International Conference

Towards sustainable use of aquatic resources...

PROCEEDINGS

NARA SCIENTIFIC SESSIONS (NSS-2024)

"OPTIMISTIC ACTIONS FOR NURTURING AQUATIC ENVIRONMENT"

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National Aquatic Resources Research and Development Agency (NARA)

Scientific Sessions 2024

“Optimistic actions for nurturing aquatic environment”

26th-27th September 2024

National Aquatic Resources Research and Development Agency (NARA)
Colombo 15, Sri Lanka

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Message from the Chairman, NARA

As the Chairman of NARA, it gives me immense pleasure to send this message to the International Conference NARA Scientific Sessions 2024, organized by the National Aquatic Resources Research and Development Agency (NARA), Sri Lanka. Our Annual Scientific Session serves as a vital platform to explore and share cutting-edge research in the aquatic resource sector with both local and international experts. This year, we aim to foster collaboration among eminent researchers in aquatic science, enabling the dissemination of research findings and the exchange of contemporary knowledge. Our overarching theme, "Optimistic Actions for Nurturing Aquatic Environment," underscores our commitment to sustainable practices and innovative solutions for preserving and enhancing aquatic ecosystems.

I would like to express my sincere gratitude to our distinguished guests and invited speakers for their presence and contribution to the conference. Your participation adds immeasurable value, and your insights enrich our discussions on the transformative potential of fisheries and aquatic resources in building a sustainable future. I encourage each participant to engage in meaningful discussions, share insights, and forge new collaborations throughout the conference.

Moreover, I would like to extend my gratitude to the chairperson of NARA Scientific Session 2024, and the committee members for their tremendous effort in making this event a success. I also greatly appreciate all Heads of technical divisions, Principal Scientists, Senior Scientists, Scientists, and the supportive staff of NARA who contributed directly or indirectly to this achievement. I wish to convey my appreciation to the Sri Lankan government and all our sponsors sectors for their generous contributions and sponsorship of the event. Finally, I sincerely wish our guests and speakers, as well as all authors and participants, a productive and pleasant stay at the NARA Scientific Sessions 2024.

Dr. Nimal Kumarasinghe
Chairman
National Aquatic Resources Research and Development Agency (NARA)

Message from the Director General, NARA

NARA annual scientific session is a platform for scientists, planners, policy makers and implementers to meet and interact. It also serves as a platform to the emerging scientist on the aquatic sciences to present their research and interact with the senior scientist in the field of aquatic sciences.

I am glad that research work, presented here, encompass all the different spectrum of the Aquatic sciences, include strategies for using under-utilized fish resources to exploration of offshore sand deposits, and findings of status of fish stock to strategies to enhance the livelihood of fishers. Scientific knowledge generated would lead to healthy ecosystem and contribute to the economic welfare.

As a nation with limited land area and land based resources but bestowed with almost unlimited ocean area and ocean resources, our economic prosperity lies on the harnessing the ocean, to which, we need many more researchers engaged in aquatic research. And a concerted effort would be made to invest more on the research and development on aquatic sciences.

Dr. K. Arulananthan
Director General
National Aquatic Resources Research and Development Agency (NARA)

Message from the Deputy Director General, NARA

Sustainable fisheries solutions are keys for the growth of the blue economy, particularly in the face of climate change scenarios. As the marine environment undergoes significant transformations, the sustainability of fisheries, a fundamental component of the economy, is at risk and needs a vigilant. Therefore, scientists should focus on innovative approaches in fisheries management to drive blue economy growth while safeguarding marine resources and their environment. Sustainable fisheries are crucial in maintaining the ecological balance and economic viability of these activities.

In this end, it's great pleasure to me extending the heartiest support to this NARA scientific sessions 2025 on "optimistic actions for nurturing aquatic environment" in making an avenue for the researchers and academicians to express their new research findings in the fields of fisheries and aquatic resources not only in Sri Lanka but also in other parts of the globe.

I highly appreciate work done by organising committee and inside and outside reviewers for the success of this event held in National Aquatic Resources Research and Development Agency (NARA) in Sri Lanka.

May this scientific session on "optimistic actions for nurturing aquatic environment" be a fruitful and inspiring experience for all, paving the way for continued scientific excellence.

Best wishes for a successful sessions.

Dr. Lalith Amaralal Kariyawasam
Deputy Director General
National Aquatic Resources Research and Development Agency (NARA)

Message from the Chairperson of NSS 2024 Organizing Committee

As a leading research institution for aquatic resources in Sri Lanka, the National Aquatic Resources Research and Development Agency (NARA) significantly contributes to bringing the standard of aquatic research dividing the scope into spcific areas such as fisheries and aquaculture, aquatic biotechnology and animal health, oceanography, hydrography, fisheries socio-economics and marketing, aquatic food technology, aquatic environment conservation and management, clmate change impact and resilience, applications of GIS and remote sensing in aquatic sciences.

NARA received a total of 76 scientific abstracts this year for the NSS 2024. The abstracts were reviewed by eminent persons in the relevant fields and the comments given by them were highly valued when accepting the abstracts for publication.

Additionally, it is a great pleasure to announce that the organizing committee presents the merit awards for research achievements of NARA scientific staff, as a prestigious recognition within the NARA Scientific Sessions 2024. Four awards are given this year in the following categories: outstanding performance in marine science and fisheries development, outstanding performance in aquaculture development, outstanding performance in aquatic environment conservation and outstanding performance in product development. These awards will serve as a significant encouragement for NARA research staff to pursue innovative research in the fisheries and aquatic resource field.

The NSS 2024 organizing committee extends their appreciation to the esteemed chief guest, keynote speakers, reviewers, sponsors and all authors for their invaluable contributions. I am confident that NSS 2024 will be a fruitful and remarkable experience for all participants.

Dr. R. Weerasingha
Senior Scientist
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Characterization of biofloculant producing - bacteria isolated from biofloc systems developed for Nile tilapia (*Oreochromis niloticaus*) culture using different inoculant techniques

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Biofloc technology has emerged as an innovative and sustainable approach for aquaculture, enhancing water quality, and good nutrition and ensuring a healthy cultural system. One of the key components of biofloc systems is the microbial community, which plays a crucial role in biofloc formation and stability. This study focused on the characterization of bio flocculant-producing bacteria (BPB) from a Nile Tilapia (*Oreochromis niloticus*) culture system, with a specific emphasis on the influence of different inoculant techniques (pond bottom, fermented and non-fermented). The BPB was isolated from the water by applying serial dilution, pour plate, and streaking plate techniques on nutrient agar (NA) media, and enrichment media. Morphological, biochemical, and 16s rDNA molecular techniques were performed to identify the bacteria. Floc volume obtained with the different inoculant techniques was quantified with the help of the Imhoff cone. At the same time, the flocculating activities of the BPB were evaluated using a modified Kaolin clay suspension technique. The highest total bacteria count of 4.38 ± 6.4×10^6 CFU/ml was reported in the biofloc obtained with the fermented culture technique, while the highest floc volume of 15.33 ± 9.02 ml/L was reported in the biofloc obtained with the non-fermented culture technique. A total of 60 isolates were successfully isolated from all three flocks obtained with different treatments (pond bottom n =20, fermented n =20 and non-fermented n =20). In total, fourteen different species were identified. Notably, *Bacillus paramycoides, Lysinibacillus fusiformis, Citrobacter sp.,* and *Bacillus sp.* were among the most abundant BPB species among isolates. *Citrobacter freundii* at 97% exhibited the highest flocculating activity and the lowest was *Bacillus marcorestinctum* at 47%. Among three treatments, the non-fermented culture inoculant was identified as the most effective treatment for supporting consistent and robust biofloc production in the Nile tilapia culture system.

Keywords: Biofloc technology, bio-flocculant bacteria, inoculation technique, 16S rDNA sequencing, flocculating activity

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Projection of Sri Lanka's fishery production for 2024 using ARIMA model

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Projections of Sri Lanka's fishery sector production crucial for sustainable resource management, economic planning, food security, environmental impact assessment, and informed policies and market strategies. This research aims to forecast based on time series observations. National statistics of fishery production data from the Ministry of Fisheries were utilized from 2008 to 2023. The time series was decomposed into trend, seasonality, and residual components using the Box-Jenkins trend analysis method and the Auto-Regressive Integrated Moving Average (ARIMA) model. Analysis was done using R-Studio. Based on the trend, it was observed that inland fishery in 2024 increased by 3.99%, while marine fishery decreased by 1.46%. However, total fish production slightly increased by 0.06% compared to 2023. Total fish production would reach 407,299 MT, contributing 289,662 MT by marine fisheries and 117,637 MT by inland fisheries. Coastal and lagoon fisheries production in the marine fishery sector declined to 158,805 MT, which is a decrease of 3.71% while offshore fisheries production increased to 130,857 MT, reflecting an increase of 1.48% from 2023 production values. In the inland fishery sector, culture fishery production decreased to 7,958.5 MT (1.56% of 2023 value), while capture and shrimp production increased to 97,995 MT (1.67% of 2023 value), and 11,683 MT (0.72% of 2023 value) respectively. According to seasonal components, fishery production is higher during the North-East Monsoon and the second inter-monsoon period. It is lower during the South-West Monsoon and the first inter-monsoon period. The study highlights that Sri Lanka's fishery production in 2024 showed no net decline compared to 2023, indicating stability in total fish production. The impact of monsoon patterns on fish production, emphasizes the dynamic nature of fishery production. Therefore, for the sustainability of fishery production, it is essential to implement appropriate fisheries management policies and legal aspects.

