magnus Group

5th EDITION OF THE

# WORLD AQUACULTURE, FISHERIES AND SEAFOOD CONFERENCE

ROME, ITALY

JUNE 09-11

2025

## VENUE

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ITALY

# BOOK OF ABSTRACTS

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BOOK OF

**ABSTRACTS**

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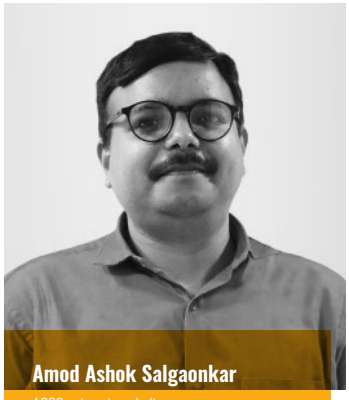
# Keynote Speakers



**Amod Ashok Salgaonkar**
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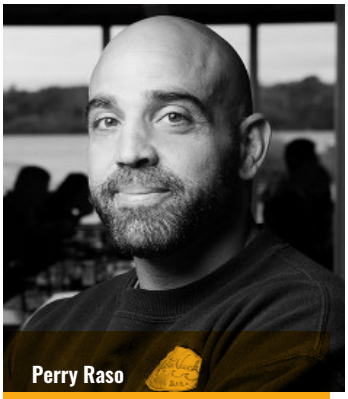

**Perry Raso**
Matunuck Oyster Farm, United Statess

**Subhas Das**
University of Burdwan, India

**T.V. Anna Mercy**
Kerala University of Fisheries and Ocean studies, India

**Timothy C. Visel**
Retired Aquaculture Educator, United States

# Keynote Speakers

**Virendra Kumar Goswami**
Indian Institute of Technology (IIT), India

**Virgilio B Ratunil**
Surigao del Norte State University, Phillipines

*Thank You All...*

# Welcome Message

Dear Conference Participants:

It is a privilege to welcome all participants to this Fifth Edition World Aquaculture Conference in Rome, Italy. What a fitting location to bring people from many nations to meet and discuss food from the sea. Seafood and aquaculture have a growing role in food stability as we strive to feed an increasingly hungry population. A sense of urgency now surrounds food production that utilizes less waste and more sustainable culture practices.

I have been asked to give a presentation as an aquaculture practitioner, climate researcher and educator. My presentation includes climate impacts to shallow water habitats, work at Land Grant universities in the USA, and finally developing centers for aquaculture education for students in grades 9-12.

As a lifelong educator, it is the ability to share experiences and information that secures the role of aquaculture in our future and to those generations yet to come. I am grateful to be a small part of this effort.

**Timothy C. Visel**

Aquaculture Educator (retired), United States

# Welcome Message

I am honored to be joining you for the 2025 World Aquaculture and Fisheries Conference, in the city of Rome, where fish farming dates back to the 1st century, 37 BC, when fish ponds called Piscinae were used to grow finfish, and the Romans farmed oysters on the Italian Peninsula.

As the aquaculture industry has matured, we've made vast improvements in formulation of feeds, larvae production, and determining best animal husbandry and grow out techniques. Now, we find ourselves facing new hurdles such as user group issues, price stabilization, increasing labor costs, achieving and maintaining environmental sustainability, safety and quality standards, and scaling.

Addressing these issues using approaches established by traditional terrestrial agriculture, and using novel approaches, as well as establishing relationships and synergy with other commercial user groups around the world, will be instrumental in the aquaculture's industry's way forward.

We look forward to your valuable contribution, and hope that you will discover knowledge, inspiration, and new partnerships in Rome.

**Perry Raso**

CEO, Matunuck Oyster Farm, United States

# Welcome Message

Dear colleagues and participants,

It is a great honor to welcome you all to the 5th Edition of the World Aquaculture and Fisheries Conference. In a time when the world seeks regenerative, inclusive, and nature-based solutions for food production, aquaculture stands at a powerful intersection of innovation and responsibility.

At Aquaponics Iberia, we believe that bridging biology, technology, and education can transform our systems from extractive to restorative. Through projects like XRAqua, we explore how immersive tools and circular aquaponics can inspire the next generation of learners and food producers alike.

I am excited to contribute to this vibrant global forum and look forward to connecting with fellow experts, innovators, and changemakers shaping the future of aquaculture.

**João Cotter**

Aquaponics Iberia, Portugal

# ABOUT
# MAGNUS GROUP

Magnus Group, a distinguished scientific event organizer, has been at the forefront of fostering knowledge exchange and collaboration since its inception in 2015. With a steadfast commitment to the ethos of Share, receive, grow, Magnus Group has successfully organized over 200 conferences spanning diverse fields, including Healthcare, Medical, Pharmaceutics, Chemistry, Nursing, Agriculture, and Plant Sciences.

The core philosophy of Magnus Group revolves around creating dynamic platforms that facilitate the exchange of cutting-edge research, insights, and innovations within the global scientific community. By bringing together experts, scholars, and professionals from various disciplines, Magnus Group cultivates an environment conducive to intellectual discourse, networking, and interdisciplinary collaboration.

Magnus Group's unwavering dedication to organizing impactful scientific events has positioned it as a key player in the global scientific community. By adhering to the motto of Share, receive, grow, Magnus Group continues to contribute significantly to the advancement of knowledge and the development of innovative solutions in various scientific domains.

# ABOUT
# WAC 2025

**Magnus Group** is delighted to invite you to the **5th Edition of the World Aquaculture and Fisheries Conference (WAC 2025)**, set to take place from **June 09–11, 2025**. This year, we're embracing a Hybrid experience—join us either in person in the timeless city of Rome, Italy, or connect virtually from anywhere across the globe.

Under the compelling theme **"Innovative Practices in Aquaculture: Bridging Science and Industry,"** WAC 2025 will shine a spotlight on the value and innovation of small-scale and artisanal fisheries. The conference aims to foster deep collaborations with fish farmers and fisheries workers, in alignment with the global mission of the Sustainable Development Goals.

This global gathering brings together a vibrant community of researchers, scientists, marine biologists, aquaculture specialists, policy makers, and industry leaders, all working to shape the future of aquatic food systems. It's more than just a conference—it's a catalyst for building partnerships, exchanging visionary ideas, and co-creating impactful solutions.

From keynote lectures and technical talks to poster presentations, every session is designed to empower attendees with insights, tools, and collaborations to elevate the role of aquaculture and fisheries in sustainable development.

Be part of WAC 2025—where knowledge meets action, tradition meets innovation, and global communities unite to create a better, more sustainable future.

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# World Aquaculture, Fisheries and Seafood Conference

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## KEYNOTE PRESENTATIONS

## Amod Ashok Salgaonkar

Co-founder & Chief Operating Officer, A2S2 Enterprises, India

# Knowing the status of fisheries cooperatives basis 2025 as “International year of cooperatives”

Fisheries Cooperative is one of the key pillars but yet less focussed segment in the fisheries industry. UN has declared 2025 as “International Year of Cooperatives” & this brings attention to this segment. There are thousands of fisheries cooperatives spread across the world with only India having 25000+ primary fisheries cooperatives exist. Across the globe; various nations may have taken up the initiatives to boost up the segment where in India is actually making the investment in segment by providing financial support to strengthen it for further uplifting it. Good outcomes are visible on ground and making the strategic practical work may enhance overall situation of the fisheries cooperatives not only in India but at world level. Sustainable sincere approaches followed by action is the real time need to take this segment at next level.

## Biography

Mr Amod Ashok Salgaonkar is a diversified industry professional having 15+ years of experience in buying & merchandising at Modern Trade as well as Cash & carry business; sustainability projects; alternative seafood, e-com export & traditional seafood business, alternative seafood, fisheries cooperatives, skill council projects, entrepreneurship, mentorship to startups & institutions etc. Mr Amod Ashok worked with lead players like Reliance Retail, Bharti Walmart, METRO Cash & Carry, Hyper CITY Retail etc. And, was the known face as an international advisory board member for the global seafood ecolabel Friend of the Sea. Amod has his own startup with the name A2S2 Enterprises which engaged in multiple activities of fisheries in a capacity of Project Management Professional. Through his startup, working in national & international environment of fisheries & aquaculture on consistent level adding value in the field. He is also a contributor at global fisheries seafood media like The Fish Site, Fish Farming Expert & Fish Focus UK.

**Amrit Bart[1*], Erica Curles[2]**

[1]Animal and Dairy Sciences, College of Agriculture and Environmental Sciences, University of Georgia, Athens, GA, USA

[2]Program Manager in Feed, United Soybean Board, Chesterfield, MO, USA

## Review of recent advances in replacing fish-based protein and oil with plant-based alternatives in aquafeeds

The growing demand for sustainable aquafeeds has accelerated research into replacing fishmeal and fish oil with plant-based alternatives. Traditionally sourced from wild fisheries, these marine-derived ingredients raise ecological and economic concerns. In response, plant-based ingredients such as soy, canola, and algaederived products have emerged as viable, scalable options.

This presentation reviews recent advancements in the use of plant-based proteins and oils in aquafeeds, focusing on improved digestibility, nutrient bioavailability, and palatability. It also addresses key challenges—including anti-nutritional factors and essential fatty acid deficiencies—and highlights innovative solutions such as novel processing technologies, biotechnological improvements, and refined feed formulation strategies.

Thereviewfurtherexplorestheeconomicandenvironmental impacts of plant-based feeds, regulatory considerations, and industry adoption trends. Drawing on current research, it demonstrates that continued innovation can enable plant-based diets to effectively support fish health, growth, and sustainable production. Soy product inclusion in feeds is featured as a case study to illustrate cost-effectiveness and applicability across diverse aquaculture species.

## Biography

Dr. Amrit Bart is a professor of aquatic food systems and aquaculture at the University of Georgia (UGA), then served as National Program Leader in Aquaculture at USDA-NIFA and as Dean and Director of Global Programs at UGA. A widely published researcher with over 100 publications, Dr. Bart is an authority on fish reproduction, larval nutrition, cryogenic sperm banking, and ultrasound-mediated delivery in embryos and larvae. And earned his graduate degrees from Auburn University and completed postdoctoral research at the Center of Marine Biotechnology, University of Maryland.

## Joao Cotter

Aquaponics Iberia, Portugal

# XRAqua: Bridging aquaponics and extended reality for an immersive learning experience

As the challenges of food security, environmental sustainability, and STEM education converge, the need for innovative, interdisciplinary learning approaches has never been greater. XRAqua is a pioneering initiative that merges aquaponics with Extended Reality (XR), offering a hybrid educational platform that transforms how students engage with sustainable food production. This project integrates a physical aquaponics system with an interactive XR environment, allowing learners to monitor, experiment, and make data-driven decisions in both real and virtual spaces.

By early June 2025, the pilot aquaponics system will have been operating for 2.5 months, providing initial data on system performance, productivity, and resource efficiency. Simultaneously, the first version of the virtual reality platform will be in its testing phase, with students interacting with the digital twin for 2 to 4 weeks. Early findings suggest that combining real-time IoT-based system monitoring with immersive VR simulations significantly enhances student engagement, scientific literacy, and understanding of circular food production principles.

This presentation will showcase the technological innovations, educational impacts, and preliminary results of XRAqua, highlighting how this blended learning approach fosters a new generation of environmentally conscious thinkers and practitioners. By integrating cutting-edge AI-driven analytics, gamified learning experiences, and real-time aquaponics data, XRAqua stands at the intersection

## Biography

João Cotter is the Co-founder and CEO of Aquaponics Iberia, a position held since early 2017. With an academic foundation in Marine Biology (MSc) and business acumen (MBA), Cotter has dedicated over 20 years to the research, development, and implementation of sustainable aquaculture systems, with a particular focus on aquaponics. His professional journey encompasses roles such as innovation consultant in the food retail sector, IT project manager, and CEO of three companies. His research in ichthyology and aquaculture has contributed to his deep knowledge of aquatic ecosystems. Cotter is a BLUEINVEST Coach for blue economy startups, an Agrifood Expert (EIT Food' AFEC) and an expert in aquaponics technology, having successfully designed, engineered, and installed numerous systems and trained more than 2200 individuals. His international impact is highlighted by his role as Aquaponics Project Manager for INMED in the Caribbean, where he contributed to social and economic development through climate-adaptive agriculture and aquaculture. Furthermore, he was also Aquatic Production Specialist for Food4Sustainability CoLAB.

of sustainable aquaculture, digital transformation, and education — a model that could be replicated globally to advance knowledge in blue and green technologies.

Join us in exploring how XR-enhanced aquaponics can revolutionize science education, food production training, and sustainability awareness for future generations.

## Dr. John Thomas

Centre for Nanobiotechnology, Vellore Institute of Technology, Vellore, India


# Development of a bioactive feed from marine source for treating bacterial infection in aquaculture

Bacterial diseases are a major obstacle to the sustainability and development of aquaculture industry, resulting in limited productivity, economic harm and the need to use expensive control measures. The overuse of certain antibiotics leads to antibiotic resistance. *Aeromonas hydrophila* and *Vibrio parahemolyticus* pathogens infect several fishes, shellfishes, shrimps, crustaceans and is a serious problem since it affects the production of aquatic animals in the aquaculture industry. Therefore, the development of novel antibacterial therapeutics is a dire necessity for the inhibition of these pathogens. 145 Actinomycetes were successfully isolated from marine sediments. Among them, five strains displayed potent antibacterial activity.

## Biography

Dr. John Thomas completed M.Sc Microbiology from University of Madras in 2004. M.Phil in Microbiology from Bharadhidasan University, Trichy in 2007, then Completed Ph.D in Microbiology (Aquaculture specialization) in the year 2010 from Thiruvalluvar University, Tamil Nadu, India. Currently working as an Associate Professor at Vellore Institute of Technology, Vellore. Has been published more than 50 research articles in Scopus indexed Journals. Also has more than 15 book chapters, 1 book and several patents. 2 of his patents have been awarded. Dr. John has completed some research projects funded by Govt. of India.

## Murugan Shanthakumar

EcoDiversity Research Centre, Bangalore, India

# Innovative aquaponics: Integrating fish farming and hydroponics for sustainable aquaculture solutions

Aquaponics is an innovative agricultural system that synergistically integrates aquaculture and hydroponics, creating a sustainable food production model that addresses pressing environmental challenges such as water scarcity, nutrient waste management, and food security. This study aims to explore the methodologies employed in aquaponics and assess its potential for sustainable agriculture. Key aspects such as nutrient cycling, water conservation, and plant-fish interactions are examined to understand the dynamics of aquaponic systems. The findings indicate that aquaponics can significantly reduce water usage while providing high-quality produce and fish, thereby contributing to food security and sustainability. The integration of fish waste as a nutrient source for plants not only enhances plant growth but also minimizes the environmental impact associated with traditional aquaculture. However, challenges remain, including the need for mineral supplementation, the optimization of system design for maximum productivity, and the economic viability of aquaponics in comparison to conventional farming methods. While aquaponics presents a promising solution for sustainable food production, further research is essential to address economic feasibility and consumer acceptance. The integration of advanced technologies, such as the Internet of Things (IoT) and renewable energy systems, may enhance the efficiency and sustainability of aquaponic practices, paving the way for broader adoption in both urban and rural settings. This study highlights the potential of aquaponics as a transformative approach to sustainable agriculture, encouraging interdisciplinary research and collaboration to overcome existing barriers.

## Biography

Dr. Murugan Shanthakumar is a renowned biologist and the innovative founder of the EcoDiversity Research Centre in Bengaluru, India. His specialization in biodiversity and ecological studies is enriched by a comprehensive research portfolio that includes avian species, reptiles, arachnids, aquaculture, and ecosystem assessments, with a particular focus on both marine and freshwater habitats. Under his guidance, the EcoBiodiversity Institute leads pioneering research aimed at addressing climate change, mangrove ecosystems, aquaculture and bird studies. Dr. Shanthakumar is a prolific writer whose publications have greatly advanced our understanding of climate change and its effects on global biodiversity. His work is recognized worldwide, with presentations at various scientific conferences. As an active participant in over 90 prestigious scientific organizations, Dr. Shanthakumar remains committed to advancing environmental science and aquaculture through groundbreaking research and a steadfast dedication to conservation initiatives.

**Keywords:** Aquaponics, Sustainable Agriculture, Aquaculture, Hydroponics, Water Conservation, Nutrient Cycling, Food Security, Environmental Sustainability.

## Perry Raso

Matunuck Oyster Farm, Wakefield, RI, USA

# The horizontal integration of a shellfish farm in a broader business model

The demand for Eastern oysters over the last two decades has increased year after year. This steady continuous growth has created opportunity not only for oyster farmers and other businesses immediately supporting the shellfish aquaculture industry, such as gear and transportation, but it has also created opportunities just outside the shellfish aquaculture market. Opportunities to reach retail markets such as restaurants and open-air markets, with their product and integrating into establishing those markets on their own.

In order to meet those markets directly Matunuck Oyster Farm has horizontally integrated in each stage of the cycle of the eastern oyster (*Crassostrea virginica*). Matunuck Oyster Farm was established in 2002 as a 1-acre oyster farm with one employee. Now, 20 years later, that business has expanded to five additional businesses with over 300 employees, each business having the farmed Eastern oyster being a central, integral part of the business. Each of the new businesses support the farm, and the farm supports each business, creating more financial stability for the oyster farm.

The growth of Matunuck Oyster Farm into the five other sectors has been organic and determined by company needs. In addition to selling oysters to wholesalers, we expanded by offering different products such as Bay Scallops. We then started selling oyster seed to other farmers, selling at open air markets, and established Matunuck Oyster Bar, a popular restaurant overlooking the shellfish farm. This led to the establishment of Matunuck Organic Vegetable Farm, Matunuck Marina, and Matunuck Shellfish Hatchery Research and Innovation Center. Perry Raso, Founder and Owner of these businesses, will discuss synergies between each of the businesses and how each business has strengthened and added value to each other.

