was found higher in treatment tank than control tank. Morphometric characteristics was found also higher in treatment than control and there was significance difference. The findings will help to formulate local seaweed-added feed for improved production of tilapia. Truss networking were also significance difference between treatment and control. The research result will be effective in contributing to the development of more sustainable and environmentally friendly aquaculture.

PPM 43 Measurement of Proximate Composition and Bioactive Compounds of Seaweeds (*Zonaria tournefortii* and Gigartina sp.) in the St. Martin Island

Md. Tanvir Ahmed[1]*, Sheikh Mustafizur Rahman[1], Muhaiminul Islam[1], Sk. Mustafizur Rahman[1], Md. Mubinul Islam[1], Nur Fatema Roti[1], Md. Moshiur Rahman[1] and Md Nazmul Hasan Zilani[2]

[1]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
[2]Department of Pharmacy, Faculty of Biological Science and Technology, Jashore University of Science and Technology
*Email: ahmedtanvir1570@gmail.com

Foods enriched with nutritional compounds and biological activities, are considered healthier for human or animal consumption. The proximate composition and bioactive compounds of seaweeds contribute to the nutritional and functional properties. Proximate composition analysis showed that protein, lipid, ash, moisture content varies between seaweed species. In this study the proximate composition and bioactive compounds of the seaweeds *Zonaria tournefortii* and *Gigartina sp*. were measured by AOAC (Association of Official Analytical Chemists) and GC-MS (Gas Chromatography-Mass Spectrometry). The highest protein (8.51%) was observed in *Z. tournefortii* and the highest lipid (1.42%), ash (52.61%) and moisture (19.38%) were observed in *G. sp*. of seaweeds. There were seven types of compounds observed in *G. sp.* and nine types of compounds were observed in Z. *tournefortii* species of seaweed. These compounds were fatty acid, polyacetyline, aromatic compound, alkene, alkane, ketone, organophosphorus compound etc. Between the two seaweed species *Zonaria tournefortii* contained higher amount of bioactive compounds than *Gigartina sp*. Understanding the nutritional and bioactive profile of seaweeds enhances their utilization in diverse applications for human health and well-being.

PPM 44 Trans-generational Effects of Heavy Metals on Zebrafish (*Danio rerio*)

Tasnim Sultana* and Md. Lifat Rahi

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
Email: tasnimsultanamouli2@gmail.com

Zebrafish (Danio rerio) is a non-cultivable freshwater species used mainly for research purpose as its gene sequence is 70% similar to human. The fish is affected (growth, survivability, fecundity, immunity, gene expression pattern, gill ultrastructure and overall fish) by heavy metal accumulation. Heavy metal enters into water body due to agricultural and industrial activities that is harmful to biodiversity and ecosystem. In the current study, 180 days+180 days experimental trial was conducted on two subsequent generations of zebrafish to investigate the effect of different doses of three heavy metals. Control condition involves no use of heavy metals (considered as Cr = 0, Hg = 0 and Pb = 0) while the two treatments include: T1 (Cr = 200 µg/L, Hg = 4 µg/L and Pb = 30 µg/L) and T2 (Cr = 300 µg/L, Hg = 6 µg/L and Pb = 45 µg/L) affects physiological (growth, survival and fecundity), genetic (IGF-1, and ghrelin) and cellular (gill ultrastructure) responses of zebrafish across generation. The best growth, survivability, fecundity and gene expression level were found in the control group ($P<0.05$). With increasing the doses of heavy metal, the growth, survivability, fecundity and gene expression level of zebrafish decreased. Effects of these heavy metal doses ranging from moderate to severe levels, causing internal tissue damage in the gill. The results of this investigation clearly demonstrate that the experimental zebrafish individuals experience varied degrees of stress in response to different doses of heavy metal. Therefore, it is advised to maintain or reduce the uses of heavy metal to mitigate the adverse effects of heavy metal pollution both for the welfare of aquatic biodiversity and environmental health.

PPM 45 Effects of Salinity Stress on Growth and Physiobiochemical Changes in the Gold Spot Mullet, *Liza parsia*

S. M. Nahid Jobayer*, Sheikh Mustafizur Rahman, Pial Paul, Mahir Faisal Rahi, Mahmudul Hasan, Md. Golam Sarower, Md Shahin Parvez and Md Moshiur Rahman[1]

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: nahidjobayer312gmail.com

Salinity is an important environmental factor that influences water quality, fish development, physio biochemical and physiological status. The study was conducted in six different salinities that were expressed as T1 (0 ppt), Control (7 ppt), T2 (14 ppt), T3 (21 ppt), T4 (28 ppt) and T5 (35 ppt) with three replications each. The present study investigated the effects of salinity on growth, survival, proximate composition (protein, lipid, ash, and moisture), gill morphology, and enzyme activities (SOD and CAT) in gold spot mullet (*Liza parsia*) juvenile. Growth performances including final length, final weight, specific growth rate, weight gain, and feed conversion ratio of mullet among the treatments varied significantly ($p < 0.05$) (Table 1). Highest growth performance was observed in 7 ppt followed by 0, and 14 ppt. Mortality of mullet decreased significantly ($p < 0.05$) with salinity, and none of the fish survived after being exposed to 28 and 35 ppt at day 6. Teared fish had significantly different lipid and moisture contents, but not in their protein or ash amounts ($p > 0.05$). The activity of catalase (CAT) and superoxide dismutase (SOD) in the liver of mullet juveniles pronouncedly decreased with increasing water salinity (Figures 1 and 2). High salinity induced damage to gill morphology suggest high stress. By considering the results of the growth parameters, survival, proximate composition, enzymatic activities, and gill histology, the culture of these species in brackish water would result in better performance and would not compromise fish welfare. The culture of these species in brackish water (7 and 14 ppt) would improve performance and not jeopardize fish welfare by considering the results of the growth parameters, survival, proximate composition, enzymatic activities, and gill histology.

PPM 46 Effect of Hydrolysate-based Diet on Growth and Biochemical Activities of Gold Spot Mullet *Liza parsia*

Pial Paul*, Sheikh Mustafizur Rahman, Md. Golam Sarower, Mahir Faisal Rahi, SM Nahid Jobayer, Md. Mahmudul Hasan, Md. Moshiur Rahman and Momotaz Khanom

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: p.pialpaul@gmail.com

Fish protein hydrolysates (FPH), derived through enzymatic breakdown of fish proteins into smaller peptides, offer high digestibility, excellent texture, and viscosity with small particle sizes, improving functionality and nutrient absorption. A 6-week feeding trial was conducted to evaluate FPH effects on growth performance, survival, digestibility (amylase and protease activity), feed conversion ratio (FCR), and body composition in juvenile *Liza parsia*. Five diets with equal nitrogen content (35% protein) were tested: Diet 1 (Control) and Treatments 1-4 with 5%, 10%, 15%, and 20% FPH enrichment, respectively. Results showed that FPH levels significantly influenced growth, survival, digestibility, and FCR of juveniles, with the 10% FPH diet yielding the highest total weight gain, specific growth rate, fish length, and survival (Table 1). Fish on the 10% FPH diet also had improved FCR, condition factor, and fish body composition. Survival rates were similar among fish fed the control, 5%, and 10% FPH diets (84–89%) but significantly decreased for the 15% and 20% FPH diets (78.94%). Additionally, fish on the 10% diet showed the highest amylase and protease activity. Water quality assessments revealed significant differences in the ammonia and nitrite content among treatments, though bacterial counts remained consistent. Feed-cost analysis indicated that higher hydrolyzed feed compositions reduce overall feed costs. Fatty acid profiling also highlighted differences between fish fed the control (0% hydrolyzed feed) and 10% hydrolyzed feed. Overall, the study demonstrated that adding a small amount of FPH to the diet of *L. parsia* juveniles enhances growth, survival, and digestibility while lowering FCR, supporting the potential for commercial aquaculture of this species.

PPM 47 Dietary Impact of Onion (*Allium cepa*) Extract on Giant Freshwater Prawn (*Macrobrachium rosenberigii)*: Growth and Immunity Insights

Uttam Adhikary*, Shaikh Shaon Ahmmed, Halima Tus Sadia, Farhana Nasrin and Alokesh Kumar Ghosh

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: adhikaryuttam809@gmail.com

This study examined the impact of ethanolic extract of *Allium cepa* (AC) on the immunological resilience and growth performance of *Macrobrachium rosenberigii*. In advance of selecting AC as a dietary supplement, an extensive evaluation of 24 spices was conducted, revealing that AC had significant bioactivity against Vibrio parahaemolyticus with little cytotoxic effects on Artemia. Then juvenile prawns (initial weight 2.1 ± 0.50 g) were randomly distributed across nine fiberglass tanks, each of which contained 15 prawns and corresponded to two dietary treatments. Control group (C) was provided with a basal diet without any supplementation, while experimental groups (AC1 and AC2) were administered diets that were supplemented with 2.5 g/kg and 5.00 g/kg of *Allium cepa* ethanolic extract, respectively with triplications. For four weeks, the shrimp were fed at a rate of 5% of their body weight per day. Following the experiment, immunological parameters such as Total Hemocyte Count (THC), Differential Hemocyte Count (DHC), Hemolymph Clotting Time (HCT), Superoxide Anion Production, Respiratory Burst Activity (RBs), and Pro-phenol oxidase activity (Pro-Po) were evaluated, along with growth performance metrics such as Final Weight (FW), Average Weight Gain (AWG), Specific Growth Rate (SGR), and Feed Conversion Ratio (FCR). In comparison to the control and AC1 groups, The AC2 group (5 g/kg diet) showed higher growth performance, feed efficiency, and increased immunological responses. According to these results, feeding *M. rosenbergii* with 5 g/kg of *A. cepa* extract showed highest activity to enhance growth, feed utilization, and antioxidant activity. This study highlights how spice-based (Onion) additives can be used in sustainable aquaculture practices to improve aquatic species health and productivity in a natural way.

PPM 48 The Impact of Fish Protein Hydrolysate-Based Diets on Growth, Body Composition, and Metabolic Activities of Tilapia *Oreochromis niloticus*

Md. Khaladur Rahman Shohag*, Sheikh Mustafizur Rahman, Md. Golam Sarower, Mahir Faisal Rahi, SM Nahid Jobayer, Pial Paul, Md. Mahmudul Hasan, Md. Moshiur Rahman, Md. Shahin Parvez and Momotaz Khanom

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: shohagkufmrt@gmail.com

Protein hydrolysates are breakdown products of enzymatic conversion of proteins into smaller peptides that contain 2– 20 amino acids. Due to the smaller peptide size, hydrolysates are the foremost available amino acid source for various physiological functions of animal body. In this study, FPHs were prepared using proteolytic enzymes at optimal temperature and pH, digesting various components of freshwater fish waste such as heads, trimmings, fins, frames, bones, scales, and viscera. A 35-day feeding trial was carried out to evaluate the use of FPH in diets for Nile tilapia (*Oreochromis niloticus).* FPH was included in isonitrogenous diets replacing fish meal protein by 0%, 30%, 40%, and 50% and offered to Nile tilapia (0.4 ± 0.02 g) stocked in 40-L glass aquaria. The inclusion of FPH produced significant differences ($P< 0.05$) in the water quality (ammonia and nitrite), the final length, length gain, final weight, weight gain, specific growth rate, feed conversion ratio, ash and moisture percentage, amylase, catalase and SOD enzyme activity (Table 1). The inclusion of FPH Nile tilapia diets did not significantly affect ($P< 0.05$) the water quality (temperature, pH, DO), protein, lipid and protease enzyme activity of the fish body. Protease activity and protein content increase with the high-content FPH fed. This study has demonstrated that FPH is a promising protein feedstuff and could account for as much as 50% of fish meal replacement of Nile tilapia diets with no adverse effects on growth, proximate composition and biochemical activities.

PPM 49 Evolution of Reproductive Performance of Guppy *(Poecilia reticulate)* Exposed to Different Concentrations of Microplastic

Amena Arefin Trisha*, Sheikh Mustafizur Rahman, Md. Golam Sarower, Tania Sultana Mohona, Momotaz Khanom and Md. Moshiur Rahman

Fisheries and Marine Resouce Technology Discipline, Khulna University, Khulna-9208, Bangladesh.
*Email: arefintrisha08@gmail.com

Microplastics measuring under 5mm, have become a significant global environmental issue, especially threatening aquatic ecosystems. This research investigates how guppies (*Poecilia reticulate*), a commonly used model organism, evolve in response to exposure to various levels of microplastic particles. So, to determine the impact of microplastics, a study was carried out on guppies in glass aquaria for 30 days in the presence and absence of microplastics. There was a control group and four treatments, including feed mixed with 5% microplastic for the microplastic incorporated feed and direct exposure to 100, 500, and 1000 µm microplastic in 20 liters of water. We assessed the impact of microplastic stress on key reproductive parameters, including sigmoid display, gonopodial thrust, sexual interest, and the sperm bundle number of male fish. The findings indicated that males exposed to microplastics exhibited fewer sperm bundles and a reduced sigmoid display, along with decreased sexual attraction compared to males who were not exposed to fish treated with plastics. The rise in microplastics negatively impacts the reproductive success of fish. Where else, untreated control males did not show any significant variations of reproductive performances but increased marginally. So, our findings reveal a substantial decline in reproductive fitness in guppy populations exposed to microplastics. This result suggests that microplastic pollution can induce rapid evolutionary changes in aquatic organisms, potentially leading to population declines and ecological imbalances. Further research is necessary to elucidate the underlying mechanisms of microplastic toxicity and to develop effective strategies for mitigating the adverse effects of plastic pollution on ecosystems.

PPM 50 Effect of Microplastics on Phenotypic Traits, Biochemical Activities and Histology of Guppy (*Poecilia reticulata*)

Rani Akhter*, Sheikh Mustafizur Rahman, Tania Sultana Mohona, Momotaz Khanom and Md. Moshiur Rahman

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: raniakhter07@gmail.com

Micro-plastic pollution has emerged as a significant environmental concern, particularly in aquatic ecosystems. This study investigates the multifaceted effects of micro-plastic exposure on the phenotypic, histological, and biochemical parameters of guppy (*Poecilia reticulata*). This study was consisted of five treatment groups namely, Control that did not receive any MPs while, in Treatment 1, fish were MPs-incorporated (5% of feed) diet. For Treatment 2, Treatment 3 and Treatment 4, MPs was exposed to water at 100, 500 and 1000 µg/L, respectively. Fish was given commercial aquarium feed at the rate of 6% (3% morning and 3% evening). The study was conducted for 30 days. Phenotypic parameters, including weight and length, were measured to assess the overall health of the fish. A significant reduction in both weight and length was observed in fish exposed to higher concentrations of micro-plastics, indicating a negative impact on growth and development. Histological analysis of muscle tissue revealed significant alterations, including cellular degeneration, inflammatory responses, and increased tissue necrosis in exposed fish. These findings suggest that micro-plastics can induce tissue damage and disrupt normal cellular processes. To evaluate the biochemical impact, enzyme activities of amylase, protease, catalase and superoxide dismutase (SOD) were measured. Exposure to micro-plastics resulted in significant alterations in these enzyme activities, indicating oxidative stress and metabolic disturbances. Increased levels of oxidative stress can lead to cellular damage and impaired physiological functions. Overall, this study provides compelling evidence that micro-plastic pollution has detrimental effects on guppies, affecting their phenotype, histology, and biochemistry. These findings highlight the urgent need for effective strategies to reduce micro-plastic pollution and protect aquatic ecosystem.

PPM 51 Enhancing Growth and Immune Responses in Giant Freshwater Prawn (*Macrobrachium rosenbergii*) via Oral Administration of Mouri (*Foeniculum vulgare*) Extracts

Shaikh Shaon Ahmmed*, Halima Tus Sadia, Farhana Nasrin, Uttam Adhikary and Alokesh Kumar Ghosh

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: ahmedshaon990@gmail.com

The present study evaluated the dietary impact of ethanolic extract of *Foeniculum vulgare* (FV) on the growth performance and immunological resilience of Giant River Prawn (*Macrobrachium rosenbergii*). Prior to selecting FV as a dietary supplement, a comprehensive screening of 24 spices with 4 solvents was conducted, with FV demonstrating the highest antimicrobial efficacy against *Vibrio parahaemolyticus* and minimal cytotoxicity on *Artemia*, highlighting its excellent bioactivity and potential for therapeutic applications. After that, juvenile prawns (initial weight 2.1 ± 0.25 g) were randomly distributed across nine fiberglass tanks, corresponding to two dietary treatments, with each tank housing 15 prawns. The control group (C) received a basal diet with no supplementation, while two experimental groups were fed diets enriched with 2.5 g/kg (0.25 %) (FV_1) and 5.00 g/kg (0.5 %) (FV_2) (with 3 replications) of *F. vulgare* ethanolic extract. Prawns were fed at 5% of their body weight daily for four weeks. After the experimental period, growth performance metrics including Final Weight (FW), Average Weight Gain (AWG), Specific Growth Rate (SGR), and Feed Conversion Ratio (FCR)—were assessed, along with immunological parameters such as Total Hemocyte Count (THC), Differential Hemocyte Count (DHC), Hemolymph Clotting Time (HCT), Superoxide Anion Production, Respiratory Burst activity (RBs) and Pro-phenoloxidase activity (proPO). The FV_1 group (2.5 g/kg diet) demonstrated significantly higher growth performance, feed efficiency and enhanced immunological responses of prawn compared to control and FV_2 groups. These findings indicate that dietary inclusion of *F. vulgare* extract at 2.5 g/kg optimizes growth performance, feed utilization, and antioxidant activity in *M. rosenbergii*. This work underscores the potential of spice-based additives in sustainable aquaculture practices, offering a natural alternative to enhance productivity and health in aquatic species.