Keywords: Fishery production, time series analysis, trend analysis, ARIMA Model, monsoon

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Preliminary study on growth performances of *Penaeus monodon* post larvae sourced from imported specific pathogen-free (SPF) shrimps in Kalpitiya lagoon in Sri Lanka

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The introduction of regulations mandating the use of specific pathogen-free (SPF) brooders for post-larvae (PL) production in the shrimp farming industry in Sri Lanka has resulted in the unavailability of seed production from wild-caught shrimp. The genetic diversity in these animals is minimal and their adaptability to the harsh natural conditions remains questionable. The use of seed produced from these SPF brooders may influence lagoon stocking initiatives designed to enhance shrimp production in lagoon fisheries. Thus, a study assessed the growth performance of PL sourced from imported SPF shrimp brooders in a natural environmental context. Specific pathogen-free PL15 confirmed as disease-free stock through PCR screening, were used for the study. Post larvae at 25/ m^2 were placed in hapas at three different sites in Kalpitiya lagoon, where their growth performances (weight and length), survival, and disease dynamics were observed for six months (December 2023 - May 2024). The physicochemical parameters of water such as pH, salinity and water temperature were 7.97 ± 0.65, 26.29 ± 5.09 ppt, 27.41 ± 3.18 °C respectively. The physicochemical parameters in the three sites did not significantly ($p > 0.05$) different while the values recorded fall within acceptable ranges for shrimp aquaculture. The average weight increase of shrimps was 4.93 ± 2.59g representing a substantial decrease in biomass over 180 days. Similarly, the average length of PL exhibited a reduction of 4.5 cm ±1.87 cm. Survival rates of shrimp in hapas declined from 100 to <35% within the 2 months after initiation of the trial while the rate was 18% at the later stage (by April). Significant growth retardation and variations in length and weight gain of shrimp were observed from the second month onward until the end. *Enterocytozoon hepatopenaei* (EHP) disease was reported in the later stages of the culture cycle. The study highlighted significant challenges in acclimating imported SPF post larvae to natural lagoon environments.

Keywords*:* SPF, post larvae, survival, growth performances

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Prevalence and antimicrobial resistance of *Escherichia coli* and *Salmonella* bacteria isolated from cultured shrimp and pond water

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Antibiotics are important for controlling bacterial diseases in the shrimp farming sector. This study investigated the antibiotic sensitivity testing (ABST) of *Escherichia coli* and *Salmonella* from shrimp samples taken from seven shrimp farms located in Puttalam District. Twenty-one cultured shrimp samples were analyzed, and thirteen *E. coli* and nine *Salmonella* isolates were confirmed. Antibiotic sensitivity for isolated bacterial cultures was tested using the Kirby-Bauer disc diffusion method. The antibiotic susceptibility patterns of these bacterial species were assayed against five antibiotics including amoxicillin (30 µg), oxytetracycline (30 µg), chloramphenicol (10 µg), erythromycin (10 µg), and tetracycline (10 µg). The diameter of inhibition zones was compared with the standards of clinical and laboratory standards institutes. Among the shrimp samples, 53.84% (7/13) of *E. coli* isolates showed the highest resistance to erythromycin, while 38.46% (5/13) were resistant to both amoxicillin and tetracycline. The isolates exhibited the highest susceptibility to chloramphenicol. Additionally, *E. coli* cultures isolated from pond water samples had resistance towards erythromycin and tetracycline at a rate of 33.33% (1/3). All *Salmonella* isolates in shrimp samples showed 44.44% (4/9) the highest resistance to erythromycin and 11.11% (1/9) lower resistance to tetracycline and amoxicillin, while they showed the highest susceptibility to chloramphenicol and oxytetracycline. Moreover, *Salmonella* isolates from pond water displayed resistance to erythromycin. *E. coli* isolates from shrimp samples were found to have a Multiple Antibiotic Resistance (MAR) index of as high as 0.8 with the antibiotic combination of amoxicillin, erythromycin, oxytetracycline and tetracycline. These results showed that antimicrobial-resistant bacteria are present in shrimp farms. Therefore, it highlights the importance of implementing biosecurity measures and maintaining proper hygienic practices in shrimp farming systems to prevent the emergence of antibiotic-resistant bacteria.

Keywords: *Escherichia coli*, multiple antibiotic resistance, pond water, *Salmonella*, shrimp

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Impact of controlled carbon-to-nitrogen ratios and HUFA-enriched *Artemia* diets on nursery rearing of *Penaeus monodon* post larvae

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In the present study, *Penaeus monodon* post larvae (PL 25) were grown for 10 days under different nursery treatments, and their growth rate, survival, and resistance were investigated against pathogenic *Vibrio* spp. The experiment comprised two nursery treatment groups (commercial feed-CP 48% + unenriched *Artemia* and tank water C/N ratio control (T2), commercial feed- CP 48% + *Artemia* enriched in HUFA-Cod liver oil diet (T3)), and control (commercial feed - CP 48% + unenriched *Artemia* (T1) with three replicates each, having 10 individual/L as stocking density in 20L tanks with constant aeration. White Sugar ($2mgL^{-1}day^{-1}$) was supplied as an organic carbon medium to control the C/N ratio (15:1) of water in T2 nursery treatment, where carbon sources encourage the growth of heterotrophic bacteria, which can maintain water quality and a healthy environment for shrimp. The treatments were conducted with a completely randomized design and all the data was analyzed using Statistical Analysis System (SAS 9.4). After the treatment, larvae nourished with an HUFA-cod liver oil enriched *Artemia* diet (T3) exhibited a significantly higher survival rate (%) (58.39 ± 1.03) compared to the control group (28.13 ± 1.85) ($p < 0.05$). No significant difference was observed in the specific growth rate (day^{-1}) between the T2 (0.21 ± 0.02) and T3 (0.18 ± 0.01) treatments. Furthermore, the total NH_3 concentration (mg/L) in the T2 treatment tank was notably lower (0.34 ± 0.09) than in the control group (2.50 ± 0.56) ($p < 0.05$). Employing the total plate count method, a significantly higher in total bacterial load ($CFU\ mL^{-1}$) was observed in the PL body, treatment tank water, and PL gut of shrimp reared in the T2 nursery treatment. Conversely, a significantly lower total *Vibrio* load was in the T2 nursery treatment. The resistance of nursery-treated larvae to pathogenic *Vibrio* spp. challenge test (optimal density 0.7), T2 nursery treatment larvae and larvae in T3 nursery treatment showed significantly higher ($p < 0.05$) survival rates (%) (68.33 ± 1.67), (58.33 ± 6.01) respectively than larvae in the control tank (38.33 ± 1.67). These findings underscore the potential of manipulating the water C/N ratio and highly enriched larval diet to enhance larval survival and mitigate the detrimental effects of pathogenic *Vibrio* species.

Keywords: *Penaeus monodon*, post larvae, nursery treatments, survival rate, *Vibrio* infection.

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Seasonal variation of the trammel net shrimp fishery in Kalpitiya coastal waters

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The emergence of small-scale trammel net shrimp fishing in Kalpitiya coastal waters has added significance following the trawl ban. This study was conducted to explore the seasonal variations in the catch of Kalpitiya trammel net operations at Periya Arichchalai, Kudiyawala, Pasadimunnai, Illupanthivu, Gangewaadiya, Serakkuliya and Pookulam from January to December 2023 through landing site and *in-situ* catch evaluations. The total fishing effort was calculated as 700 vessels (20 fishing days per month) and 90% of vessels were actively operated during the peak months (October to March). Mainly two types of trammel nets were used and *Peneaus merguiensis*, *P. indicus*, *P. semisulcatus* and *P. monodon* were the target shrimps. Twentynine species including finfish (Leognathidae, Ariidae, Mugilidae, Gerridae and Terapontidae), crabs and cephalopods were recorded as bycatch. The mean annual Catch Per Unit Effort (CPUE) was estimated as 10.1 ± 3.3 kg operation^{-1}, whereas shrimp catch constituted as 3.9 ± 2.3 kg operation $^{-1}$). Significant differences were observed in the mean CPUE of shrimps among four monsoonal seasons (P value < 0.01), whereas the highest (7.3 ± 1.2 kg. operation $^{-1}$) and lowest (2.1 ± 0.8 kg. operation $^{-1}$) values were reported in 2nd inter-monsoon (IM 2) and Southwest (SW) monsoon periods respectively. *P. indicus* and *P. merguiensis* dominated with 44% and 40% of the total catch respectively. *P. semisulcatus*, the key shrimp in trawl fisheries was found only 12% of the total catch. The estimated total shrimp production from trammel net fisheries at Kalpitiya in 2023 was ca. 544 MT. Of this, 40% was landed during the NE monsoon followed by 34% in IM 2. The average net income per fishing day for a motorized craft and non-motorized craft were estimated as LKR 6000.00 ± 3000.00 and LKR 4000.00 ± 3000.00 respectively. The variations in CPUE and total catch with seasonality play a pivotal role in shaping shrimp fishery dynamics.

Keywords: Bycatch, catch per unit effort, monsoonal season, trammel net, shrimp

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The effect of duckweed on growth performance, offspring output and fatty acid profile of guppy (*Poecilia reticulata*)

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This study investigates the potential of using floating aquatic plants, duckweed, as a partial replacement for fishmeal in the diet of guppies (*Poecilia reticulata*). Two species of duckweed, *Lemna minor* and *Spirodela polyrhiza*, were dried using solar dryer and oven drying methods, then ground into a fine powder. Experimental diets were formulated to replace 10% of the fishmeal with duckweed powder. A total of 216 guppies (male to female ratio 1:2) were distributed across 12 tanks, with 18 fish per tank, for a 68 day feeding trial. Growth performance parameters, including weight gain, length gain, specific growth rate, and survival rate, showed no significant differences ($p > 0.05$) between fish fed the experimental diets. However, fish fed the diet containing oven dried *L. minor* exhibited the highest weight gain (51.51 ± 7.08%), male length gain (64.90 ± 7.28%), female length gain (64.90 ± 7.28%), specific growth rate (1.08 ± 0.22), and survival rate (94.44 ± 5.56%) compared to those fed *S. polyrhiza*. Reproductive performance analysis showed that fish fed oven dried *S. polyrhiza* produced the highest number of offspring (9.67 ± 1.15). Fatty acid composition analysis indicated an increase in docosahexaenoic acid (DHA) levels (6.12% of total fatty acids) in fish fed solar dried *L. minor*. The highest arachidonic acid (ARA) to eicosapentaenoic acid (EPA) ratio (5.54) was observed in fish fed *S. polyrhiza*, while the lowest ARA/EPA ratio (2.81) was found in fish fed sun dried *L. minor*. These findings suggest that *L. minor*, particularly when oven dried, can serve as an effective feed ingredient in guppy diets, improving growth performance. Future research should focus on optimizing duckweed supplementation and assessing its long term effects on guppy growth, reproduction, and health to enhance ornamental fish breeding practices.