## Biography

Perry started digging littlenecks in Point Judith Pond when he was 12 years old. While grew up harvesting shellfish, eel trapping, bull-raking clams, and scuba diving for steamers. Graduating from URI with a bachelors and master's degree, Raso studied aquaculture and fisheries technology In 2002, founded Matunuck Oyster Farm, a wading depth aquaculture farm, on Potter Pond in East Matunuck (Wakefield), RI. Perry opened the restaurant in 2009 to provide a place for work boats to access the farm, and to sell fresh oysters from the farm. In 2011 he started growing organic vegetables to provide guests with fresh produce. Also established Shellfish Hatchery Research and Innovation Center and most recently a retail market. Has been doing educational oyster farm tours since 2002 and has travelled to several developing countries to consult on various aquaculture operations. Education and giving back has always been at the core of the business.

## Subhas Das

Eco-toxicology Laboratory, Department of Environmental Science, The University of Burdwan, West Bengal, India

# Choline-exposed Indian major carps and air-breathing fishes reflect successful maturation of gonads reared in a semi-intensive pisciculture system: A histotechnological and ultrastructural introspection

The surveillance under direct field-pond application of choline chloride with farm-made-aqua-feed under semi-intensive culture system was undergone to investigate the gonadal maturity in two Indian Major Carps, *Catla catla, Labeo rohita* and in two air-breathing teleosts, *Clarias batrachus*, Anabas testudineus reared in a ratio of 2:5:1:1 for a period of 90-d both during dry [November to January: Control-Dry (CD) and Treatment-Dry (TD)] and breeding seasons [June to August: Control-Breeding (CB) and Treatment-Breeding (TB)]. Results were compared with control [C: pond (C) fed only with farm-made-aqua-feed] and treatment [T: ponds (P1 and P2) fed with farm-made-aqua-feed plus choline chloride @ 350 g bigha-1 fortnightly]. The histotechnological observations of ovary of CD and CB fishes depicted follicular layer separation, follicular atresia, resulting into non-fertile oocytes, and ovarian tissue necrosis; while the TD and TB fishes showed ripe and developed oocytes. Besides, the TB fishes showed improved seminiferous tubules of testis, increased sertoli cells. Ultrastructurally, ovary of CD and CB fishes depicted thick thecal wall of Cortical Alveolus oocytes (CA), abundance of immature oocytes, single-layered squamous follicular epithelium; whereas, TD and TB fishes displayed well-compacted, well-articulated CA oocytes, mature follicle, and abundance of Mucopolysaccharides (MPS) over the oocyte's surface. Testes of CD & CB fishes

## Biography

Dr. Subhas Das is a fisheries professional and working in the Department of Fisheries, Government of West Bengal since last almost seventeen years. Has acquired Bachelor of Fishery Science (B.F.Sc.) from the West Bengal University of Animal and Fishery Sciences, West Bengal, India; M.Sc. in Environmental Science from Vidyasagar University, West Bengal, and Ph.D. in Environmental Science from the University of Burdwan, West Bengal. Presently, Dr. Subhas Das is a registered candidate of Doctor of Science under the Department of Environmental Science, the University of Burdwan, West Bengal, India. His field of specialization under the broad subject area is Fisheries, Aquaculture, Environment and Ecology, while his major research interest under the thrust area is fish nutrition, fish immunology, eco-toxicology, biochemistry, histology, histochemistry, scanning-electron microscopy, immune-histochemistry, enzyme-histochemistry, haematology, metagenomics, amino acid profiling.

depicted less potent primary spermatocytes and weak secondary spermatocytes; whereas, TD & TB fishes showed well-structured spermatogonia, several well-organized secondary spermatocytes, spermatids, and strong motile healthy Sperms (SPM). Finally, choline can trigger successful ovarian maturation depicting better yield, which may cause substantial profit to fish farmers.

## T.V. Anna Mercy

Professor & Director, Department of Aquaculture, Sacred Heart College (Autonomous), Thevera, Ernakulam, Kerala, India 686513

# Small Indigenous Freshwater Fishes (SIFFs) of the Western Ghats of India, a rich source of nourishment

The Small Indigenous Fish Species (SIFFs) are those species which can grow maximum to a length of 25-30 cm in the mature or adult stage of their lifecycle (Felt et al., 1996). India is blessed with a rich diversity of fresh water fishes both in the Western Ghats (WG) and North Eastern Hills. About 765 species are reported to have from freshwater and out of this 450 species are categorized as Small Indigenous Fishes (SIS). These small fishes (SIFFs) are important sources of micronutrients (especially Ca, Mg and P) and are also cheap sources of high quality animal proteins. There are about 300 species of fresh water fishes in the Western Ghats alone of which half of them are small sized. Because of their large inhabitants and high abundance, they comprise a significant assemblage of the total finfish population in the inland capture and culture fisheries production. In the 1970s, most fish farmers “cleaned” their ponds with pesticides. This expensive practice was to eliminate competition from the small, lower yielding small indigenous fresh water (named as “weed fish”) species before farmers stocked their ponds with more marketable fish such as carp or tilapia. Contrary to popular belief at the time, small fish did not compete with large fish for space or food. Instead, the approach increased total productivity by as much as five times, as well as enhancing species diversity and nutritional value of the production.

People in the villages consume more SIFF compared than the urban counterpart as these fishes do not have good market demand as compared to the major carps and other large fishes but plenty available from local water bodies

## Biography

Dr. T.V. Anna Mercy studied M.Sc. Marine Biology at Cochin University, Kerala, India. Received Ph. D from Kerala University in 1982. Her Ph. D work was on a unique Indian blind clariid fish Horaglanis krishnai Menon that dwells only in subterranean wells at Kottayam, Kerala. And became the Junior Assistant Professor at College of Fisheries, Kerala Agricultural University, Panangad in 1984 & became Professor in 2002. Dr. T.V. Anna pioneered research on Indigenous fresh water Ornamental Fishes of the Western Ghats of India, developed captive breeding technology for 15 prioritized fresh water species including Sahyadria denisonii, which is a much sought after ornamental fish in the international market. It is popularly known as “Miss Kerala”. Has been published about 100 research papers including 50 in peer reviewed journals and authored/co-authored many books. Presented research papers on different aspects of ornamental fishes in several international conferences at Brazil, Oregon, USA, China, South Africa, Ethiopia, Iceland, Netherland, China, Srilanka, Singapore, Korea, Malaysia, Indonesia and Australia.

may serve as an alternative source of quality dietary proteins in rural food and nutrition. Thus, the SIFF can play a key role in preventing the widespread micronutrient deficiencies and allied diseases. Though Small Indigenous Fish Species (SIFFs) are nutrient dense, they are often overlooked in developing nations (Roos et al., 2007). Earlier they were called as trash fish or miscellaneous fish, but nowadays, it is preferred by all classes of society. As a result, the people with low income who are unable to afford costly species such as carp, there is an increasing demand for small indigenous fishes. As far as public health is concerned, it is essential to be acquainted with the nutrient profile of the small indigenous fish species from the WG of India. It is useful to know their nutritive significance in terms of food, nutritional security and poverty alleviation. So far, very few published information is available on the proximate composition and nutrient profile of Small Indigenous Fish Species (SIFFs) of the WG of India. Considering the importance of the small indigenous fishes, a study is initiated at the department of Aquaculture of the Sacred Heart College to document comprehensive nutrient profiles with a specific focus on important Small Indigenous Fish Species (SIFFs) available in the Kerala state of South India. In the present paper proximate composition and nutrient profile of five SIFFs is presented.

## Timothy C. Visel

Retired Aquaculture Educator, USA

# Growing up with climate change: From childhood curiosity to teaching future farmers of the sea

Growing up on the Connecticut coast (USA) in the 1960s came at the end of a long period of cold. In 1965, Long Island Sound froze over as far as the eye could see; it hasn't frozen over again. Harry Van Loon living in Copenhagen described his experiences in a 2005 interview as being born at one end of the NAO (North Atlantic Oscillation) and living 26 years "at its receiving end." The NAO has obtained much recent interest as it relates to the Atlantic Meridional Overturning Circulation (AMOC).

The New England winters in the 1950s were frequently cold and storm filled. Although Connecticut has a rich shellfish history of producing oysters, Crassostrea virginica and the hard clam, Mercenaria mercenaria (quahog), these industries reached their highest production in the 1890s. Storms in central and eastern Connecticut caused shellfish in open high energy areas to be cast up onto beaches in the coastal town of Madison, Connecticut. My brother, Raymond, and I noticed these clams and oysters washed up along Hammonasset Beach State Park, a coastal public park near our home. We saw these stranded shellfish as an opportunity to keep them alive in Tom's Creek, a small tidal creek. In the summers, we would check to see if they lived and could see them grow. I was 12 years old, and my brother was 10 years old.

In time, Tom's Creek became an oyster and clam farm in a small business in which we sold shucked oysters and large adult clams for chowder. We planted shells for oyster spats and noticed that our raking kept the soil loose and suitable for clam sets despite the presence of the green crabs, Circinus maenas, which lived in Tom's Creek as well. Fresh water discharge kept the starfish, Asterias forbesi, and

## Biography

Timothy Visel attended an oceanographic technology program at The Florida Institute of Technology, Jensen Beach, then attended the University of Rhode Island where he earned an Associates degree in Fisheries (1977), a BS in Marine Resources (1978), and an MS in Animal Pathology (1985)-Department of Aquaculture. In 1994, Timothy Visel earned a 6th year diploma in School Administration from the University of Connecticut and has held several university positions from 1978 to 1990 (UMass, URI, UConn) and later two public schools, supervising Aquaculture School Construction projects from 1990 to 2022. Has been published numerous journal articles and papers regarding shellfish aquaculture and aquaculture education.

oyster drill snail, Urosalpinx cinerea, out of Tom's Creek.

However, as the waters warmed, the shellfish in Tom's Creek perished; harmful algal blooms, sulfate bacteria, sulfide, brown tides, oyster and clam disease, including MSX and vibrio infections soon ended our small shellfish venture. A more detailed description of shellfish habitat loss can be found in Neil Berro's manuscript about oysters titled "Oyster Haven Lost" (2024).

There was a huge gap between the observations of shallow water habitats of Rhode Island, Connecticut and Cape Cod, Massachusetts (USA) and the scientific literature. This gap was magnified by shallow water warming, a shift in soil bacteria, clam and oyster diseases and organisms that could not survive in the colder waters of the 1960s.

The end of the shallow water habitats created a desire to bridge habitat observations to specialized science laboratories for grades 9-12. This practical application of industry equipment at a secondary school level is the cornerstone of a century-old agriculture education. Today, we recognize vocational agriculture education and its student association, FFA (formerly known as the Future Farmers of America). At these new aquaculture education centers labs for biotech, toxicology, pathology and bacteriology would exist, the sciences needed for future aquaculture industries.

In Connecticut, the Bridgeport Aquaculture Center completed a $40 million (USD)/30,000 square foot (2,787 square meters) expansion in 2010 after the original $8 million (USD) build in 1990. The Sound School Aquaculture Center in New Haven, opened in 2003 as a $38 million (USD) and later updated its Fish Production laboratory in 2023. Hundreds of people helped make these aquaculture education centers a reality. Combined, to date, these two centers represent 65 program years of education much needed for future farmers of the sea.

## Prof. (Dr.) Virendra Kumar Goswami

Indian Institute of Technology (IIT) & Environment and Peace Foundation, India


# Application of Artificial Intelligence and Remote Sensing (AIRS) to study the correlation of climate change with ocean energetics (OSIRIS) to develop Numerical Ocean Cryosphere-Energetics Model (NOCEM)

By making use of Artificial Intelligence and Remote Sensing (AIRS), the present study aims to understand Ocean Energetics by studying the morphological and dynamical properties of Oceans at Sea-Surface (SS), Sub-Sea-Surface (SSS), and Deep-Sea Surface(DSS) levels e.g., Sea Surface Temperatures (SSTs), Sub-Sea Surface Temperatures (SSSTs), Deep-Sea Surface Temperatures (SSTs), Salinity, Marine Pollution due to toxic gases, Ocean Systems Interactions, Risks, Instabilities, and Synergies (OSIRIS) to develop first 'Numerical Ocean Energetics Model (NOEM)'.

Next, the aforesaid studies are to be conducted at Cryosphere Surfaces (CS), Cryosphere (CSS), and Deep-Cryosphere Surface (DCS), by studying the morphological and dynamical characteristics e.g., melting of the glaciers, ice sheet stability, ice and bedrock coring, ice sheet modelling, and ice sheet processes over the cryosphere, in order to substantiate the developed 'Numerical Ocean Energetics Model (NOEM)'into 'Numerical Ocean Cryosphere-Energetics Model'(NOCEM)',through the computational correlational techniques by using high-resolution satellite imageries, data access, assimilation; HPC and cloud computing for real-time analysis and artificial intelligence to explore the deep seas.

Seminal scientific research is needed to develop Numerical Ocean Cryosphere-Energetics Model (NOCEM), over the North Atlantic-Arctic Sector, to understand the major

## Biography

Dr. Virendra Goswami, Ph. D Indian Institute of Technology (IIT), Kharagpur, MS from the University of Wisconsin, USA. Post Doctorate Fellow (PDF) at the University of Illinois, Chicago, USA. 'Visiting Scientist' to UNIDO, ICTP, Italy &International Civil Aviation Organization (ICAO), Canada. Founder President 'Environment & Peace Foundation, and Wing Commander (Retd), with 550 hours of flying as a supernumerary Aircrew. Dr. Virendra Goswami worked at Space Science Engineering Centre, NOAA(NASA) at the University of Wisconsin, USA. Former Vice-Chancellor (Rector): Sangam & Sunrise Universities. Had been Director General /Director of Management / Engineering Institutes. More than 44 years of teaching, research, and administrative experience at Home and abroad. Member: American Geophysical Union, American and Indian Meteorological Societies. Special Invitee by the World Meteorological Organization (WMO) in 2001& 2016. Invited Speaker in Apr'15 at NPW: NSF, NCAR, USA, Météo-France, WMO, CLIVAR, and Lomonosov Moscow State University,' Globalistic-17', 'Globalistic-20 TROPMET-20,

atmospheric challenges due to extreme weather events caused due to mesoscale convective systems, global carbon cycle, dynamical and morphological properties, along with sub-mesoscale dynamics of Arctic ice sheet stability, Cryosphere (Arctic), Oceanic Atmospheric regions.

Hence, efforts art on the Co-evolution of climate and marine life in the Arctic-Antarctic-Sea through the correlation of ocean-atmosphere-cryosphere interactions with climate variability i.e., to evaluate the correlation between the impacts of multiple stressors on the ocean and the associated risks of abrupt state shift, rising of sea level, melting of the glaciers, vis-à-vis climate change.

Next, through the process of initialization, computation, parameterization, within the (1x1) deg. grid-box by the computer algorithm, the numerical prediction models for ocean-cryosphere climate variability over Arctic & North Atlantic regions would be evolved by studying the kinematic features of the mesoscale convective systems over Arctic- North Atlantic Ocean regions and, be correlated with ocean-cryosphere climate variability on time & space scales; at the local, regional and global levels through the extracted sea and cryosphere surface temperature over the grid box (10-10), attributing the regional change to natural and anthropogenic radiative forcing agents to bring out the few optimum values of the (OSIRIS) to develop 'Numerical Ocean Cryosphere-Energetics Model'(NOCEM).

**Keywords:** Ocean and Cryosphere Energetics, Toxins, Climate Change, Ocean Systems Interactions, Risks, Instabilities, Synergies (OSIRIS), Ice Sheet Stability, Ice and Bedrock Coring, Ice Sheet Modelling, 'Numerical Ocean Cryosphere- Energetics Model'(NOCEM).

Euro-Marine2021, WAC2022 and WAC2023, Tokyo. Reviewer/ Member of Editorial Board of Royal Meteorological Society Atmospheric Science Letters (R. Met. SAL) as well as Prof. Emeritus: Sharda Univ., and GNEC, Medical College, New Delhi. Presented Papers in the field of Chemical Technology, Atmospheric, Marine, Oceanic, Space, Medicinal, and Lunar Sciences. Satellite Application, Climate Variability, Control of Global Warming & Quality Higher Education at International and National Conferences held in India, USA, UK Latin America, South Africa, Canada, and Europe (more than 32 countries of all the Continents) in the capacity of 'Visiting Scientist'. Besides, headed various delegations at the National & International Levels.

**Virgilio B. Ratunil[1*] Jr., Maria Lourdes Dorothy G. Lacuna[2], Maria Luisa S. Orbita[2], Annielyn D. Tampus[2], Ruby C. Gonzales[3]**

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## Occurrence of *Panulirus ornatus*, *Panulirus* versicolor and *Panulirus longipes longipes* (Palinuridae) pueruli in the coastal waters of Surigao Del Sur, Philippines

Puerulus naturally settles in Surigao del Sur's water during the early months of the year. Its arrival was caused by an ocean current that carried them from Papua New Guinea to the Southern Philippines, where they settled as puerulus. Many fishermen rely on puerulus collection as a source of income, while many marine live dealers profit financially from it. During the season, catch monitoring was conducted at five sampling stations: Tandag City, Marihatag, Surigao del Sur, San Agustin, Surigao del Sur, Lianga, Surigao del Sur, and Bislig City. The fish landing survey form was used to monitor the puerulus catch during the puerulus occurrence period at the aforementioned sampling stations. The results revealed three species: Panulirus ornatus, Panulirus versicolor, and Panuirus longipes longipes. P. ornatus had the greatest mean catch (84.85%), followed by P. versicolor (10.22%) and

## Biography

Mr. Virgilio B. Ratunil, Jr., Associate Professor IV at Surigao del Norte State University–Mainit Campus, Magpayang, Mainit, Surigao del Norte, Philippines holds a Bachelor's in Marine Biology (1997) and a Master's in Aquaculture (2016) from Mindanao State University at Naawan, Naawan, Misamis Oriental, Philippines. Virgilio Ratunil is pursuing a Ph.D. in Marine Science at Mindanao State University–Iligan Institute of Technology at Tibanga, Iligan City, Philippines, focusing on his dissertation, "Puerulus Lobster Occurrence in the Waters of Surigao del Sur, Philippines." Has been published several peer-reviewed articles in Web of Science and Scopus-indexed journals.