PPM 52 Comparative Analysis of the Nutritional Composition of Nile Tilapia Reared in Biofloc Technology and Earthen Pond System

Nirjhar Roy*, Sharmin Aktar, Md. Shahin Parvez, Md. Nazmul Ahsan, Sudip Debnath and Sheikh Mustafizur Rahman

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: nirjharroy20@gmail.com

The study aimed to evaluate the proximate composition and amino acid profile of Nile tilapia cultured in biofloc tank systems (BTS) and earthen pond systems (EPS). To achieve this, juvenile tilapia of similar sizes was stocked in both biofloc tanks and earthen ponds in triplicate. The fish in both the BTS and EPS were reared for 90 days, with feeding rates of 3-2% and 6-4% of body weight, respectively. After 90 days, there were no significant differences ($p>0.05$) in the proximate analysis, including crude protein and ash content, in the whole fish composition of tilapia reared in both culture systems. The moisture content was higher in the BTS compared to the EPS, while lipid content was significantly lower in the BTS than in the EPS. In the muscle samples, there were no significant differences ($p\geq0.05$) in crude protein and moisture. However, crude lipid and crude ash were found to be significantly ($p<0.05$) higher in the BTS compared to the EPS. The amino acid profiles were similar between the two systems, with 12 amino acids identified in the BTS culture system and 13 in the EPS culture system (Table). All essential amino acids were present in the fish cultured in the earthen pond, while two essential amino acids were absent in the biofloc cultured fish. Overall, the current study indicated similar nutrient profiles in the BTS compared to the EPS.

Table: Amino acid profiles of the Nile tilapia fish reared under BTS and CTS

Essential amino acids	**Composition (%)**		**Non-essential amino acids**	**Composition (%)**	
	BTS	**EPS**		**BTS**	**EPS**
Histidine	0.04±0.06	0.03±0.04	Arginine	ND	0.23±0.32
Isoleucine	ND	1.00±1.41	Aspartic acid	0.05±0.02	0.12±0.03
Leucine	0.15±0.21	0.17±0.25	Cysteine	ND	1.94±2.74
Lysine	2.13±0.57	1.85±0.28	Glycine	0.03±0.04	ND
Methionine	0.01±0.01	1.24±1.75	Glutamic acid	0.32±0.45	ND
Phenylalanine	0.86±1.15	1.09±1.43	Proline	0.09±0.12	ND
Threonine	0.05±0.07	0.32±0.45	Serine	0.03±0.04	0.23±0.32
Valine	ND	1.58±2.24	Tyrosine	0.84±0.95	0.11±0.16

*Data presented as mean ± SD; ND denotes Not Detected.

PPM 53 Zootechnical Performances and Organ-Somatic Indices of Nile Tilapia Raised in Biofloc and Non-Biofloc Culture System

Israt Jahan*, Sharmin Aktar, Md. Shahin Parvez, Sheikh Mehedi Hasan Rony, Mohammad Zahirul Islam, Sheikh Mustafizur Rahman and Md. Nazmul Ahsan

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: isratjahanjyoti199920@gmail.com

The present study was conducted to evaluate the growth, feed and space utilization efficiency, organosomatic indices, and somatic yield of Nile tilapia cultured in biofloc tank system (BTS), clear-water tank system (CTS) and earthen pond system (EPS). In this regard, Nile tilapia juveniles of similar weight (22.01±0.33g) were stocked in the tanks of BTS and CTS, and in the ponds of EPS in triplicate. The stocked fish were reared for 90 days, fed at a rate of 3-2% in BTS and 6-4% in CTS and EPS. After harvest, the fish reared in EPS obtained the highest and significant (*$p<0.05$)* growth performances than the fish in BTS and CTS (Table). The organosomatic indices (viscera, liver, visceral fat, stomach, intestine and digestive tract) and carcass waste yield of the BTS-raised fish were found to be significantly higher ($p<0.05$) than the fish reared in CTS and EPS. Accordingly, the somatic yield indices in terms of head and carcass yields in the BTS fish were significantly lower ($p<0.05$) than others. However, culture system didn't affect survival and condition factor of the fish ($p\geq0.05$). Moreover, there were found significantly (*$p<0.05$)* lower FCR with higher PER and production (space/water) efficiency in BTS compared to CTS and EPS. The study concluded that though the biofloc culture system reduced overall growth and somatic yield, it could ensure efficient utilization of water and space and reduce feed cost while improving the survival and overall health of the reared fish.

PPM 54 Satellite-Based Sea Surface Temperature as a Determinant of Fish Abundance - A Case in the Maritime Zone of Bangladesh

Bapy Golder* and Muhammad Abdur Rouf

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: bapygoldar@gmail.com

Sea surface temperature (SST) is an important parameter in marine ecosystem studies as its relations of Fishery and other marine resources. In this study SST we have focused on the variation of SST among four fishing grounds and the relationship between SST and fish catch data. Fish catch data of November, 2022 was acquired from fishery logbook. Satellite derived VIIRS daily and monthly products have been used to derive thermal fronts in the maritime zone of Bangladesh. Research results indicated that the Sea surface temperature gradually changed from 24.4°C to 30.52°C among four fishing grounds. The results are showed that there are no significant differences (F3, 44= 0.213, P = 0.00) of SST among the four fishing grounds. The results are shown that the highest SST was (29.94 ± 2.01) °C in the Middle Ground and lowest SST was (27.61 ± 1.98) °C in the Swatch of No Ground. A very weak relationship was found between SST (26.52°C ≤SST≥ 29.21°C) and fish data. But a negative relationship was found when SST was from 27.88°C to 28.54°C. The results are shown a moderate relationship between SST (28.55°C≤SST≥29.21°C) and fish catch data. And a high moderate correlation was found between SST and fish catch in Middle grounds but very low correlation ship between SST and fish catch data was found in Swatch of No Ground. A further detailed investigation is required to the association of other parameters with SST variability and relationship between SST and fish abundance.

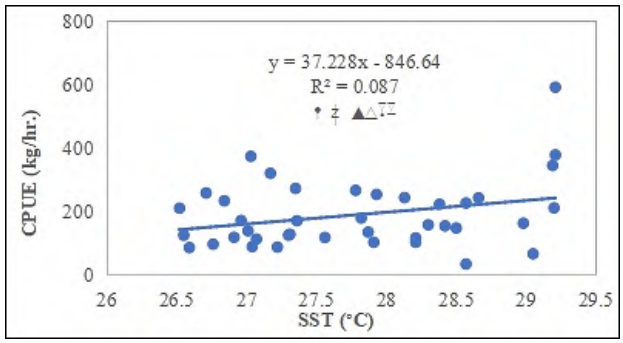


Figure: The relation between all SST data CPUE data

PPM 55 Dinoflagellate-Microbiome Interactions and Production of Algal Metabolites: A Review

Mst. Afia Humaira*, Md. Rashedul Islam, Ruma Khatun, Alokesh Kumar Ghosh, Abul Farah Md. Hasanuzzaman and Shikder Saiful Islam

[1] Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna, Bangladesh
*Email: humairamoonmoon20@gmail.com

Algal microbiomes are collection of microorganisms that live on, within, and around phycosphere, where they engage in interactions with the host cells, actively synthesis and exchange substances and support host cells health and physiology. Algae and bacteria exchange macro- or micro-nutrients, vitamins, minerals, and cell signaling molecules. These interactions may cover from symbiotic to parasitic mode, often synergistic to harmful algae, aiding their growth and physiology during bloom formation. Algal-bacterial interactions also have a vital role in bio-geochemical cycling, food web productivity and ecosystem functioning through contributing to nitrogen, carbon, phosphorus, and sulfur cycles. In this review paper, major interactions of dinoflagellates and microbiomes are discussed with their contributions to production of algal metabolites. Therefore, this paper will also provide an insight into dinoflagellates and bacterial cell to cell communications and its significance in marine biotoxin production.

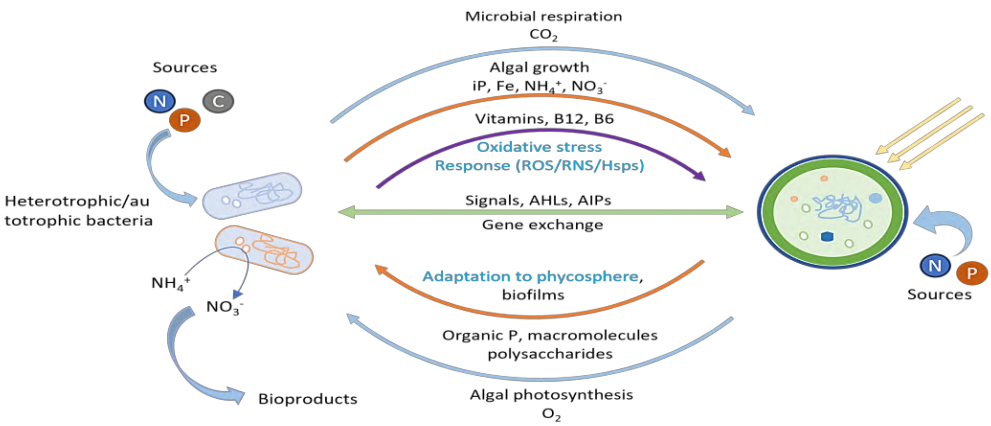


Figure: Algal-bacterial interactions: algae and bacteria engage in significant interactions within the marine microbiome.

PPM 56 A Case Study on Consumers Perception towards Ready to Cook (RTC) Fish Products in Khulna

Suzana Afrose Labonno* and Md. Nazmul Ahsan

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: Suzanaafrose99@gmail.com

This case study aimed to explore the consumption patterns of ready-to-cook (RTC) fish products and consumer's preferences. The study revealed a varied occupational landscape among participants, with students constituting the largest group (43%), followed by individuals engaged in government service (13%), the private sector (23%) and NGOs (7%). The remaining 14% represents a diverse array of professions. The findings suggested a correlation between monthly income, buying price and preferred fish procurement methods. Individuals with a monthly income less than BDT 20,000 show a significant preference for live fish from the market (77%), in the income bracket of BDT 20,000-30,000, a majority of respondents (82%) express a preference for live fish from the market, indicating a sustained desire for freshness. However, there was also a notable interest in whole fish cut and cleaned (10%) and RTC fish products that are not whole (8%), in the BDT 30,000-50,000-income range, the preference for live fish decreases to 69%, while the interest in whole fish cut and cleaned (22%) and RTC fish products (9%) remains steady, in the highest income bracket above BDT 50,000, the preference for live fish further decreases to 57%, while the preference for whole fish cut and cleaned (36%) becomes the dominant choice. The interest in RTC fish products not sold remains at 7%. Preferences for fish processing among individuals reveal a diverse range of choices. While a minority opt for the raw/ live fish experience (10%), a larger segment prefers live fish processed immediately after purchase (13%). A significant number entrusted the processing to housemates (8%) or house helps (26%), indicating a reliance on the convenience of others. Furthermore, a substantial portion favors fully cut and processed fish (15%), while the majority leans towards processed fish but not as a whole (28%), but as pieces or convenience size. This study provided a delicate understanding of the factors influencing RTC fish consumption, emphasizing the role of profession, household dynamics, income levels and individual.

PPM 57 Food and Feeding Habits of Gold Spot Mullet, *Liza parsia* Species in Rupsha River of Khulna, Bangladesh

Anannya Sikder* and Momotaz Khanom

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: anannya06sikder@gmail.com

Food and feeding habit of fish is a helpful of fishery biology and culture aspects. The present study was conducted to find out the food and feeding habits of *Liza parsia* from September to November. Sixty samples were randomly collected with net from Kajibacha River, which is located in Batiaghata, Khulna, Bangladesh. After collection, samples were immediately preserved in ice and transported to the laboratory of Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna and were further used for detailed studies on gut contents. Food compositions of the gut was examined using microscope. Gastro-somatic index (GaSI), Relative Length of Gut (RLG), Index of fullness and Frequency of occurrence were observed. The findings concluded that *Liza parsia* prefers phytoplankton over zooplankton, and the plankton consumption was slightly higher. The stomach contents were composed of a wide variety of algae, diatoms, plant materials, detritus and sand grains in its feeding habits. Out of 60 stomachs of *Liza parsia* examined, (66.75$\pm$ 5.17) % stomachs contained food and the rest (33.24$\pm$5.16) % were without food which varied during different months. The maximum GaSI was recorded in October (4.116$\pm$1.569) and minimum in September (3.471$\pm$0.706). Highest RLG was found in September whereas the lowest one was observed in October. This research is expected to be important in the management and conservation of endangered *L. parsia* and provide important information for future research and open the way for captive aquaculture.

PPM 58 Synergistic Impact of Probiotics and Prebiotics on Cellular and Humoral Immunity in *Penaeus monodon*

Ruma Khatun[1]*, Saroj Kumar Mistry[2], Shikder Saiful Islam[1], Md. Asadujjaman[3], Md. Golam Sarower[1] and Syed Hafizur Rahman[4]

[1]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh.
[2]Department of Fisheries, Ministry of Fisheries and Livestock, Bangladesh.
[3]Department of Aquaculture, Fisheries and Ocean Sciences, Khulna Agricultural University, Khulna, Bangladesh.
[4]Department of Environmental Sciences, Jahangir Nagar University, Savar, Dhaka-1342, Bangladesh
*Email: ruma422765@gmail.com

This study evaluated the synergistic effects of probiotics and prebiotics on haemocyte counts and prophenoloxidase (pro-PO)-based innate immune enzyme activity in *Penaeus monodon* reared under semi-intensive culture conditions. Control ponds were stocked with shrimp at a density of 12 PL/m² and fed commercial pelleted feed. In the treatment groups, shrimp were stocked and fed under the same conditions, with additional supplementation of probiotics at a rate of 1×10^9 CFU/g and prebiotic application at 1 ppm. The findings revealed a significant improvement in total haemocyte count (THC), semi-granular haemocytes (SGs), and pro-PO activity in the treated group compared to the control group. Conversely, a reduction in non-granular hyaline cells (HCs) was observed in the treated group relative to the controls. The increase in THC, SGs, and pro-PO activity indicates that the synergistic impact of probiotics and prebiotics enhances the innate immune response, increasing shrimp resilience to infections and stressors. In conclusion, probiotics and prebiotics can serve as natural and effective immunostimulants to strengthen the innate immune system and improve disease resistance in shrimp.

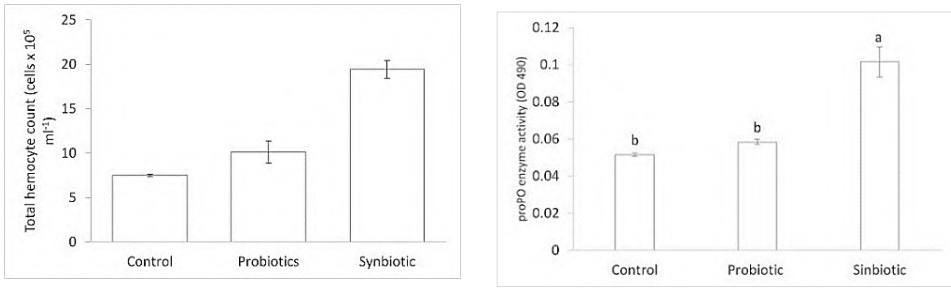


Figure: THC and pro-PO of the control and treatment groups.

PPM 59 Effect of Size Variation in the Proximate Composition of Different Body Portions of Bhola Fish *(Johnius argentatus)*

Umma Romana Akter* and Md. Rashedul Islam

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh.
*Email: romanaislamku32@gmail.com

The Bhola fish *Johnius argentatus* is abundantly found in the Bay of Bengal and this fish has significant importance as low-cost source of protein for coastal peoples. This study aims to investigate the impact of size variation on the proximate composition across distinct portions of the Bhola fish. The lab work was conducted at the Fish Nutrition Laboratory of Fisheries and Marine Resource Technology Discipline. The proximate composition of different body portions (head, middle and tail muscle) was determined using standardized laboratory procedures such as the Soxhlet extraction method for lipid content, Kjeldahl method for protein estimation and gravimetric techniques for moisture and ash quantification. Three different sizes, i.e., ≤50g, ≤300g and ≥500g was analyzed to execute the present study. Protein content was found highest in the middle portion of large size (≥500g) fish and protein percentage was found to be increased with increasing body size. Highest moisture and lipid content was found in the head portion of the ≥500g size group and the highest ash content was found in the tail portion of the same size group. In the different size groups average protein, moisture, lipid, and ash contents ranged from 16-20%, 79-82%, 1.11-1.34 and 1.24-1.35% respectively. Data showed no significant differences in the protein, ash and lipid content of the three size groups of Bhola fish.