Keywords: Duckweed, *Lemna minor*, *Spirodela polyrhiza*, guppy, fishmeal, growth

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Impact of salinity fluctuations on cage culture practices of Asian seabass *(Lates calcarifer)* in Negombo lagoon

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The highly productive brackish water ecosystem of Negombo lagoon in Sri Lanka supports a substantial population of around 10,000 individuals who depend on its resources, both directly and indirectly. To enhance exports and improve livelihoods, the Ministry of Fisheries and Aquatic Resources, Asian Development Bank, launched a project introducing Asian seabass (*Lates calcarifer)* farming for local fishermen. In June 2021, a mass mortality event resulted in the loss of around 20,000 kg of seabass, highlighting the need for water quality assessments at cage culture sites. This study aimed to evaluate the water quality in the Munnakkaraya area, where seabass cages are located. Conducted from March to October 2022, the study meaured water temperature (WT), pH, electrical conductivity (EC), total dissolved solids (TDS), salinity, and electrical resistivity were measured across 30 cage sites using a Cyberscan Series 600 meter. The data indicated that most water quality parameters were within acceptable ranges for seabass growth with mean values recorded as follows: WT, pH, EC, TDS, and salinity were as 29.98 ± 0.22°C, 7.94 ± 0.85, 38.32 ± 8.69 mS/cm, 35.57 ± 13.15 ppm, and 18.71 ± 8.69 ppt, respectively. However, a significant drop in salinity to 0 ppt in June resulted to a mass mortality event, resulting in the death of nearly 4,000 kg of seabass. This drastic salinity depletion was identified as a critical factor contributing to the mortality observed. It is recommended to adjust the culture cycle to mitigate the impact of salinity fluctuations and improve water quality management. Additionally, further research is needed to monitor water quality over extended periods and develop facilities capable of addressing unfavourable environmental conditions, thereby enhancing the sustainability of seabass farming.

Keywords: *Lates calcarifer,* salinity, cage culture, Negombo lagoon

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Assessment of proximate and fatty acids compositions of some commercial marine fish species of the Bay of Bengal, Bangladesh

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This study was conducted to determine proximate composition and fatty acids profile of 17 commercial marine fish species of the Bay of Bengal, Bangladesh, collected from the Chittagong, offshore trawl area during December 2023. The analyzed fish species consisted of *Muraenesox bagio*, *Gonialosa manmina*, *Setipinna taty*, *Trypauchen vagina*, *Lepturacanthus savala*, *Odontamblyopus rubicundus*, *Selar crumenophthalmus*, *Acetes* sp., *Sphyraena obtusata*, *Anodontostoma thailandie*, *Ilisha filigera*, *Gerres filamentosus*, *Gazza minuta*, *Sardinella longiceps*, *Drepane longimana*, *Auxis rochei*, and *Tenualosa toli*. Fatty acid composition was analyzed by preparing methyl esters and subjecting them to gas chromatography. In the analyzed values of dry matter level, a significantly ($p < 0.05$) higher level (29.52%) was found in *S. obtusata*. The body protein content (77.04%) was significantly higher in *M. bagio*. The highest total body lipid (36.33%) was found in *S. longiceps*. The body carbohydrate content (18.09%) was higher ($p < 0.05$) in *Acetes* sp., while the body ash (18.90%) was significantly higher in *T. toli* ($p < 0.05$). Thirty-two types of fatty acids were identified among these fishes. Significantly highest levels (67.86%) of total saturated fatty acids (SFAs) were found in *A. rochei* ($p < 0.05$), while the value was low in *T. vagina* (52.16%). The total monounsaturated fatty acids were significantly ($p < 0.05$) higher in *G. filamentosus* (34.89%) than these levels in *A. rochei* (22.88%), *G. manmina* (22.78%) and *Acetes* sp. (22.51%). The total polyunsaturated fatty acid (21.27%) and unsaturated fatty acids (47.87%) were significantly ($p < 0.05$) higher in *T. vagina*, while these levels were lowest in *A. rochei* (9.29% and 32.17%, respectively). Omega-3 fatty acids were significantly ($p < 0.05$) highest in *Acetes* sp. (15.55%) and *T. vagina* (15.92%). The higher omega-6 fatty acids (6.54%) were detected in *G. minuta* ($p < 0.05$). The linoleic acid level was significantly ($p < 0.05$) better in *G. manmina* (2.55%). A highest ($p < 0.05$) alpha-linolenic acids (ALA) (2.77%) and eicosapentaenoic acids (EPA) were obtained in *T. vagina*. The docosahexaenoic acid (DHA) was significantly ($p < 0.05$) higher in *S. obtusata* (9.78%). The results highlight the economic significance of these marine fish species in Bangladesh and indicate that investment in sustainable practices and value-added products may enhance the sector's performance. The high protein contents, balanced lipid and essential fatty acids profiles make these marine fishes an excellent dietary choice for

affordably meeting nutritional needs. Findings of the present study elaborate nutritional value of marine fish species available in the Bangladesh Sea and can suggest to look over investing in marine fish product development could boost the sector's performance. Future research should focus on establishing the value chain of important marine fishes by comprehensive composition analysis and their health benefits criterion. The crucial insights into the nutritional value of 17 marine fishes of Bangladesh marine waters demonstrate the significant untapped scope of dietary inclusion through promoting a healthy nutritional source.

Keywords: Bay of Bengal, nutritional values, fatty acids, marine fish

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Poster Presentations

Exploring challenges in inland fisheries management: A case study of participatory approaches in Victoria Reservoir, Kandy District, Sri Lanka

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Victoria Reservoir, the major reservoir in the Kandy district hosts approximately 102 fishers engaged in inland culture-based fishery practices. No previous study had focused on identifying the specific needs and challenges in fisheries management using Participatory Rural Appraisal (PRA) techniques. The major objectives of this study were to investigate the challenges in improving fisher folk's daily harvests, uplift the socio-economic conditions of the community involved in dried-fish production, and evaluate the factors influencing fish farming practices. To achieve these goals, a strengths, weaknesses, opportunities, and threats (SWOT) analysis, a problem tree, and a matrix ranking were conducted with a convenience sample of 44 fishers from Victoria Reservoir. The SWOT analysis revealed that strengths in Victoria Reservoir's fisheries included strong stakeholder collaboration, effective fisher society management, and a conducive ecosystem. Indicated weaknesses were limited use of modern technology, high equipment costs, and inadequate fish storage facilities. Opportunities comprised the availability of sustainable fisheries management training programs, cage culture systems, and demand for value-added products, while threats included illegal fishing, water level fluctuations, and economic challenges. Barriers to dried-fish production were identified through a problem tree analysis and results showed that adverse weather conditions affected drying processes and equipment shortages limited production scalability. Tilapia (*Oreochromis niloticus*) emerged as the preferred species due to its high-income potential and strong disease resistance, as indicated by the matrix ranking results. These findings underscore the importance of collaborative efforts, targeted interventions, and strategic planning to enhance the sustainability and productivity of inland fisheries in Victoria Reservoir. Future studies are needed to focus on assessing the effectiveness of investments in modern fishing technology, infrastructure improvements, and capacity-building programs in addressing the impact of illegal fishing and invasive species, thereby advancing the development of a more resilient and sustainable inland fishing community at Victoria Reservoir.

Keywords: Culture-based fishery practices, participatory rural appraisal, inland fisheries

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Fisheries Socio-economics and Marketing

A survey of onsite fish retailers' knowledge, attitudes and practices on seafood safety in Western Province, Sri Lanka

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The knowledge, attitudes and practices (KAP) of onsite fish retailers concerning seafood handling vastly affect the safety aspects of fish. This survey aimed to assess the KAP and analyze the association between KAP and socio-demographic variables of onsite fish retailers in the Western province of Sri Lanka. Data was collected using a pre-tested questionnaire which consisted of four main sections: socio-demographic variables, knowledge, attitude and practices on seafood handling from randomly selected 150 fish retailers. Direct observation and in-depth interviews were also conducted to collect the qualitative data. Data was analyzed by using the IBM SPSS version 26 software package. The association between socio-demographic variables with KAP and the relationship between KAP were analyzed by the Kruskal Wallis H test and Pearson correlation, respectively. The linear regression model was used to assess the strength of the correlation. In this study, 88% of the retailers were male, and the highest number (58%) of responses were from the age group of 40 to 60 years. The overall performance of fish retailers was at a satisfactory level (38%) about knowledge of seafood safety, positive attitudes (95.33%) towards food safety and bad (0.6%) in seafood safety practices. The bad handling practices were mainly due to a lack of practical skills and facilities. There is a significant relationship between seafood KAP and socio-demographic factors: seafood safety knowledge and age ($p < 0.05$), attitudes and monthly income ($p < 0.05$) and also seafood safety practices and gender ($p < 0.05$). There is a positive yet weak correlation (0.178) between knowledge and attitude towards seafood safety which is significant ($p < 0.05$) while the practices of retailers on seafood safety were independent. Results indicated that it is a must to improve the safety practices of fish retailers on seafood safety. It is recommended to conduct training programs on seafood safety practices and provide infrastructure facilities for fish retailers.