P. longipes longipes (4.92%). P. orantus predominated at all sampling sites, with the highest relative abundance in Tandag City, Bislig City, and Lianga, Surigao del Sur, at 99.68%, 99.46%, and 99.43%, respectively. Tandag City had a high mean catch (45.20 pieces/fisher/day), followed by San Agustin, Surigao del Sur (30.36 pieces/fisher/day), Marihatag, Surigao del Sur (8.83 pieces/fisher/day), Bislig City (9.43 pieces/fisher/day), and Lianga, Surigao del Sur (3.66 pieces/fisher/day). CPUE values began at 0.92 pueruli/hour in February, increased to 1.60 pueruli/hour in March, and reached 3.27 pueruli/hour in April; however, there was an abrupt increase between April and May, between 3.27 and 8.91 pueruli/hour, followed by an abrupt decrease between May and June, from 8.91 to 0.85 pueruli/hour. Pueruli occur once a year, with higher fishing activity one week before and after the new moon phase. Since this study focused on the puerulus resource in Surigao del Sur, Local Government Units must implement appropriate management strategies to ensure the province's fishing resource sustainability.

**Keywords:** Puerulus, Natural Settlement, Seasonality of Catch, Catch Per Unit Effort, Catch Composition.

# BOOK OF ABSTRACTS

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5th Edition of the

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## ORAL PRESENTATIONS

**Ahmed Ghallab**

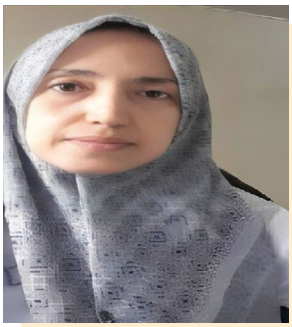
Manager of red sea protectorates, PhD in Marine ecology, Ministry of Environment, Egyptian Environmental Affairs Agency, Nature Conservation sector, Manager of red sea protectorates, Hurghada, Egypt

## Success of coral reef restoration through sexual spawning at Egyption Red Sea

Sexual reproduction of corals is one of the key processes for the stability and reproduction of coral reefs. According to the literature and our survey, mass spawning of Acroporidae in red sea actually matures in late April, and all are empty in early May. We documented the slicks of maturing eggs during 2017, 2022, 2023 and 2024 through mass picncky colour which indicate the spawning of coral in sea were set, spawning slicks indicate that many of these colonies released gametes in April-May each year. We have witnessed the accumulation of pink slicks of coral eggs in different years 2017, 2022, 2023 and 2024. We can collect and receiving fertilized eggs which are examined under a microscope for use in coral restoration. The slicks collected from that accumulate on the surface and placed in an artificial tank closer to the sea, after 6 months of set slicks recruitment of ten individual Acropora corals were grown in the tank.

### Biography

Dr. Ahmed Ghallab received bachelor's degree in biological marine sciences from Al-Azhar University in 2002. In 2003, worked with the Red Sea protectorates as environmental researcher to protect the natural resources of the Red Sea. In 2011, received a master's degree for a thesis of environmental and biological studies on Gastropods feeding on coral reefs at the Red Sea coast in Egypt. In 2021, obtained Ph.D. thesis of the environmental rules of managing and protecting ecosystems in the northern Red Sea islands. Dr. Ahmed participated and published several studies on the Red Sea coast and its environment. In coral reefs, red sea dolphins, seagrass, he one of the members of the Monitoring scientific team at the Ministry of Environment in Egypt, Dr. Ahmed Ghallab is currently the Director General of the Red Sea protectorates.



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## Transforming eel fisheries: Case studies and success stories from the IFish project in Sukabumi, Indonesia

The IFish project in Sukabumi, Indonesia, has played a pivotal role in transforming the management and sustainability of eel (*Anguilla* spp.) fisheries. These abstract highlights the development of eel aquaculture in Sukabumi before and after the implementation of the IFish project, emphasizing policy support at both regional and national levels. Before the project, Sukabumi's eel aquaculture heavily relied on wild-caught glass eels with low survival rates, posing significant risks to the sustainability of natural eel populations. The lack of comprehensive management strategies and infrastructure further exacerbated these challenges, limiting the potential for sustainable aquaculture development. Recognizing these issues, the IFish project, initiated in 2018 by FAO and supported by the Global Environment Facility (GEF), introduced innovative solutions to improve eel conservation and aquaculture practices. Key achievements of the project include the establishment of demonstration sites such as the Tonjong Fish Seedling Center, which successfully increased glass eel survival rates to 60%, reducing pressure on wild populations. The construction of fishways in critical habitats like the Cibareno River ensured migratory connectivity for eels, addressing biodiversity concerns. Additionally, the project facilitated capacity-building programs for local stakeholders and established community monitoring groups to oversee inland fisheries resources. Policy advancements have been integral to these efforts. At the regional level, Sukabumi ratified a District Regulation on Fisheries Management and Sustainability in 2023, mandating fishways in dams and weirs to support migratory species. Nationally, collaboration with the Ministry of Marine Affairs and Fisheries (MMAF) led to the formulation of an Eel Fisheries Management Master Plan, aligning local practices with broader conservation goals. The IFish project's integrated approach—combining scientific research, community engagement, and policy reform—has enhanced sustainable eel aquaculture and strengthened Sukabumi's position as a leader in Indonesia's inland fisheries sector. These success stories underscore the potential for replicating similar models across other regions to achieve biodiversity conservation and improved livelihoods.

**Biography**

Aisyah works as a policy analyst at the Education Center, Ministry of Marine Affairs and Fisheries. Her journey began as a researcher with more than 15 years of skills and experience focusing on inland fisheries and later transitioned to policy analysis roles in 2022. Holding a master's degree in marine technology from IPB University, her diverse training experiences domestically and internationally have shaped her expertise in data analysis, Geographic Information Systems, and scientific writing. Aisyah dedication is evident in contributions to formulating strategic policies that enhance vocational education quality and human resource development in the marine and fisheries sector.

**Ana Claudia Sánchez-Ortiz[1*], Rafael Franco-Sapién[2], Ángel Isidro Campa-Córdova[3]**

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[3]Acuacultura, Centro de Investigaciones Biológicas del Noroeste, La Paz, Baja California Sur, México

## Sustainable aquaculture: Strategies for comprehensive improvement

Aquaculture supplies more than half of food production in the fishing sector, which is why it has become one of the most important practices for the food industry worldwide. The need to produce food under strict quality standards and reduce the impact on the environment, leads to development of food industry, particularly aquaculture practices. Minimizing the impact of this industry implies the use of non-chemical antimicrobials and better practices for a sustainable management. Aquaculture biotechnology provides tools and processes that allow the development of pathogen detection and control strategies, improvement of genetic lines, improved performance (lower mortality and greater growth), and less impact on the environment. Search for alternatives for crop improvement and protection against pathogens is of utmost importance to avoid production losses and dispense with the use of antibiotics. In traditional medicine, plants have been used ancestrally for therapeutic purposes, which is why their antimicrobial potential is well recognized. Medicinal plants offer a natural and sustainable alternative with high antimicrobial capacities, particularly if native species are used. Antimicrobial potential, in addition to antioxidant, which medicinal plants can contribute to aquaculture practice, implies the elimination of harmful antibiotics from the environment and contributes to the improvement of aquaculture practice and the reduction of its impact. The use of medicinal plants as antimicrobials in aquaculture systems requires the evaluation of the dose and method of application, since direct application can result in a certain degree of toxicity to organisms. The use of yeasts and bacteria as probiotics has represented a highly effective strategy in: Reducing pathogens by competition or by the production of metabolites such as bacteriocins, increasing feed digestibility by the production of digestive enzymes, increasing immune response, greater growth and lower mortality.

Plant extracts, together with microorganisms, can help minimize pathogens in the culture water, as well as reduce or eliminate contaminating compounds such as heavy metals, among others, facilitating the bioremediation of water and reducing the impact on the environment by eliminating the use of antibiotics and generating cleaner water that can be used in another system, integrating a multi-culture.

These and other strategies have been evaluated with different species of interest to aquaculture, particularly with white shrimp. The integration of these strategies can increase the productive performance of aquaculture systems and reduce the impact of the industry on the environment. A comprehensive system with best practices and innovative scientific and technological tools can boost the aquaculture industry and contribute to food sovereignty.

**Biography**

Dra. Ana Claudia studied Marine Biology at UABCS, La Paz, BCS, Mexico and graduated as master in science in 2009 and doctor in science in 2015 in the area of marine biotechnology. Then joined at 2017 to the University of Guadalajara as professor and researcher in marine, aquaculture and food biotechnology. Dra. Ana Claudia has published her work in international journals and leads a research project that involves doctoral students. Conducts collaborative research for the development of the aquaculture industry with other leading researchers.

**Apinun Suvarnaraksha**

Faculty of Fisheries Technology and Aquatic Resources, Maejo University, Chiangmai, Thailand

## Sustainable fisheries and aquaculture in the Yom River, Chao Phraya River Basin, Thailand

This study delves into the integrated management of aquaculture and fisheries in the Yom River, Thailand. It is divided into four key components:

1. **Aquatic Resource Foundation:** This section explores the biological diversity of fish species in the basin, including their distribution, abundance, and conservation status. It also investigates the ecological factors influencing fish communities and their seasonal spawning patterns.

2. **Economic, Aquaculture, Food Processing, and Society:** This component analyses the economic significance of fisheries and aquaculture in the region, including fish consumption patterns, aquaculture practices, and fish processing techniques. It also examines the social and economic implications of these activities.

3. **Conservation and Networking:** This section highlights the importance of conservation efforts, such as youth engagement and community-based initiatives, in preserving the aquatic ecosystem. It also discusses the establishment of networks to promote sustainable practices.

4. **Integrated Management:** This final section outlines the principles of integrated management, emphasizing the need for a holistic approach that considers ecological, economic, and social factors. It proposes strategies for promoting sustainable aquaculture, conserving fish populations, and enhancing the livelihoods of local communities.

By combining scientific knowledge with practical applications, this study aims to contribute to the sustainable management of the Yom River basin's aquatic resources and to ensure the long-term well-being of both the ecosystem and its inhabitants.

**Biography**

Dr. Apinun Suvarnaraksha studied fisheries from Maejo University (Thailand) in 1993 and master in fisheries biology from Kasetsart university (Thailand) in 1997. Working on fish taxonomy, fish biology, fish ecology, aquaculture, integrated agriculture, rural development, and education integration. Received Ph.D. degree in Aquatic Ecology at the Ubon-Rachathani University in Thailand and Paul Sabatier University (Toulouse III) in France and graduated in 2011. Also, had collaboration with Techno I and II Project (Erasmus Mundus) from 2005-2014, European Union and Nagao Natural Environmental Foundation Project, Japan from 2006-present. Dr. Apinun obtained the position of an Associate Professor at the Maejo University and has been published more than 40 research articles.

**Firew Admasu[1,3*], Mulugeta Wakjira[1], Tokuma Negisho[1], Ketema Bacha[2], Soressa Gershe[2]**

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[2]Applied Microbiology, Department of Biology, College of Natural Sciences, Jimma University, Jimma, Ethiopia, P.O. Box 378

[3]Department of Biology, College of Natural and Computational Sciences, Dilla University, Dilla, Ethiopia, P.O. Box 419

## Effect of probiotic dosage on fish growth, water quality, and microbial composition in aquaponics systems

Probiotics play a vital role in enhancing immunity, combating pathogens, and reducing the impact of antibiotics in aquaculture. However, studies on optimal probiotic dosages remain limited. This study evaluated the effects of mixed probiotics on fish growth, water quality, and microbial composition in an aquaponics system. A total of 36 Clarias gariepinus (initial weight: 41.53±3.88 g, $p>0.05$) were collected from a reservoir, stocked in six identical tanks, and fed at 5% body weight twice daily. Probiotics were isolated from African catfish, screened and administered in basal diets for three treatments at ratios of 1:2:3 and monitored for 60 days. Additionally, 192 lettuce seedlings were transplanted into six hydroponic units with initial parameters at $p>0.05$ and evaluated over five weeks. The collected data from aquaponics system were analyzed using one-way ANOVA and Duncan's test. The highest fish weight was recorded in T2 (122.67±5.19 g), followed by T3 (118.17±8.30 g) and T1 (112.17±8.79 g/fish). Performance metrics ranged as follows: Daily weight gain (1.18–1.36 g/day), percentage weight gain (169.19–196.81%), feed conversion ratio (1.11–1.02), feed efficiency (90.03–98.46%), specific growth rate (1.65–1.82%/fish/day), and a consistent survival rate (100%). While no significant differences ($p>0.05$) were observed between T2 and T3, both outperformed T1 ($p<0.05$). Water quality parameters showed no significant differences ($p>0.05$) between treatments. Nitrogen compounds were highest in fish tanks, followed by biofilters and hydroponics units, except for nitrates, which peaked in biofilter outlets. Lettuce biomass was highest in T3 (672±177.09 g), followed by T2 (624±61.14 g) and T1 (602±99.08 g). Microbial loads in water were highest in T1 (68.33±27.27 CFU/mL), followed by T2 (57.67±19.62 CFU/mL) and T3 (54.83±16.02 CFU/mL). Microbial loads in fish tissues were highest in the stomach, followed by the skin and gills, with higher values in T1 compared to T2 and T3. In conclusion, increasing probiotic dosage improves fish growth, enhances water quality, reduces toxic nitrogen compounds, and boosts nitrate levels, ultimately supporting higher lettuce biomass and fostering balanced ecosystems in aquaponics systems.

**Keywords:** Aquaponics, Fish Growth, Lettuce Biomass, Microbial Composition, Probiotics, Water Quality.

**Biography**

Firew Admasu studied B.Ed. degree in Biology with minor chemistry, and M.Sc. degree in Biology (Ecological and systematic zoology), then joined Dilla University as a lecturer of Biology (Ecological and Systematic Zoology) at the Department of Biology, College of Natural Sciences, with affluent experiences in both teaching and research. Has been published more than 10 research articles in different journals. Now, Firew Admasu is a Ph.D. Candidate in Biology (Aquaculture and Fisheries Management) at Jimma University, Ethiopia.

**Fuyuko Hashio**
Tsukui Co., Ltd., Japan

## Frequency analysis of electroencephalogram recorded from a bottlenose dolphin (Tursiops truncatus) during transportation by truck

The bottlenose dolphin (Tursiops truncatus) is a marine mammal positioned at the top of the food chain and lead social lives. These brain functions are controlled by the electrical activity of neurons in the cerebral cortex, and changes in this activity can be detected by an electroencephalogram (EEG) or electrocorticogram(ECoG).

In order to obtain information regarding the correlation between an electroencephalogram (EEG) and the state of a dolphin, we developed a noninvasive recording method of EEG of a bottlenose dolphin and an extraction method of true-EEG (EEG) from recorded-EEG (R-EEG) based on a human EEG recording method, and then carried out frequency analysis during transportation by truck. The frequency detected in the EEG of dolphin during apparent awakening was divided conveniently into three bands (5-15, 15-25, and 25-40 Hz) based on spectrum profiles. Analyses of the relationship between power ratio and movement of the dolphin revealed that the power ratio of dolphin in a situation when it was being quiet was evenly distributed among the three bands. These results suggested that the EEG of a dolphin could be detected accurately by this method, and that the frequency analysis of the detected EEG seemed to provide useful information for understanding the central nerve activity of these animals.

**Biography**

Fuyuko Hashio has a BS (Konan University), an MSc (Nagasaki Institute of Applied Science), and a PhD (Azabu University). She worked for Yazaki Corporation on semiconductor-related development projects and contributed to dolphin research at Nihon University. She is currently working on animal-assisted therapy at Tsukui.

**Gandhi Napitupulu[1,2*], Achmad Nagi[3], Susanna Nurdjaman[2,3], Ivonne Millichristi Radjawane[2,3], Rima Rachmayani[2,3], Muhammad Ridwan Ramadhan[4], Muhammad Ikram Nasution[5], Ahmad Dhuha Habibullah[3], Filan Muhammad Kelvin[4]**

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## Ecological responses of coral reefs to marine heatwaves and cold spells in the tropical indo-pacific: A case from Lombok, Indonesia

Coral reefs are among the most biologically diverse and economically valuable marine ecosystems but increasingly threatened by climate change-related thermal stress events. This study examines the impacts of marine Heatwaves (MHWs) and Marine Cold Spells (MCSs) on coral reef assemblages of the Lombok Strait of Indonesia and the degree to which they induce coral bleaching and loss. Using 1998-2022 day-to-day Sea Surface Temperature (SST) records, we identified and characterized MHW and MCS events by frequency, amplitude, and persistence. Fluctuations in coral cover were remotely estimated from Landsat imagery (Landsat 5, 6, and 7) and measured in situ through surveys conducted in 2016. We revealed that both MCSs and MHWs are primary drivers of coral bleaching, especially during years with extreme temperature anomalies. Notably, intense MCS events in 2000 and MHWs in 1998, 2016, and 2022 were simultaneous with widespread coral loss, with reef cover reducing by approximately 30%. Large-scale climate patterns, namely El Niño–Southern Oscillation (ENSO) phases, were also found to enhance thermal stress in key years, boosting bleaching and reef harm. Spatial analysis further indicated that vulnerability varied across reef zones, depending on regional oceanographic circulation. These findings highlight increasing intensity and frequency of thermal extremes in the area and their marked ecological effects. Apart from thermal stress, local anthropogenic stresses such as pollution and overfishing also increase coral reef loss. Our work highlights the urgent need for adaptive coral reef management and mitigation actions to counter global climate change as well as local stressors. Future research should aim to enhance monitoring efforts, explore synergistic environmental stressors, and develop predictive models to assess long-term ecosystem resilience in a warming ocean.