PPM 60 Fish Fauna and Livelihood Preferences of Inshore Fishing Community in Kuakata, Bangladesh

Romana Akter Shapla* and Mst. Muslima Khatun

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: romanaakter250100@gmail.com

An investigation was carried out on the fish fauna in Kuakata inshore area under Patuakhali district, Bangladesh to know the present status of freshwater, brackish water and marine species variety in the major two fish landing centers (Alipur and Mohipur) of Kuakata. This study also investigated the livelihood preferences of inshore fishing community. The study was conducted by using questionnaire interviews to the key informants, fishermen and local people. A total of 21 types of inland and marine water fish and crustacean species under 8 orders and 17 families were identified from the study area. The study identified Perciformes as the dominant fish order (38%), followed by Beloniformes, Cypriniformes and Mugiliformes (5%), Clupeiformes and Decapoda (10%) and Scombriformes and Siluriformes (14%) (Figure 01). Among 100 fishermen, 62 were interviewed to assess socio-demographics. Most fishermen were aged 31-40 years (40%), with only 5% under 20. Families with 5 members (27%) were most common, and 8% had 7 members. Education levels were low, with 31% illiterate and only 13% educated up to JSC level. About 63% did not involve their children in fishing, while 31% did. Most fishermen earned 16,000–25,000 BDT/month (65%). Most of the people were interested to switch their livelihood option. Livestock, poultry/duck, fish farming, small business, and crop farming were very popular as alternative livelihood preferences ($p < 0.1$) (Table 01).

PPM 61 Food and Stomach Content Analysis of *Lates calcarifer* from the Poshur River, Khulna

S M Al Amin* and Momotaz Khanom

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: smalamin713713@gmail.com

Fishes are the most attractive, nutritional, and amazing form of aquatic life. Food is a significant factor in the ecology of fishes and required growth, reproduction, and extensive migration. Food and feeding habits of fish is a helpful of fishery biology and culture aspects. The feeding strategies and diet composition of Asian seabass *Lates calcarifer* was observed from Poshur River, Rampal region in August 2023. There was a preponderance of empty stomach recorded. The fullness of the stomach of that month is 84% and the emptiness is 16%. Crustaceans (30.00%) and small fishes (34.00%) and phytoplankton (20%) were the major components of the food item in the food spectrum of the fishes. IRI for fish 1967.833, for shrimp 2507.4594 and for phytoplankton 541.446. The percentage of IRI for shrimp is (49.981%), for fish is (39.22%) and for plankton is (10.792%). These findings could contribute valuable insights for aquaculture development and biodiversity conservation of *Lates calcarifer*.

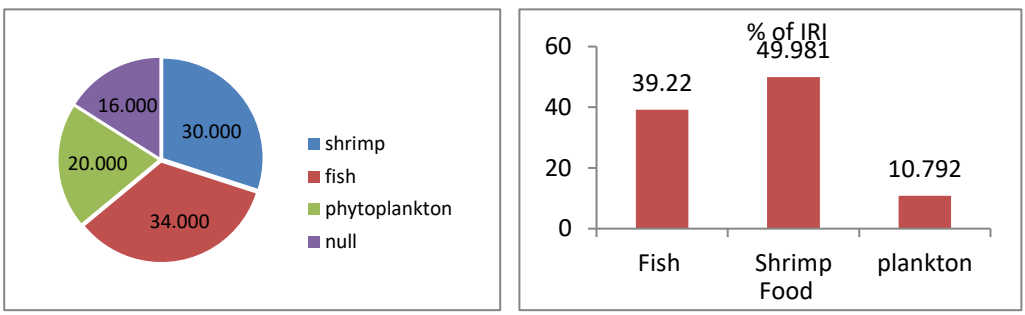


Figure: Food and Stomach Content Analysis of *Lates calcarifer* From the Poshur River, Khulna

PPM 62 Morphometric and Meristic Features of *Pomadasys argyreus* from South-west Regions of Bangladesh

Kaniz Fatima Chaiti* and Muhammad Abdur Rouf

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: kanizfatimachaiti4421@gmail.com

The silver grunt, *Pomadasys argyreus* (Valenciennes, 1833) is a very popular marine, brackish fish species under the family, *Haemulidae*. The study on morphometric and meristic characters in fishes is important for the differentiation of taxonomic units and can spot differences between fish population. This study aims to estimate the morphometric and meristic features of *P. argyreus* from the south- west regions of Bangladesh. A total of 50 individuals were collected from Kuakata area during January to June 2023 randomly. The analysis of data using z test determines whether it is true *P. argyreus* species or not. The results of morphometric and meristic features show similarities with their standard value. There are no significant differences between ($p > 0.05$) for all characters. So, it is a true *P. argyreus* species. The result of our study is supportive to analyze the actual morphometric and meristic features of *P. argyreus* in the marine and coastal water south-west of Bangladesh.

PPM 63 Dietary Influence of Tulshi (Holy Basil), *Ocimum tenuiflorum* on Growth and Immune Response of Penaeid Shrimp (*Penaeus monodon*)

Md Rejwanul Haque Galib*, Alokesh Kumar Ghosh and Wasim Sabbir

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh

*Email: mrhgalib@gmail.com

The purpose of this study was to ascertain how oral administration of *Ocimum tenuiflorum* extracts affected the immune modulatory activity and growth performance of the *Penaeus monodon* shrimp. *O. tenuiflorum* leaf methanol extract was sprayed at doses of 0.05 % (TLE 0.05), 0.1 % (TLE 0.1), and 0 % (control) onto a pellet meal. The shrimps were brought into the lab for the experiment after being fed at 5% of their body weight for four weeks. When compared to the control group, the shrimps given the extract exhibited notable gains in growth performance and feed utilization efficiency. Shrimp fed *O. tenuiflorum* extract showed improved immunological measures such as total hemocyte count, prophenoloxidase activity, superoxide dismutase activity, and decreased hemolymph clotting time when compared to shrimp fed the control diet. Consequently, *O. tenuiflorum* extracts may be employed as immunostimulants to boost shrimp development and resistance to shrimp viruses and diseases. It is possible to conclude that 0.1% (TLE 0.1) of *O. tenuiflorum* extract is the most efficient dose for enhancing growth performance and antioxidant activity.

Parameters	Control (Mean±SD)	TLE 0.05 (Mean±SD)	TLE 0.1 (Mean±SD)
Final Weight (g)	4.3±0.8^{a}	4.3±0.9^{a}	5.1±1.1^{b}
Relative Weight Gain (g)	2.2±0.17^{a}	2.2±0.30^{a}	3.0±0.30^{b}
SGR (%)	2.58±.14^{a}	2.56±0.25^{a}	3.18±0.21^{b}
FCR	3.2±0.52^{a}	2.8±0.38^{a}	2.3±0.59^{b}
PER	1.01±0.16^{a}	1.17±0.16^{a}	1.45±0.37^{b}
Survival (%)	85±7.1^{a}	100±0.00^{a}	90±14.1^{b}

Table: Summary of growth parameters for *P. monodon* after 28 days of feeding with TLE

PPM 64 Growth and Morphometric Changes of Monosex Tilapia (*Oreochromis niloticus*) Fry Given Diet Supplemented with *Chara braunii* Extract

Md. Arifuzzaman Uzzal*and Md. Golam Sarower

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: smuzzal555@gmail.com

Macroalgae (*Chara braunii*) is a great source of nutrients and bioactive compounds and works as health boosters in aquaculture. *Chara braunii* has the potential to be economically successful when added to fish feed to aid in their growth. The purpose of this study was to assess the potential benefits of feeding macroalgae (*Chara braunii*) extract to Nile tilapia (*Oreochromis niloticus*). A 28 day long study was carried out in rectangular glass tank (72.5 cm×37.5 cm) with one control, C and one treatment, T with three replications to determine the effect of feed mixed with *Chara braunii* extract on growth performance and morphometric variation of Monosex Nile tilapia (*Oreochromis* niloticus). Fifty fishes were stocked in each tank. They were given 35%, 30-35%, 25-30%, 20% feed at 1^{st}, 2^{nd}, 3^{rd} & 4^{th} week respectively according to their body weight. Higher Weight Gain Rate were found in treatment (794.21±148.28) than control (565.15 ± 221.31), Higher Specific Growth Rate (SGR) were found for fishes which were fed with *Chara braunii* extract (7.78 ± 0.59) than those fishes which were reared without algae extract (6.58 ± 1.18). Fish raised without algal extract had a higher feed conversion ratio (FCR) of (0.53 ± 0.21), whereas fish fed with *Chara braunii* extract had a lower FCR of (0.38 ± 0.06). Higher Total Length (TL), Fork Length (FL), Standard Length (SL), Head Length (HL), Eye Diameter (ED), Body Depth (BD) were found in treatment than control. Higher truss network readings were discovered in treatment than control at several distance. This research showed that fish that are given algae extract mixed feed has better growth and lower feed conversation ratio.

PPM 65 Evaluation of Proximate Composition and Bioactive Compounds of Three Selected Seaweeds (*Hypnea* sp.*, Sargassum pacificum* and *Eeisenia arborea*) Inhabitated in the Saint Martin's Island

Nur Fatema Roti[1]*, Sheikh Mustafizur Rahman[1], Md. Tanvir Ahmed[1], Md. Muhaiminul Islam[1], Md. Mubinul Islam[1], Md. Moshiur Rahman[1] and Md Nazmul Hasan Zilani[2]

[1]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
[2]Department of Pharmacy, Faculty of Biological Science and Technology, Jashore University of Science and Technology
*Email: nurfatema85@gmail.com

The significance of seaweeds as a source of unique bioactive compounds is expanding. The present study assesses the proximate composition and bioactive compounds of three seaweed species viz. *Hypnea* sp., *Sargassum pacificum* and *Eeisenia arborea* collected from western coast of the St. Martin's Island, Cox's Bazar. In general, the highest moisture content was observed in *E. arborea* (21.83%) and the lowest in *S. pacificum* (15.25%). The maximum ash content was found in the brown seaweed *S. pacificum* (41.33%), while the lowest was observed in red algae *Hypnea* sp. (13.45%). The red marine algae *Hypnea* sp. (1.59%) and *E. arborea* (0.57%) showed the highest and lowest lipid contents, respectively. The highest amount of protein was found in the red seaweed *Hypnea* sp. (11.75%) and the lowest in *S. pasificum* (8.75%). In GC-MS analysis, 23, 22 and 20 compounds were identified in *Hypnea* sp., *S. pacificum and E. arborea,* respectively. N-Hexadecanoic Acid (Fatty acid) is the most abundant compound of *Hypnea* sp. and *S. pacificum* and second most abundant of *E. arborea.* The highest containing compound is Peucelinendiol in the *E. arborea. Hypnea* sp. is the great source of n-Hexadecanoic Acid (31.36%), Methyl 11-Methyl-Dodecanoate, 13-Octadecenoic Acid, Methyl Ester, *E. arborea* of Peucelinendiol, n-Hexadecanoic Acid, Cis-Alpha-Copaene-8-Ol, and *S. pacificum* of n-Hexadecanoic Acid, Tetradecanoic Acid, 10,13-Dimethyl-, Methyl Ester. The study indicates that seaweeds might be used as a potential source of protein, fiber, FAs and bioactive compounds. Thus, the current study concludes that seaweeds are potentially beneficial foods in our diets and may be useful to the fish food as a source of high-nutritional-value and components.

PPM 66 Effects of Carbofuran Pesticide on Selected Biological Traits of Zebrafish (*Danio rerio*) Across Two Generation

Sanzida Sultana Lina* and Md. Lifat Rahi

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: sanzidalina2828@gmail.com

Pesticides from agricultural runoff contaminate water and harm aquatic biodiversity. Bangladesh faces a severe problem with pollution from agriculture, which has reduced the abundance and diversity of freshwater fish species, including zebrafish (Danio rerio). Zebrafish, a freshwater species widely used in research .The current study investigated two different doses (T1=0.5mg/l and T2=1mg/l) of carbofuran exposure that altered fish physiological response (growth, survival, and fecundity), cellular (slightly to moderate change in gill-ultrastructure) along with changes in expression of two selected gene insulin-like growth factor-1 (IGF-1) and ghrelin across two consecutive generation: parental generation (PG) and F1 generation (F1G). The exposure induced stress, reduced growth rates, and impacted gene expression in larval, juvenile, and adult stages, with higher exposure correlating with lower gene expression levels. Carbofuran exposure caused changes in the gills, with various concentrations of pesticides showing moderate to intense differences in the cellular ultrastructure including brittle gill lamellae, along with damaged gill filaments. Comparatively higher physiological, cellular and genetic alterations were observed for the F1G. Continuous exposure to carbofuran will continuously increase mortality rates, leading to a decline in population size and genetic variation, resulting in reduced growth, fecundity, and gene expression across generation. Thus, the experimental fish registered slower growth rate, lower fecundity, and lower levels of gene expression in F1G. The results of this investigation clearly suggest that the experimental zebra fish individuals are susceptible to varied degrees of stress at different carbofuran dosages not only for the specific generation but also the future generation. Considering this, it is suggested to minimize the use of pesticides to maintain healthy and normal conditions for fish species.

PPM 67 Nutritional Assessment and Bioactive Compound Profiling of Three Selected Seaweeds in the Saint Martin Island, Bangladesh

Muhaiminul Islam*, Sheikh Mustafizur Rahman, Md. Mubinul Islam, Nur Fatema Roti, Md. Tanvir Ahmed, Md. Moshiur Rahman and Tania Sultana Mohona

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: muhaiminulislam7912@gmail.com

Nowadays, seaweeds are widely involved in biotechnological applications. This study investigated the proximate composition and bioactive components of three selective seaweed species *Padina australis, Laurencia pinnatifida, Padina boryana* that were collected from The St. Martin Island, Bangladesh. Standard analytical method was used to determine the proximate composition (Figure 1). From this analysis, *P. boryana* contained the highest protein content (11.6%) than other species. *L. pinnatifida* is a richer source of ash and lipids because it has a much higher ash (69.4%) and lipid (3.09%) content despite having a comparable protein level (7.4%). *P. australis* has a lower fat content (1.21%) despite having considerable amounts of protein (7.5%) and ash (46.3%). Gas Chromatography-Mass Spectroscopic Analysis (GC-MS) was used to identify the bioactive compound and 19, 19 and 17 bioactive compounds were observed in *P. australis, L. pinnatifida, P. boryana* respectively. Several bioactive compounds including fatty acid, alkane hydrocarbon, alkene and diterpene, organic molecules, dehydroepiandrosterone, synthetic vitamin D, vitamin E, phenolics etc. were explored which manifest many of therapeutic effects like anti-cancer, antioxidant, anti-inflammatory and anti-diabetic activities. The amount of fatty acid is high than any other compound among this species. The study indicates that seaweed might be used as a potential source of nutrition and pharmaceutical element not only for humans but also aquatic species.

PPM 68 Salinity Induced Biological Alteration in Zebrafish (*Danio rerio*) across Two generations

Md Musfiqur Rahman Sarkar* and Md. Lifat Rahi

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: mdmusfiqurrahmansarkar@gmail.com

Climate change is a major concern across the world and freshwater species are extremely vulnerable to this issue due to salinity intrusion from sea level rise. As a primary freshwater species, Zebrafish (*Danio rerio*), an important model species, is extremely vulnerable to salinity intrusion. Therefore, the current study tested the effects of four different salinity levels (0‰, 2‰, 4‰ and 6‰) on the selected physiological, cellular and gene expression (changes in expression pattern of selected growth and ion regulatory genes) in Zebrafish across two generations. Experimental salinity levels significantly affected growth, fecundity and survival performance ($p < 0.05$); the highest levels of growth and survival performance were observed at the control (0‰) salinity. Experimental salinity treatments (stress) led to growth retardation, reduced fecundity and population loss/decline through higher mortality rate across two generations (PG and F1 generations). With increasing salinity, expression of IGF-1 NKA genes showed contrasting pattern across the two generations (elevated expression of NKA with increasing salinity while decreasing expression for IGF-I). No significant differences were observed between the two generations for gene expression (Figure). Physiological trait (growth, survival and fecundity) alterations due to salinity treatments are lower in F1 generation than parental generation. Internal structure of gill tissue was found to be damaged due to the exposure of salinity treatments across two generations. Findings clearly suggest that any level of salinity intrusion in freshwater can cause catastrophic consequences to Zebrafish (broadly aquatic biodiversity). Thus, appropriate conservation measures must be taken to better manage the wild populations to overcome any stressful conditions in the nature.