Keywords: Age group, correlation, questionnaire, relationship, socio-demographic

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Fishers' perception on the sustainability of mechanized beach seining in Arugam Bay, Pottuvil, Eastern Sri Lanka

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Arugam Bay belongs to Kalmunai fishery district and it has been renowned for beach seine fishing for three decades. Traditional beach seine operations in Arugam Bay have transitioned into a mechanized beach seine fishery using a winch system since 2023, as a response to labour shortage. Comprehensive studies exploring the implications of this transition on coastal communities is quite limited. Therefore, an attempt was made to bridge this research gap by investigating the perceptions of fisherfolk on the sustainability of mechanized beach seining fishery. Face-to-face interviews were conducted with a convenience sample of 100 beach seine workers who were engaged in winch-operated mechanized beach seining. Selected beach seine operating sites in Arugam Bay were visited 4 days per week from October 2023 to March 2024 to collect data from the respondents using a pre-tested structured questionnaire. Data were analyzed using both descriptive and inferential statistics. The latter included the Wilcoxon Signed- Rank Test, and the Chi-Square Test. The majority of the workers (89%) came from the same locality while 11% came from other areas to engage in this modernized fishery. Respondents reported that approximately 12-15 operations were carried out per month depending on the weather. Wilcoxon Signed-Rank Test results revealed that traditional beach seine practices generated higher production ($z = -5.558$, $p < 0.05$) and higher income ($z = -6.794$, $p < 0.05$) for their labour compared with the mechanized winch operations. According to Chi-Square Test results, there was a significant association (Pearson Chi square = 19.95, DF = 3, $p < 0.05$) between work experience and worker satisfaction on the level of income received from mechanized beach seine operations. Approximately 54% of fishermen who have more than 10 years of work experience in beach seine fishery expressed higher dissatisfaction with income received from mechanised beach seine operations as the income was not sufficient to meet the current expenses in their households. About 63% of respondents stated that the winch system attached to tractors would cause negative environmental impacts in coastal areas. Therefore, appropriate policies and regulations should be designed and implemented to improve the sustainability of the mechanization of beach seine fishery.

Keywords: Coastal communities, sustainability, traditional beach seine, winch system

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Exploring the culinary potential of kirala (*Sonneratia caseolaris*) for jam production

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Mangrove Apple/ Kirala (*Sonneratia caseolaris*) is a widely distributed, nutritious, and medicinally valuable mangrove fruit. This study aimed to develop a novel, marketable product (jam) and to check consumer acceptance as a value addition for the Kirala in the local market to present in a manner suitable for all age groups. The purpose is to introduce Kirala jam, leveraging sensory evaluation (hedonic points) to highlight its taste and flavour. Kirala juice, often used locally, has low acceptance due to its short shelf life. Scientific literature and local knowledge indicate that Kirala jam has not yet been produced. This potential for mangrove apple remains unexplored. The current study aimed to fill this production gap. Exquisite jams are crafted by skillfully simmering Kirala fruits with sugar, lime, and gentle heat, preserving their natural flavours in carefully sealed jars and extending shelf life beyond seasons. In all three treatments, only the sugar concentration is altered (the same concentration of lime and similar Kirala are used). An untrained taste panel was involved in the sensory evaluation. Data were summarized and the three treatments of different sugar levels (high, medium, low) in three age groups (16-24, 25-34, 35 <) were tested using the Friedmann test and Multiple Regression using MINITAB 19. The Fridmann test revealed that there was no significant mean hedonic point difference ($p > 0.05$) among all treatments and the Multiple Regression test revealed more concern has been given to the aroma. Then sugar level did not affect their overall acceptance, as their more concern has been given to the aroma of all treatments. Results suggest the low-sugar jam is healthy for all ages, showing no trade-off between reduced sugar levels and product marketability. Hence, a customizable, healthy jam can be introduced to the market as a modified food product.

Keywords: Kirala jam, mangrove plant, *Sonneratia caseolaris*, Sri Lanka

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The invisible reality: Gender disaggregated data in Sri Lanka's marine sector and the implications for policy formulation

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The marine sector plays a crucial role in Sri Lanka's economy, providing livelihoods and contributing to national development. However, data on women's participation and gender dynamics in the sector are scarce and sex-disaggregated, the understanding of women's roles and the formulation of inclusive policies. This study addresses this gap by analyzing sex-disaggregated data through 3 case studies conducted in Lellama, Negombo and reviewing existing literature. Data were analyzed using thematic analysis. The findings reveal that women are significantly underrepresented in employment (Department of Census and Statistics, 2022), and occupy only a small fraction of leadership and decision-making roles (Fisheries and Aquatic Resources Act No 2 of 1996). They are mainly engaged in informal and unpaid work, often invisible to policymakers and planners (case study statements). The lack of sex-disaggregated data has implications for policy formulation, as it perpetuates gender inequalities and biases. Policies that are not gender-responsive fail to address the specific needs and challenges faced by women in the marine sector. This limits their opportunities for participation, advancement, and fair remuneration. This study highlights the importance of collecting and using sex-disaggregated data to inform gender-responsive policymaking in the marine sector. By shedding light on the invisible reality of women's contributions, policymakers can design policies that promote gender equality, empower women, and enhance the sustainable development of the sector. The findings highlighted the need for targeted interventions to address gender inequalities, such as capacity-building programs, improved access to education and training, and the removal of structural barriers to women's participation. By investing in women and recognizing their vital role in the marine sector, Sri Lanka can unlock its full economic potential and promote inclusive growth and development.

Keywords: Sex-disaggregated data, policy, fisherwomen, gender disparities

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Constraints of protecting traditional fishing practices and livelihood in stake net fishery in Chilaw Lagoon

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There is a growing interest in community-based fisheries management (CBFM) which allows the major responsibility to fishing communities to manage their fishery resources. Stake net fishery is a CBFM technique and the stake net fishing community is facing several constraints in preserving their traditional fishing practices and livelihood. This paper examines the livelihood status and constraints of protecting traditional fishing practices and their livelihood in the Chilaw Lagoon. A quantitative and qualitative mixed research design was applied for this study. Primary data was collected using a questionnaire survey from a sample consisting of thirty fishermen while semi-structured interviews, focus group discussions with six fishermen and resource mapping were used as participatory rural appraisal (PRA) tools. Descriptive statistics were used to analyze data using the SPSS 22.0 Statistical Package. The results of the study revealed that Stake net (Kattudel) fishery is based on Pella system and accordingly, there are three main *Pella* represented: Pitipana Street, Aluthwatta and Sea Street in the structure of Chilaw Kattudel Association. The majority of the fishermen (47%) were in the age category of 60- 69 years while 60% of fishermen have over 30 years of experience in the fishery. The findings show that stake net fishermen are currently facing various constraints and their fishing practices and livelihood have been affected. Increased use of mechanized boats within the lagoon (90%), speed of motorized boats disturbs the operation of stake net fishery and damage to stake nets (86.5%), difficulty in finding alternative stakes instead of mangroves (83%), garbage dumping (83%), release of chemical mixed wastewater from shrimp farms into the lagoon (70%) and less communication between government officials and lagoon fishers on lagoon development projects (73%) are the key constraints of protecting traditional fishing practices and livelihood. It is recommended to practice sustainable management measures to preserve the livelihoods of stake net fishermen.

Keywords: Community-based fisheries management (CBFM), constraints, livelihood, stake net fishery, sustainability

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Analyzing the role of the fisheries information centre (FIC) in the development of Sri Lanka's fisheries sector (2015-2021)

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Efficient information sharing between resource users and fishery managers is critical for the sustainable management of aquatic resources. The National Aquatic Resources Research and Development Agency (NARA) established the fisheries information centre (FIC) on May 7, 2013, to provide timely and accurate solutions to fisheries-related issues. This study investigates the role of the FIC by analyzing the spatial distribution of received queries, the content of these interactions, and the satisfaction levels of various user groups. A six-year (2015–2021) time series of call data was analyzed using SPSS, and spatial data were mapped with ArcGIS 10.4.1. The analysis revealed that 42% of inquiries were related to trade and investment, while 17% pertained to complaints and comments on general fishing activities. Colombo received the highest number of queries (18%), followed by Gampaha (14%), Hambantota (11%), Galle (10%), Puttalam (9%), and Matara (9%). Active fishermen made up 33% of the queries, focusing on welfare, disaster response, and industry-related issues. The study also analyzed user satisfaction, highlighting that the fishing community, government agencies, semi-government institutions, NGOs, and the public benefited most from the FIC. In response to user needs and challenges, this study recommends integrating local fishery institutions into a virtual one-stop service center and establishing a comprehensive database to streamline information access and expand FIC services.

Keywords: FIC, fisheries sector, information sharing and spatial distribution

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Poster Presentations

Application of ICT tools in multiday fisheries in the West Coast in Sri Lanka

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The multiday fisheries sector in Sri Lanka has exhibited an upward production trend in recent years. However, the underutilization of Information and Communication Technology (ICT) and modern technologies has impeded its full potential for development. This study aims to identify the challenges and opportunities associated with the application of ICT tools in multiday fisheries in Sri Lanka. A survey was conducted using a pre-tested semi-structured questionnaire among 100 multiday boat owners and skippers in the Negombo and Kalutara fisheries districts during 2021. A mixed-method approach was employed, integrating both quantitative and qualitative studies. The sample comprised 48 longline fishers, 20 gill net fishers, and 32 ring net fishers. Data analysis was performed using SPSS V25 software, employing descriptive statistics and a chi-square test to determine the relationship between fishers' income and ICT usage. Results indicated a significant association ($p = 0.038$) between ICT use and fishermen's income per trip. Various ICT tools, such as mobile phones (100%), GPS (100%), SSB Radio (100%), VMS (56%), AIS (81%), and compasses (100%), were utilized by multiday fishermen to enhance communication and increase fish catches. Attitudes towards ICT application were positive; 88% of respondents were satisfied with increased sea safety, and 69% appreciated improved information on weather and fisheries-related events. Despite these advantages, challenges remain. High costs associated with advanced ICT tools, such as fish finders and sonar eco-sounders, limit fishers' ability to invest in this equipment. Furthermore, moderate awareness of NARA's weather and fish forecasts hinders operational efficiency. To address these challenges, the study recommends that relevant institutions provide real-time weather and fisheries forecasts, initiate subsidy schemes for high-quality technologies, and introduce specialized training programs on ICT applications for skippers.