**Biography**

Gandhi Napitupulu completed Bachelor's and Master's degrees in Oceanography at the Bandung Institute of Technology (ITB), Indonesia, in 2022 and 2023, respectively. Since the 2023/2024 academic year, has served as a Lecturer in the Environmental and Applied Oceanography Research Group within the Faculty of Earth Sciences and Technology at ITB. Gandhi Napitupulu is currently pursuing doctoral studies at Hiroshima University, Japan, where he joined the Coastal Hazards and Energy System Science (CHESS) Laboratory under the supervision of Professor Han Soo Lee. His Ph.D. research, beginning in October 2024, focuses on estimating blue carbon potential in the Seto Inland Sea using high-resolution ocean modeling and remote sensing techniques. He enrolled in the Graduate School of Innovation and Practice for Smart Society.

**Dr. Gopika Suresh**
Marble Imaging AG, Bremen, Germany

## An Earth Observation (EO) service using AI for efficient monitoring, reporting and certification in the blue economy

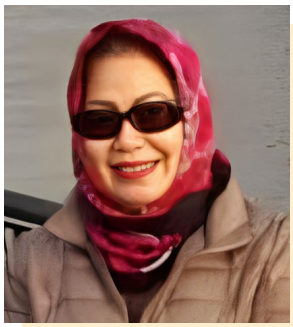
Our oceans are threatened and food security from ocean products through sustainable practices such as aquaculture is critical. Marble Imaging presents an Earth Observation (EO)-powered analytical solution that supports sustainable aquaculture certification by delivering crucial insights into water quality, habitat health and suitability, and regulatory compliance. Currently using multispectral data from Sentinel-2, our solution integrates a comprehensive array of EO datasets including data from Copernicus, USGS and others as well our in-house algorithms to monitor ecosystem dynamics within aquaculture zones. The solution is specifically designed to detect Harmful Algal Blooms (HABs), analyze threats from river outflows, and assess water turbidity and temperature, which are vital for maintaining ecosystem balance and fish welfare.

In addition, our solution uses advanced AI techniques to accurately map aquaculture farm boundaries and detect illegal fishing activities in Marine Protected Areas (MPAs) and during non-fishing seasons. By analysing activity patterns, it enables authorities to enforce sustainable fishing regulations more effectively.

As this solution evolves, it will incorporate Very High Resolution (VHR) data from Marble Imaging's proprietary satellites, enhancing the precision and timeliness of geospatial geoinformation, offering certification bodies, policymakers, and aquaculture operators valuable insights that support compliance with environmental standards. This aligns with the Geospatial World Forum's goals to promote sustainable geospatial solutions and transparency within the blue economy.

**Biography**

Dr. Gopika Suresh is an Earth Observation scientist with over 14 years of experience developing complex methods to extract information from EO data. Holds a PhD in Marine geosciences from the University of Bremen, Germany, MSc from the Technical University, Munich and a B. Tech from the University of Kerala, India. Dr. Gopika Suresh is co-founder, CSO and head of the products team at Marble Imaging. She was a scientist at the German Federal agency for Cartography and Geodesy & German Aerospace Center, lectured at the Frankfurt University of Applied Sciences and did her postdoc at the Earth Observatory of Singapore.



**Indah Susilowati**

Nugroho Sumarjiyanto Benedictus Maria, Waridin Waridin, Aini Nur Furoida, Ika Suciati Universitas Diponegoro (UNDIP), Semarang-Indonesia

## Small-scalers competition in the fisheries of Demak Regency, Indonesia: Between conventional fishers vs the baby trawlers

Demak Regency is located on the north coast and is an essential small-scale fisheries enclave in Central Java. The potential for the Blue Economy is very promising, although it has yet to be utilized optimally. Many Baby-trawl (local name: Arad) are operated in the waters of Demak. Although a baby (tiny in size), it has a destructive character, such as a trawl, since it will drag all fish and creatures with a tiny mesh-size net. Meanwhile, the other small- or medium-scale gears are operated using a conventional system. This conventional fishing method, while less harmful than the baby-trawl, still faces challenges in sustainability and efficiency.

The objective of this research is: (1) to estimate the economic & environmental impacts incurred by the two dichotomous fishing gears. (2) to develop a win-win strategy to improve the welfare of small-scale fishers in Demak as one of the supports for realizing a blue economy. Quantitative and qualitative methods have been used to analyze data from in-depth interviews with competent stakeholders.

The study found that in order to boost the blue economy, more ecologically friendly practices must be implemented, as well as investments in technologies that promote responsible fishing while maintaining marine biodiversity. These innovations may include the creation of selective fishing gear to reduce bycatch, as well as enhanced monitoring systems to assure regulatory compliance. By encouraging collaboration among fishermen, scientists, and policymakers, we may develop a sustainable fishing framework that combines economic requirements with ecological preservation. This joint strategy will not only help to sustain fish populations, but will also benefit coastal people that rely on these resources for their livelihoods. Finally, prioritizing sustainability in the Blue Economy will result in healthier seas and a more resilient marine ecosystem for future generations.

**Keywords:** Competition, Small-Scale, Trawl, Collaboration, Livelihoods, Demak, Indonesia.

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[2]Biodiversity Laboratory, Institute of Advanced Study in Science and Technology (IASST), Guwahati 781035, Kamrup, Assam, India

## Limnological status of the Basistha Hill Stream of Assam, India, with special reference to change in its fish assemblage pattern

Hill streams are perennial fresh water bodies characterized by low temperature, turbulent water and rocky substratum. The combined effort of rocks, gravels and sand in healthy hill streams create a preferred habitat for stream invertebrates and fish fauna. Unfortunately, several hill streams are nowadays observed to be deteriorating due to anthropogenic activities that cause degradation and incision of healthy streams; thereby inducing flooding and erosion. The species composition and size structure of fish assemblages are considered as useful indicators of hill stream health and associated climatic changes. Evidences show that global changes in climate lead to a shift of habitats in fish populations in accordance to their thermal preferences. Fish feed at different levels of the food web, and their assemblages are affected by fishing, pollution and other human impacts.

The ichthyofauna of the Basistha hill stream, a tributary of the Brahmaputra River in Kamrup, Assam, India shows marked changes in its fish assemblage pattern in a span of 20-25 years. The stream originates from the hills of adjacent state Meghalaya and is found to harbour true hill stream cold water fishes along with warm water fish species found in the Brahmaputra drainage. A total of 21 fish species belonging to 15 genera and 9 families were recorded during our survey period (20132015). Apart from the record of true hill stream (lotic) fishes like Garra sp., Olyra longicaudata.

Opsarius bendelisis, Schistura vinciguerrae, etc., other fishes like Puntius chola, Pethia conchonius, Puntius sophore, Badis assamensis and Esomus danrica which usually inhabit lentic water bodies were also recorded in our survey. This fish assemblage is indicative of the gradual change in habitat pattern of the Basistha stream. Comparison of this baseline data with available secondary data has revealed the inclusion of 11 fish species not recorded earlier from this hill stream. This study therefore indicates that over the past two decades, several sub-tropical species (species preferring warm waters) have shown a preference to inhabit this hill stream.

This study lays down an inference that fishes' preferences towards suitable habitat niche in the Basistha stream have changed over the years. Analysis of secondary data which dates back to 1997 (approximately two decades from the present study) has revealed an entirely different fish assemblage pattern of this hill stream. The Indian Meteorological Department, 2024, has stated that unusual rise in temperatures happens to be a common phenomenon, while the annual mean temperatures in Assam has increased by 0.56ºC during 1951-2010. This temperature spike impacts fish assemblages too, as is indicative from the varying range of water temperatures recorded from this hill stream over time. The present paper discusses the limnological status, fish diversity along with molecular barcoding of selected fishes of this stream, in the light of fish assemblage pattern and habitat data recorded over the past two decades. The study is believed to help and support the conservation of the habitat and fish diversity in this hill stream; as well as the surrounding ecosystems.

**Biography**

Dr. Jafrin Farha Hussain is currently working as an Assistant Professor in the Department of Zoology, Nanda Nath Saikia College, Assam, India. She studied Zoology at Gauhati University Assam, and completed Master's in 2012. And, carried out doctoral research work at the Institute of Advanced Study in Science and Technology (IASST) as an Institutional Fellow; under the supervision of Dr. Sabitry Choudhury Bordoloi, Scientist G (Retired). Dr. Jafrin was awarded Ph. D. degree by Gauhati University and served as a Research Officer at the Ministry of Environment, Forest and Climate Change, Government of India for more than 5 years. She has earned awards based on her academic achievements from the American Federation of Muslims of Indian Origin, Brahma Kumaris Rajyoga Education Centre, etc. Dr. Jafrin has several publications; three book chapters, and authored 1 book. Has been participated in national and international conferences, also received best presenter awards in some.

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## Ecological cage aquaculture in quarry lakes: A post-mining strategy in Buenos Aires, Argentina

Freshwater ecological aquaculture of Odontesthes bonariensis in floating cages—whose success has been demonstrated through the regular production of thousands of individuals for restocking purposes—is an ecosystem-based strategy with the potential to promote regional economies while minimizing environmental impacts. This approach builds on the appeal of this emblematic native species of the Province of Buenos Aires, Argentina, and has been developing in shallow lakes for the past twenty years. More recently, the focus has shifted toward sustainable use strategies for quarry lakes: water-filled excavations resulting from the extraction of soil, rock, or other geological materials, formed after mining operations cease, due to increase of groundwater table, surface water runoff, and/or precipitation. In Buenos Aires Province, there are approximately one thousand quarries, about 300 of which are flooded, many located within or near urban areas. These are considered environmental liabilities, posing challenges for numerous municipalities. However, these sites also present unique characteristics that make them suitable for implementing innovative post-use strategies, such as collaborative and ecosystem-based aquaculture projects for native fish species. Recognizing aquaculture as a means to enhance local quality of life, four experiments have been conducted since 2022 in a quarry lake in Samborombón (Brandsen, Buenos Aires). These involved floating cages built and installed in collaboration with local stakeholders. Those experimental units, of 12 m3 in volume, were designed based on prior experience and stocked with pejerrey of different ages. The outcomes of these experiments have informed decisions that significantly improved fish growth, achieving the highest growth rates ever recorded for the species using these methods. Key improvements included optimal cage positioning and introducing an innovative pumping system as a technological adaptation. Using simple and low-cost techniques, and in dialogue with the local community, the goal for the coming years is to promote the co-construction of scientific and technological knowledge with a tangible impact on the local landscape. This sustainable approach could be replicated in other quarry lakes across the region.

**Biography**

Dr. Javier Garcia de Souza studied biology at the “Universidad Nacional de La Plata” (UNLP), Argentina, and graduated in 2008. Received a PhD degree in Natural Sciences from the same University in 2014 and holds a diploma in Public Science Communication from the “Universidad Nacional del Centro de la Provincia de Buenos Aires” (UNICEN). Dr. Javier is a researcher in “Consejo Nacional de Investigaciones Científicas y Técnicas” (CONICET) at “Instituto de Limnología Dr. Raúl A. Ringuelet” (ILPLA, CONICET-UNLP-Centro Asociado CIC). His research focuses on the development of ecological aquaculture for native fish in floating cages, with socio-ecological and transdisciplinary approach.

**Jaynos R. Cortes**

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## Behavioral shifts and the serotonin blueprint in all-male giant freshwater prawn (Macrobrachium rosenbergii): Implications for culture practices

Serotonin is a critical neuromodulator that significantly influences the physiology of the Giant Freshwater Prawn (*Macrobrachium rosenbergii*), impacting key behaviors such as aggression, social dominance, and reproduction. Its dual role as a neurotransmitter and neurohormone enables it to regulate neural and hormonal pathways, making it essential for adaptive behavioral responses in crustaceans. In aquaculture, serotonin's effects are particularly relevant as they contribute to optimizing productivity in all-male populations, which are preferred for their superior growth performance. This paper delves into the biological mechanisms through which serotonin exerts its influence in *M. rosenbergii*. It regulates male differentiation via the androgenic gland by stimulating insulin-like androgenic gland hormone production, which enhances reproductive capability and establishes dominance hierarchies. Additionally, serotonin modulates vitellogenin synthesis and ovarian maturation in females, highlighting its broad regulatory capacity across the sexes. The evolutionary conservation of serotonin's role in behavioral modulation across species underscores its importance in both crustacean neuroscience and aquaculture applications. Understanding serotonin pathways can guide the development of strategies to manage behaviors such as aggression and mitigate challenges like size variation and cannibalism in farming systems. By synthesizing current research, this paper aims to identify knowledge gaps, propose future research directions, and explore serotonin-based interventions to enhance sustainable aquaculture practices. These insights emphasize the transformative potential of serotonin in improving the productivity and welfare of *M. rosenbergii* and other aquaculture species.

**Biography**

Jaynos R. Cortes is a faculty member in the Department of Fisheries, Marine, and Environmental Sciences and the Head of the Aquaculture Nutrition and Health Management Laboratory, Center of Research for Aquamarine Life Sustainability (CoRALS) at North Eastern Mindanao State University- Lianga Campus, Lianga, Surigao del Sur, Philippines. He is currently finishing his Ph.D. in Aquaculture and Aquatic Resources Management at the Asian Institute of Technology, Thailand. As part of his doctoral research, Jaynos is endeavoring to investigate the hierarchical behavior of all-male Giant Freshwater Prawn using dietary supplementation, aiming to mitigate the aggressive behavior exhibited by different morphotypes of the prawn. Aside from his Ph.D. research, he is actively involved in studies on nutritional physiology using phytogenic feed additives in shrimp and fish. A neophyte researcher in this field, Jaynos is diligently publishing academic articles to contribute to the expanding body of knowledge in aquaculture and fisheries. Additionally, he serves as an editorial board member and academic reviewer for several reputable Scopus-indexed journals in the field, further cementing his role in advancing research and innovation in aquaculture and fisheries sciences.

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## Growth performance and gut pH of juvenile shrimp fed with a lignosulfonic acid-based feed acidifier

The objective of this study was to evaluate the effect of two doses of feed acidifier containing lignosulfonic acid, on the growth performance and gut pH of juvenile shrimp, Penaeus vannamei. The experimental design included two outdoor tanks of 7.96 $m^3$ for each dietary treatment and one tank for a control diet, totaling five tanks. Juvenile, P. vannamei were stocked at a density of 75 animals/$m^2$ and reared for five weeks. The dietary treatments were as follows: 1) control, 2) feed with 5 g/kg of lignosulfonic acid-based feed acidifier, and 3) feed with 15 g/kg of lignosulfonic acid-based feed acidifier. The inclusion of acidifier in shrimp feed significantly influenced pH levels, with higher concentrations creating a more acidic environment. However, contrary to expectations, the midgut pH of shrimp did not show a consistent decline with acidifier inclusion. Shrimp growth was notably affected by dietary treatments, with the acidifier treatments exhibiting the highest survival rates and significantly lower Feed Conversion Ratios (FCR), indicating the effectiveness of the acidifier in enhancing shrimp yield. Mortality rates directly impacted growth parameters, with lower mortality rates correlating with higher yields. In conclusion, lignosulfonic acid-based feed acidifier significantly improves the survival and growth performance of juvenile P. vannamei under intensive farming conditions. The study found that a dosage of 15 g/kg of acidifier was more effective than 5 g/kg, resulting in enhanced yield and a more favorable FCR. These findings suggest that feed acidifier containing lignosulfonic acid can be a valuable additive in shrimp aquaculture, promoting better growth performance and survival rates, thereby contributing to more efficient and sustainable shrimp farming practices.

**Biography**

Dr. Julia Dvorska studied veterinary medicine at the Sumy National Agrarian University, Ukraine. Received a PhD degree at the Kharkiv Research Institute. Dr. Julia has two decades of the experience in animal nutrition and health and published more than 260 research publications, including 7 in professional journals in English, 50 articles in professional journals in Russian/Ukrainian, 13 book chapters.

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## Enhancing pelleting efficiency in aquafeed production: A comparative study

Pelleting is a crucial process in aquafeed production, significantly influencing both production efficiency and the quality of the final feed product. Enhancing pelleting efficiency can lead to substantial economic benefits and improved feed performance. This study, conducted on a shrimp farm in Asia, compares the effects of a newly developed lignosulfonate-based pelleting aid with an existing synthetic urea formaldehyde-based binder on production rate, energy consumption, and pellet durability. Three diets were tested using different dosages of pelleting aids: a control diet with 0.5% urea formaldehyde-based binder, and two experimental diets with 0.3% and 0.5% of the new lignosulfonate-based aqua feed binder. The results demonstrated that using 0.5% of the new product resulted in a 28.76% increase in productivity and a 29.13% reduction in energy consumption, along with improved pellet quality (maintaining the same water stability, 7.31% lower fines, and the same durability). Furthermore, using a lower dosage of 0.3% of the new product increased productivity by 2.47% and reduced energy consumption by 9.33%, without compromising pellet quality. The new sustainable aqua feed binder not only significantly enhanced milling performance but also showed potential as an effective pellet binder. These findings suggest that the lignosulfonate-based binder can improve pellet quality and production efficiency even at lower dosages compared to the urea formaldehyde-based binder, offering substantial economic benefits for aquafeed production.

**Biography**

Dr. Julia Dvorska studied veterinary medicine at the Sumy National Agrarian University, Ukraine. Received a PhD degree at the Kharkiv Research Institute. Dr. Julia has two decades of the experience in animal nutrition and health and published more than 260 research publications, including 7 in professional journals in English, 50 articles in professional journals in Russian/Ukrainian, 13 book chapters.

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## Biomonitoring insights from a stream of River Ganga Central Himalaya, India, using benthic macroinvertebrates community

This study assessed water quality in the Rawasan stream of the holy River Ganga in the Central Himalaya, Uttarakhand, India, using benthic macroinvertebrates as bioindicators. Sampling was conducted at five sites along the stream, covering upstream to downstream stretches over one year (2021–2022). Water and macroinvertebrate samples were collected and analyzed to evaluate the stream's biodiversity and ecological health.