PPM 69 Heavy Metals Contamination and Human Health Risk Assessment of Mud Crab (*Scylla olivacea*) from the Southwestern Coastal Regions of Bangladesh

Kazi Marufa*, Mst Sharmin Nahar and Md Sherazul Islam

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: kazimarufa431@gmail.com

Crab, important sources of protein, are currently being adversely affected by the rising industrialization, which has led to higher levels of heavy metals. The goal of this study was to evaluate the health risks of contamination associated with eight heavy metals (Cd, Pb, Cu, Cr, Zn, Ni, As, and Fe) in mud crab (*Scylla olicacea*) and which were collected from the Khulna, Satkhira, Sharonkhola and Chandpai areas of Bangladesh. Inductively coupled plasma-optical emission spectrometry (ICP-OES) was used for heavy metal detection (Table). The results showed that among eight metals five were below the recommended level, Fe (9.53-22.769 mg/kg) and Ni (0.5877mg/kg), Cd (0.6-0.8 mg/kg) exceeded the allowable limit of WHO/FAO. To evaluate the non-carcinogenic health risks, the target hazard quotient (THQ) and hazard index (HI) were determined, and the target cancer risk (TR) was utilized to evaluate the carcinogenic health risks. This study showed that mud crab obtained THQ and HI ≥1. THQ and HI of crab samples were exceeded the USEPA (United States Environmental Protection Agency) which is health concerning issue and continuous consumption of studied fishes may cause health risk to the consumers. The TR value was found from 10^{-8} -10^{-5} Obtained that considered an acceptable range (USEPA. Integrated Risk Information System (IRIS).

PPM 70 The Effects of Phytochemicals on Biofilm and Its Application in Aquaculture

Sraboni Biswas*, Shirin Akter and Md. Sarafat Ali

Fisheries and Marine Bioscience Department, Bangabandhu Sheikh Mujibur Rahman Science and Technology University, Gopalganj-8100, Bangladesh
*Email: srabonibiswas048@gmail.com

Biofilms, or communities of microorganisms attached to surfaces, are a major problem in aquaculture. Biofilm is responsible for antibacterial resistance due to its potential to survive in adverse environments. They can cause diseases and reduce water quality, leading to significant economic losses. Phytochemicals, which are biologically active compounds found in plants, have been investigated for their potential to control biofilm formation and growth. The objective of this study is to investigate the effects of phytochemicals on biofilm formation and their application in aquaculture. A review of literature was conducted to explore the current state of knowledge on the topic about the experimental studies that were performed to evaluate the effects of phytochemicals on biofilm formation and growth. The results showed that certain phytochemicals, such as quercetin, curcumin, cinnamaldehyde, carvacrol, citral, eugenol, linalool, and thymol can inhibit biofilm formation and disrupt existing biofilms. These phytochemicals also demonstrated antibacterial activity against several pathogenic bacteria commonly found in aquaculture systems such as *Aeromonas hydrophila*, *Citrobacter freundii*, *Staphylococcus aureas*. In addition, the use of phytochemicals as an alternative to traditional chemical disinfectants and antibiotics was explored. The results suggest that phytochemicals can be effective in controlling biofilms in aquaculture systems and maybe a more environmentally friendly and sustainable approach compared to chemical disinfectants.

PPM 71 *Aeromonas* spp. Load in Carp Fishes Collected from Polyculture System with Tilapia and without Tilapia

Sumaiya Tabassam Joty Mony* and Abul Farah Md. Hasanuzzaman

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208,

Bangladesh

*Email: sumyatabassumku142@gmail.com

The present investigation was carried out for determination of *Aeromonas* spp. load in carp fishes collected from the polyculture system with tilapia and without tilapia. The fish samples rohu (*Labeorohita*) and mrigal (*Cirrhinuscirrhosus*) were collected from two fish farms, Kazi Fish Farm and Imperial Fish farm located near at Koiya Bazar in Dumuria upazila of Khulna district. Aero-pseudo selective media (HIMEDIA) was used for *Aeromonas* culture. *Aeromonas* load was found as 7.5±0.60 $x10^3$ and 1.35±0.45 $x10^3$ CFU/g in the rohu fish collected from polyculture system with tilapia and without tilapia respectively. The rohu fish samples from the polyculture with tilapia had the highest *Aeromonas* load. *Aeromonas* load was found as 6.90±1.08 $x10^3$ and 3.15±0.45 $x10^3$ CFU/g in the mrigal carp fish samples collected from polyculture system with tilapia and without tilapia respectively. Mrigal fish from the polyculture with tilapia had the highest *Aeromonas* load. There was significant difference ($P<0.05$) in *Aeromonas* load of both rohu and mrigal fish for the two-poly culture system with tilapia and without tilapia. But there was no significant difference ($P>0.05$) in *Aeromonas* load between the two fish species. The gill of both fishes from the polyculture system had the highest load but There is no significant main effect ($P>0.05$) of organ on the load of *Aeromonas* spp. The information obtained from this study could be useful for understanding as well as controlling *Aeromonas* infection in rohu, mrigal and tilapia farming system.

PPM 72 Availability of Live Feed in Jashore Sadar

Umme Habiba* and A. B. M. Mohsin

Fisheries Department, University of Rajshahi, Rajshahi-6205, Bangladesh
*Email: tishahabiba5@gmail.com

For sustainable aquaculture, production of quality seeds of finfish and shellfish is imperative, and it is possible only by using suitable live feed for rearing their larvae. There are many potential species belonging to Chironomid, Cladocerans and Copepods which could be an ideal live feed in hatcheries and aquarium shop. The available live feed using for fish larvae culture are *Tubifex*, *Artemia*, *Daphnia*, *Moina*, Black soldier Fly, Water fleas and Mosquito Larvae. By analyzing different hatcheries (52.94%) and aquarium shop (33.33%), Tubifex are mostly cultured and after that also have *Artemia*, *Daphnia* and Micro worm. Finfish larvae, mostly carnivores and also herbivores and omnivores fish take live feed as their preliminary stage. This study presents in details of aquarium shop, hatchery (available live feed, culturable Fish) also the satisfaction level of customer.

Table: Percentage of live feed in study area

Study Place	Total	Live Feed Used	Not Used	Percentage
Hatchery	21	17	4	83.33%
shop	9	8	1	16.66%

PPM 73 Assessment of Biochemical Composition and Identification of Bioactive Compounds of Three Seaweeds Collected from the Saint Martin Island, Bangladesh

Md. Mubinul Islam*, Sheikh Mustafizur Rahman, Md. Muhaiminul Islam, Nur Fatema Roti, Md. Tanvir Ahmed, Md. Moshiur Rahman and Tania Sultana Mohona

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: mubin203030@gmail.com

Macroalgae are a promising source of a vast variety of nutrients and bioactive compounds with potential interest in aquaculture and pharmaceutical industries. This study investigated the biochemical compositions and bioactive compounds of three seaweed *species Ulva intestinali, Hypnea musciformis, Colpomenia sinuosa* that were collected from The Saint Martin Island, Bangladesh. Standard analytical method was used to determine the proximate composition, while Gas Chromatography-Mass Spectroscopic Analysis (GC-MS) was used to identify the bioactive compounds. *C. sinuosa* contained the highest protein content (9.85%) than *U. intestinali* (6.34%) and *H. musciformis* (7.93%). The ash content was high in *C. sinuosa* (45.17%) but as values were comparable between *U. intestinali* (34.7%) and *C. sinuosa* (33.41%). The highest lipid was observed in *H. musciformis* (6.49%) followed by *U. intestinali* (1.87%) and *C. sinuosa* (3.74%). Motsture content ranging from 11.73 to 24.84%, high in *H. musciformis* (24.84%) and low in *C. sinuosa* (11.73). Twenty-two bioactive compounds were identified in *U. intestinali* and eighteen were identified in both *H. musciformis* and *C. sinuosa*. The compounds including fatty acid, alkane, organic compound, methyl hydrocarbon, organophosphate, furan, alcohol, diterpene, ether were explored from the studied species. Overall, the amount of fatty acid (N-hexadecanoic acid) is high than any other compound among these species. The study suggests that several nutrients and bioactive compounds obtained from seaweeds could be potentially utilized as a dietary supplement and medicinal ingredient for aquatic species as well as human.

PPM 74 Microalgae: A Source of Potential Bioactive Compounds and Their Impacts on Human health

Nimatul Jannat*, Abul Farah Md. Hasaanuzzaman and Shikder Saiful Islam

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: jannatnijhum2389@gmail.com

Microalgae, a diverse group of multicellular or unicellular photosynthetic microorganisms, have emerged as a promising source of bioactive compounds with significant potential for enhancing human health. This review synthesizes current knowledge on the nutritional and therapeutic properties of various microalgal species, associated molecular mechanisms behind these functions and genomic strategies to improve these mechanisms. Microalgae are rich in proteins, essential amino acids, vitamins and bioactive metabolites such as carotenoids, polysaccharides and fatty acids, which exhibit anti-oxidative, anti-inflammatory, anticancer and cardio protective effects. Some of the dinoflagellates, diatoms and cyanobacteria produce toxins that are responsible for human health hazards. Advances in genetic engineering, particularly CRISPR-Cas9 technology, have enabled the optimization of microalgal strains for enhanced production of valuable bioactive compounds. Furthermore, the cultivation of microalgae presents a sustainable alternative to traditional agricultural practices, as they can thrive in non-arable lands and utilize waste resources. This review highlights the functional genomics of microalgae, their health benefits as well as their potentials for commercial applications in food, pharmaceuticals and nutraceuticals, paving the way for future research and development in this field.

PPM 75 Probiotics and Postbiotics are Emerging Therapeutic Tools Used against Pathogenic Biofilms-A Critical Review

Samsun Naher* , Shirin Akter and Md. Sarafat Ali

Bangabandhu Sheikh Mujibur Rahman Science & Technology University, Gopalganj-9100, Bangladesh
*Email: samsunnahertorna@gmail.com

A biofilm is a collection of microbial cells that have become permanently attached to a surface and are contained in a polysaccharide-based matrix. It can develop on a wide range of surfaces, including biological tissues, medical equipment, pipelines in industrial or drinkable water systems, and aquatic environments in nature. One may see a well-diversified creature in the biofilm assemblage, including bacteria, arthropods, algae, and protozoa. The hydrodynamics of the system, the availability of nutrients, the organism's ability to graze and receive light, as well as the composition of the substrate, all affect how the biofilm is structured. Chronic infections, infections caused by malfunctioning medical equipment, and infections caused by biofilms have all been significant clinical issues. Biofilms pose a global danger to animal health since they are difficult to eliminate and control due to their incomplete availability. There have been avenues to tackle biofilms largely based on the disruption of their adhesion and maturation. Nowadays, the use of probiotics and postbiotics with their derivatives has gained a growing interest in battling against pathogenic biofilms. In the present review, we have a close look at probiotics and postbiotics with the ultimate objective of inhibiting biofilm formation and maturation. In conclusion, understanding the mechanisms through which probiotics, postbiotics, and their derivatives can be utilized in managing biofilm infections would be valuable.

PPM 76 Effects of Extractive Species on Production of Fed Species in Integrated Multi-Trophic Aquaculture (IMTA) System

Mrinmoy Fouzder* and Shaikh Tareq Arafat

Fisheries and Marine Resouce Technology Discipline, Khulna University, Khulna-9208, Bangladesh.
*Email: mrinmoyfouzderpstu@gmail.com

Integrated multi-trophic aquaculture (IMTA) is the modern technology in which cultivation of fed aquaculture species (e. g. finfish/shrimp) with organic extractive aquaculture species (e. g. shellfish) and inorganic extractive aquaculture species (e. g. seaweed) to create balanced systems for environmental sustainability, economic stability and social acceptability. An experimental study was carried out in IMTA models with three different species combinations (T_1, T_2 and T_3) was compared with conventional polyculture (C) in low-saline ponds (15 dec) in triplicate. In a 120-day field trial, ponds under T_1, T_2 and T_3 were stocked with *Peneaus monodon* at 30000 no. ha^{-1} and *Oreochromis niloticus, Liza parsia, Rinomugil cosula* and *Mystus gulio* at 10,000 no. ha^{-1} and C stocked with *Peneaus monodon*, *Oreochromis niloticus and Liza parsia* with same stocking density as fed species. In addition, T_2 and T_4 contained mussel at 2000 no. ha^{-1}, and T_3 and T_4 contained aquatic plants. Najas sp. at 500 no. ha^{-1} as extractive species. Growth of tiger shrimp was significantly higher in T_4. Survival of fishes and shrimp was similar among treatments and total production of shrimp was significantly higher in T_4 (936.95$\pm$ 2.70 Kg ha^{-1}), followed by that in T_1 (548.89 $\pm$10.40Kg ha^{-1}), T_2 (697.08$\pm$ 7.505553 Kg ha^{-1}), T_3 (779.42$\pm$ 7.505553 Kg ha^{-1}) and C (491.26$\pm$9.224063 Kg ha^{-1}). Net return from all species including mussels and aquatic weeds in T_4 is higher (205,850 TK) and lower in C (89,700 TK) and cost-benefit ratio, is also higher in T_4 than other treatments. Therefore, this IMTA model (T_4) proved to be more productive, and economically viable with environmentally sustainable.

PPU 01 Impact of Extraction Solvent on the Yield and Toxicity of Selected Spices using Brine Shrimp and Zebra Fish

Arfin Naher Eva*, Nabonita Roy, Rajdwip Sarkar and Alokesh Kumar Ghosh

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: evaarfin5221@gmail.com

Spices are aromatic and pungent food ingredients, have significant antioxidative effects and are commonly used natural antimicrobial agents in foods, imparting flavor and pungent stimuli. In aquaculture they serve as immunostimulant and natural remedies, promoting fish health and disease resistance. However, some spices can exhibit toxicity and can cause health risk as pharmaceutical agents in aquaculture industry. The purpose of this study was to assess the extraction yield of some selected spices including Mace (*Myristica fragnans*), Cloves (*Syzygium aromaticum*), Turmeric (*Curcuma longa*), Almond (*Prunus dulcis*), Coriander (*Coriandrum sativum*), Cinnamon (*Cinamomum verum*), Cardamom (*Elettaria cardamomum*), Ajwan (*Trachyspermum amni*) as well as their toxicity using the brine shrimp lethality test (BSLA, LC_{50}) and Zebra fish assay in relation to four different solvents Hexane (H), Ethyl acetae (EA), Ethanol (E) and Methanol (M). The maximum extraction yield (38.2%) was obtained from Ethyl acetate extract of *P. dulcis* and lowest extraction yield (2.8%) was obtained from *C. verum.* This experiment assessed the acute toxicity of spice extracts at concentrations up to 1000 µg/ml using two-fold serial dilution. According to Probit Regression Analysis (p <0.05), BSLA result revealed that *T. amni* was non-toxic in Hexane with LC_{50} >1000 µg/ml and highly toxic for rest of three solvents (EA, E, M); *P. dulcis* showed low toxicity with LC_{50} 1000 µg/ml. *S. aromaticum* and *C. longa* was highly toxic in all solvents and three different solvent, respectively. Zebra fish assay revealed that *P. dulcis* was non-toxic in ethyl acetate and methanol with LC_{50} >1000 and 1000 µg/ml and rest of the seven spices showed high and moderate toxicity. The study suggest that certain spices may be toxic when apply at high concentration, requiring further research using different animal model.

PPU 02 Phenotypic Diversity Among the Commonly Occurring Loaches (Genus: *Lepidocephalichthys*) of Bangladesh

Razia Sultana Rima* and Md. Lifat Rahi

Fisheries and Marine Resource Technology Discipline, Khulna University, Bangladesh
*Email: rimarazia0@gmail.com

Loach under the genus *Lepidocephalichthys* plays a vital role in ecosystem functioning, also known as indicator species. The genus *Lepidocephalichthus* constitutes four different species (*L. annandeli*, *L. berdmorei*, *L. guntea* and *L. irrorata*) that are phenotypically very similar. It is difficult to phenotypically distinguish the four species instantly, requires very close observation. This study aimed to document the phenotypic (morphological) variations/diversity among the four species collected from seven locations of Bangladesh (1. Punorvoba river, Dinajpur, 2. Chalan beel, Natore, 3. Dakatia beel, Khulna, 4. Surma river, Sylhet, 5. Arial beel, Munshiganj, 6. Kaptai lake, Rangamati and 7. Shangu river, Bandarban) covering all major river systems. Significant ($P < 0.05$) and distinguishing differences were observed for the morphometric and meristic traits among the four species. Hepatosomatic index (HSI) and viscero-somatic index (VSI) values showed significant differences ($P < 0.05$) among the four species. Significantly higher HSI ($P < 0.05$) was observed for the Kaptai lake and Shangu river populations compared to the other five populations (while no significant differences between these five populations). No significant differences were observed for the VSI values among the seven populations. No significant differences were observed between different types of morphometric and meristic traits among the sampling sites, but significant differences were observed among the four species. Abundance estimation (species composition/ratio) revealed that 50 – 55% fish individuals were *L. annandeli*, 30 – 35% *L. guntea*, 10 – 12% *L. berdmorei* and 3 – 5% *L. irrorata*. Remarkable (distinguishable) differences were observed for the mouth shape among the four species. Significant differences were observed for the mouth size and genital pore size among the four *Lepidocephalichthys* species. No significant differences were observed for these parameters among populations within each species. Overall results of this study revealed that only few phenotypic traits were found to vary significantly among the four *Lepidocephalichthus* species while majority of the traits were not significantly different among these species. Therefore, it can be concluded that the four *Lepidocephalichthys* species have been diverged recently and did not undergo extensive phenotypic diversity.