Keywords: Multiday fisheries, ICT applications, GPS, vessel monitoring system, automatic identification System

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Economic perspectives of surrounding gill net for sardines (kotu dela) fishery in Sri Lanka: A case of kotu dela fishing in Negombo fisheries district

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Surrounding gill nets for sardines, have been used in Sri Lankan fisheries for over fifty years, primarily targeting *Sardinella* spp and *Hilsa Shad*. However, few studies have focused on their impact on the livelihoods of coastal fishermen. This study addresses this gap by examining kotu dela fishing in the "Palagathurai" community of the Negombo fisheries district, where this method is prominently used. The primary data were gathered from September 2023 to May 2024, using semi-structured questionnaires across 63 fishing trips, and a focus group discussion with the local fisheries' cooperative society. Fishers used two-ply nets with mesh sizes of 1 1/16", 1 3/16", and 1 1/4" for *Sardinella* spp, and 2" and 2 1/4" for *Hilsa* spp. They used up to six net pieces for *Sardinella* spp and four for *Hilsa* spp. They operate by fiberglass boats and travel up to 3.5-4 km offshore and up to 25 km along the coastline and operate 1-3 times per day depending on the weather and fishing availability. The results indicate that each trip consumed an average of 13 liters of fuel. The highest recorded catches per trip were 665 kg for *Sardinella* spp and 778 kg for *Hilsa* spp, though the most frequent catches were 56 kg and 62 kg, respectively. The average operational cost of *Sardinella* spp (LKR 16, 987.00) was slightly lower than for Hilsa (LKR 17,472.00). The average monthly income for a boat owner was LKR 136,248.00 while a crew member earned LKR 45,416.00 The break-even catch was 77 kg for *Sardinella* spp and 86 kg for *Hilsa* spp. Profitability was affected by low market prices and high fuel costs, resulting in 21% of trips not meeting the break-even catch. It is evident that there may be potential issues with fishing efficiency and uncertainty in catches. It is suggested to conduct a comprehensive economic efficiency analysis and assess the biological and ecological impacts before implementing any regulatory or management measures.

Keywords: *Sardinella* spp, *Hilsa shad*, economic efficiency, surrounding gill nets, livelihoods, coastal fishery

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Aquatic Environment Conservation and Management

Disposal of fish waste to the coastal environment: Insights from fish vendors of Negombo and Peliyagoda fish markets in Sri Lanka

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Despite the negative externalities of indiscriminate fish waste disposal (FWD), relatively less attention has been paid to exploring the perceptions of fish vendors on this issue and the challenges they confronted with proper FWD. The major objective of this study was to investigate the current status of fish waste generation, disposal methods, and management. A convenient sample of 180 fish vendors was selected from the busiest fish markets in Negombo and Peliyagoda. A pre-tested questionnaire was used to collect data from the respondents in December 2023. The data were analyzed employing Binary Logistic Regression and descriptive statistics using SPSS software. Results revealed that 60% of the fish vendors provided fish waste for recycling, and 36% of respondents engaged in indiscriminate disposal. In comparison, the remaining 4% buried the waste. The major way of indiscriminate FWD was throwing to the ocean and coast. Daily accumulation of fish waste per vendor varied from less than 5 kilograms to more than 50 kilograms. The majority (62%) of fish vendors stated they would like a proper FWD mechanism. Among the socio-demographic factors, only gender and the nature of the occupation had a significant relationship with their preference for establishing a proper FWD mechanism. Findings showed that fish vendors who preferred to have a proper FWD mechanism were more likely to believe that tourism and other related recreational activities along the coast are negatively affected by indiscriminate fish waste disposal. In conclusion, both Negombo and Peliyagoda fish markets generate considerable fish waste, but the Peliyagoda fish market has a well-functioning proper FWD mechanism to produce organic fertilizers. Therefore, it is recommended to introduce proper waste management practices for instance the current practice in Peliyagoda fish market to Negombo fish markets and make fish vendors aware of the socio-economic and environmental impacts of indiscriminate FWD. This task requires the active participation of researchers, policymakers, environmentalists, and waste management professionals.

Keywords: Fish waste disposal, fish vendors, waste management practices, environmental impacts

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Ethogram analysis of the diverse sub-behavioral patterns of mangrove birds

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Mangrove birds exhibit various sub-behavioral types, however, published information on their sub-behaviors of foraging, locomotion, comfort, resting, and vocalization is limited. In particular, no studies have been done on Sri Lankan mangroves in this regard. The present investigation focused on the sub-resting, comfort, and feeding behaviour patterns of mangrove birds in five distinct mangrove sub-habitats (brush piles, mangrove canopy, grassland, open water, mud pool) within a selected area of Rekawa Lagoon (6.054422, 80.8389906). The study examined sub-behavior types across five sub-habitats from October to November 2023, using focal and ad-libitum sampling methods and observation from 6 am to 4 pm. Observations were started upon a bird belonging to one of 11 bird types: (*Vanellus indicus, Ardea alba, Bubulcus ibis, Egretta garzetta, Phalacrocorax fuscicollis, Phalacrocorax carbo, Ardea purpurea, Pelecanus philippensis, Anhinga melanogaster, Ardeola grayii, Amaurornis phoenicurus*) entering into the observation plot. Until they left the observation plot, the birds were tracked, recorded their sub-behavior type every 10 seconds. The birds primarily engaged in seeking, watching, preening, and standing/ resting sub-behaviors, while other sub-feeding, comfort, and resting behaviors were less prevalent. While related species share common behaviors, each species also exhibits unique, species-specific behaviors. The aforementioned bird species were compared for their number of sub-feeding, sub-resting, and sub-comfort kinds, using a Kruskal-Wallis. Only the number of sub-feeding types showed significant differences ($p < 0.05$) between the bird species. As the sub-behavior types were different from each other, a common ethogram was constructed to identify sub-behavior types. There was strong evidence for the concept that different species of birds have different sub-behavioral needs and mangrove sub-habitats support them to fulfill those sub-behavioral needs where certain behaviors were exclusively confined to specific sub-habitats. However, due to limited observation hours, sub-locomotion and breeding behaviors were not monitored and could be explored in future studies.

Keywords: Mangrove, sub-comfort, sub-feeding, sub- resting

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The use of environmental DNA (eDNA) for monitoring aquatic biodiversity

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This study mainly aims to detect the potential of environment DNA (eDNA) in monitoring aquatic biodiversity. The analysis of the existing research has been done to evaluate the effectiveness of eDNA in detecting the species composition combining with the next generation sequencing methods, in assessing relative abundance for population assessment and monitoring of aquatic species and in monitoring the success of invasive species eradication programs in both freshwater and marine ecosystems. The reviewed studies included both fish and aquatic invertebrates and demonstrated the high sensitivity of eDNA in analyzing species composition and in biomass evaluation in the aquatic ecosystems. It also revealed the importance of following accurate sample collection procedures that reduce the probability of eDNA contamination owing to the high sensitivity of the methods. Moreover, eDNA has been detected in areas where the targeted species were not observed, making it a more sensitive method of detection. The eDNA analysis can immensely support the study of rare or threatened species compared to traditional survey methods. This study also discovered the influence of environmental factors such as seawater temperature, high salinity, and UV radiation on the degradation rate of eDNA, in marine ecosystems. The microbial community composition is considered to be one of the major factors determining DNA degradation. The eDNA sampling can be done without any physical interactions with the target species, preventing stress on the animals. Environmental DNA facilitates the early detection of invasive species. However, eDNA analysis requires standardization of practices and protocols for the accuracy of results. This review study evaluated the current status of eDNA as a monitoring tool for aquatic biodiversity, and the strengths and weaknesses of eDNA analysis for future implementation of successful eDNA-based monitoring systems.

Keywords: eDNA; aquatic biodiversity, eDNA analysis

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Phytoplankton community structure in a coastal recreational site in Southern Sri Lanka

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Studies on phytoplankton community structure in coastal recreational sites are rare in the ocean around Southern Sri Lanka. The current study investigated the phytoplankton community structure in Pareiwella bathing site on the Southern coast of Sri Lanka. Plankton samples were collected from November 2023 to January 2024, filtering 20 L of water through a phytoplankton net with a mesh size of 55 µm. A total of nine phytoplankton samples were collected monthly in three transects with triplicate samples, with a distance of 20 m between each transect. The collected samples were preserved with Lugol's solution. The phytoplankton were identified to the lowest possible taxonomic level and enumerated under the Sedgwick rafter cell using a light microscope at a magnification of 10×10. This study identified a total of 51 phytoplankton genera or species comprised of diatoms (34 taxa) and dinoflagellates (17 taxa). The most abundant group was diatoms (54%) followed by dinoflagellates (46%) during the study period. The abundance of phytoplankton differed significantly among different months and transects (repeated measure ANOVA; $p < 0.05$). The highest phytoplankton abundance was recorded as 75.56 ± 39.10 L^{-1} in a non-disturbing area (non-bathing area) (One–way ANOVA; $p < 0.05$). The highest phytoplankton abundance was recorded in December than in other months during the study period. Among all the diatoms and dinoflagellates recorded, six diatoms (Pseudo-nitzchia, Guinardia, Proboscia, Chaetoceros, Leptocylindrus, Asterionellopsis) and one dinoflagellate (*Ceratium fusus*) represented potentially harmful species. These findings demonstrated the importance of monitoring phytoplankton communities in coastal recreational sites, as they play a pivotal role in maintaining marine ecosystem health and water quality.