Macroinvertebrate samples revealed a rich assemblage comprising 89 genera across eight taxonomic orders dominated by *Trichoptera* (25.09%), *Plecoptera* (24.77%), and *Ephemeroptera* (22.02%), with lower representation from *Acariformes* (2.67%) and Hemiptera (2.47%). The presence of a high EPT (*Ephemeroptera, Plecoptera*, and *Trichoptera*) percentage—47.04%, indicated clean and well-oxygenated waters throughout the stream.

In addition, 13 water quality parameters were measured using standardized procedures. Most variables, including pH, dissolved oxygen, and conductivity, remained within the safe limits prescribed by the Bureau of Indian Standards (BIS) and the World Health Organization (WHO). Statistical analysis revealed a significant positive correlation between the distribution of macroinvertebrates and environmental variables, reinforcing their effectiveness as reliable indicators of stream health.

Overall, the study highlights the ecological value of the Rawasan stream and supports the use of benthic macroinvertebrates as a cost-effective and efficient tool for long-term biomonitoring and freshwater quality assessment in the Central Himalayan region.

**Keywords:** Biomonitoring, Macroinvertebrates, Rawasan, Garhwal Himalaya, India.

**Biography**

Dr. Koshal Kumar is a dedicated teacher cum researcher in the Himalayan Aquatic Biodiversity department at H.N.B. Garhwal University (A Central University), Srinagar (Garhwal), Uttarakhand, India. Then began his academic journey with a science graduation from Jammu University, followed by a Master's and Ph.D. in Zoology from H.N.B. Garhwal University, and is currently serving as an Assistant Professor in the Department of Himalayan Aquatic Biodiversity at H.N.B. Garhwal University, Dr. Koshal fetches more than twelve years of research experience. His work focuses on crustacean fisheries, freshwater bionomics, benthic fauna, and hydro-ecological dynamics of riverine ecosystems in the Himalayan region of India. Dr. Koshal has published more than 35 research articles in reputed Journals, actively contributed to numerous national and international seminars, conferences, and training programs, and has earned recognition from several scientific and environmental organizations for his research contributions from time to time.

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## Diversity and host specificity of ectoparasites in tunisian elasmobranchs: A critical ecological perspective

With more than 62 reported species, Tunisia has a rich diversity of elasmobranchs. However, investigations of their parasites in Tunisian waters remain rare and fragmented. Given the ongoing biodiversity crisis affecting most living species, studying parasites diversity is crucial. In this study we examined 2092 specimen of cartilaginous fishes (Chondrichthyes: Elasmobranchii) from eight species across five families collected along the Tunisian coast for their ectoparasite species. All host species were infected by at least one ectoparasite species. A total of 24 species of ectoparasites were collected and identified. Copepods showed the highest taxonomic diversity with eleven collected species followed by Monogenean and Isopods with six and five species respectively. Only two Hirudinae species were collected including a new species. To understand the diversification and host specificity of the collected ectoparasite species and their influencing factors, we analyzed parasitological indices, parasitic community composition, parasitic richness and seasonal variation. This study provides an important insight into elasmobranch-parasite interactions in Tunisian waters and underscores the complex ecological relationships that characterize marine biodiversity, offering crucial baseline data for conservation strategies in an era of increasing environmental challenges.

**Biography**

Dr. Lamjed Mansour is a full professor at both King Saud University and Tunis El-Manar University. His academic carrier began at Tunis El-Manar University, where he earned his bachelor's and master's degrees in molecular parasitology. Driven by a passion for research, Dr. Mansour got his Ph.D. in 2007 from Tuns El-Manar and Blaise Pascal Universities (now Clermont-Ferrand), where he worked in the Laboratory of Cellular and Molecular Parasitology under the mentorship of Professor Christian Vivares and Oum kalthoum Ben Hassine on the diversity of microsporidia parasites of the Mediterranean Sea. Throughout his career, Dr. Mansour has contributed significantly to the field of parasitology, particularly focusing on fish parasites. He has been involved in numerous national and international projects, enhancing our understanding of these organisms. His research has led to the publication of over 200 scientific papers, and he has described more than 30 new species of myxozoan, microsporidian, and metazoan fish parasites.

**Lee Van Cleff M. Labsan[1*], Rudy Liza B. Cadiong[1], Richelle Jane D. Cornites[1], Prince John Rudolf V. Badilla[1], Mecah Ella N. Cajes[1], Nielwin P. Catina[1], Jaynos R. Cortes[1,2]**

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## Synergistic effects of garlic (*Allium sativum*) skin and guava (*Psidium guajava*) leaf extracts on growth, feed efficiency, morphometry, molting dynamics, and histology in whiteleg shrimp (*Litopenaeus vannamei*, Boone, 1931)

Understanding the impact of plant-based dietary supplementation in aquaculture holds significant potential for enhancing productivity and sustainability. This study investigated the synergistic effects of Garlic Skin Extract (GSE) and Guava Leaf Extract (GLE) on growth, feed efficiency, morphometry, and molting dynamics in *Litopenaeus vannamei* (Boone, 1931) during a 60-day feeding trial. Four dietary treatments—Control, GSE, GLE, and Complex—were evaluated using a completely randomized design, assessing Final Length (FL), Final Weight (FW), Survival Rate (SR%), Feed Conversion Ratio (FCR), biomass, Condition Factor (CF), and microbial load (Vibrio spp.) in the digestive tract and gills, along with morphometric characteristics and molting frequency. Results showed that the GSE diet significantly enhanced biomass (100.80±20.00 g) and survival rate (60.00±8.66%), while the Control group exhibited the highest final length (10.77±0.23 cm). The GLE diet resulted in the highest final weight (9.02±1.76 g) and condition factor (1.30±0.56), indicating improved physiological condition. GSE supplementation also led to the highest molting rate (11.47±0.26) and the shortest molt cycle (2.99±1.09 days), suggesting enhanced molting dynamics. Microbial analysis revealed the lowest Vibrio counts in the Control group, with GSE reducing Vibrio loads in the digestive tract but slightly increasing them in the gills, while GLE maintained balanced microbial control across both sampled areas. Positive correlations were observed between final length, biomass, and survival rate, whereas the feed conversion ratio was inversely correlated with the condition factor. Histological analysis showed significant alterations in the hepatopancreas and muscle tissues of *L. vannamei* supplemented with GSE and GLE, where GSE boosted cellular activity, tissue repair, and hepatopancreatic function, and GLE preserved muscle fiber integrity and overall tissue health. The Complex treatment produced mixed effects, likely due to interactions between its bioactive compounds. In conclusion, both GSE and GLE diets improved growth, survival, tissue integrity, and microbial management in *L. vannamei,* with GSE excelling in biomass production and molting efficiency. These findings underscore the potential of plant-based dietary supplements in enhancing shrimp production and emphasize the importance of optimizing formulations for sustainable aquaculture practices.

**Biography**

Lee Van Cleff Labsan is a 4th Year Bachelor of Science in Fisheries student at North Eastern Mindanao State University–Lianga Campus and a grantee of the Bureau of Fisheries and Aquatic Resources' Fisheries Scholarship Program. Lee Van's undergraduate thesis focuses on Whiteleg shrimp, incorporating phytobiotic extracts from guava leaves and garlic skin to enhance shrimp health. Through this research, Labsan and his team aim to promote sustainability in aquaculture by exploring natural alternatives for shrimp health management.

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## Assessment of suitability of fish culture in paddy fields: Growth performance of Channa punctatus and paddy yield

The present investigations have been carried out in Village Pipal Tha, District Jind, Haryana (India) to explore the possibility of culture of fish, Channa punctatus in paddy fields. 12 paddy plots of 120 square meter area were selected and four treatments (T1: No Fish, no pesticide in paddy fields; T 2: Fish in paddy fields without pesticide exposure; T3: Fish in paddy fields with recommended dose of pesticide and T4: Fish in paddy fields with pesticide exposure whatever the dose used by farmers) were maintained. Paddy fields without fish but pesticide exposure according to farmer that means farmer's treatment was also considered (T5). Fingerlings of C. punctatus were stocked with paddy fields with mean body weight of 15.50±0.40 g @ 1 fish/3 sq. m of area. Two experiments were conducted, in experiment 1 no supplementary feed was given to the fish whereas in Experiment 2 fish were fed on freeze dried tubifex worms or blood worms. Physico- chemical characteristics of water and fish growth performances were analysed from mono-paddy culture fields and paddy cum fish culture fields. Values of water quality characteristics remained in optimum range for fish culture in both the experiments. Growth performance in terms of weight gain, growth % gain in BW (%), specific growth rate revealed significantly high values in treatment T2 followed by treatment T3 and T4. Carcass composition revealed higher accumulation of protein, fat and energy in fish grown in T2 as compared to T3 and T4. Paddy production from treatment plots and Framer's plot was calculated per hectare in order to calculate the economics and it was observed that the values increased from treatment T1 to treatment T3 and thereafter decreased in treatment T4 and treatment T5. A comparison of trial conducted with and without supplementary feed revealed that growth performance in experiment 2, with supplementary feed was higher in comparison to trial without supplementary feed. Although there was extra investment on supplementary feed yet net profit was higher in treatment with supplementary feed. Thus concurrent culture of rice and fish with optimum management practices can not only yield economic benefit to farmers but can contribute significantly to sustainable food security of the nation

**Keywords:** Carcass composition, Fish Growth, Paddy cum Fish culture, Supplementary feed, water quality

**Biography**

Dr. Manjeet Kaur graduated from C.M.K. National Girls College, Sirsa (Haryana), India. She completed her M.Sc. in Zoology (2006–2008) from Kurukshetra University, Kurukshetra. She went on to pursue an M.Phil. with a specialization in Cytogenetics and Fish and Fisheries from the same university. Following this, she participated in a training program at the National Bureau of Fish Genetic Resources (NBFGR), Lucknow, India. She earned her Ph.D. in 2017 from Kurukshetra University. Currently, she is serving as a faculty member at Government College, Safidon, India. Dr. Kaur has several national and international research publications to her credit.

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## Influence of intensive trout production on the aquatic environment and sediments of Titicaca Lake in Perú

Trout production in the Puno region has increased to around 35 thousand tons per year and is mainly carried out in Titicaca Lake, the highest navigable lake in the world. However, approximately 10 thousand tons of solid waste from trout production have been generated in recent years. In the study, the physicochemical parameters of water, chlorophyll, and turbidity were determined in two zones of Lake Titicaca (Bay and Open lake) comparing areas with trout cages and areas without trout cages. The stable isotope of N and C in the waste collected from trout cages and in sediments collected from the lake bottom were also analyzed. The results indicate that there is a greater impact of trout production on the aquatic environment in the bay than in the open lake. However, minor differences are observed in both zones between the areas with trout cages and those without trout. Internal water currents could reduce the impact of trout production on the aquatic environment. Stable isotope analysis of N and C in waste and sediments indicates that the greatest impact comes from the commercial feed given to trout. In conclusion, there are indications of a negative impact of the trout production on the aquatic environment and avoiding it will be a decisive factor in its sustainability in the coming years for the development of trout farming in the region.

**Keywords:** Aquatic Environment, Sediments, Trout Production, Titicaca Lake.

**Biography**

Dr. Marcelino studied Veterinary Sciences at the Universidad Nacional of the Altiplano (UNAP), Perú and graduated as MS in 1995 at the Pontificia Universidad Católica of Chile, then joined the research group of Prof. Gonzalo G. Mateos of Animal Nutrition at the Universidad Politécnica of Madrid. He received his PhD degree in 2002 at the same institution. In 2007 He was obtained a Norman E. Borlaug fellowship from USDA and supervised by Dr. Gita Cherian in Animal Science Department at the Oregon State University. He has actual position of a full Professor at the UNAP. Has been published more than 20 research articles.

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## Causes of discard observed in the industrial purse seine fishery targeting anchovy (Engraulis ringens), between the Arica y Parinacota and Antofagasta Regions in the Northern Chile

The industrial purse seine fishery targeting anchovy (Engraulis ringens), is a complex socio-economic and ecological system, because it is a resource used to be reduced into fishmeal and fish oil for feeding other animals that are used for food production, and in smaller quantities, to direct human consumption. In Chile, the capture of this resource is generated in the Northern Zone, between the Arica y Parinacota and Antofagasta Regions (18°23′S y 24°00′S). However, the capture of this specie has negative effects such as discarding, which consists of, the return of the catch to the sea of target specie, accompanying fauna and incidental catch (bycatch), enclosed in the purse seine net. At the 2017, starting the discard research plan began. According to data from the scientific observer on board, 452.3 tons (t) of discarding catches were produced in this period between 2017 and 2018, with the main causes of discarding being: “Poor quality criteria”, “Capture of specimens under commercial size” and “Exceed operating capacity or safety considerations (mechanical failure or risk to the crew)”. In 2019, the implementation of discard reduction plans for the anchovy fishery and its accompanying fauna was established, beginning the monitoring and compliance period of these plans. Between 2019 and 2023, a trend towards a decrease in the volume of discarded catch was observed (approximately 100 t), with the main causes of discarding in the monitoring period being: “Capture of specimens under commercial size”, “Exceeding operating capacity or safety considerations (mechanical failure or risk to the crew)” and “Exceeding the permitted limit of accompanying fauna”. In both research and discard reduction periods, it was observed that anchovy was the main resource that presented the highest percentage by weight of discarded catch.

**Biography**

Dr. Maria Fernanda Jiménez Reyes, studied Marine Biology at the Jorge Tadeo Lozano University of Bogotá (Colombia) and graduated as a Doctor in Aquaculture in 2015, at the Pontificial Catholic University of Valparaiso (Chile). During her doctoral thesis, she worked at the Institute of Nutrition and Food Technology (INTA), where she observed the stimulation of the innate immune system of rainbow trout and Salmo salar, through bacteria typical of the microbiota of these species. Currently works at the Chilean Fisheries Development Institute (IFOP). She specializes in identifying the causes of discards in the purse seine fishery of the main pelagic species in Chile.

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# Mud crab fisheries management and farming opportunity in the coastal area of Bangladesh, enhancing coastal livelihood resilience amid climate change

Bangladesh's coastal regions, home to nearly 29% of the population and projected to reach 57.9 million by 2050, are increasingly threatened by natural disasters such as cyclones, storm surges, and riverbank erosion. These recurring events damage infrastructure, disrupt livelihoods, and endanger vital coastal industries like fisheries and aquaculture. While shrimp farming has traditionally been the cornerstone of brackish water aquaculture, frequent disease outbreaks have highlighted the need for alternative livelihoods. Mud crab (Scylla olivacea), a species with high market value, has emerged as a promising option. However, harvesting and exportation continue to grow without adequate knowledge of crab biology, habitat requirements, or modern farming techniques.

A comprehensive three-year study (2021–2023) investigated the ecological dynamics of mud crab habitats in mangrove ecosystems. It revealed that salinity is the most critical environmental factor shaping crab distribution and reproductive behavior. High-salinity zones with low elevation and clay loam soils supported the highest crab abundance (3.02±0.77 individuals/hr/gear) and plankton diversity, critical for juvenile recruitment. While male crabs dominated across all investigating areas, mature females were more prevalent in low to moderate salinity zones. These findings emphasize the importance of habitat-specific conservation, sustainable harvesting, and adaptive management to support long-term mud crab viability and biodiversity in the Sundarbans.

To explore aquaculture-based solutions, Bangladesh's first indoor vertical mud crab farming trials using a Recirculating Aquaculture System (RAS) were conducted. The trials tested crab adaptation to different salinity levels, tied versus untied conditions, and water flow types. Higher survival rates were recorded under high salinity (>15 ppt), untied conditions, and running water. In fattening trials, crabs were reared individually in vertical boxes and fed with tilapia feed, achieving 55% survival and 91.67% fattening success, excluding the initial trial. These results confirm the feasibility of vertical mud crab farming in controlled indoor systems. However, the method faces key challenges: prolonged fattening periods (over 30 days), high mortality from transport stress, and significant initial investment, mainly due to RAS infrastructure. Future efforts should explore using natural coastal water to lower operational costs and improve sustainability. With further optimization, indoor vertical farming of mud crabs can offer a resilient, high-value livelihood for coastal communities, particularly during climate-induced instability.

**Biography**

Dr. Md. Sherazul Islam completed his Bachelor's and MS in Fisheries and Marine Resource Technology at Khulna University, Bangladesh, in 2000 and 2003, respectively. He did 2nd MS in Aquaculture and Aquatic Resource Management from the Asian Institute of Technology, Thailand, in 2005. Later, received PhD from the University of Tokyo, Japan, in 2008. After that, joined the Department of Fisheries and Marine Bioscience, Jashore University of Science and Technology, Bangladesh in 2009 and serving their as a Professor. Has already conducted 18 research projects and published 50 research articles, along with two books.

**Michael Rosciszewski Dodgson**
University of Gdansk, Poland

# Economic challenges and livelihood resilience in the Baltic fisheries sector

The European fisheries sector has long been a dynamic and adaptive cornerstone of coastal livelihoods. However, environmental changes and the evolving Common Fisheries Policy (CFP) pose significant challenges for the fishing community. This study examines the perspectives of Polish Baltic fishermen regarding the current landscape of their profession and market dynamics. Using a Likert scale questionnaire with 129 respondents from 17 coastal harbors and in-depth interviews with 28 participants. Key issues include livelihood security, government responsiveness, and adaptation strategies, revealing widespread dissatisfaction and significant disparities across regions, unit sizes, and employment statuses. The Kruskal-Wallis test further analyzed these responses, exploring variations based on port location, employment status, and vessel size among respondents. Communities like Łeba and Wolin Island reported the highest dissatisfaction with CFP regulations and the lowest resilience. Large-Scale Fisheries (LSF) in full time employment demonstrate greater resilience due to their ability to adapt to changes in target species and market demands but are undercut by limited quota allocations. While, Small-Scale Fisheries (SSF) in part time emplyment face greater financial challenges, including high operational costs and limited fishing opportunites leading to increased vulnerability and dissatisfaction. The consistently low resilience scores across all fishing groups highlight that the fisheries sector in Poland is increasingly hostile to its fishermen. With a likely unsustainable future within this sector, many fishermen are likely to abandon the profession in pursuit of better economic opportunities. Future research should assess if similar trends exist in other fishing communities globally to inform policies that balance sustainability and economic resilience.