PPU 03 Effects of Microplastic on Growth and Behavior of Asian Walking Catfish (*Clarius batrachus*)

S Asadullhahil Galib Tanha*, Ezaz Ahmed Shawon, Rajdwip Sarkar, Sheikh Mustafizur Rahman, Shikder Saiful Islam and Md. Moshiur Rahman

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: galibtanha@gmail.com

Microplastic pollution has become a critical environmental concern, posing threats to aquatic ecosystems and organisms. This study evaluates the effects of microplastic exposure (1 mg/L) on the growth and behavior of the Asian walking catfish (*Clarias batrachus*), a species of ecological and economic significance. Juveniles were exposed to microplastics for 30 days and evaluated the growth parameters including (survival rate, mean weight gain and SGR) and behavioral metrics including (swimming and feeding). Fish exposed to microplastics (T2) demonstrated statistically significant differences between weight gain compared to controls (P<0.05) and a lower SGR versus controls (Fig-1). Behavioral observations revealed reduced swimming velocity and slow feeding patterns in microplastic exposed fish though they are not statistically significant (P<0.05) suggesting potential sub lethal stress effects (Fig-2). Despite the absence of significant statistical differences in behavioral metrics and a 100% survival rate across all treatments, these results highlight sub-lethal but significant physiological impacts of microplastic exposure, emphasizing the need for long term studies and more robust experimental design to elucidate these effects. The findings emphasize the ecological and economic implications of microplastic pollution in freshwater aquaculture, calling for immediate mitigation strategies to preserve aquatic biodiversity and sustainability.

PPU 04 Effects of Solvent Polarity on Extraction Yield and Toxicity of Certain Spice Extracts

Rajdwip Sarkar*, Nabonita Roy, Most. Arfin Nahar Eva and Alokesh Kumar Ghosh

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: rajdwipsarkar200611@gmail.com

Spices, which have been utilized for culinary purposes and in traditional herbal medical practice for humans, can also be employed as immunostimulants and therapeutic agents in aquaculture. However, the toxicity of these spices poses a danger to their use as a pharmaceutical agent in the aquaculture industry. This study's goal was to evaluate the toxicity and extraction yield of a few chosen spices using the zebrafish larvae acute toxicity test (Zebrafish assay) and the brine shrimp lethality assay (BSLA, LC_{50}) in relation to four distinct solvents: methanol, ethanol, ethyl acetate, and hexene. Eight spices, including Poppy Seed (*Papaver somniferum*), Nutmeg (*Myristica fragrans*), Bell Pepper (*Capsicum annuum*), Black Caraway (*Nigella sativa*), Green Chili (*Capsicum annuum*), Piper Chili (*Piper chaba*), Garlic (*Allium sativum*), and Cashew Nut (*Anacardium accidentale*), were selected for the experiment. The maximum extraction yield (49.28%) was obtained from the ethyl acetate extract of A. accidentale and the lowest (2.65%) from the hexene extract of P. chaba. This experiment assessed the acute toxicity of spice extracts at concentrations up to 1000 (µg/ml) using two-fold serial dilution. According to Probit Regression Analysis ($p < 0.05$), BSLT elicited that *P. somniferum* was non-toxic for three solvents, while N. sativa, A. sativum, and *A. accidentale* were non-toxic for a single solvent with $LC_{50} > 1000$ (µg/ml). *P. chaba* is highly toxic, and *C. annuum* (bell pepper) showed moderate toxic effects for all the solvents. Hexane extracts are less toxic; methanol and ethanol extracts are more toxic, and ethyl acetate extracts exhibit moderate toxicity in most of the spices. Zebrafish are much more sensitive than artemia, as the assay inferred that the LC_{50} value is much lower in the zebrafish acute toxicity assay than the BSLT. The zebrafish experiment showed a significant difference ($p < 0.05$) in the toxicity of the chosen spices against the solvent. This study added to the data for the probable toxicity of various spices.

PPU 05 Effect of Poisons used in the Sundarbans on the Survivability and Behaviours of *Mystus gulio*

Shila Khanam*, Sk Arif Ahmmed Rubel, Babu Kumar Roy, Shikder Saiful Islam and Muhammad Abdur Rouf

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: sanzanashila512@gmail.com

The Sundarbans, the world's largest mangrove forest, faces severe threats from anthropogenic activities, particularly the use of chemical poisons that significantly impact on its aquatic organisms. This study investigates the toxicological effects and behavioural deviations on different doses (0.10, 0.25, 0.50, 0.75, 1.00, 1.25, 1.75, 2.00, 2.50, 2.75, 3.00 ml/L) with three replicates of the most detrimental poison (Ripcord) on *Mystus gulio*, a widely abundant estuarine fish species. Using Probit analysis, the LC_{50} value was estimated to be 0.073 ml/L revealed significant p-values (<0.05). Beyond mortality, sub-lethal behavioural changes were observed across various concentrations with time. Most fluctuations were observed within 30 minutes. Swimming patterns were disrupted, showing reduced activity, cessation of movement, and erratic behaviour (55%). Gulping frequency diminished progressively (40%), indicating respiratory distress. Feeding activity was significantly affected, with reduced feed intake and cessation (100%) gradually. Aggregation behaviour was altered, with reduced group formations observed (60%), highlighting disruptions in natural survival mechanisms. The study demonstrates that even sub-lethal doses induce profound behavioural changes, signaling potential ecological instability in the Sundarbans. These findings underscore the urgency for strict enforcement of regulatory interventions in banning chemical exposure and mitigate its impact on aquatic species. This research lays the groundwork for developing targeted conservation strategies to protect the biodiversity of the Sundarbans.

PPU 06 Total Bacterial Load and Vibrio spp. Load of Marine Tuna Fish "*Auxis Thazard*" Collected from K.C.C Shondha Bazar, Khulna

Nasrin Nahar Ranu* and Md. Rashedul Islam

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: nasrinranu007@gmail.com

The study was conducted to determine total bacterial load and *Vibrio spp*. load in Tuna fish (*Auxis thazard*) collected from the local market in Khulna district. The importance of the study lies in assessing the microbial safety and public health associated with the fish, focusing on the total bacterial load and *Vibrio* spp., which are potential pathogens impacting food safety and seafood quality. The Tuna samples were collected from K.C.C Shondha Bazar, Khulna. The samples of muscles and gut were used for analysis. Two different size greater than 1000g and smaller than1000g weight of fish were used for the analysis. Selective agar media (TCBS) was used for isolation and enumeration of total bacteria. The total bacterial count (TBC) of the Tuna fish (weight >1000g) was found in gut 1.895×10^6 ±.20 cfu/g and in muscle 9.7×10^5±.12 cfu/g. The total *Vibrio spp*. count (TVC) in the gut was found 7.6×10^5±.24 cfu/g and in the muscle 3.5×10^5±.25 cfu/g. The total Bacterial count (TBC) of Tuna fish (weight<1000g) in the gut was found 1.24×10^5±.20 cfu/g and in the muscle 8.2×10^5±.12 cfu/g. and the total *Vibrio spp*. bacterial count (TVC) in the gut was found 7.3×10^5±.24 cfu/g and in the muscle 3.1×10^5±.25 cfu/g. The highest load of total bacteria and *Vibrio spp*. was found in the gut of the Tuna fish, while the same were found lower in the muscles of the Tuna fish. To reduce the risk of bacteria containing contamination posing health risks, the study emphasizes the significance of enforcing stringent hygiene and quality control procedures throughout fish handling and marketing. These findings also highlight the need for additional research into the causes and mitigation techniques of bacterial contamination in commercially significant marine fish species, and they offer baseline data for microbial risk assessment.

PPU 07 Phylogenetic Diversity among the Four *Lepidocephalicthys* Loaches of Bangladesh

Tanvir Shahriar Shohag* and Md. Lifat Rahi

Fisheries and Marine Resource Technology Discipline, Khulna University, Bangladesh
*Email: tanvirshohag128@gmail.com

Loach is a group of fish, usually smaller in size, playing important functional role for ecosystem purification by feeding on bottom debris, parasites, insects and bacteria. Bangladesh constitutes 14 different species of loach, of which, only four species in the genus *Lepidocephalicthys* (*L. annandeli*, *L. berdmorei*, *L. guntea* and *L. irrorata*) are common and widespread throughout Bangladesh. The four *Lepidocephalicthys* loaches are very similar in size, shape and appearance, making them very difficult to distinguish phenotypically. Therefore, this study was conducted to document the genetic diversity among the four species using a highly conserved mitochondrial 16S rRNA gene as the molecular marker. In total, 60 fish samples were used for this study (15 individuals for each species). Amplification of 460 base pair (bp) sequences of 16S gene revealed a total of 36 variable sites among the four species. In total, 71 haplotypes were identified with only 19 unique haplotypes indicating relatively lower level of genetic divergence among the four species. Following alignment of equal sequence lengths for all 60 individuals, molecular phylogenies were constructed using two different methods including: maximum likelihood (ML) and Bayesian inference (BI) methods. Comparison of the two phylogenetic trees resulted in 94.6% similarity index indicating precise phylogenetic construction for deciphering evolutionary relationships among the four species from a common ancestor. Minor variations in branch lengths for the four *Lepidocephalicthys* species in the phylogenies indicate lower levels of genetic diversity in both phylogenies: the four species formed a reciprocally monophyletic grouping pattern in both methods. Divergence time estimation suggests that the four *Lepidocephalicthys* species radiated/diversified from a common ancestor recently (≈ 10,000 – 15,000 years ago). This shallow divergence time explains the lower levels of genetic variation among the four species. The lower genetic diversity among the four species explains the close phenotypic similarity.

PPU 08 A Study on Plastic Waste Disposal Perceptions and Practices of Household in Khulna City, Khulna

Diganta Saha*, Md. Tanvir Hossain, Md Abir Hassan Sajib and Shaikh Tareq Arafat

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh.
*Email: digantasaha.0100@gmail.com

This study examines household plastic consumption and disposal habits in Khulna City, Bangladesh. A survey of 100 households across 5 residential areas utilized a stratified random sampling method. Data was collected through questionnaire-based interviews and analyzed using SPSS. The research aimed to understand the current state of plastic waste management within the city. The Chi-Square Test revealed significant relationships between education level and plastic usage, knowledge, and attitudes (p-values: 0.517, 0.562, 0.954, respectively). However, correlation analysis showed a very weak positive correlation between monthly income and these factors (r-values: 0.007, 0.062, 0.090), indicating a negligible impact of income on plastic-related behaviors. The survey found a high tendency (54.53%) to use food wrapping and packing plastics, while single-use plastic usage was low (8.16%). A significant proportion (49%) of respondents lacked knowledge about proper plastic disposal. Only 24% used reusable plastic bags. The Rupsa River, flowing alongside the city, serves as the final destination for most plastic waste generated in the studied residential areas. This plastic pollution poses a significant threat to aquatic life. To effectively address plastic pollution, a comprehensive approach is necessary, encompassing public awareness campaigns, increased accessibility to sustainable alternatives like reusable bags and containers, and the promotion of alternative materials such as paper and glass.

PPU 09 Evaluation of Occupational Health Hazards and Safety of the Fishermen in the Bay of Bengal Inhabiting in Mongla

Srabony Kha* and Mst. Muslima Khatun

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: srabonykha@gmail.com

Sea fishing is one of the most dangerous and physically demanding occupations worldwide. This study evaluates the occupational health hazards and safety of fishermen living in Mongla, Bangladesh. The primary objectives are to assess the health issues (physical and mental) of fishermen and examine the opportunity of healthcare facilities. A cross-sectional study was conducted using a questionnaire to collect demographic and self-reported occupational and health data from both fishing and non-fishing groups. The findings indicated that the majority of fishermen (54%) are aged between 30 and 50 years, with only 2% under 18. Regarding education, 52% of fishermen completed primary education, while 34% were uneducated. Most fishermen (86%) engaged in year-round fishing activities except ban period. The study found no significant difference in the prevalence of mental problems (depression, anxiety, stress) between fishermen and non-fishermen (p >0.05). However, a significant difference was observed in the prevalence of physical problems including fever (68%), vomiting, diarrhea (48%), dysentery (70%), and eye problems between the two groups (p<0.05). Additionally, 32% and 36% of fishermen reported carpal tunnel syndrome and low back pain due to repetitive work. 60% faced sleeping difficulties during sea fishing trips. Fishermen faced environmental challenges such as hot weather (49%) and foggy conditions (53%). In terms of safety, 58% of fishermen received government support, while 47%, 39%, and 65% used life jackets, first aid kits and communication devices respectively. This study emphasized on the urgent need for improved healthcare access, enhanced safety measures, and training on occupational safety of fishermen in the region.

PPU 10 Breeding Performance of Wild *Macrobrachium rosenbergii*: Insights into Hatchery Management Practices

Md Salaudddin Hossen Sabbir*, Maliha Tabassum Shoroni and Md. Golam Sarower

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
Email: salauddin21k@gmail.com

The study investigates the breeding performance of wild *Macrobrachium rosenbergii* and implications for hatchery management practices at "Aqua Farm Shrimp Limited", Bagerhat, Bangladesh. *M. rosenbergii* production is considered a key stakeholder in the aquaculture economy and is affected by problems in broodstock quality, genetic diversity, and larval survival rates. In this research, the effectiveness of current practices for broodstock collection, acclimatization, spawning induction and larval rearing are explored. Wild populations and local farms were the sources of broodstock, and selection was chosen based on size, health and morphological traits. Acclimatization protocols maintained optimal water parameters (temperature:30ºC), In biofloc tanks (salinity: 0.5-3 ppt, dissolved oxygen: 3-4 mg/L), with 2 to 3 individuals per m^2 stocking density. Optimization of the breeding environment, with a hatching success rate of 75%. All larvae were reared to the support of growth through stages with impeccable control of water quality and developmentally appropriate feeding of Artemia nauplii and egg custard, in meticulously managed tanks. But survival from larvae to post larval (PL) stage was still 35–40%, suggesting some improvement in the early-stage care could be made. The results point to tight water quality management, disease prevention protocols and balanced nutrition improving breeding outcomes. Some challenges include early-stage larval mortality (15–20% through 1^{st} 7 to 8 days), and these need to be overcome through advances in feeding strategies, including enriched diets or probiotics. Furthermore, the use of biosecure systems and more advanced monitoring technologies may increase hatchery productivity. From a perspective of sustainable and efficient *M. rosenbergii* hatchery practices, this research offers effective avenues to mitigate genetic diversity, disease resilience and improve larval survivability. The results provide the basis for design improvements in Bangladesh hatchery operations, which in turn will advance global aquaculture sustainability and food security.

PPU 11 Population Structure, form Factor, and Condition of the Dwarf Gourami *Trichogaster Lalius* (Hamilton, 1822) from A Wetland Ecosystem (Beel Dakatia) of Southwest Bangladesh

Md Mahbub Miah*, Md Hasibur Rahman, Kazi Tasnim Nahar Tazin and Wasim Sabbir

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: 200633@ku.ac.bd

Dwarf Gourami *Trichogaster lalius* is an important freshwater species under the family Osphronemidae. Our study focused on discovering the growth pattern, length-length relationship, form factor and Fulton's condition factor of *T. lalius* harvested from a wetland ecosystem (Beel Dakatia) SW Bangladesh. A total of 100 specimens were collected from the commercial fishermen during 2022. Individual total length and body weight were measured by measuring board and digital balance with 0.01 cm and 0.01 g accuracy. Total length ranged from 5.7 to 10.6 cm and body weight varied from 3.24 to 22.28 g. The overall allometric co-efficient (*b*) value indicated positive allometric growth pattern ($b > 3.00$). The length-length relationship was found highly correlated with $r^2 = 0.948$. The calculated form factor ($a_{3.0}$) was 0.0240 indicated fusiform body shape. The mean Fulton's condition factor was recorded well above 1 specifies that the health condition is satisfactory. The results of our study will be supportive to implement proper management strategy in the Beel Dakatia and connected ecosystem of southwest Bangladesh.

PPU 12 Population Structure & Condition of Climbing Perch *Anabas testudineus* (Bloch, 1792) from a Wetland Ecosystem (Beel Dakatia), Southwestern Bangladesh

Md Hasibur Rahman*, Md Mahbub Miah, Kazi Tasnim Nahar Tazin and Wasim Sabbir

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: pias.hasib@gmail.com

The Climbing Perch *Anabas testudineus* is an important freshwater species under the family Anabantidae. Our study focused on discovering the growth pattern, length-length relationship, form factor, and Fulton's condition factor of *A. testudineus* harvested from a wetland ecosystem (Beel Dakatia), SW Bangladesh. A total of 300 specimens were collected from commercial fishermen on a seasonal basis (pre-monsoon, monsoon, and post-monsoon) during 2024. Individual total length and body weight were measured by measuring board and digital balance with 0.01 cm and 0.01 g accuracy. Total length ranged from 6.5 to 14.5 cm and body weight varied from 5.09 to 50.62 g. The overall allometric co-efficient (*b*) value indicated negative allometric growth pattern ($b < 3.00$). The length-length relationships were found highly correlated. The calculated form factor ($a_{3.0}$) was 0.0179 indicating short and deep body shape. The mean Fulton's condition factor was recorded well above 1 specifying that the health condition is up to satisfaction. Our study's results will support the implementation of a proper management strategy in Beel Dakatia and the connected ecosystem of SW Bangladesh.