Keywords**:** Bathing site, diatoms, dinoflagellates, Pareiwella, phytoplankton

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Diversity of butterfly and damselfishes assemblages in Arippu Reef Northwest coast, Sri Lanka

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Reef fishes are a very important group of fauna in coral reef ecosystems. The diversity of two reef fish varieties of butterfly fish in Chaetodontidae family and damsel fish in Pomacentridae family in Arippu Reef, Northwest Coast, Sri Lanka was investigated in March 2022. The Arippu Reef is a group of coral patches located coordinates at 08.75152°N & 79.89274°E offshore between the Vankalai Reef and Silawathurai Reefs. Eight sites were investigated within the reef patches and underwater visual census techniques were used to record fish abundances over the reefs. Since the substrate composition was a key factor species for species distribution. It was calculated as a percent cover for the whole area. Among the recorded fish species, six species of butterfly fish such as *Chaetodon collare, Chaetodon lunula, Chaetodon octofasciatus, Chaetodon andamanensis, Chaetodon trifascialis* and *Chaetodon trifasciatus* were recorded. Among these species, *C. octofasciates* was the most abundant fish. However, there was no obvious pattern of distribution of butterfly fish within the depth range of 1- 1.5m to 2- 2.5m and the highest butterfly fish abundance which is 22 fish/500 m^2 was also recorded at site 1 (08.75152˚ N 79.89274° E) while the lowest value which is 0 fish/500 m^2 was recorded the site 5 (08.76770˚ N 79.15629° E**)**. Furthermore, 13 damselfish species which belong to six genera like Abudefdduf, chromis, Chrysiptera, Neopomacentrus, Plectroglyphidodon and Pomacentrus were recorded at different study sites. Also, the most abundant damselfish species was *Chromis viridis* fish. The highest damselfish abundance which is 59 fish/ 500 m^2 was also recorded at site 1, and the lowest value which was 3 fish/500 m^2 was at site 8 (08.74742˚ N 79.189426° E**)**. The substrate was covered from the major categories such as live hard corals, dead corals, coral rubble, sand and other (mud and algae) with percentages of 43%, 21%, 12%, 23% and 2% respectively. Among the hard coral species, such as *Echinophora species, Favia species, Favus species, Goniophora species, Platigyra species, Pocillopora Porites sp. Branching Acropora sp and table Acropora sp* were the dominant. The findings of the study would be useful in making conservation and management plans for the Arippu Reef area.

Keywords: Abundance, diversity, coral reefs, butterfly fish, damselfish, Arippu Reef

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Carbon sequestration potential in above ground living biomass of different salt marsh species in the vicinity of Kalpitiya area and Puttalam Lagoon, Sri Lanka; A preliminary survey

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The salt marsh is one of the important coastal blue carbon ecosystems which is considered the second most carbon-sequestering ecosystem after mangroves, helping to mitigate climate change. In Sri Lanka, data on the assessment of carbon stocks of salt marsh vegetation is scarce. The scientific studies show that the salt marsh vegetation in the Puttalam district covers 1557 ha. However, there is insufficient data on carbon stock assessments for this area. This preliminary survey was conducted in December 2023 to quantify the carbon sequestration potential of aboveground living biomass of different salt marsh species. Several saltmarsh species were identified including *Sesuvium portulacastrum* (Puttalam Beach Park), *Suaeda maritima* (Puttalam Salt Limited), *Salicornia brachiate* (Pallivasalthurai), *Suaeda vermiculata* (Pallivasalthurai), *Heliotropium curassavicum* (Kurinjipitiya South) in the vicinity of the Kalpitiya area and Puttalam Lagoon area. Samples were collected randomly placing 50 cm × 50 cm quadrates in the locations based on salt marsh accessibility. To determine the biomass of different plant species, species-specific allometric equations were developed for each species using regression analysis in MINITAB statistical software representing the relationship between biomass and stem height. Aboveground carbon content was measured using the carbon conversion factor of 0.45. According to the one-way ANOVA (P<0.05), *Sesuvium portulacastrum* showed a high carbon sequestration potential with a value of 0.9048 ± 0.317 Mg C/ha (2.0107 ± 0.704 Mg biomass/ha). The carbon sequestration potential of the other four species namely *Suaeda vermiculata, Suaeda maritima, Heliotropium curassavicum, Salicornia brachiata* were 0.2426 ± 0.034 Mg C/ha (0.539 ± 0.075 Mg biomass/ha), 0.17 ± 0.025 Mg C/ha (0.3768 ± 0.05 Mg biomass/ha), 0.162 ± 0.018 Mg C/ha (0.36 ± 0.04 Mg biomass/ha), 0.017 ± 0.0009 Mg C/ha (0.0378 ± 0.002 Mg biomass/ha) respectively. This preliminary survey will provide baseline data for further carbon sequestration assessments in salt marshes vegetation.

Keywords: Salt marshes, carbon sequestration, above-ground living biomass, Kalpitiya, Puttalam lagoon.

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Preliminary analysis of spatial and vertical sediment dynamics in Negombo Lagoon

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Sediment transport in Negombo Lagoon (NL) is crucial for its ecosystem functioning and morphological evolution. Rainfall, river inflow, tides, and human activities effect on, sediment transport in NL, analyzed at four locations: main outlet (MO), Attanagalu Oya, Ja-ela, and Hamilton Canal inlets using four sediment traps from November 2023 to April 2024, during the North-East Monsoon (NEM) and First Inter Monsoon (FIM) seasons separately. In addition, sediment samples were collected using a core sampler from 40 sites covering the whole lagoon during two seasons. Each sediment core sample was equally divided into three layers top, mid, and bottom and each was subjected to analysis for pH, color, and texture separately. Data analysis was conducted using QGIS, MiniTab, and Excel. Considering the sediment transportation, the highest sediment accumulation and outgo occurred within the MO region, it was high during the NEM season (Average sediment accumulation: 549.40 kg m^{-2} $month^{-1}$), influenced by net freshwater flux and seasonal sea level changes, peaking in October-November. Significant differences in pH ($p < 0.05$) were observed between the top and bottom layers. Sediment pH increased with depth, with the bottom layer recording the highest mean pH values in both seasons (6.54, 6.49) and the top layer the lowest (6.34, 6.15). The overall higher pH was during FIM. Sediment colour paled with depth, indicating low organic matter accumulation. Oceanic influence led to yellow to pale brown with sandy-loam texture sediment in MO. Southern parts exhibited grey to dark grey colours, with clay and silty clay loam textures resulting from river inputs. The clay percentage increased with depth, while the sand percentage decreased. There was no considerable difference in sediment texture and colour between seasons. This study emphasizes the considerable spatial, vertical variation and sediment fluctuation changes within NL, highlighting the need for comprehensive management strategies to preserve the lagoon's morphology and ecological balance.

Keywords: Sediment transport, Negombo Lagoon, monsoon seasons, anthrgenic pollution, ecosystem management

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Novel propagation method for selected mangrove species in Rhizophoraceae Family toward successful restoration

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Mangrove restoration efforts often use Rhizophoraceae family species, either as mono-species like *Rhizophora mucronata* or in combinations such as *Rhizophora apiculata* and *Rhizophora mucronata*. Usage of limited number of species for mangrove restoration leads to decrease mangrove diversity. To address the scarcity of propagules, novel methods are crucial for increasing planting materials from a single propagule. The study assessed the applicability of cut-propagules for propagating selected species in Rhizophoraceae family. Healthy seeds of *Ceriops tagal* and *Ceriops decandra* were collected. The treatments involving commercially available Indole-3-butyric acid (IBA) and bio-stimulants including cinnamon powder and *Aloe vera* gel were used. Treatments were applied to three types of planting materials: complete propagule, upper part of cut-propagule and lower part of cut-propagule. Each type of planting material was immersed in its respective treatment for 15 minutes before potting. The success rates, indicating the formation of shoots and roots, were evaluated separately. Untreated propagules served as the control group. The experiment was triplicated with 144 samples. For *Ceriops tagal*: *Aloe vera* and cinnamon powder achieved 100% success with complete propagules in 28 days and lower part cut-propagules in 42-56 days. The growth rate was 66.7% for complete and lower part cut-propagules in negative control and IBA treatments after 49-63 days. Upper part cut-propagules resulted 66.7% success rate with multiple shoots after 84-112 days for all treatments. For *Ceriops decandra*: Aloe vera and cinnamon powder achieved 100% success with complete propagules in 28-35 days and lower part cut-propagules in 35-42 weeks. The growth rate was 33.3% for complete and lower part cut-propagules in negative control and IBA treatments after 50-63 days. Upper part cut-propagules had a 66.7% success rate with multiple shoots after 70-96 weeks for all treatments. In conclusion, growing *Ceriops tagal* and *Ceriops decandra* via the cut-propagule method is possible. The study could extend to evaluating the adaptability of resulting planting materials for successful restoration.

Keywords: Cut-propagule method, *Ceriops tagal*, *Ceriops decandra*, biostimulants

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Poster Presentations

Determination of physicochemical parameters of surface waters in the Hamilton Canal, from Negombo to Maha Oya

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The Hamilton Canal, once used by residents for fishing and bathing, has become polluted as a result of sub-surface drains and various sub-channels transporting sewage, industrial wastewater, stormwater, and other contaminants into it. The water quality of the canal has also been impacted by the Maha Oya estuary and Negombo Lagoon. Although the water quality of the lower segment of the canal from Kelani River to Negombo Lagoon has been researched, the upper segment from Negombo Lagoon to Maha Oya estuary has not been thoroughly investigated. Therefore, a study was carried out to assess different water quality parameters over this 7 km stretch, at seven locations, from June to September 2020. The parameters measured included pH, temperature, salinity, electrical conductivity, total dissolved solids, dissolved oxygen and turbidity in-situ, along with other physicochemical parameters in the laboratory using standard methods for the examination of water and wastewater published by Rice *et al* (2017). The results indicated that the pH levels varied from 5.78 to 7.51 with a mean of 6.88 ± 0.48. Dissolved oxygen (DO) concentration ranged between 1.07 – 6.34 mg/l with a mean of 3.15 ± 1.40 mg/l. During most of the sampling events, DO in the canal was significantly below the acceptable level (5 mg/l, min) for aquatic life under the ambient water quality guidelines (CEA, 2019). Biological oxygen demand ranged from 1.8 to 22.0 mg/l, indicating the high organic pollution in the canal. Furthermore, high turbidity levels of 16.5 ± 11.2 NTU and slight salinity of 0.9 ± 1.8 ppt indicated the influence of Maha Oya on the canal waters. Ammonia concentration ranged between 0.01 to 3.09 mg/l with a mean of 0.85 ± 0.84 mg/l and it was above the standard limit for fish and aquatic life (0.94 mg/l; CEA, 2019) in some sampling events. High chlorophyll A concentration of 22.8 ± 22.6 µg/l was observed in the canal indicating high phytoplankton growth due to nutrient influx. Therefore, the results of physicochemical parameters indicate pollution in the canal and emphasize the need for effective pollution control strategies to protect the health of the canal.