**Keywords:** Small-Scale Fisheries, Large-Scale Fisheries, Common Fisheries Policy, Local Ecological Knowledge, Stakeholder Participation, Sustainable Livelihoods.

**Biography**

Michael John Rościszewski-Dodgson is a PhD researcher at the University of Gdańsk, focusing on the fisheries sector in the Baltic Sea. His research explores fish stock management and the integration of fishermen as key stakeholders in sustainable fisheries governance. He holds a master's degree in marine management and planning from the University of Liverpool. Michael also collaborates with the National Marine Fisheries Research Institute (MIR) in Poland, contributing to national and EU-level policy through data-driven insights that inform the European Commission, ICES, and stock allocation processes. His work aims to support the sustainable management of marine resources and the optimization of fishing unit operations.

**Mona Ibrahim Mohamed Almahy (PhD)**

Associate Research Professor Red Sea Fisheries Research Station Port Sudan/ Sudan

## Some spawning aggregations in Sudan red sea coast

Sudan has Red Sea Coast line 853 km length, with boundaries with Egypt in the north, and Eretria in the South. Including bays, flourish coral reefs, mangroves and sea grass beds. Ten Spawning Aggregations along Sudan Red Sea coast were assessed in February 2024, during Ilegal Unreported, Unregulated (IUU) fishing assessment survey in Sudan. This survey is a part of SFISH project implemented by PERSGA in Red Sea and Gulf of Aden Countries. Maximum SSC score was (+118) for Khor Hawiri which is located in southern of Sudan Red Sea Coast (Agig), and minimum SSC score was (-13) for Abu Shigra which is located in north of Sudan Red Sea Coast (Dongonab area one of Sudan World Heritage Sites), the median SSC score was (+56.5). Some spawning aggregations sites were deteriorated, as a result of ghost fishing by lost nets, illegal fishing (using illegal fishing tools, as guns, using of powder, nylon nets in some fishing areas), and increasing fishing effort. Some spawning aggregation enriched with nutrients due to relatively high rains during that period, as agreed by most of the interviewed fishers. The most important fish species found in these ten spawning aggregation: Snappers, shark, emperors, barracuda, groupers, shrimp, mullets, parrot fish. Hook and line the most common used in these ten spawning aggregations sites, in addition to gill nets, and cast nets.

**Keywords:** Red Sea, Sudan, Spawning Aggregations, IUU, SSC.

**Biography**

Dr. Mona Ibrahim Mohamed Almahy, Associate Research Professor at Red Sea Fisheries Research Station, Port Sudan, SUDAN. PhD (2010) Marine Ecology, Sudan Academy of Science, MSc (2004) fish Biology, Khartoum University. BSc (1998) Natural Resources and Environmental Studies (fisheries Department). Published two books (1) Major Crustaceans in Red Sea Coast. (2) Marine Fishing Sector in Sudan Red Sea Coast, and more 5 scientific papers in (E) journals, more than 25 invited talks (conferences, workshops, forums, and trainer in more than 20 training workshops. Collaborated with Red Sea University in Teaching, supervision, external examiner for post graduate students (MSc/ PhD).

**Muhammad Ar Rozzaaq Nugraha*, Fan-Hua Nan, Yeh-Fang Hu**

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# Effects of Taiwanese indigenous cinnamon (Cinnamomum osmophloeum) leaf hot-water extract on Minimum Inhibitory and Bactericidal Concentrations (MIC and MBC), intestinal and hepatopancreatic histology, nonviable cells, and haemocyte subpopulations in white shrimp (Penaeus vannamei)

White shrimp's immunological and metabolic systems rely on haemocytes, intestines, and the hepatopancreas. The innate immune system combats infections and illnesses. The digestive system interacts with its host, influencing digestion, metabolism, and immunity. *C. osmophloeum* Leaf Hot-Water Extract (CLWE) includes various bioactive components with potential antibacterial action. It could be a natural dietary supplement, safer than organic solvent extracts. This study discovered the effect of CLWE on MIC and MBC, intestinal and hepatopancreatic histology, nonviable cells, and haemocyte subpopulations in white shrimp. Firstly, the MIC and MBC data against Lactobacillus sp. (*L. acidophilus, L. plantarum, and L. reuteri*) likely exceeded 8000 mg L-1. Furthermore, the MIC and MBC data against Vibrio sp. (*V. alginolyticus, V. harveyi, and V. parahaemolyticus*) revealed that bacterial colonies could not grow at concentrations greater than 4000 mg L-1.

In the intestinal and hepatopancreatic analysis, CLWE dietary supplementation of white shrimp for 14 days showed the most remarkable effect ($p<0.05$) regarding wall thickness, epithelium height, B and R cells in intestinal and hepatopancreatic tissues, respectively. In addition, as a challenge test, the shrimp were infected with V. parahemolyticus injections after 14 days of feeding. According to the challenge test results, CLWE 0.5 and CLWE 5 significantly reduced the proportion of nonviable cells while activating diverse haemocyte subpopulations ($p<0.05$). These findings showed that dietary supplementation with CLWE can improve the maintenance of intestinal and hepatopancreatic conditions in white shrimp, and further research into these systems may reveal information on white shrimp health and resilience under various conditions.

**Biography**

Muhammad Ar Rozzaaq Nugraha earned a Master's in Aquaculture from the National Taiwan Ocean University in Taiwan and graduated in January 2024. He is currently a PhD student at the same institution, under the supervision of Prof. Fan-Hua Nan and Dr. Yeh-Fang Hu at the Aquaculture and Physiology & Animal Health Laboratories. He was awarded the National Science and Technology Council Graduate Research Fellowship (NSTC-GRF) by NSTC Taiwan. This program recognises outstanding PhD students with exceptional research potential and provides support for them to pursue a full-time doctoral degree.

**Dr. Nitai Chandra Kundu**

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## Prospect and challenges of sewage fed pisciculture: East Kolkata wetlands (Ramsar) experiences

Waste treatment function of the East Kolkata wetland is considered as the main function of this Wetlands of international importance is being compromised due to increase in the presence of heavy metals along with the organic nutrients in sewerage supplied to EKW fishponds. It is observed predominantly Kolkata city s industrial effluents are also mixing in the Sewage. Thus, Wetland function of treating raw sewage is getting affected by settling of heavy metals and sludge of Industrial pollutants in the fish farm beds and also lead to bioaccumulation of heavy metals in fish and plant species. Presence of heavy metal contaminants in wetlands pose health risk to the producers and consumers dependent on resource harvest from wetlands.

Wastewater of the city is discharged into the fish farms locally known as bhery. This wetland system exhibits immense potential in remediating the water quality by reducing the high amounts of Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) it receives from the inflow on a daily basis. Each hectare of the shallow waterbody has the ability to remove 237 kg of BOD per day.

The bhery being shallow allows full vertical circulation of water to the surface where algal blooms occur. A solar radiation that is about 250 Langley's a day, allows sufficient photosynthesis which augment reoxygenation to allow for efficient BOD and pathogen/faecal coliform reduction. Factors that play role in water purification are the shallow ponds acting as stabilization ponds, abundant water hyacinth that absorbs heavy metals, sun light penetrating to the bed of the water body and other microbial components that help in bioremediation (Raychaudhuri et al, 2008).

The commercially important fish and shellfish in the EKW include 79 species of fish (Chandra, Raghunathan and Mao 2020), 11 species of prawns, 3 species of crabs and 20 species of molluscs. Among the fish species, 17 are culture species and 41 are wild species.

Traditionally, aquaculture in the EKW was predominantly of indigenous Indian Major Carps (IMC), (Rohu (*Labeo rohita*), Catla (*Catla catla*) and Mrigal (*Cirrhinus mrigala*), and sometimes minor carp Bata (*Labeo bata*). In the 60s, exotic fish species were introduced, which included Common carp (*Cyprinus carpio*), Silver carp (*Hypophthalmichthys molitrix*), Grass carp (*Ctenopharyngodon idella*) and Mozambique tilapia (*Oreochromis mossmbicus*). The Nile tilapia (*Oreochromis niloticus*) has replaced Mozambique tilapia in recent times. In

limited quantities, walking catfish (*Clarias batrachus*) and striped catfish (*Pangasianodon hypophthalmus*) are also produced, and attempts made to introduce Seabass (*Lates calcarifer*) enhance farm incomes 27 ornamental fish species of 21 families have also been recorded from EKW (Mahapatra and Lakra 2014). Previously the fish fauna in the EKW system comprised both brackish water and fresh water forms. Reported occurrence of 80 species of fishes from the Salt Lake.

Further it is observed entry of 4 exotic species (Crocodile fish) in EKW in recent years. Exotics *Clarius guriepinnus* and *Pangasius sutchi* have also been recorded from the aqua culture farm.

Further, 63 Indigenous species *Nandous nandus* and *Xenentodon cancila* which were abundant during 1980's has not been recorded at present. The rapid spread and population increase of suckermouth armoured catfishes belonging to the genus Pterygoplichthys (Loricariidae) in EKW in recent times is of increasing concern, because of the notable possibility that these non-native catfishes are adversely affecting fish germplasm and commercial fishery of this unique ecosystem.

But this unique sewage fed fisheries is facing number of problems which requires improvement of fish culture technology-optimization of yield, improvement of pond design keeping in mind comprehensive production system in the realm of treatment of sewage and epidemiologically sound fish quality.

**Biography**

Dr. Nitai C Kundu (Born in 1959) is an expert in Applied Social and Environmental sciences with committed and dedicated in research and teaching form 1986 to till now. Carrying out Research and training, Policy formulation and Evaluation, part time teaching in several University. He started his career after his Master degree from Calcutta University as Research Fellow during 1982-1986 Under State Planning Board and Registered for PhD in Calcutta University and then he joined as Research Associate during 1986-1993, in Institute of Wetland Management and Ecological Design, an autonomous Research Institute under Govt in Calcutta. Later he joined as Scientist, 1993-2003, in Institute of Wetland Management and Ecological Design, Calcutta. and Sr. Scientist, 2003-20013, Institute of Environmental Studies and Wetland Management (formerly Institute of Wetland Management and Ecological Design), Calcutta. He also joined parallelly as Chief Technical Officer in 2006-2011 in East Kolkata Wetlands Management Authority, Department of Environment, Govt of West Bengal Kolkata. He also worked as Sr. Scientist, from February, in 2013-September, 2016 West Bengal Pollution Control Board on a particular assignment. He left Institute of Environmental Studies and Wetland Management as Sr. Scientist, in January, 2019, (formerly Institute of Wetland Management and Ecological Design), Calcutta and joined Centre for Environmental Management and Participatory Development (CEMPD) in 2019 and continuing as Chief Advisor till date. As regards his academic qualification he did Pre-University and Graduation from University of Calcutta and also Master Degree from University of Calcutta in Social Science in 1981. He did Ph.D. from University of Calcutta in 1994 and Environment Management Degree from University of Birmingham in 1993. He completed 24 Research projects 29 Research papers of national and internation standard, 8 Books and one edited international Journal on Science and Technology and Development. He supervised PhD and M Phil students.

**Paulin Nyadjeu[1*], Dickson Jack Arreytabe[1,2], Minette Eyango Tomedi-Tabi[1]**

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# Effect of garlic and ginger mixture on growth and improvement of physiological condition of African catfish juveniles raised in closed system

An 84-day study was conducted to evaluate the growth performance, feed nutrient utilisation and retention, whole body composition, orgonosomatic indices and blood serum biochemical profile of juvenile Clarias gariepinus fed diets supplemented with garlic-ginger mixture. Four isoproteinic diets were prepared with varying levels of garlic-ginger mixture at 0%, 1%, 2% and 3% corresponding to treatments D0 (control), D1, D2, and D3. A total of 120 juveniles (46.55±3.66g) were randomly distributed in triplicate to 12 plastic tanks and fed three times daily (09:00, 13:00, and 17:00) at the feeding rate of 5-3% of the biomass with biweekly intermediate sampling for biometric measurements and total counting. Water temperature, pH, dissolved oxygen, ammonia, nitrite, and nitrate measured daily before feeding were found to be within the accepted levels for raising C. gariepinus. At the end of the experiment, 18 mixed-sex adult fish were randomly selected from each treatment group. Six of them were sacrificed for final whole-body bromatological composition. For the remaining 12, blood obtained through the caudal fin was collected in non-heparinised tubes and left in the open air for 5 hours. Afterwards, the serum samples were transferred to other tubes and stored at -20°C for biochemical analysis. Results indicate that fish in treatment D2 have expressed the best performances in terms of Weight Gain (WG=175.38±3.05g), Protein Efficiency Ratio (PER=1.39±0.05), Lipid Efficiency Ratio (LER=12.92±0.38), and Feed Conversion Ratio (FCR=1.55±0.05) significantly different from 44.96%, 34.53%, 51.31% and 37%, respectively, relative to control (WG=99.53±0.03g, PE=0.91±0.07, LE=6.29±0.45, and FCR=2.46±0.18). In addition, diets containing the garlic-ginger mixture significantly improved whole-body bromatology, nutrient retention, organosomatic indices, and serum biochemical profile compared to control. In general, the best values were obtained in treatment D2 with a significantly high retention of ash (24.63 1.04% dry feed), protein (33.48 0.39% dry feed), lipids (68.63 2.81% dry feed), and energy (25.56 0.04% dry feed) by 50,38%, 45%, 66.72% and 44.56% respectively, compared to control. The same observations were made for total serum proteins, total cholesterol, HDL-Cholesterol and LDL-Cholesterol, with a significantly higher HDL-C/LDL-C (2.60 0.01) ratio of 33.10% compared to control (HDL-C/LDL-C=1.74 0.05). The observed growth enhancement could be the result of the bioactive components of garlic and ginger acting in synergy to improve gastrointestinal tract organ function, nutrient metabolism, and overall health. Thus, African catfish production can be enhanced by adding garlic and ginger to feed.

**Keywords:** Clarias Gariepinus, Garlic, Ginger, Growth, Body Nutrient Content and Blood Serum Profile.

**Biography**

Dr. Paulin Nyadjeu studied Animal physiology In the University of Dschang, Cameroon where he was graduated as MS in 2006 and later received his PhD degree in 2013. Subsequently, he was hired as a lecturer to the department of aquaculture at the Institute of Fisheries and Aquatic Sciences of the University of Douala, Cameroon where he develops the research areas, such as the valorisation of agricultural products and by-products in fish feed formulation and aquaculture nutrition, the identification and domestication of local fish species with high aquaculture potential. Dr. Paulin is an Associate Professor since 2021 with more than 20 research articles published in peer-reviewed journals.

**Ragia Moussa Moussa**

Aquaculture Division, National Institute of Oceanography and Fisheries/Assistant Professor of Invertebrate Aquaculture, Alexandria, Egypt

## Sustainable pearl farming in the mediterranean and red seas: Opportunities, challenges, and economic potential

Pearl farming in the Mediterranean and Red Seas offers a promising and sustainable business opportunity, driven by the regions' unique marine ecosystems and growing global demand for high quality pearls. Their favorable biological and environmental conditions provide a strong foundation for the development of a high-value, sustainable pearl farming industry.

The economic potential is significant, as the increasing global demand for high-quality pearls creating opportunities to tap into luxury markets and tourism. However, key challenges such as environmental threats, regulatory constraints, and long production cycles can impact the feasibility and profitability of pearl farming.

Integration of eco-friendly farming techniques and securing government support can help overcome existing barriers, making pearl farming a viable economic and ecological opportunity for the Mediterranean and Red Seas. This approach not only supports local economies but also aligns with global sustainability goals, benefiting both communities and the environment.

**Biography**

Dr. Ragia Moussa is an Assistant Professor at the National Institute of Oceanography and Fisheries in Alexandria, Egypt, specializing in marine invertebrate aquaculture and biodiversity. She holds a Ph.D. in Zoology from Tanta University, Egypt and has over 20 years of research experience in invertebrate aquaculture. Her research focuses on shrimp culture, pearl oyster and sea cucumber biology, and the study of non-indigenous mollusks and crustaceans. She has led and contributed to several international research projects and has numerous publications in high-impact journals.

**Mr. Rahul Pal[1*], Dr. Akash Deep[2]**

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## Nanotechnology: Revolutionary advances and future prospects in aquaculture and fisheries

Nanotechnology has emerged as a transformative force across various sectors, and its integration into aquaculture and fisheries represents a significant leap toward sustainable and efficient aquatic food production. The application of nanotechnology in this field has revolutionized traditional practices, offering innovative solutions for disease management, water purification, feed improvement, and environmental monitoring. This talk aims to delve into the current advancements and future prospects of nanotechnology in aquaculture and fisheries, focusing on how nanoscale materials and tools are reshaping the industry. Nanoparticles (NPs), nanosensors, and nanocarriers have demonstrated immense potential in enhancing fish health through targeted drug delivery systems, minimizing the use of antibiotics, and reducing the emergence of antimicrobial resistance. The development of nanoformulated feeds improves nutrient absorption and feed conversion ratios, ultimately boosting the productivity and profitability of aquaculture ventures. In water quality management, nanomaterials such as nano-clays, carbon nanotubes, and metal oxide NPs have shown remarkable efficiency in removing toxicants, heavy metals, and microbial contaminants, thereby ensuring a healthier aquatic environment. Additionally, the deployment of nanosensors offers real-time monitoring of water parameters such as pH, dissolved oxygen, temperature, and the presence of pathogens, enabling timely interventions and reducing fish mortality. Moreover, nanotechnology supports the sustainable use of natural resources by enhancing breeding practices, seed quality, and genetic monitoring through nanogenomics and nano-biomarkers. The integration of nanotechnology in fisheries also opens avenues for advanced packaging and preservation techniques, extending the shelf life of fish products and maintaining their nutritional integrity during transportation and storage. These promising advancements, the implementation of nanotechnology in aquaculture and fisheries is not without challenges. Regulatory concerns, environmental risks, and potential toxicity issues associated with nanomaterials necessitate thorough evaluation and risk assessment. This talk will also highlight the importance of developing safe, cost-effective, and eco-friendly nanotechnological approaches, supported by interdisciplinary research and strong policy frameworks. Furthermore, capacity building and awareness among aquaculture practitioners, researchers, and policymakers are crucial for the responsible and effective adoption of nanotechnology in this domain. In conclusion, nanotechnology holds immense promise in transforming aquaculture and fisheries into more resilient, productive, and

sustainable systems. By embracing these revolutionary advances and addressing associated challenges, we can pave the way for a blue revolution that not only meets the global demand for aquatic food but also ensures environmental protection and economic development. This session will provide an insightful overview for scientists, academicians, industry experts, and policymakers to understand the scope, applications, and future trajectory of nanotechnology in aquaculture and fisheries.