PPU 13 Evaluating the Effects of Different Extraction Solvents on Yield and Toxicity of Certain Spice Extracts

Nabonita Roy*, Most. Arfin Naher Eva, Rajdwip Sarker and Alokesh Kumar Ghosh

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: nabonitaroy08@gmail.com

Spices have claimed health benefits, and they are rich in polyphenolic compounds with antioxidant properties, providing numerous bioactive compounds, can also be used as immunostimulants and therapeutic agents in aquaculture. The aim of this study was to assess the extraction yield of some selected spices named Onion (*Allium cepa*), Ginger (*Zingiber officinale*), Bay leaf (*Laurus nobilis*), Fenugreek seed (*Trigonella foenum-graecum*), Fennel seed (*Foeniculum vulgare*), Mustard seed (*Brassica juncea*), Black pepper (*piper nigrum*), & Cumin (*Cuminum Cuminum*) as well as their toxicity using the brine shrimp lethality test (BSLA, LC_{50}) and Zebra Fish Assay in relation to four different solvents Hexane (H), Ethyl acetate (EA), Ethanol (E), Methanol (M). The highest extraction yield (38.7%) was obtained from the Ethyl acetate extract of *B. juncea* and the lowest (2.38%) from the Ethanol extract of *C. Cuminum*. This experiment used two-fold serial dilution to evaluate the acute toxicity of spice extracts at doses up to 1000 µg/ml. In BSLA, according to Probit Regression Analysis (p <0.05), *B. juncea* for two solvents (EA & M), *L. nobilis* for Hexane and *T. foenum-graecum* for Ethanol were non-toxic with LC_{50} > 1000 µg/ml. *P. nigrum* & *Z. officinale* showed higher toxicity for three solvents (EA, E & M) and moderate toxicity for Hexane. In, Zebra Fish Assay, *L. nobilis, A. cepa* & *T. foenum-graecum* were non-toxic for three solvents (EA, M & E), respectively. *Z. officinale* & *P. nigrum* showed higher toxicity for all solvents. The study suggests that certain indigenous spices may be toxic when applied in high concentrations, requiring further research using different animal model.

PPU 14 Abundance and Diversity of Phytoplankton in Ecologically Approached Prawn Culture System

Ayashirza Biswas* and Khandaker Anisul Huq

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: biswasayashirza@gmail.com

Knowledge about phytoplankton communities is important for sustainable aquaculture due to their influence on environmental variables. This study was conducted to understand the abundance and diversity of phytoplankton in ecologically approach (treated) prawn culture system, integrating aquatic vegetable like water spinach (*Ipomoea aquatica*) and mollusks (*Pila globosa*) and conventional practice (control). In both culture systems juvenile prawn (40000/ha) was stocked. In ecological approach prawn culture system floating vegetable water spinach was planted 1m interval around the upper water surface of pond dike as inorganic pollutants extractor and snail was stocked at (5000/ha) as organic pollutant extractor. Two types of studies were done in the laboratory using the collected samples: qualitative and quantitative. The quantitative enumeration of phytoplankton was carried out with the help of Sedgewick- Rafter cell (SR cell) and identification of various groups of phytoplankton were done by using a variety of bibliographic references. In total, twenty-five phytoplankton genera were identified under six classes where Bacillariophyceae class consisted of seven genera, Chlorophyceae and Cyanophyceae classes seven genera, Euglenophyceae class two genera, Cryptophyceae class one genus and Xanthophyceae class one genus. During the study period it was found that the abundance and diversity of phytoplankton in conventional practiced pond was increasing gradually but was higher in ecological approach pond than in conventional practice pond. In the control pond total number of phytoplankton was 5799 Individual/L and in the treated pond, total number of phytoplankton was 7750 Individual/L. From May to July, populations were consistently high. However, Shannon – Wiener Diversity Index indicated that the diversity of treated pond is comparatively better than that of control pond. Bacillariophyceae and Cyanophyceae were the most dominant in the Phytoplankton groups and Xanthophyceae were the least dominant. The production of prawns was directly supported by the favorable ecological conditions created by all of these elements, which allowed phytoplankton to thrive and provide a natural food source. The findings suggest that ecological approach in culture system balances environmental condition in the treatment ponds and changes the nature of primary productivity and water quality parameters significantly and ecological approach could be more productive towards increasing nutrition and income of the poor fish farmers.

PPU 15 Prevalence of Ciliates in Rearing Tanks of Mud Crab Hatchery

Tasneem Tahmeed Rupontee* and Abul Farah Md. Hasanuzzaman

Fisheries and Marine Resource Technology, Khulna University, Khulna-9208, Bangladesh
*Email: rupontee2001@gmail.com

The present study aimed at knowing prevalence of ciliates in Mud crab rearing tank water (*Scylla serrata*) in a hatchery. in Satkhira region. The water samples (treated sea water, river water, brood water, zoea water) were collected from the Mud carb hatchery operated by *JAPAN FAST TRADE LTD*. of Satkhira, Khulna. The samples were analyzed using microscopes. There were several types of ciliates found in the water samples; these were *Loxodes* sp*., Aspidisca* sp. and *Laurentiella* sp. *Spirostomum* sp*., Vorticella* sp., *Euplotes* sp*., Stentor* sp.. The highest prevalence was *Loxodes* sp. (100%) observed in sea water, river water, and brood water and zoea water*, Laurientella* sp. (100%) observed in river water and brood water. and *Spirostomum* sp. (100%) observed in sea water, river water, and brood water The highest intensity was *Loxodes* sp. (5) in zoea water and river water, *Laurentiella* sp. (3.33), and *Euplotes* sp*.* (3) observed in river water.

PPU 16 Microplastics Pollution in The Upstream Aquatic Environment Adjacent to Sundarbans

Md Abir Hassan Sajib*, Diganta Saha, Md Salauddin Hossein Sabbir, Md Nurul Islam and Shaikh Tareq Arafat

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: abir200647@gmail.com

Microplastics (MPs) pollution in the aquatic environment has become one of the emerging environmental problems due to increased use and unwise disposal. The ultimate fate of plastics is the marine environment. This study investigated the abundance, shape, color, and length of MPs in water, sediment, and intestine of a commercially important fish, large-eye croaker (*Johnius plagiostomata*) in the upstream rivers (Rupsha and Passur) of Sundarbans, Bangladesh. The samples were collected from 6 points of the rivers. The water and sediment samples were collected using a Manta trawl net and Ekman grab sampling machine respectively. The samples were examined for MPs investigation through digestion (KOH and H_2O_2) protocol, density separation, filtration, and microscopic observation. In total, 2006.67 microplastics particles were identified from water, sediment, and fish intestines. MPs were found in an average of 303.833 particles/water trawl, 132.469±12.73 items/kg of sediment, and 0.822±0.38 items/g of the intestine sample ($P>0.05$). For the water sample, the highest number of MPs were found in S1 Point and the lowest was in S6 Point, for the sediment sample the highest number was in S1 Point and the lowest was in S2 Point, for the fish sample the highest number was found in S3 point and the lowest number was in S6 point. In the fish intestine, the abundance of MPs is relatively high in the Rupsha River in comparison to the Passur River. The majority of microplastics were fragments. In total among water, sediment, and fish intestines, the most dominant color found was brown (31.15 %). The average microplastics length was 2120±1390 µm. This study indicates that the Rupsha and Passur rivers are the carriers of the MPs from Khulna City to the Sundarbans environment.

PPU 17 Total Viable Bacterial and *Vibrio* spp. Load of Seawater and Seawater Extract of Seaweed Collected from the St. Martin Island

Sagar Roy* and Abul Farah Md. Hasanuzzaman

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: sagarroysr007@gmail.com

This study was conducted to determine the comparison of total viable bacteria and *Vibrio* spp. load between seawater and seawater extract of seaweed (*Hypnea spinella, Padina australis* and *Sargassum carpophyllum*) collected from the St. Martin Island, Bangladesh. The total bacteria count (TBC) in the seawater sample ranged from 1.23 to 1.25×10^8 CFU/mL whereas the seawater extract of seaweed had the TBC in the range of 1.09 to 1.12×10^8 CFU/mL. The total *Vibrio* count for the seawater sample ranged from 8.6 to 8.9×10^7 CFU/mL but in the case of seawater extract of seaweed, the range was 8.0 to 8.1×10^7 CFU/mL. The range of values for both total viable bacteria and total viable *Vibrio* counts was notably lower in the seawater extracts obtained from seaweed when compared to the values estimated in the seawater samples without seaweed extract; accordingly, this comparative study has pointed out the antibacterial activity of the bioactive compounds present in collected seaweed species against bacterial community.

PPU 18 Antibacterial Activity of Selected Sundarban Mangrove Plants against Shrimp Pathogenic Bacteria *Vibrio parahaemolyticus* -A Review

Sayma Akter Mim[1*], Md Rafiul Islam[1], Chaity Rani Mondal[1], Jamil Ahmad Shilpi[2] and Shamima Sultana[1]

[1]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh.
[2]Pharmacy Discipline, Khulna University, Khulna-9208, Bangladesh.
*Email: saymamim999@gmail.com

This review represented an overview on the antibacterial effect of secondary metabolites of five Sundarban mangrove plants against shrimp pathogenic bacteria *Vibrio parahaemolyticus* responsible for different diseases like acute hepatopancreatic necrosis disease (AHPND), vibriosis and non-luminous vibrios. This review included five plants namely, *Sonneratia caseolaris, Sonneratia apetala, Excoecaria agallocha, Avicennia marina* and *Rhizophora mucronata* which contained secondary metabolites like alkaloids, phenolics, hydrocarbons, steroids, saponins, tannins, flavonoids, polyphenolic compounds, terpenoids, triterpenoid, saturated fatty acid, unsaturated fatty acid, sterols. Different research described that, the extract of those Sundarban mangrove plants showed antibacterial effect against *V. parahaemolyticus* because of containing a huge number of secondary metabolites. Past research also mentioned that *S. caseolaris* contained saponins, terpenoids, flavonoids, tannins, alkaloids, steroid and triterpenoid whereas *S. apetala* possessed flavonoids, alkaloids, steroid, triterpenoid and saponins. Additionally, previous different research concluded that *E. agallocha* possessed, flavonoids, phenol, polyphenolic compounds, saponins and tannins whereas *A. marina* contained flavonoids, alkaloids, steroids, tannins, triterpenoid and saponins. *R. mucronata* incorporated unsaturated sterols, terpenes, flavonoids, tannins and organic acids. Past research directed that those mangrove plants extract could be work as potential antibacterial agent against pathogenic *V. parahaemolyticus* causing shrimp bacterial diseases.

PPU 19 Abundance and Diversity of Macrobenthos in Ecologically Approach Prawn Culture System

Shahnur Akter Chamaly* and Khandaker Anisul Huq

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208
*Email: shahnurakter919@gmail.com

Macrobenthos are the unsung heroes of aquatic ecosystems, driving nutrient cycling, ecological stability, and thriving food webs making them indispensable for sustainable aquaculture. This study delves into their diversity and abundance within blending aquatic vegetables (water spinach *Ipomoea aquatica*) and mollusks (apple snail *Pila globosa*) in ecological approach prawn culture system. The research focused on both qualitative and quantitative analyses of macrobenthos in both ecological approach and conventional prawn culture. Qualitative analysis identified nine species of macrobenthos belonging to four genera (*Melanoides*, *Bellamya*, *Pila*, and *Indoplanorbis*). Quantitative analysis was conducted using mean abundance and standard deviation values to determine the population density of these species across the study period. The results revealed that the abundance of macrobenthos was significantly higher in ecological approach pond than in conventional culture. For instance, species such as *Melanoides granifera* and *Melanoides polymorpha* showed notable increases in abundance under ecological conditions. In contrast, certain species like *Bellamya javanica* exhibited minimal variation between the systems. The ecological treatment ponds also demonstrated the presence of *Indoplanorbis exustus*, which was absent in control ponds under specific conditions. This study highlights the potential of an ecologically approached prawn culture system to enhance biodiversity and abundance of macrobenthos, contributing to a more sustainable aquaculture environment. The findings suggest that integrating vegetables and mollusks into prawn farming systems can improve ecosystem health, water quality, and productivity, providing an avenue for better nutrition and income for aquaculture practitioners.

PPU 20 Effect of Microplastic on the Enzyme (Stress & Digestive) Activities of Walking Catfish (*Clarias batrachus*)

Md. Sumit Raihan Piyas* and Sheikh Mustafizur Rahman

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: sumitpiyas@gmail.com

Microplastics are small pieces of plastic, (<5 mm) in length, that occur in the environment as a consequence of plastic pollution, and microplastic have been commonly found in organisms. But effects of microplastic on the enzyme activity (Stress & Digestive) were poorly understood. Their impact on fish can be observed at several levels, affecting their health, behavior, and ecosystems. Microplastics are a significant environmental concern for fish, causing harm at multiple levels from individual health to ecosystem dynamics. A study was conducted to find out how some phenotypic characteristics and enzyme activities of magur (*Clarias batrachus*) were affected by microplastics (<5 mm). Magurs fed commercial diet were reared for 60 days in tanks under two separate experimental conditions: control (no plastic) and treatment (with microplastic). The results showed that fishes exposed to microplastic had significantly less digestive enzyme activity and higher stress enzyme activity compared to no-plastic treated fishes ($p<0.005$). The result shows that microplastic had adverse effect on the enzyme activity (stress and digestive) of magur (*Clarias batrachus*). It also creates a stressful environment.

PPU 21 Population Diversity of the Annandale Loach (*Lepidocephalichthys annandalei*) in Bangladesh

Ireena Akter Bristy* and Md. Lifat Rahi

Fisheries and Marine Resource Technology Discipline, Khulna University, Bangladesh
*Email: ireenaakterbristy2025@gmail.com

Loaches are small groups of fish that are known to play excellent ecosystem functions by feeding on insects, parasites and bottom debris (also known as ecosystem cleaner). There are 14 loach species in Bangladesh, of which, the Annandale loach (*Lepidocephalichthys annandeli*) is the most common and widespread in Bangladesh. In the recent years, the natural abundance of loach has been declining. Therefore, this study attempted to investigate the population diversity (in terms of phenotypic and genetic) to document population status of this species collected from seven locations of Bangladesh: Dinajpur, Natore, Khulna, Sylhet, Munshiganj, Rangamati (Kaptai lake) and Bandarban (Shangu river). Different types of phenotypic/morphological measurements revealed no significant differences among the traits. Only a physiological trait, hepatosomatic index (HIS) was found to vary significantly ($P < 0.05$) among some populations (significantly higher HSI for Kaptai lake and Shangu river over the other populations). In addition, mitochondrial cytochrome oxidase I (COI) DNA marker was used to estimate the population genetic diversity of *L. annandeli* among the seven sampled populations of Bangladesh using 70 fish (10 fish samples per sampling site). A 560-base pair (bp) COI gene (DNA) fragment was amplified for the 70 fish samples. This analysis revealed 35 variable sites with 153 haplotypes, of which, 41 haplotypes were unique. Different types of population genetic parameters (nucleotide and haplotype diversity, pair-wise genetic distance matrix and Tajima's D) indicate the highest degree of genetic variation ($P < 0.05$) for Sylhet population, followed by Kaptai lake, and Shangu river. The remaining four populations were found to constitute lower level of genetic variation with no significant difference among the populations. Phylogenetic analysis (neighbour joining method) and haplotype networking showed three distinct clades or lineages. Shangu river (Clade – I) and Kaptai lake (Clade – II) formed two distinct lineages while Sylhet population (Clade – III) grouped with the remaining three populations that formed a single large population. Findings also suggest that there is no gene flow between Kaptai lake and Shangu river populations (geographically isolated) and these two populations are also isolated from the other five populations. There is gene flow (and no barrier) between the remaining five populations of Bangladesh. These three major clades can be considered as the major conservation sites.

PPU 22 Abundance and Diversity of Zooplankton in Ecologically Approach Prawn Culture System

Ezaz Ahmed Shaon*, Lifat Rahi and Khandaker Anisul Huq

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: ejejahmedshawon@gmail.com

This study compares the abundance and diversity of zooplankton between ecologically aproach (treated) prawn culture system and conventional practice (control). In both culture systems juvenile prawn (40000/ha) and *Labeo rohita* (1000/ha) were stocked. In ecological approach prawn culture system floating vegetable (*Ipomoea aquatic*) was planted 1m interval around the upper water surface of pond dike as inorganic pollutants extractor and snail was stocked at (5000/ha) as organic pollutant extractor. The research was conducted at the experimental ponds (240m^2) of Fisheries and Marine Resource Technology Discipline, Khulna University from January to July 2024. Zooplankton were sampled monthly, and composition and abundance were assessed. In ecological approach pond four rotifer, four copepod, two cladoceran, and two protozoan species were found whereas three rotifer, three copepod, two cladoceran, and two protozoan species were observed in conventional pond. Zooplankton abundance was quantitatively higher in the ecological approach pond, and population peaks were always during early summer. Copepods and cladocerans were the most abundant in the zooplankton groups and protozoans were the least abundant. Then had rotifers initially been abundant in both systems, declining steadily through the study period. Good water quality and habitat complexity afforded by floating vegetation and snails might contribute to improved zooplankton diversity and abundance in the ecological approach pond. All of these factors led to favorable ecological conditions for growth of zooplankton and natural food source which directly supporting prawn production. The study sets up a framework for the development of environmentally sustainable strategies for both increasing aquaculture productivity and maintaining ecological balance which has implications for some practical prawn farmers and aquaculture policymakers.