Keywords: Hamilton canal, water quality, pollution, physicochemical parameters

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Fish abundance and their feeding patterns associated with coral reefs in Southern Sri Lanka

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Coral reefs provide essential food, shelter, and living space for nearly one-third of the world's marine fish species found around reefs contributing about 10% to global fish consumption. Recent research on coral reef fish ecology associated with the Pareiwella, Polhena, and Weligama reefs is limited and no prior information on the Thalaramba reef. This study examines the diversity, abundance, and feeding patterns of reef fish families. Using the Swim Timed Data Collection method, three belt transects were performed at each site, each lasting 30 minutes and measuring 20 meters in length and 5 meters in width, within a depth range of 3 to 5 meters. Data were collected between November 2023 and February 2024, identifying fish families and species along with their dietary preferences according to Allen and Steen (2007). Observation data were analyzed according to the taxonomic references showed that seventeen reef fish families belong to six dominant families (Acanthuridae, Balistidae, Caesionidae, Labridae, Lethrinidae, and Pomacentridae). Reef fish abundance data were applied to determine the Shannon-Weiner Diversity Index (SWDI). Weligama site had the highest diversity (H' = 1.81), while Thalaramba had the lowest (H' = 1.13). A total of 37 species were observed, with White-banded triggerfish (*Rhinecanthus aculeatus*), Dusky wrasse (*Halichoeres marginatus*), Lined surgeonfish (*Acanthurus lineatus*), and Convict surgeonfish (*Acanthurus triostegus*) dominating across the sites. Weligama had the highest number of carnivorous and omnivorous fishes, while Pareiwella had the most herbivorous fish. More than 40% of the observed fish were herbivores. The Chaetodontidae family was observed only in Weligama which is considered a bio-indicator of reef health. This study emphasizes the importance of reef fish biodiversity to improve reef health by grazing macroalgae. Further long-term research is needed to improve the conservation of reef fish.

Keywords: Reef fish, diversity, southern Sri Lanka, feeding, conservation

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Assessment of cortisol and blood glucose responses in *Dawkinsia filamentosa* and *Rasbora dandia* exposed to different water quality conditions in the Kelani River basin: Using the ELISA method

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Cortisol is the major corticosteroid hormone in fish and is released by the inter-renal cells of the kidney. The increase of this hormone and blood glucose levels (BG) indicates an increased sensitivity to stress in fish which has been related with the assessment of poor water quality of rivers and streams. In the present study aimed to assess two freshwater fish species, *Dawkinsia filamentosa* (DF) and *Rasbora dandia* (RD), pre-determined as bio-indicator species were used to associate BG and cortisol analysis with water quality of Kelani River. The Enzyme Linked Immunosorbent Assay (ELISA) was chosen for cortisol and BG assessment due to its high sensitivity and critical for small sample volumes in fish studies. Thirty specimens of DF from Ambathale of the lower catchment and RD from Alagal Oya of the upper catchment were harvested and acclimatized in laboratory tanks filled with water from their respective collection sites. Basic water parameters, blood glucose levels and baseline cortisol levels were tested initially. Water quality analysis revealed elevated chemical parameters in Ambathale water, including COD (67.60 mg/L), nitrate nitrogen (3.665 mg/L), ammonia nitrogen (0.927 mg/L), and phosphate (0.343 mg/L), and Alagal Oya water showed higher turbidity (12.45 NTU) and dissolved oxygen (9.31 mg/L exceeding prescribed standard limits by the Central Environmental Authority. Basal BG concentrations measured in DF and RD, showed mean values of 70.5 mg/L and 72.33 mg/L, respectively, with no significant difference ($p = 0.735$) between the two species. Initial cortisol levels in both species also showed no significant difference between DF and RD ($p = 0.8102$). However, significant differences in BG levels were observed between DF (71.00 mg/L) and RD (140.8 mg/L) after 5 minutes when they transferred to the Ambathale water filled tank. In Alagal Oya water filled tank, DF exhibited significantly higher BG (132.5 mg/L) compared to RD (69.7 mg/L) after 5 minutes. After 30 minutes in Ambathale water tank, RD continued to show elevated cortisol (114.3 mg/L), significantly higher than DF (71.50 mg/L). In Alagal Oya water tank after 30 minutes, DF exhibited higher cortisol (97.00 mg/L) compared to RD (65.67 mg/L). Further, RD showed increased physiological responses, particularly in Ambathale water, suggesting their increased vulnerability to the chemical nature of the environmental contaminants. Conversely, DF shows resilience to the same conditions, indicating a differential stress response based on species-specific sensitivities. These findings underscore the importance of considering species-specific sensitivities and interactions in assessing the ecological impacts of environmental pollution on aquatic species. Such insights are crucial for informing effective conservation and management strategies to mitigate the effects of anthropogenic activities on aquatic ecosystems.

Keywords: Bio indicator, cortisol, ELISA, blood glucose, Kelani River

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Land-based pollution and water quality assessment at selected fishery landing sites in Southern Province, Sri Lanka

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Coastal pollution has been identified as a significant environmental issue in Sri Lanka. The majority of coastal fishing vessels dock at fishery landing sites, which serve as hubs for trading, repairing nets, and anchoring boats. The waste generated at these sites, both solid and liquid, has the potential to contribute to pollution. This research project aimed to conduct an environmental monitoring survey at 13 fishery landing sites in the Galle, Matara, and Tangalle districts of the Southern province, where more than 30 motorized boats operate. Two water samples from each landing site were collected on the same day, once a month in 2021. Pollution-related information was gathered through interviews with fisheries inspectors and visual observations. Water samples were analyzed for physicochemical parameters following the standard methods. The findings indicated the presence of obsolete nylon fishing nets and a significant amount of plastic waste (bottles and cans) discarded at the landing sites. Plastic waste pollution was primarily attributed to land-based sources. Abandoned fishing vessels and discarded fiberglass waste were also observed at most sites. However, pollution from waste oil from boats and fish offals was not detected during the study period. Landing sites with fish stalls were found to discharge wastewater contaminated with fish waste directly into coastal waters, potentially leading to increased nutrient concentrations and coastal water pollution. The physicochemical analysis results of coastal water showed that most parameters were within ambient water quality standard limits, such as water temperature (30.5 ± 1.0 °C), pH (7.4 ± 0.5), DO (6.3 ± 1.3 mg/L), EC (40.0 ± 20.3 mS/cm), salinity (26.1 ± 13.4 ppt), turbidity (8.1 ± 9.3 NTU), TSS (25.8 ± 19.9 mg/L), nitrite nitrogen (0.004 ± 0.003 mg/L), and Chlorophyll a (3.9 ± 3.6 µg/l). However, the mean COD (500 ± 281.4 mg/L) exceeded its standard limit. The highest COD (860 mg/L) was found at the Oruwella (Rekawa) landing site, while the highest BOD (6.1 mg/l) at the Mawella landing site indicated organic pollution. The fishery landing sites had been polluted by plastic waste (bottles/cans), discarded fishing nets, abandoned vessels, and fiberglass scrap. Plastic and fiberglass waste potentially threatens marine life, releasing toxins, heavy metals, oil-related hydrocarbons, tributyltin (TBT), and microplastics. This could ultimately have a detrimental impact on coastal habitats and aquatic life. However, the overall coastal water quality at the selected landing sites was favourable for fish and aquatic life. Implementing proper disposal methods for solid waste management and raising public awareness could greatly contribute to the sustainable management of coastal fisheries in Sri Lanka.

Keywords: Landing sites, pollution, water quality, coastal fisheries

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Aquatic Biotechnology and Animal Health Management

Fish born bacterial zoonotic diseases, present status and trends

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Diseases or infections naturally transmissible from vertebrates to humans and vice-versa, classified as zoonosis, are caused by various agents, including bacteria, parasites, fungi, viruses, and unconventional agents. These infectious agents are responsible for 61% of total human infections and 75% of emerging human infectious diseases. Among these, fish-borne bacterial zoonotic diseases are increasingly significant, but knowledge of their transmission and impacts remains limited. This narrative review critically examines the available literature on bacterial pathogens of fish and crustaceans with zoonotic potential, focusing on aquaculture contexts and zoonotic risks from handling cultured fish and crustaceans. The review specifically evaluates studies related to direct or indirect exposure to bacterial pathogens via fish handling, including contact with infected mucus, tissues, or wounds. Human pathogenic bacteria in the finfish and crustaceans produced in aquaculture can be divided into two groups; - Indigenous bacteria (*Vibrio spp., Aeromonas, and Mycobacterium*) and bacteria that are introduced to the aquatic environment via contamination with human or animal faeces *(Enterobacteriaceae*). *Streptococcus, Staphylococcus, Clostridium, Erysipelothrix, Mycobacterium,* and *Listeria monocytogenes* are the major gram-positive bacteria with zoonotic potential. Gram-negative bacteria namely *Vibrio sp, Plesiomonas shigelloides, Aeromonas*, and *Enterobacteriaceae* caused diseases in humans. Virulence factors, clinical manifestations in fish and humans, and transmission pathways are explored to clarify the zoonotic associations between bacterial pathogens and aquaculture practices. Individuals with immunocompromised status or those taking immune-suppressing medications are more susceptible to zoonotic bacterial pathogens. Zoonotic diseases can rapidly spread across international borders, impacting people's health, livelihoods, and global trade. Public education campaigns targeting fish handlers and policymakers, along with improved sanitation and hygiene practices, are identified as foundational steps to reduce bacterial zoonotic risks. Collaborative efforts among stakeholders are essential to enhance the understanding, prevention, and managing of zoonotic diseases, contributing to safer aquaculture practices and better global health outcomes.