**Biography**

Mr. Rahul Pal, currently working as Assistant Professor, Department of Pharmaceutics, ISF College of Pharmacy, GT Road, Moga, 142001 Punjab, India. Mr. Rahul Pal awarded as Young Scientist Award* (Jan. 2025) from the International Organizing Committee to his expertise, skill and knowledge regarding his valuable contribution from Scientific Laurels. Mr. Pal has made substantial contributions to academic literature, having published 32 Review Articles, 11 Research Articles, and 8 textbooks (D. Pharm, B. Pharm and M. Pharm level) across various national and International journals and publishers (PeeVee*, JEC, Pritam and KDP) recognized on platforms such as Web of Science, Bentham Publishers (Scopus/PMC), Google Scholar, Publons, and NLM journals. Mr. Pal has engaged in over 15 International events, including those in the USA and New Castle, as well as 8 national conferences, 12 International Faculty Development Programs (FDP) & 4 National FDP, and 10 International workshops, thereby enhancing his academic experience. He had also granted 10 Indian Design Patent Granted, 25 International UK patents through IPR and 3 Copyrights Granted.

**Luthada-Raswiswi Rendani[1*], Mukaratirwa Samson[2,3], O'Brien, Gordon[1,4]**

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## Animal protein sources as a substitute for fishmeal in aquaculture diets: A systematic review and meta-analysis

Fishmeal is the main source of dietary protein for most commercially farmed fish species. However, fishmeal prices have been raised even further because of competition with domestic animals, shortage in world fishmeal supply, and increased demand. Increased fishmeal prices have contributed to the quest for alternatives necessary to replace fishmeal as a global research priority. A literature search was conducted using these terms on Google Scholar and EBSCOhost, fishmeal replacement in fish feeds, fishmeal alternatives in fish feeds, animal protein sources in aquaculture, insects in fish feeds, terrestrial byproducts, and fishery by-products. To calculate the variation between experiments, a random effect model was used. Results indicated that different fish species, sizes, and inclusion levels were used in the various studies and showed that the use of insects, terrestrial by-products, and fishery by-products has some limitations. Despite these drawbacks, the use of animal protein sources as a replacement for fishmeal in fish diets has had a positive impact on the feed conversion ratio, variable growth rate, final weight, and survival rate of different types of fish species of different size groups. Findings also showed that some animal byproducts had not been assessed as a protein source in aquaculture or animal feeds, and future studies are recommended.

**Biography**

Dr. Rendani is a Principal Technician in School of Life Sciences, University of KwaZulu Natal and a part-time Aquaculture Trainer at Université Nationale d'Agriculture (UNA), Ketou, Benin. She received her PhD in Ecological Sciences in 2022 at the University of KwaZulu Natal. She has extensive knowledge in aquaculture facilities management, fish nutrition and feeding management, live feeds production, water quality management, laboratory and equipment's maintenance. She has four publications with 162 citations so far, and reviewed manuscripts from journals such as Waste and Biomass Valorization, African Journal of Aquatic Sciences, International Journal of Agricultural Science and Food Technology, African Journal of Agricultural Research, Biology One, and Heliyon Journal.

**Dr. Sandhya Leeda D'Souza**
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## Marine molluscs of India-threats and conservation

In this abstract, the significance of marine molluscs of India, existing and potential threats are discussed, and molluscan distribution in Indian states based on current information is examined. About 3370 molluscan species are known from marine habitats of India and the highest number of species from the east coast of India. Marine molluscs of India are facing threats because of various causes. The greatest threat to marine molluscs has been the loss and reduced quality of habitat caused by human-induced modifications and the capture of molluscs for the fishery. Species and habitat-based approaches to molluscan conservation are evaluated. The conservation measures taken by the Indian government are discussed.

**Biography**

Dr. Sandhya Leeda D'Souza studied Applied Zoology at the Mangalore University, India and obtained her doctorate on molluscan studies in 2022. She then joined the department of Zoology, St. Joseph's University, Bangalore, India and has been teaching undergraduate and postgraduate students. After some years of work experience as Assistant Professor she is currently promoted as Professor in the department. Dr. Sandhya's expertise is molluscan research including taxonomy and ecology. She is editor in JCC, published books, several research articles reputed journals.

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# Impact of global climate change on apex pelagic predators of the world's oceans: Potential adaptation or tropicalization

Examining the consequences of worldwide climate change on fisheries is essential as it directly impacts the well-being of marine ecosystems, the sustenance of millions of individuals, and the security of global food supplies. Thus, understanding these impacts is crucial for developing adaptive management strategies for sustainable fisheries. This study aimed a comprehensive analysis on the potential responses of apex pelagic predators inhabiting in the Indian and South Atlantic oceans in response to changing climate conditions. The study analyzed sea surface temperature, salinity, and chlorophyll levels to predict species' impact by the end of the 21st century using a generalized additive model in response to normal and extreme conditions. Significant shifts in the Mean Temperature of Catch (MTC) were forecasted for all species inhabiting the Indian and South Atlantic oceans under extreme climatic conditions (potential adaptation), but no changes in MTC were expected under normal conditions. All the species from both oceans exhibited a tendency to shift their distribution latitudinally (southward) in response to extreme conditions, while shifting longitudinally (wither east or westward) under normal conditions (potential tropicalization). In addition, South Atlantic species were predicted to experience higher latitudinal and longitudinal displacements (33-1125 kms, and 11-724 kms) compared to those in the Indian Oceans (33679 kms, and 45-468 kms), in normal to extreme conditions. Present study suggests that, tropical Indian ocean species like bigeye, skipjack, yellowfin tuna, swordfish and marlins are less susceptible to climate change due to higher SST preferences, while temperate Indian ocean species like albacore and southernbluefin tuna are more vulnerable compared to their counterparts in the South Atlantic ocean under changing climatic conditions. The study's results can enhance comprehension of the potential consequences of climate change on marine species, provide guidance for conservation strategies, and assist in the development of adaptive management practices for sustainable fisheries in global oceans.

**Biography**

Sandipan Mondal is a full time Post-Doctoral Fellow & Adjunct Assistant Professor at the National Taiwan Ocean University from India. He is working with habitat modeling and climate change effect on multiple species in the global Ocean and Taiwan Strait. Apart from that, has expertised in feeding ecology, taxonomic identification of fish, stable isotope analysis, and fishing gear technology.

**Shridhar Prabhuraman*, Shlok Nemani, Dr. (Cdr.) Arnab Das**

Maritime Research Center, Pune, Maharashtra, India

## APY analysis: Integrating mathematical modeling in aquaculture to predict growth dynamics for high-yield and sustainable operations

Aquaculture, as a critical component of global food security and economic development, requires innovative approaches to ensure sustainable intensification without exacerbating environmental degradation. Recognizing the limitations imposed by finite land and water resources, recent efforts have focused on integrating digital technologies and data-driven methodologies to optimize production systems.

At Maritime Research Center (MRC) India, a novel framework, namely Area, Production and Yield (APY) Analysis, has been developed that synthesizes empirical knowledge from existing literature with machine learning-based modelling to construct a mathematical function mapping environmental variable—temperature, salinity, pH, dissolved oxygen, and stocking density—to organismal growth outcomes. By systematically encapsulating complex biological-environmental interactions within a mathematical model, this approach enables precision monitoring and adaptive management of aquaculture environments, thereby enhancing productivity without necessitating spatial expansion.

Validation studies underscore the model's predictive fidelity, achieving significant accuracy in forecasting shrimp growth trajectories using solely physical parameters, and demonstrating its operational feasibility through the deployment of IoT-based monitoring systems. Furthermore, the framework facilitates spatial demarcation of high-yield zones based on climatic and hydro-chemical data, offering a scalable solution for resource optimization and risk mitigation in the face of climate variability. This research highlights the transformative potential of digital interventions in aquaculture, including remote farm operations, Integrated Multi Trophic Aquaculture (IoT), Precision farming, etc., positioning them as indispensable tools for future-proofing the sector against environmental, economic, and ecological uncertainties. The integration of environmental monitoring, system modelling, and machine learning represents a critical advancement towards achieving sustainable, resilient, and economically viable aquaculture systems.

**Biography**

Shridhar Prabhuraman is a Consulting Research Fellow at the Maritime Research Center, Pune. Trained as a machine-learning engineer, he brings together expertise in acoustic modelling, geospatial analytics, and cloud-native architectures to translate complex ocean-science challenges into user-centric digital solutions. His domain focus lies in underwater acoustics, with notable contributions including AI-driven underwater channel modeling for tropical littoral waters, ambient noise mapping using AIS-derived ship traffic data, and the development of risk analysis tools for diver safety based on acoustic ecological patterns.

**Soha Sameeh Hasanein Abdelrahman**

Fisheries Division, Fish Physiology Lab. National Institute of Oceanography and Fisheries (NIOF), Egypt

## Importance of physiological studies of cultured fish

The physiological studies of cultured fish are crucial in aquaculture for several key reasons:

1. **Understanding Growth and Development:** Physiological processes like metabolism, digestion, and energy utilization are central to how fish grow. To assess whether fish are growing at the expected rate under specific farming conditions. A lack of growth or abnormal growth patterns could signal issues such as poor water quality or nutritional imbalances.

2. **Stress and Health Monitoring:** Fish are sensitive to stress factors (e.g., overcrowding, handling, poor water quality, or disease). When fish are stressed, they release cortisol and other stress hormones that can affect their overall health, immune system, and meat quality. Studying the stress physiology of fish to monitor the signs of stress and take corrective action before it affects the quality of the product.

3. **Water Quality Management:** The physiological functions of fish are closely tied to the environment, especially water quality. Factors like oxygen levels, pH, temperature, and ammonia concentration directly influence how fish metabolize food, grow, and maintain health. Monitoring the physiological responses of fish to changing water conditions can help prevent issues like disease outbreaks, reduced growth, or lower quality flesh.

4. **Fish Nutrition and Feeding:** The way fish process and utilize feed is influenced by their digestive and metabolic systems. Understanding fish physiology can help you optimize feeding strategies and ensure that fish are receiving the right balance of nutrients. This results in better growth, healthier fish, and ultimately, higher quality products.

5. **Disease Resistance and Immune Function:** The immune system of fish is a critical aspect of maintaining their health. A deep understanding of immune physiology helps in early detection of diseases or infections that could compromise fish quality. Fish with weakened immune systems may exhibit poor growth, off-flavors in their flesh, or a shorter shelf life, all of which negatively impact product quality.

6. **Meat Quality (Texture, Flavor, and Fat Content):** The muscle physiology of fish determines factors like texture, flavor, fat content, and overall tenderness of the fish fillet. Studying how fish muscles develop and respond to diet, exercise, and environmental factors allows farmers to produce fish with the desired quality for consumers. Chronic stress often have lower fat content, altered texture, and poor taste.

7. **Behavioral Indicators of Fish Health:** Fish behavior is also an important physiological indicator of their well-being. Monitoring behaviors like feeding activity, swimming patterns, and social interactions can provide early signs of health problems or environmental stress. For example, if fish stop feeding or exhibit abnormal swimming patterns, it could indicate a problem that affects product quality.

8. **Temperature Regulation:** Temperature plays a key role in the metabolic rate of fish. Cold-blooded species are highly sensitive to temperature changes, and understanding how temperature impacts fish physiology allows for better control of growth rates and quality of the fish flesh.

9. **Harvest Timing and Handling:** Knowing the physiological state of the fish before harvest is crucial for achieving the best quality product. Fish that are harvested at their peak physiological state (e.g., optimal growth and fat deposition) will have better texture and flavor. Additionally, the handling process post-harvest can affect muscle physiology, so a deep understanding of this helps reduce spoilage and preserve product quality.

**Biography**

Dr. Soha studied (Special Zoology) Al-Azhar University–Excellent degree with honor in 1/6/2003. Master of Science, (M.Sc.), of Physiology in Science Tanta University (Special Zoology) 28/4/2009. She is an Assistant Researcher in Fish Physiology lab., and The National Institute of Oceanography and Fisheries (NIOF), 2012-2016. She is a Doctor Researcher in Fish Physiology lab., (NIOF)from 2016 till 2024. Soha has obtained the position of an Assistant Professor in Fish Physiology at NIOF in 2025.

**Solomon Melaku[1*], Akewake Geremew[2], Abebe Getahun[2], Seyoum Mengestou[2], Amha Belay[3]**

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## Challenges and prospects of using live feed substitutes for larval fish

Larviculture of commercially important aquaculture species faced limitations associated to the incomplete understanding of larval nutrition and the inability to total replacement of live feeds by formulated diets at the early larval stage. The main challenges to alternatives of live feed in larval fish culture are related to the inherent behaviors of the larvae and the incomplete knowledge and practice leading to the inefficiency of using micro diets. Although significant achievement has been reached in the complete replacement of live feeds by formulated micro diets in freshwater species and marine shrimps, its success is far from complete in marine finfishes. However, recent progress in biotechnological advances in manufacturing process and advanced knowledge of the nutritional necessities of larvae indicated improvements in the field. A range of technologies in the manufacturing of micro diets for larval fish are in place currently. To this end, several achievements of substituting live feeds with formulated micro diets at later stages of larval development have been reported by various researchers providing a clue on the prospects for the future. Therefore, the objective of this review is to compile existing information on the challenges of substituting live feeds by formulated diets in the past and prospects for future development.

**Keywords**: Live feeds, Micro Diet, Nutrition.

**Biography**

Solomon Melaku is a PhD student at Addis Ababa University, Department of Zoological Sciences Under Aquatic Science, Fisheries and Aquaculture Stream. Solomon Melaku has obtained his master's degree from Ghent University, Belgium in 2014 in Aquaculture. He has been employed by Debre Berhan University, Ethiopia before he joins Addis Ababa University for his PhD study. Solomon has published two book chapters and 3 research articles in SCI indexed journals.

**Suleiman Uba Muhammad[1,2*], Mamdoh Jamal[1], Yasir Muhammad[2], Aymn Abbas[2], Essam Azhar[2]**

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# Enhancing sustainability in Arabian aquaculture through the screening of fish for resistant and multidrug-resistant pathogens in Jeddah

The global fish farming sector loses over $10 billion annually due to the estimated 10% of fisheries that are farmed for food dying from microbial diseases. The aim of this study was to identify antimicrobial resistant aquatic pathogens and to find probiotic bacteria and evaluate their antagonistic activity against aquatic pathogens.

Using the MALDI-TOF MS technique, isolates were identified from Nile tilapia (5), Brown spotted grouper (5), and Red grouper (5) samples obtained from each specimen's mouth, gills, skin, and gastrointestinal tract (four site from each sample, 20 for each species and a total of 60 samples). Antimicrobial susceptibility was determined by the agar dilution technique. The well diffusion approach was used to investigate the probiotics' antagonistic effect against the infections.

Eight pathogenic organisms were found to cause diseases in aquaculture. *Vibrio* (30%), *Pseudomonas species* (38%), and *Aeromonas* (18.3%) were the most prevalent bacteria. The five antibiotics tested in this study were ineffective against Vibrio and Aeromonas species. *S. parauberis, P. fluorescens*, and *P. damselae* are suppressed in the agar well diffusion experiment by *Aeromonas media* AM, *Clostridium tyrobutricum* CT, and *Zymomonas mobilis* ZM. Every isolate could grow in pH (2-10) ranges and tolerate somewhat high temperatures.

Antimicrobial resistant bacteria were found in both freshwater and marine fish species. Antagonistic activity was noticed in the marine isolates against aquatic bacterial pathogens. This work has also highlighted the need for surveillance of aquatic microbial pathogens and antibiotic susceptibility.

**Keywords:** Aquaculture, Antibiotic-Resistance, Probiotics, Antagonism.

**Biography**

Suleiman studied Veterinary Medicine at Ahmadu Bello University, Nigeria and graduated with a DVM degree in 2017. He is currently completing his master's degree in Dr. Yasir's Antimicrobial resistance research group at King Fahd Medical Research Center in King Abdulaziz University Jeddah, Saudi Arabia.

**Timothy Charles Visel**
Retired Aquaculture Educator, USA

## Can we farm eelgrass as a high protein sustainable marine grain for aquaculture?

In 2001, the Food and Agriculture Organization (FAO) predicted that aquaculture-raised seafood would surpass fish-natural stock catches in 2030 (Aquaculture News, Vol. 9, No. 3, January, 2001). The aquaculture industry did not need to wait until then. Aquaculture seafood surpassed capture fisheries in 2022. With a growing world population, the need for sustainable food places increased production from diverse culture feeds that are responsive to best practices and lessen anthropogenic impacts. A limiting factor continues to be sustainable high protein feed ingredients. A recent FAO report (2024) “The State of World Fisheries and Aquaculture” mentions the need of lower trophic food webs and alternate protein sources as key to maintaining and expanding worldwide aquaculture production.