PPU 23 Status of Poison Fishing in the Sundarbans and Its Impact on Water Parameters

Sk Arif Ahmmed Rubel*, Shila Khanam, Babu Kumar Roy, Shikder Saiful Islam and Muhammad Abdur Rouf

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: rubelarifahmmed@gmail.com

Poison fishing in the Sundarbans is endangering its unique mangrove ecosystem, causing severe harm to aquatic life and biodiversity. Urgent measures are needed to address this ecological crisis. This study explores the status of poison fishing and its direct effects on water quality parameters. Status was assessed through surveys conducted across four ranges of the Sundarbans, utilizing questionnaires, Key Informant Interviews (KII), and Focus Group Discussions (FGD). Surveys reveal that poison fishing is most practiced during the marine ban period, involving approximately 5-7% of licensed and 2-3% of unlicensed fishermen. Laboratory experiments at Khulna University were carried out to assess the effects of eight types of poisons on water quality parameters, including pH, dissolved oxygen (DO), temperature, ammonia (NH_3), and hardness, over various time intervals. This study revealed no significant threat-related variations in water parameters. Though, laboratory tests revealed notable changes in water parameters within 10 minutes of exposure to specific chemicals (Ripcord, Amister, Fighter), but the parameters consistently stayed within standard ranges. This implies that fluctuations on water parameter are not responsible for fish mortality. These findings underscore the urgent need for stricter regulatory enforcement, increased community awareness, and the promotion of sustainable fishing practices to mitigate the harmful effects of poison fishing and safeguard the ecological integrity of the Sundarbans.

PPU 24 Reproductive Efficiency and Larval Yield of Neo-Female Galda Broodstock in Controlled Hatchery Conditions

Maliha Tabassum Shoroni*, Md. Salauddin Hossen Sabbir and Md. Golam Sarower

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: shoronimaliha@gmail.com

This study examines the reproductive performance and larval yield of Macrobrachium rosenbergii (commonly known as Galda) neo-female broodstock under controlled hatchery conditions in Sreeghat, Bagerhat Sadar, situated in the southwestern region of Bangladesh. The research was conducted in a shrimp hatchery using a combination of direct field investigations and questionnaire interviews with hatchery personnel. But traditional broodstock, over recent decades, has been facing significant challenges including disease causing early larval mortality, slower growth rate, poor reproductive performances for various known and unknown reasons. In this situation, more efficient and resilient alternative is needed without imposing risk on wild. To address this, the hatchery imported neo-female broodstock from Thailand. Super-intensive system of culture was found in the shrimp hatchery. The key findings of the survey where fecundity was higher with an average of 55,000-60,000 eggs per female compared to 35,000-40,000 eggs in traditional galda. Additionally, the larvae reached post larval stage within 13-17 days whereas in case of our traditional galda it often takes 20-25 days, average survival rate from larvae to post larvae was 65%. Disease related mortality was reduced by 20-25%. In such way, larval yields were developed with increased survival rate and healthier offspring with disease resistance capacity compared to traditional galda. Though the initial importing cost of neo-female broodstock is higher, the production cost is less compared to native galda as they reach to marketable size early in the same maintenance cost. To improve shrimp hatchery management, several recommendations are proposed such as comprehensive projects can be introduced by Government, training program, development of software for knowledge sharing, funding for publication are essential. By integrating this innovative approach, the shrimp aquaculture industry in Bangladesh can achieve greater sustainability and global competitiveness, contributing to food security and economic growth. This study highlights the promise of adopting advanced broodstock management strategies to overcome the limitations of traditional practices, paving the way for a more resilient and productive shrimp farming sector in Bangladesh.

PPU 25 Seasonal Succession of Phytoplankton Across Two Lakes at Khulna University Campus Having Nutritional Source Dynamics

Farhana Rahman Nabila*, Hridoy Saha, Alokesh Kumar Ghosh, Ruma Khatun and Shikder Saiful Islam

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: pharhatnabila@gmail.com

Phytoplankton are a fundamental component of aquatic ecosystems, serving as a primary food source for various aquatic organisms. They play a critical role in maintaining ecological balance, nutrient cycling, and water quality. This study investigated the seasonal succession of phytoplankton and their diversity, richness and evenness in two lakes on the Khulna University campus. The sampling stations were selected from each lake, and a random sampling strategy was used to collect samples from each station every month, from August to October. Quantitative enumeration was performed by microscopic slide analysis method using a light microscope, and species identification was based on bibliographic references, including books and journals. Community structure was analyzed through species diversity, richness, and evenness metrics. A total of 40 phytoplankton species were recorded across the six sampling stations. *Clorella sp*., *Lepocinclis ovum*, *Euastrum spinulosum* and *Microcystis aeruginosa* were most abundant phytoplankton species in both lakes. Monthly variations were observed in diversity, richness, and evenness. Statistically significant differences ($p < 0.05$) were noted between the two lakes and among sampling stations. Lake 1 recorded the highest species diversity (2.434), richness (0.147), and evenness (0.697) in September, while Lake 2 showed the lowest species diversity (1.993) and evenness (0.594) during the same month. The lowest species richness (0.110) was observed in Lake 1 in August. Comparing Lake 1 to Lake 2, the species richness results revealed that the Lake 1 had a stable phytoplankton community and suitable physical and chemical water parameters (Figure). According to the study's findings, the phytoplankton community of Lake 1 was more enriched than Lake 2. There were some changes between the water quality parameters like pH, dissolve oxygen (DO), water temperature, ammonia, nitrite and hardness across two lakes. This study provides insights into the understanding of phytoplankton community dynamics and their role for aquatic ecosystem management.

PPU 26 Biometric Indices of Elongate Glass Perchlet *Chanda nama* (Hamilton, 1822) from a Wetland Ecosystem (Beel Dakatia) Southwestern Bangladesh

Kazi Tasnim Nahar Tazin* and Wasim Sabbir

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: tasnimtazinn@gmail.com

The elongate glass perchlet *Chanda nama*, is a prominent freshwater species belonging to the family Ambassidae. This study primarily investigated the growth pattern, condition and form factor of *C. nama* sampled from the wetland ecosystem of Beel Dakatia in southwestern Bangladesh. A total of 200 individuals were sampled from commercial fishers during 2024, with recording of length and weight of each specimen. Total length (TL) ranged from 4.2 to 8.8 cm while body weight (BW) varied from 0.59 to 6.23 g. Overall, the species exhibited a negative allometric growth pattern, with a strong correlation in the length-length relationships (LLRs) documented. The assessed value (0.0122) of form factor ($a_{3.0}$) indicated short and deep body shape. Further, the average value of Fulton's condition factor (K_F) was estimated to be well below 1, indicating suboptimal health status. The findings of this study will contribute to the development of effective conservation policies for this fish species in the Beel Dakatia and connected ecosystems.

PPU 27 Evaluation of Occupational Health Hazard and Safety of Fishermen in Sundarbans, Bangladesh

Sumaiya Islam* and Mst. Muslima Khatun

Fisheries and Marine Resource Technology Discipline, Khulna University, Bangladesh.
*Email: sumaiyasumubabibu@gmail.com

The Sundarbans, the world's largest mangrove forest, is a vital ecosystem supporting a significant population of fishermen in Bangladesh. Despite its ecological importance, the livelihoods of fishermen in this region are fraught with numerous occupational health hazards and safety concerns. This study evaluates the occupational risks and safety challenges faced by fishermen in the Sundarbans, emphasizing their exposure to hazardous working conditions, environmental threats, and limited access to healthcare and safety measures. Data were collected through surveys, interviews, and field observations involving fishermen and key stakeholders. 80 people aged 17 to 60+ years inhabiting Chila bazar under Mongla upazila adjacent to the Sundarbans in Khulna, Bangladesh were selected in the study. The findings reveal that the fishermen are exposed to physical injuries, waterborne diseases, and respiratory problems due to prolonged exposure to harsh environment. Fishermen working in Sundarbans were suffered more from all types of physical health (skin, vision, hearing, common cold, headache, gastrointestinal and injuries) issues and mental health problems (depression, stress, anxiety, hyperactivity) than non- fishermen in that area ($p<0.05$). The study shows that there is significant difference of disease prevalence of physical health and mental health between fishermen and non-fishermen. Gastric problem (72%), skin disease (62%), cold (64%), and depression (60%) were more prevalent among fishermen working in the Sundarbans. Additionally, inadequate personal protective equipment (PPE), poor awareness of safety protocols, and insufficient emergency response systems amplify occupational risks. Long term interventions are required to decrease the health issues, and to maintain pleasant environment for fishermen involved in the region.

PPU 28 Proximate Composition Analysis of Wild and Cultured Fish, *Rhinomugil corsula* (Hamilton) in the South-West Region of Khulna, Bangladesh

Md. Ashrafuzzaman Emon* and Momotaz Khanom

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: ashrafemon911@gmail.com

The current study was conducted to compare the proximate composition of wild and cultured *Rhinomugil corsula*. Ten wild fishes from the Pasur River, Mongla and ten cultured fishes from a farm in Batiaghata, Khulna were collected. After being collected, the samples were preserved in ice and immediately transported to the Biology Laboratory of Fisheries & Marine Resource Technology Discipline of Khulna University and stored at -20°C until the experiment was finished. Protein, lipid, ash and moisture contents were estimated according to AOAC, 2000. The data were analyzed using SPSS 26.0. The mean values of protein, lipid, ash and moisture in wild *R. corsula* were found as 18.77±0.76, 1.48±0.05, 4.52±0.44 and 74.03±0.95 respectively. While the mean values of protein, lipid, ash and moisture in cultured *R. corsula* were found 18.49±0.47, 1.87±0.08, 3.68±0.28 and 75.07±0.44 respectively. Lipid and moisture were significantly (p<0.05) higher in cultured *R. corsula* than wild fishes and for ash it was vice versa. On the other hand, there was no significant (p>0.05) difference in protein and moisture of the fishes of two different habitats. This variation might be due to feeding regime, feed type, environmental factors, salinity, and water depth. However, both wild and cultured *R. corsula* may play a significant role in contributing to the nutritional demands of the population in Bangladesh. Furthermore, the information of this study can help to develop culture strategies of this near-threatened species, *Rhinomugil corsula*.

PPU 29 Morphological Analysis of Wild and Cultured *Rhinomugil corsula* (Hamilton) in South-Western Region of Khulna

Nuraiya Shammi* and Momotaz Khanom

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: nuraiyashammi3@gmail.com

Rhinomugil corsula, commonly known as the corsula mullet belonged to Mugilidae family, is a species of fish found in coastal and freshwater environments in South Asia, known for its economic importance in local fisheries. The present study was aimed to investigate morphometric and meristic analyses of two different aquatic habitats. Thirty wild brackish water fishes from the Pasur River, Mongla and thirty cultured fishes from freshwater farm in Batiaghata, Khulna were collected for the study. After collection, the length (cm) and weight (gm) of the samples were measured by using measuring scale and digital balance (DIGISCALE 0.01g to 600g). In this study, morphometric characteristics including body weight, total length, standard length, fork length, head length, body depth, eye diameter, pre-dorsal length, first dorsal fin length, second dorsal fin length, pectoral fin length, pelvic fin length, anal fin length and meristic characters such as dorsal fin spine ray, dorsal fin soft ray, pectoral fin ray, pelvic fin ray, anal fin ray, caudal fin ray were observed. Length-weight relationship and all parameters in relation to total length were regressed following $W = a \times L^b$ (Le Cren, 1951), Where, *W* is the weight of the fish (g), *L* is the length of the fish (cm), *b* is the exponent describing the rate of variation in weight in respect to length and *a* is the co-efficient of the length-weight relationship. The length (24.23±1.44cm) and weight (85.23±10.54gm) of the farmed fishes were significantly higher than those of wild fishes. The length of all morphometric characters except head length in farmed fishes were significantly higher ($P<0.05$) than those of wild fishes. Fulton's condition factor (K_F) of wild fishes were significantly higher than farmed fishes. The linear regression of all morphometric parameters in relation to total length of the fishes exhibited negative allometric growth ($b<3$) for both aquatic habitats. The results of the present study indicate the growth patterns and health status of two different populations of *Rhinomugil corsula* which can help to develop culture strategies.

PPU 30 Hygiene and Sanitization Practices of the Fish Markets in Khulna City

Shadique Al Hasan Shohan* and Md. Rashedul Islam

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: shadique20ku@gmail.com

Fish is an important part of the human diet due to its high protein content and essential nutrients for brain development. This study enunciates the infrastructural adequacy and adoption level of hygiene & sanitization practices by the marketing personnel in selected fish markets of Khulna City. A random sampling technique was applied to a sample of 100 fish marketing personnel from five major marketplaces. The study utilized a semi-structured interview schedule and observation method to assess infrastructure facility adequacy, hygienic measures adoption, and marketing practice adoption. Descriptive statistics, ANOVA, F tests, correlation, and regression were used with SPSS. Analysis of 'F' and P values reveals considerable differences among marketing personnel in five selected markets. Overall availability index in all five markets has shown infrastructure availability in drainage facility (2.06±0.78%), hygienic toilet facility (1.56±0.67%), whereas there is a availability index in the use of clean water (1.95±0.77%). Among all the hygienic practices featured, the use of fish-keeping platforms (2.25±0.75%) and the use of clean polyethylene for a consumer (2.44±0.7%) were adopted by the majority of fish marketing personnel. However, the least attention (less than 50% of the scoring index) related to the adoption practices was observed to have the proper maintenance of waste disposal (2.1±0.74%) and using adequate ice facilities (2.52±0.62%). The major constraints among the marketing personnel were found, as per the scoring index, to be the improper maintenance (1.55±0.5%), lack of technical guidance (1.5±0.5%), and irregular market structure (1.58±0.5%) while handling fish. Research showed that educational level may considerably affect maintaining hygienic practices. Research indicates that education level might significantly impact hygiene practices. To provide high-quality fish products, fish marketing workers require ongoing training in personal cleanliness. This study advises using a grading system to implement and monitor cleanliness policies in fish market.

PPU 31 Zootechnical Performance of Nile Tilapia, *Oreochromis Niloticus* Fry Fed Diets Containing Fishery Waste Meal Replacing Commercial Fish Meal

Nusrat Jahan*, Md. Shahin Parvez, Sharmin Aktar, Sanjida Yeasmen Urmi, Nirjhar Roy and Sheikh Mustafizur Rahman

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: nusratjahan17129@gmail.com

Fish meal is a primary protein source in fish diets, but its rising cost has driven the aquaculture industry to explore alternatives to reduce feed cost. Therefore, this study was conducted to explore the effect of discarded marine pelagic fishery waste as a substitute of imported fish meal in the diets of Nile tilapia fry, employing two control (C) diets and two dietary treatments (T). One of the controls (C-1) diets contained imported commercial fish meal. A commercial feed for tilapia fry was used as another control diet (C-2). In the two dietary treatments, 50% (T-1) and 100% (T-2) of the imported fish meal were replaced with locally available marine pelagic fishery waste-based meal. Uniform-sized Nile tilapia fry (mean weight of 1.51±0.04 g) were stocked in 12 glass tanks at 10 fish/tank and fed with the experimental diets in triplicates at 6% of their body weight twice daily for 30 days. After harvest, survival rates and condition factors remained unaffected ($P>0.05$) among the dietary treatments. A considerable amount of nutrients was found in treatment diets compared to control diets. The growth performance parameters were highest in fish fed the control-1 (C-1) diet, with no significant differences ($P>0.05$) observed among other diets. However, fish fed the treatment diets (T-1 and T-2) had lower FCR values, significantly differing from control-1 diet. In cost-benefit analysis, the lower incident cost and higher profit index were found in the treatment diets compared to the control diets (Table). Therefore, this study concludes that diets replacing commercial fish meal partially (50%) or completely (100%) with locally sourced marine pelagic fishery waste-based meal are viable.