Novel protein sources, once overlooked, are being re-examined as future potential feed ingredients. For three decades, concerns have been mentioned about high trophic impacts to forage species as primary feed ingredients (Fishing Down Marine Food Webs, Natural Science, Vol. 1997). One possible source of high protein grain could be from the eelgrass plant, Zostera marina. Eelgrass has a history of human food use (Felger et al., 1973, Science, Vol. 181, July 27, pp. 355-356) as mentioned in a New York TimesTM article on July 28, 1973 “Remote Indian Tribe in Mexico Eats a Grain in the Sea” by Walter Sullivan, pg. 24. Studies conducted on protein content found that Zostera grain was in the range of wild rice, wheat and rye grain, about 13% protein (Perez-liorens et al., “Sea Rice,” December, 2023).

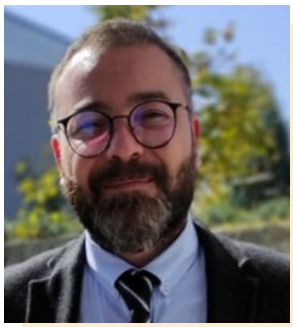
Unfortunately, only a few papers describe the soil conditions for eelgrass growth or its ability to produce a high protein grain. Soil science studies are noticeably absent in the marine soil literature as compared to terrestrial grain soil research. Controlled eelgrass farming may remove nitrogen compounds (identified as damaging in many coastal areas) and provide habitat nursery services to natural fisheries as well as a potential future source of plant-based protein. To my knowledge, no current feed trials utilizing eelgrass grain for prepared feed ingredients are underway while some research is concentrating on alternate sources of unsaturated fats and essential amino acids for formulated fish feed.

Eelgrass (*Zostera marina*) is a highly efficient C-3 plant that requires no fertilizer and parent root stock may live a decade or longer. Some reports from northern Europe in areas where eelgrass wrack is considered a nuisance indicate that eelgrass monocultures can exist in the same general habitat for three centuries or longer.

A barrier to aquaculture trials is the result of most of the harvested seeds being used in restoration projects. It is a time-consuming process for hand harvests, and seed planting is often made in poor or unsuitable marine soils. Terrestrial culture technology and related soil science may help evaluate if eelgrass grain is a sustainable protein ingredient for aquaculture feeds.

**Biography**

Timothy Visel attended an oceanographic technology program at The Florida Institute of Technology, Jensen Beach, then attended the University of Rhode Island where he earned an Associates degree in Fisheries (1977), a BS in Marine Resources (1978), and an MS in Animal Pathology (1985)-Department of Aquaculture. In 1994, he earned a 6th year diploma in School Administration from the University of Connecticut. He has held several university positions from 1978 to 1990 (UMass, URI, UConn) and later two public schools, supervising Aquaculture School Construction projects from 1990 to 2022. Has been published numerous journal articles and papers regarding shellfish aquaculture and aquaculture education.



**Dr. Utku Duran**

Department of Veterinary Health, Çaycuma Food and Agriculture Vocational School, Zonguldak Bulent Ecevit University, Zonguldak, Turkey

## Turkish Salmon: Sustainable production in Turkish aquaculture and position in the global market

In recent years, Turkish Salmon, one of the most prominent products in Turkey's aquaculture sector, has attracted attention with an export volume of 1 billion dollars. Individuals of rainbow trout weighing 1000 grams or more are called salmon in Turkey. However, labeling this product as “salmon” in international exports causes confusion with Atlantic salmon (*Salmo salar*). While Atlantic salmon is known as salmon in the world market, in Turkey this term is used for large rainbow trout colored with astaxanthin. Thanks to its geographical advantages, Turkey has established natural breeding areas, especially in the central and eastern regions of the Black Sea. Transferred to the sea in November and harvested in May, these fish are a high-quality aquaculture product. In 2020, the Turkish Ministry of Food, Agriculture and Forestry officially called rainbow trout weighing 1000 grams or more as “Turkish Salmon” to eliminate this name confusion. In 2022, the “Turkish Salmon” trademark was registered worldwide by the General Secretariat of the Eastern Black Sea Exporters Association. Turkish Salmon has reached a production and export volume of over 60 thousand tons in a short period and has gained an important place in the world market. The sustainability of this production is of great importance both ecologically and commercially. Turkey has taken various measures to protect fish health and the economic stability of producers. This presentation aims to provide detailed information on the production methods, productivity, volume, and sustainability measures of Turkish Salmon.

**Keywords:** Aquaculture, Turkish Salmon, *Oncorhynchus* Mykiss, Sustainability.

**Biography**

Utku Duran graduated from Uludağ University, Faculty of Veterinary Medicine, Department of Veterinary Medicine in 2007. In 2016, graduated from OMU Institute of Health Sciences, Department of Veterinary Biochemistry Master's program. He graduated from his PhD program in Veterinary Biochemistry at OMU Graduate Institute of Postgraduate Education in 2023. Utku DURAN, who is currently working as a lecturer at Zonguldak Bülent Ecevit University, Çaycuma Food and Agriculture Vocational High School, speaks English fluently.

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## Spatial variability of temperature inside atoll lagoons assessed with Landsat-8 satellite imagery

Sea Surface Temperature (SST) maps are necessary for managing marine resources in a climate change context, but are lacking for most of the 598 world's atolls. We assessed the feasibility of using the Landsat-8 (L8) satellite to infer SST maps for four French Polynesia atolls of aquaculture interest in Tuamotu Archipelago, namely Takaroa, Raroia, Tatakoto, and Reao. Specifically, we (1) used sensors to measure in situ the range of spatial temperature differences recorded in these four atoll lagoons; (2) calibrated and assessed the performances of SST algorithms to estimate lagoon temperature from L8 signals; (3) generated temperature maps for the lagoons and compared spatial patterns of temperature obtained from these maps with patterns highlighted by in situ sensors. Good agreements between satellite and in situ temperature data were obtained, with better results achieved when using an atoll-by-atoll optimization (average bias=-0.26°C; RMSE=0.55°C). However, we also show that the range of temperature inside atoll lagoons is low, and of the same order of magnitude than RMSE achieved with SST algorithms. Because of the L8 overpass time (~9 AM) and the revisit time (16 days), L8 SST could not capture the entire range of spatial differences measured in situ in the four lagoons, but could capture spatial gradients and fronts better than with few in situ sensors. Considering the achieved accuracies and the actual temperature differences at the four study sites, we discuss the usefulness of L8 derived SST maps to assist fishery and aquaculture management in atoll lagoons, as well as the possible generalization to other lagoons.

**Biography**

Dr. Simon Van Wynsberge studied Ecology at the UPMC University, France and graduated as MS in 2011. He then joined the research group of Prof. Andréfouët at the French Institute of Research for Development (IRD), Nouméa, New Caledonia. Received an PhD degree in 2016 at the University of French Polynesia. After one-year postdoctoral fellowship at IRD, French Polynesia, obtained the position of researcher at Ifremer, and perform researches in various fields for aquaculture and fishery applications, including remote sensing.

**Violetta M. Yurakhno[1*], Vo Thi Ha[2], Christopher M. Whipps[3]**

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## Myxosporean fauna of East Sea marine fishes off the coast of Vietnam

In 2018-2023, we examined in East Sea of Vietnam total 1297 fish specimens for myxosporean infections, including 638 specimens of 7 fish species of the Mugilidae family and 659 specimens of 40 fish species belonging to 21 families. Four myxosporean species were described based on materials collected by Chinh Nguyen from Hanoi. All our studies were conducted during 1-2 months of each year in Nha Trang. Three long-distance expeditions were also carried out: To the north (in 2021–Quy Nhon, Da Nang, Hue, Dong Hoi) and south (in 2022–Phan Rang, Phan Thiet, Mui Ne, Vung Tau), (in 2023–Ha Tien, Phu Quoc Island). A total of 53 representatives of myxosporeans of 11 genera were found, including 19 *Myxobolus*, 18 *Kudoa*, 6 *Ceratomyxa*, 2 *Ellipsomyxa* and *Zschokkella*, and 1 in each genus of *Ortholinea, Chloromyxum, Sigmomyxa, Auerbachia, Unicapsula and Henneguya*. Only 13 species were identified using morphological and molecular genetic data. 7 species were found in mullets: *Myxobolus spinacurvatura* in *Mugil cephalus; Ellipsomyxa gordeyi* in *Planiliza melinoptera, P. subviridis, Planiliza sp*. D and M. cephalus; Kudoa dicentrarchi in Planiliza sp. D, Crenimugil seheli, Osteomugil perusii, O. *cunnesius, P. melinoptera, and M. cephalus; Kudoa igori in O. cunnesius; K. borimiri in O. perusii, O. cunnesius, P. melinoptera and Planiliza sp. D.; K. bora in Mugil cephalus; K. surabayaensis-like sp*. in *Mugilidae gen sp*. 3 members of the *genera Henneguya, Zschokkella* and *Kudoa* have also been described but not identified. In fish of other families, 6 species are described – *Kudoa monodactyli* in *Monodactylus argenteus; K. thyrsites in Decapterus russeli, K. whippsi in Abudefdus vaigiensis; K. javaensis* in *Atule mate; Ceratomyxa binhthuanensis* in *Epinephelus fasciatus, Auerbachia chakravartyi in Negalaspis cordila and 1 unidentified representative of the genus Unicapsula* in Nemipterus japonicus. Thus, out of 16 known in Vietnam marine fish identified species to date, we have described 13, i.e. 81% of the fauna. *Myxosporeans* were found in the gall bladder, intestine, muscles, gills, oesophagus and pharynx. In each species of mullet fish, from 1 to 6 species of myxosporeans were found, sometimes 3 species simultaneously in one fish, and sometimes even in one organ (gall bladder) or tissue (muscles). The prevalence of myxosporean invasion in mullets varied from 4 to 78% for different species. The number of Myxobolus cysts ranged from 1 to 104 in one fish. Each fish species of other families usually contained 1, sometimes 2 myxosporean species. The prevalence of myxosporean invasion in these fish ranged from 10 to 70% depending on the parasite species. The number of Kudoa cysts ranged from 1 to 9 in one fish. Of all the *myxosporean species*, only 2 are of practical

interest for fisheries and mariculture. These are Kudoa thyrsites in Decapterus russeli, found in 36% of fish with an intensity of one to tens of spores in a smear in the absence of histolysis in muscles, and Kudoa bora in the mullet *Planiliza sp. D* in the form of white cysts in the muscles of fish and the wall of the pharynx and oesophagus, found in 3% of fish in the form of 10 muscle cysts, 2 cysts in the pharynx and 1 on the esophagus. Since the size of the cysts was quite large and clearly visible (1.2 - 2.0 mm), this spoiled the commercial appearance of fish products.

Part of the work carried out by V. M. Yurakhno was supported within the framework of IBSS state research assignment “Biodiversity as the basis for the sustainable functioning of marine ecosystems, criteria and scientific principles for its conservation” (No. 124022400148-4) (Russian Federation) and with Vo Thi Ha within the topic of the Joint Russian-Vietnamese Tropical Research and Technology Center (ECOLAN E-3) “Conservation, restoration and sustainable use of marine coastal ecosystems based on the study of their structural and functional organization” (Russian Federation and Vietnam). Work carried out by Ch. M. Whipps at ESF was supported in part by the SUNY Center for Applied Microbiology (USA).

**Biography**

Violetta M. Yurakhno graduated from the Molodezhnenskaya Secondary School of Simferopol in 1981 with a gold medal, from Simferopol State University in 1986 with honors, completed her postgraduate studies in 1989, and defended her PhD thesis on "Myxosporeans of Black Sea fish: systematics, fauna, ecology, zoogeography" in 1994. Author of 208 publications. A famous specialist in parasites of fish in the World Ocean. Has works on ichthyology, nature conservation, and the history of biology. Described 25 new species of myxosporeans (24) and leeches (1). Indicated many new species for the fauna of the Black, Azov and East Seas. Has extensive international cooperation.

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## POSTER PRESENTATIONS

**Angkasa Putra[1*], Ilham Ilham[2], Fitriska Hapsari[3], Sahabuddin[4], Sarifah Aini[1]**

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## Rice-tiger shrimp system in brackish water: An alternative for marginal land utilization

Saline intrusion in rice fields often compels farmers to abandon these areas, rendering them unproductive and fallow. This study explores an innovative solution: integrating a rice-shrimp system in the brackish water environment. We aimed to evaluate the implementation of this system, focusing on biota growth performance, water quality, and financial efficiency. The study area was designed with 70% allocated to salt-tolerant varieties of Irrigated Inbred Rice (Inpari 34 and Inpari 35) and 30% to tiger shrimp cultivation. Conducted over a single production cycle across two ponds, rice was planted 25 days after seeding, followed by an 85-day cultivation period. Shrimp were introduced at the post-larval stage after 50-day acclimatization at salinity of approximately 5 ppt, with stocking occurring 25 days after rice planting at a density of 3 individuals/m$^2$, and harvested after 62 days. Growth and water quality were monitored biweekly, and yields were recorded at harvest. Results showed rice growth from an average height of 40 cm to 125 cm, yielding 9.98±0.08 t/ha. The shrimp exhibited a survival rate of 27.33±25.08%, averaging 12.94±2.94 g in weight, resulting in an estimated production of 0.041±0.020 t/ha. These findings suggest that integrating salt-tolerant rice varieties with shrimp cultivation in brackish water is feasible within a single system. This innovation presents a viable technological alternative for optimizing marginal lands, mitigating land conversion for residential purposes, and enhancing both agricultural and aquacultural productivity.

**Biography**

Angkasa Putra, B.App.Fish., M.Sc., IPP., CPGAM., is a graduate of SUPM Bone (2012–2015), the Applied Bachelor's Program in Fisheries at Jakarta Technical University of Fisheries (2015–2019), and holds a Master of Science degree from Pukyong National University, South Korea (2023–2025). In 2022, he obtained two professional degrees: Associate Professional Engineer from the Institution of Engineers Indonesia and Certified Professional in General Affairs Management from Revolution Mind Indonesia. In addition to receiving a scholarship for his master's studies, he was previously awarded various government and foundation scholarships in Indonesia. He also gained professional experience working in research and educational institutions under the Indonesian Ministry of Marine Affairs and Fisheries. As of October 2024, he had authored 141 publications, including books, journal articles, conference proceedings, posters, magazines, and newspaper contributions.

**Kim Henri F. Alonzo[1*], Charita S. Kwan[2], Analiza P. Rollon[3], Arturo O. Lluisma[1]**

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## Unravelling the spatiotemporal molecular diversity of microeukaryotes in a river-to-estuary continuum using full-length 18s rDNA

The taxonomic composition and diversity of microeukaryotic communities in aquatic ecosystems vary across time and space. Understanding this diversity, its variations, and the effects of natural and anthropogenic factors is crucial for assessing aquatic ecosystems and informing management strategies. This study surveyed the molecular diversity of microeukaryotes in the Pampanga River and its estuary in Manila Bay, Philippines, using metabarcoding. Full-length 18S rDNA sequences from samples collected at different sites and seasons revealed 3,973 ASVs across 35 phyla. Alpha diversity indices indicated higher diversity during the wet season across all sites, with San Luis (Site 2) showing the highest diversity and Arayat (Site 1) the lowest in both seasons. Spatiotemporal patterns were observed in taxonomic abundance and community shifts, notably with a gradual shift in abundance between Cryptophyta and Arthropoda across the sites. The communities were dominated by Ciliophora, Arthropoda, Cryptophyta, and Chlorophyta, with distinct groups prevalent at specific sites. For instance, Cryptomonas sp. and Tintinnidium sp. were prevalent upstream, while Strobilidiidae and freshwater Maxillopoda were more abundant downstream. In the estuary, brackishwater Maxillopoda and Tintinnopsis sp. were the most prominent. These distribution patterns lead to three distinct community clusters along the river-estuary gradient. Although no clear link was found between the overall microeukaryotic structuring and pesticide levels, an inverse relationship between microeukaryotic diversity and pesticide concentrations was observed each season. This study represents the first molecular assessment of river and estuarine microeukaryotes in the Philippines. It highlights the country's microeukaryotic diversity, including first report taxa, while providing valuable baseline data for conservation and serving as a model for future metabarcoding studies in similar ecosystems.

**Biography**

Mr. Alonzo is a graduate student at the University of the Philippines Diliman taking Marine Science (Marine Biotechnology) at the Marine Science Institute. Currently a University Researcher at the University of the Philippines System working on various bioinformatics projects on the different omics disciplines. His research interests are focused on microbial ecology, genomics, and bioinformatics.

**Xiran Li[1], Hongye Wang[1], Hisham Abdelrahman[2,3], Anita M. Kelly[2,3], Luke A. Roy[2,3], Esteban Soto Martinez[4], Luxin Wang[1*]**

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[4]Department of Veterinary Medicine, University of California Davis, Davis, CA 95616, United States

## Impact of antibiotic application on microbiome present in catfish gut and water

Terramycin (oxytetracycline) is an FDA-approved antibiotic commonly used to treat enteric septicemia in catfish caused by Edwardsiella ictalurid. Despite its widespread use, its impact on the gut microbiota of catfish as well as the water mcirobiome remains poorly understood. This study evaluated the combined effects of antibiotic administration and water temperature on the catfish gut microbiome and water microbiome. Thirty-six 35-gallon tanks were set up, with four replicates per treatment. Tanks were filled with pond water and equipped with biofilters. Temperatures were maintained at 20, 25, and 30°C, with dissolved oxygen at ~6 mg/L. Each tank housed 25 channel catfish fingerlings. Terramycin-medicated feeds were administered for 10 days, followed by 21 days of withdrawal. Samples were collected at three time points (start, end of treatment, and end of withdrawal). Intestinal contents of the catfish were collected using FLOQSwabs® and the 1 L of water samples were taken from each tank at every sampling point.

Temperature had a significant impact on both the fish gut microbiome and the water microbiome. In the fish gut, the treatment led to an increased relative abundance of Mycobacterium at 20°C, Enterobacter at 25°C, and Klebsiella at 30°C. For the water microbiome, Terramycin treatment increased the relative abundance of Shewanella, Pelobium, and Aeromonas at 20°C; Pelobium at 25°C; and Pelobium and Klebsiella at 30°C.

**Biography**

Luxin Wang is a professor at the University of California Davis and research program focuses on microbial food safety and quality.

# BOOK OF ABSTRACTS

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