PPU 32 A Review on Bioactive Phytochemical Constituents of Important Mangrove Plants against Shrimp Pathogenic Bacteria *Vibrio parahaemolyticus*

Chaity Rani Mondal[1]*, Sayma Akter Mim[1], Jamil Ahmad Shilpi[2] and Shamima Sultana[1]

[1]Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
[2]Pharmacy Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: chaityridisha@gmail.com

The aim of this review work was to focus on bioactive phytochemical constituents of important mangrove plants against shrimp pathogenic bacteria *Vibrio parahaemolyticus.* Vibriosis, Acute Hepatopancreatic Necrosis Diseases (AHPND) and Non-luminous vibrios are important diseases of shrimp in Bangladesh. One of the major causative agents of those diseases is *Vibrio parahaemolyticus*. This review included five mangrove plants namely *Acanthus ilicifolius, Avicennia alba, Avicennia marina, Sonneratia caseolaris* and *Rhizophora mucronata*. This present review disclosed that these mangrove plants contained numerous amounts of phytochemical constituents. Previous different research concluded that *A. ilicifolius* contained alkaloids, phenol, flavonoids, and tannins where *A. alba* contained flavonoids, saponins and tannins. Moreover, different researchers mentioned that *A. marina* possessed a high number of flavonoids, tannins as well as saponins, steroids, and phenols whereas *S. caseolaris* mainly incorporated fatty acids, saponins, terpenoids, flavonoids, tannins, polyphenols, hydrocarbons, steroids and so on. The phytochemical constituents *of R. mucronata* contained phenols, alkaloids, terpenoids, saponins, flavonoids, tannins and so on. In accordance with past research, those mangrove plants extract worked against shrimp pathogenic bacteria *V. parahaemolyticus.* Therefore, those mangrove plant species are potential for treating shrimp bacterial diseases caused by pathogenic *V. parahaemolyticus.*

PPU 33 Comparative Analysis of the Proximate Composition and Major Mineral Contents of Some Selected Low and High Valued Marine Fish Species from the Landing Center of Kuakata in Bangladesh

Papiya Bahadur*, Sharmin Aktar, Nirjhar Roy, Md. Shahin Parvez, Md. Abdur Rahman, Shayma Khanam, Alokesh Kumar Ghosh and Md. Nazmul Ahsan

Fisheries and Marine Resource Technology Discipline, Khulna University Khulna-9208, Bangladesh
Email: prottashapapiya@gmail.com

Nutrition-sensitive food policies and programs should prioritize the mainstreaming of underutilized and low-valued marine pelagic fish in the domestic market. Therefore, this study was conducted to analyze the proximate composition and major mineral contents of two high-valued fish, viz. Rupchanda (*Pampus argenteus*) and Hilsha (*Tenualosa ilisha*), and three low-valued fish, viz. Chapila (*Sardinella fimbriata*), Faissa (*Thryssa setirostris*), and Loittya (*Harpadon nehereus*), sampled from the Alipur fish landing center of Kuakata, Bangladesh. Thirty pooled samples from a total of 252 individuals, comprising six pooled samples from each fish containing 30 Ilish, 42 Rupchanda, and 60 Chapila, Faissa, and Loittya individuals, were analyzed for proximate composition in triplicates. In addition, one pooled sample of each species was dried and analyzed for major mineral content. In this analysis, protein content was significantly ($p<0.05$) higher in Chapila and Faissa compared to Hilsha and Loittya, while it was insignificantly ($p>0.05$) higher compared to Rupchanda (Table). Lipid content was the highest in Hilsha and varied significantly ($p<0.05$) from other species. Ash content was significantly ($p<0.05$) higher in Chapila and Faissa compared to others, while there was an insignificant ($p>0.05$) difference among those fish. Consuming 100g of raw Chapila contributed the highest to children (6-23 months) and women (pregnant and lactating) for their daily recommended nutrient intake (RNI) of protein, zinc, calcium, and phosphorus, while Rupchanda contributed to them obtaining the highest iron content. It could be concluded that low-valued fish species also offer a valuable source of high-quality protein and major minerals that can help combat malnutrition for the children and women groups inhabiting coastal regions of Bangladesh.

PPU 34 Total Bacterial Load and *Vibrio spp*. Load in Marine fish *Scomberomorus guttatus* Collected from K.C.C Shondhya Bazar, Khulna

Sunjida Yesmin* and Md. Rashedul Islam

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: sunjidayesmin@gmail.com

The study aimed to evaluate the total bacterial load and *Vibrio* spp. load in the marine fish *Scomberomorus guttatus*, collected from K.C.C Shondhya Bazar, Khulna. Fish samples were categorized based on body weight: greater than 500g (>500g) and less than 500g (<500g). Bacterial enumeration was conducted to evaluate potential health risks associated with microbial contamination in marine fish consumed locally. Selective agar media (TCBS) was used for isolation and identification of *Vibrio* spp., while nutrient agar was used for isolation and enumeration of total bacteria. Results revealed that the total bacterial load in fish weighing greater than 500g was found $1.805\times10^6\pm$ 0.19 cfu/g in gut and $0.985\times10^6\pm$ 0.19 cfu/g in muscle, while for fish weighing less than 500g, the load was found $1.605\times10^6\pm$ 0.04 cfu/g in gut and $0.84\times10^6\pm$ 0.04 cfu/g in muscle. Similarly, The *Vibrio* spp., load with fish greater than 500g was found $4.75\times10^4\pm$ 0.04 cfu/g in gut and $4.2\times10^4\pm$ 0.04 cfu/g in muscle, and fish less than 500g showed $3.8\times10^4\pm$ 0.03 cfu/g in gut and $3.35\times10^4\pm$ 0.03 cfu/g in muscle. These findings suggest that both weight categories of S. *guttatus* are subject to significant microbial contamination, although, higher bacterial and *Vibrio* spp. loads observed in fish weighing more than 500g. The study indicates the importance of implementing strict hygiene and quality control measures during fish handling and marketing to mitigate potential health hazards posed by bacterial contamination. Additionally, these results provide baseline data for microbial risk assessment and emphasize the need for further investigations into the sources and mitigation strategies of bacterial contamination in commercially important marine fish species.

PPU 35 Proximate Composition and Major Mineral Content of Five Common Marine Fish Available at the Landing Sites of Kuakata in Bangladesh: Potential Contribution to Vulnerable Human Groups

Shayma Khanam*, Md. Abdur Rahman, Papiya Bahadur, Sheikh Mustafizur Rahman, Sharmin Aktar, Md. Nazmul Ahsan and Md. Shahin Parvez

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: shayma1315@gmail.com

A significant knowledge gap exists regarding the nutrient composition of marine fish species, despite their prominent role in the Bangladeshi diet. Therefore, this study was conducted to evaluate the proximate composition and major minerals of five common and commercially important marine fish species including Datina (*Acanthopagrus datina)*, Ramchos (*polynemus paradiseus)*, Tular Dandi (*Sillaginopsis panijus)*, Deshi Poa (*Dendrophysa russelii*), and Churi (*Lepturacanthus savala*) collected from the Alipur fish landing center of Kuakata, Bangladesh. Specimens of each species were collected on two to three times, subsequently, we analyzed the proximate composition of 27 pooled samples (each containing 24-72 individuals) in triplicate. Additionally, a single pooled sample from each species was dried and analyzed for its major mineral content. The proximate composition of the studied samples revealed varying proportions of protein (20.57- 16.21 g/100g), moisture (77.27-71.48 g/100g), ash (2.03- 1.58 g/100g), and lipid (4.61- 2.33 g/100g) contents (Table). Among the examined fish species, Datina contained significantly ($p<0.05$) higher protein content which was insignificant ($p>0.05$) with Churi. The lipid and ash content were insignificantly ($p>0.05$) varied among the species. In minerals analysis, Datina contributed higher Zinc, Calcium, Iron and Phosphorus than other species in the percentage of recommended nutrient intake for children (6-23m) and women (pregnant and lactating). Overall, this study highlights the potential of these five fish species to contribute significantly to the nutritional well-being of vulnerable coastal communities in Bangladesh by providing essential nutrients.

PPU 36 Nutritional Composition of Five Underutilized Fish from the Landing Sites of Kuakata in Bangladesh: Potential Contribution to Addressing Hidden Hunger

Md. Abdur Rahman*, Shayma Khanam, Papiya Bahadur, Tanvir Ahmed, Md. Shahin Parvez, Md. Nazmul Ahsan, Sheikh Mustafizur Rahman and Sharmin Aktar

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: alhasemfmrtku@gmail.com

Fish can play a vital role in tackling the challenges of global food and nutrition insecurity and nutrient data on fish species are essential for formulating effective policies aimed at mitigating these challenges. This study was conducted on the proximate composition and the major mineral content of five underutilized fish species—Bashpata, Lal Boiragi, Dombura, Maitta, and Chouka—to assess their potential contribution to recommended nutrient intake (RNI). The species were collected two-three times from the Alipur fish landing center of Kuakata, Bangladesh and twenty-two pooled samples containing 21-50 individuals (total 206 individuals) from each species were analyzed for proximate composition in triplicates. In addition, one pooled sample of each species was dried and analyzed for major mineral content. In the analysis, moisture, protein, lipid, and ash contents ranged from 72.00±2.71 to 75.88±1.19, 17.75±0.76 to 20.79±0.64, 1.31±0.18 to 4.43±1.04, and 2.36±0.48 to 3.39±0.13 g/100g, respectively. Protein content was significantly ($p<0.05$) higher in Maitta compared to Lal Boiragi and Bashpata while it was insignificantly ($p>0.05$) higher compared to Chouka and Dombura. Lipid content was significantly higher in Dombura than other four species. The ash content of Bashpata is significantly ($p<0.05$) higher than Maitta and Chouka, while it was insignificantly ($p>0.05$) higher compared to Lalboiragi, and Dombura. Consuming 100g of raw Chouka contributed comparatively higher to children (6-23 months) and women (pregnant and lactating) for their daily recommended nutrient intake (RNI) of protein, Iron, zinc, calcium, and phosphorus. The findings of this study could offer a promising contribution to the national food composition database, providing valuable insights into the potential of these underutilized fish species as a strategic resource in combating malnutrition in Bangladesh.

PPU 37 Utilization of Waste Based Non-Conventional Raw Materials in the Diet of Nile Tilapia, *Oreochromis niloticus* Fry

Sanjida Yeasmen Urmi*, Sharmin Aktar, Md. Shahin Parvez and, Nusrat Jahan, Tanvir Ahmed and Md. Nazmul Ahsan

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: sanjida.urmi2121@gmail.com

The present study was conducted to develop a cost-effective and sustainable diet for Nile tilapia fry, incorporating waste-based non-conventional ingredients locally available in Bangladesh. In this regard, five experimental diets were employed, comprising two control (C) diets and three dietary treatments (D). One of the control (C-1) diets contained imported commercial fish meal as the main crude protein (CP) source and conventional raw materials. A commercial feed for tilapia fry was used as another control diet (C-2). In the dietary treatments, three diets (D-2, D-3, and D-4) were prepared using local fishery waste-based ingredients as the main CP source and using other non-conventional raw materials in three different compositions. Uniform-sized Nile tilapia fry (mean weight of 1.51±0.04 g) were stocked in 15 glass tanks at 10 fish/tank and fed with the experimental diets in triplicates at 6% of their body weight twice daily for 30 days. After harvest, survival (%) and condition factor (CF) of the fish remained unaffected among the dietary treatments. A considerable amount of nutrients was found in fish fed with all the experimental diets. Fish fed with the D-2 diet obtained similar and insignificant ($p>0.05$) growth performances with improved FCR compared to D-1 and D-5 diets, while the performances were significantly lower ($p<0.05$) in the fish fed with D-3 and D-4 diets (Table). However, in profitability analysis, the diet D-2 showed significantly ($p<0.05$) lower incidence cost with the highest profit index compared to all other diets. Findings of the present study concluded that the diet D-2 formulated with local marine pelagic fish (mixed) and shrimp waste-based meal as the main animal protein source could replace the diets formulated with conventional raw materials.

PPU 38 Seasonal Dynamics in Zooplankton Abundance and Diversity across Two Lakes at Khulna University Campus with Varied Nutritional Sources

Hriday Saha*, Farhana Rahman Nabila and Shikder Saiful Islam

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: hridaysaha2000@gmail.com

Zooplankton play a vital role in aquatic ecosystems, acting as key intermediaries in the food chain by transferring energy from primary producers to higher trophic levels. They also contribute to nutrient recycling by supplying essential nutrients like nitrogen, phosphorus and carbon to phytoplankton. This study was conducted across two lakes at Khulna University campus, performing a random sampling method to collect the zooplankton samples to investigate the seasonal shift of community dynamics of zooplankton in Lake-water. Standard analytical method was used to determine the diversity, richness and evenness of the zooplankton of three different stations in each lake. The results indicate that copepods were the most abundant zooplankton species in both lakes. The species diversity of lake 1 (1.01) was comparatively higher than lake 2 (0.95) over the sampling period. The species richness in the month of September was significantly higher in Lake 1 compared to Lake 2, which indicates that Lake 1 had a stable zooplankton community with suitable physical and chemical water properties compared to Lake 2 (Figure). Linked to this finding a higher species evenness was observed in Lake 1 over the month September to October compared to Lake 2. We also observed some fluctuations between some of the water quality parameters like pH, dissolve oxygen, water temperature, ammonia, nitrite and hardness across two lakes. This study concludes that the zooplankton community in Lake 1 was more enriched than the lake 2. Therefore, this study provides valuable insights into how nutritional sources and seasonal fluctuations shape zooplankton dynamics, contributing to our understanding of aquatic biodiversity and ecosystem health. It is crucial to take these factors into considering efficient lake management and conservation initiatives on the Khulna University campus.

PPU 39 Antagonistic Effects of Tulsi (*Ocimum Tenuiflorum*) on Specific Pathogen of Mud Crab (*Scylla olivacea*) Collected from Bagerhat

Sourav Mallick*, Tasniva Chaity and Ghausiatur Reza Banu

Fisheries and Marine Resource Technology Discipline, Khulna University, Khulna-9208, Bangladesh
*Email: souravmaliick705@gmail.com

Mud crab (*Scylla olivacea)* farming in Bangladesh has become economically significant because it advocates sustainable coastal resource management, supports local livelihoods, expands the aquaculture industry, and contributes to the export market. Disease is one of the limiting factors that hinder the production system. The study aimed to know the present scenario of bacterial load as well as the specific pathogen of *Vibrio* spp. and to investigate the antibacterial property of various extracts of Tulsi, *Ocimum tenuiflorum* to combat the bacterial infection. For this purpose the crab samples (weighing of 100g -210g) were collected from three different upazillas (RampaL, Mongla and Morrelgong) of the Bagerhat district which is the most promising area for crab culture. The current study found that the total bacterial count (TBC) was ranging from 7.09 ± 0.22 to 7.80 ± 0.29 $\log_{10}$ CFU/g and total *Vibrio* spp., count (TVC) was ranged from 3.43± 0.90 to 5.09± 0.28 $\log_{10}$ CFU/g respectively in gill which were higher than the other organs of hepatopancreas, abdominal muscles, and leg muscles investigated. When the antibacterial property of Tulsi was investigated, it demonstrated that all the investigated extracts (n-hexen, methanol, and ethyl acetate) were found to be effective against *Vibrio parahaemolyticus.* IC_{50} of various extracts were 4mg/ml, 2mg/ml, and 0.3mg/ml in n-hexen, methanol, and ethyl acetate respectively, which indicated that ethyl acetate was found to be the more effective among the extracts tested. Compared to commercial drugs, eco-friendly plant extract medications provide safer, more cost-effective, sustainable options with fewer adverse effects. Further studies are needed to investigate the active compounds present in this plant (tulsi) which have antibacterial properties that may help us to provide more effective chemotherapeutic agent to hinder bacterial growth in crab specially *Vibrio parahaemolyticus*.

PPU 40 Antagonistic Effects of *Moringa oleifera* on Specific Pathogen of Mud Crab (*Scylla Olivacea*) Collected from Khulna

Tasniva Chaity*, Sourav Mallik and Ghausiatur Reza Banu

Fisheries and Marine Resource Technology Discipline Khulna University, Khulna-9208, Bangladesh.
Email: tasnivachaity32@gmail.com

Mud crab (*Scylla olivacea*) farming has become a significant economic activity in south-west coastal region of Bangladesh. Mud crabs are highly susceptible to various bacterial diseases that cause high mortality and reduce production. To know the present scenario the crab sample (weighing of 120 to 190g) were collected from three different upazillas (Botiaghata, Dacop, Paikgacha) of Khulna. Before curing the bacterial disease of crab, it is necessary to know the bacterial load in different organs of gill, hepatopancreas, abdomen muscle and leg muscle of the crab. The total bacterial count (TBC) of mud crabs ranged from 7.44 ± 0.09 $\log_{10}$ CFU/g to 7.56 ± 0.16 $\log_{10}$ CFU/g and the total *Vibrio* spp. count (TVC) ranged from 5.34 ±0.14 $\log_{10}$ CFU/g to 5.38 ± 0.032 $\log_{10}$ CFU/g which contained under diseases producing rate. From the bacterial load, among the other organs, gill contained the highest bacteria. This study also examined the antagonistic effects of Moringa, *Moringa oleifera* extracts against the pathogenic *Vibrio parahaemolyticus*, which is well-known for its strong antibacterial qualities. Three solvents of n-hexane, ethyl acetate, and methanol were used and IC_{50} were found 10mg/ml, 3.5mg/ml, 2.5mg/ml respectively indicating that the methanol extract was more effective among the others. Compared to commercial antibiotics, medicinal plant extract is more effective, less side-effect and eco-friendly. Further studies are needed to investigate the active compounds present in this plant (moringa) which have antibacterial properties that inhibit the growth of bacteria.