Keywords: Aquatic, bacterial disease, zoonosis

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Morphometric measurements, and optimization of PCR conditions targeting the mitochondrial Cytochrome Oxidase 1 (CO1) gene of *Dania rerio*

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Danio rerio is an alternative model used in animal testing. However, morphological variations are observed in fish from different localities. Hence it is necessary to have a genomic analysis. The current study aimed at assessing the morphometric measurements and optimizing PCR conditions for targeting the mitochondrial cytochrome oxidase 1 (CO1) gene in *Danio rerio*. Morphometric characteristics were measured in adult females (n=10) and male (n=10) zebrafish maintained in the Medical Research Institute (MRI). The fish was anaesthetized by gradual cooling and the caudal fin was dissected. Total DNA was extracted from the caudal fin of each fish using a Column-Pure animal genomic DNA isolation kit (abm® Inc, Canada) and quantified. The PCR composition was optimized for amplifying 608 bp of the mtDNA COI gene. A mixture of 25 µL solution containing 1x PCR master mixture (abm Inc, Canada), 0.2 µM of forward (5'-TTCTCCACCAACCACAARGAYATYGG-3') and reverse primers (5'-CACCTCAGGGTGTCCGAARAAYCARAA-3'), 2.5 mM of $MgCl_2$, and 3µL (200ng- 400ng) of extracted DNA. Negative control was also maintained. Optimized PCR conditions were, 94 ^{0}C for 5 min, thirty-five cycles of 94 ^{0}C for 30 seconds, 57 ^{0}C for 40 seconds, and 72 ^{0}C for 1 minute, with a final extension at 72 ^{0}C for 10 minutes. A 100 bp ladder (Invitrogen, USA) was used to get the band size. PCR products were visualized on 2% agarose gel stained using Ethidium Bromide and observed under UV illumination. Female and male zebrafish morphometric measurements are in centimetres with standard deviation as total length 4.24 ± 0.37:3.92 ± 0.29, standard length 3.75 ± 0.51:3.31 ± 0.26, Predorsal lengths 2.2 ± 0.18:3.31 ± 0.40, the height of posterior dorsal fin 0.43 ± 0.08:0.48 ± 0.08, length of the basis of the posterior dorsal fin 0.31 ± 0.09: 0.41 ± 0.12, the diameter of eye 0.13 ± 0.04: 0.14 ± 0.05, length of head 0.6 ± 0.13: 0.57 ± 0.13, height of body (depth) 1.15 ± 0.21:0.93 ± 0.45, length of caudal fin 0.68 ± 0.16: 0.73 ± 0.10, length of caudal peduncle 0.55 ± 0.15:0.61 ± 0.34, length from the origin of the anal fin to base of caudal fin 1.13 ± 0.14:1.01 ± 0.36 and fork length 3.85 ± 0.35: 3. 65 ± 0.28. The expected size of the 608 bp region was amplified successfully with optimized PCR conditions. In subsequent research, these morphometric measures can be used to characterize population-level changes in zebrafish.

Keywords: *Dania rerio*, morphometric measurements, PCR conditions, CO1 gene, variable region

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Molecular Diagnosis of *Penaeus monodon* Densovirus (*Pm*DNV) infection in shrimp farms in Sri Lanka

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Penaeus monodon densovirus (*Pm*DNV) is one of the viral infections that has caused severe damage in the *Penaeus monodon* farming industry. Shrimp infected with *Pm*DNV do not display specific clinical signs. However, severe infections may result in stunted growth. This study aimed to detect *Pm*DNV infection in *P. monodon* using samples collected from the Chilaw region, one of the main shrimp farming areas in Sri Lanka. Forty (40) farmed shrimps originating from specific pathogen-free broodstock were collected from four selected farms (A, B, C and D) with 10 shrimps from each farm. The hepatopancreas of each shrimp were isolated and preserved in 70% ethanol until DNA extraction. DNA extraction and qPCR were performed on all 40 shrimps using specific primers for *Pm*DNV (5'AATCTGCAGGGTACGGAAAAAAC3'-F, 5'TGTGGAACCATCTCAAA TGCC3'-R) and actin gene primers (5'GACTCGTACGTCGGGCGACGAG G3'-F, 5'AGCAGCGGTGGTCATCACCTGCTC3'-R) as an internal control. The amplified products were visualized by agarose gel electrophoresis. The band intensity was expressed relative to the actin gene and densitometric analyses were performed using the Image J software package. Results revealed that 60% of the total shrimp were infected with *Pm*DNV and 27.5% were negative. Farm-wise *Pm*DNV rates were 80% in farm A, 70% in farm B, 40% in farm C, and 50% in farm D. Band intensity analysis showed that 37.5% of the total shrimps were moderately infected, and only 20% were severely infected. Mean body weight and mean total length of shrimps collected from each farm were analyzed separately and it revealed that, no significant difference ($p > 0.05$) between mean body weights and mean total length of the infected and non-infected shrimps. These results revealed that densovirus infection does not affect the growth of shrimp at a considerable level since the infection still exists in the moderate level. This is the first study, reporting the presence of *Pm*DNV in *P. monodon* in Sri Lanka with molecular findings, highlighting the necessity of disease prevention and control measures needed to be taken.

Keywords: *Penaeus monodon, Penaeus monodon*, Densovirus, stunted growth, polymerase chain reaction.

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Development of bio-encapsulated oral vaccine using *Daphnia, M*oina, and microworms against *Aeromonas hydrophila* infections in *Cyprinus rubrofuscus*

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Bio-encapsulation of vaccine antigens using *Artemia* (live feed) is a popular vaccine delivery strategy identified to enhance innate immunity in juvenile fish through the oral route. The study aims to explore the potential to use alternative live feeds to bio-encapsulate pathogenic *Aeromonas hydrophilla* for the immunization of *Cyprinus rubrofuscus*. The formalin-killed pathogenic *A. hydrophila* was bio-encapsulated by feeding the inactivated bacteria to the commonly used live feeds, *Daphnia*, microworms, and *Moina*. The 61-day-old and 91-day-old young *C. rubrofuscus* were vaccinated by feeding the bio-encapsulated live feeds separately. After vaccination and booster vaccination, vaccinated and unvaccinated control groups were challenged with pathogenic *A. hydrophila*, and the fish survival and hematological responses were evaluated. *C. rubrofuscus* vaccinated at 61 days and 91 days with bio-encapsulated microworms showed the highest relative percentage survival (RPS) (93.34 ± 3.33%, 85.71 ± 6.67%) when compared to *Daphnia* (73.34 ± 3.33%, 64.28 ± 3.33%) and *Moina* (46.66 ± 3.67%, 28.58 ± 3.3%). Moreover, the hematological responses were substantially induced in the orally vaccinated groups compared to the control group. White blood cell (WBC) counts of *C. rubrofuscus* vaccinated with bio-encapsulated microworms at the age of 61 and 91 days were less ($32.66 \pm 0.22 \times 10^3/\mu l$, $32.76 \pm 0.27 \times 10^3/\mu l$) compared to the fish vaccinated with bio-encapsulated *Daphnia* ($35.01 \pm 0.96 \times 10^3/\mu l$, $33.11 \pm 0.53 \times 10^3/\mu l$) *Moina* ($38.27 \pm 0.24 \times 10^3/\mu l$, $38.27 \pm 0.57 \times 10^3/\mu l$) and control ($51.15 \pm 1.05 \times 10^3/\mu l$, $50.19 \pm 1.31 \times 10^3/\mu l$). Comparatively, the control group showed the highest mortality and WBC count than the vaccinated groups ($p < 0.001$). Observation of the Leishman blood statin higher neutrophil cells is observed under control groups. These results confirmed that utilizing live feeds such as microworms, *Daphnia*, and *Moina* for bio-encapsulation of vaccines offers a promising alternative to *Artemia*, and microworms were identified as the best alternative with higher efficacy. Microworms are small in size, have soft bodies, transparent, lack of hard exoskeleton or shell-like structure, and are easily ingestible by small fish because they have small digestive tracts. The optimal age for administering the vaccine to *C. rubrofuscus* is identified as 61- days from hatching.

Keywords: *Aeromonas hydrophila*, bio - encapsulation, immunity, live feeds, vaccine

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Poster Presentations

Identification of economically important shrimp species as *Macrobrachium lar* in the western coast of Sri Lanka

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Shrimp are an economically valuable fishery resource in Sri Lanka. The identification of economically important shrimp species that can be found in Sri Lanka is important for the sustainable utilization of this resource. The present study, aimed to identify commercially important shrimp species using morphological key (The marine fishery resource in Sri Lanka, FAO of the United Nations) and molecular methods. Molecular methods were utilized for shrimp species that could not be identified through morphological methods only. In molecular identification, species were identified using the mitochondrial CO1 gene and the DNA barcode was elucidated for the species identified. The shrimp samples were collected from major shrimp fishery operating areas in the West coast of Sri Lanka. The shrimp sample was collected from Elakanda, Sri Lanka (6.9961^0N, 79.876^0E). Which was identified using ambiguous morphological features as *Macrobrachium rude*, was sequenced to identify and confirm. The mitochondrial CO1 sequence results helped to identify the species as *Macrobrachium lar*. There are no previous records of *M. lar* being reported from Sri Lanka. Also, this study showed the sequence of *M. lar* on the west coast of Sri Lanka is closely related to *M. lar* found in Indonesia and distantly related to *M. lar* found in Taiwan and the Philippines. This study shows the importance of combining molecular methods with morphological for the identification of species of shrimp.

Keywords: DNA barcoding, morphological identification, *Macrobrachium lar*, shrimp and Western coast

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Preliminary study on genetic diversity of *Stomopneustes variolaris* in Negombo coast, Sri Lanka

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The black sea urchin or long-spined sea urchin (*Stomopneustes variolaris*) is the only sea urchin species which belongs to the genus Stomopneustes and the only living species within the Stomopneustidae family. Its distribution is uneven throughout the tropical Indo-Pacific region. This study investigates the genetic diversity of the 16S rRNA gene sequence of *S. variolaris* collected from the Negombo area in the Western province of Sri Lanka with 16S rRNA gene sequences of *S. variolaris* available in the NCBI database. Successful amplification of a partial amplification of the 16srRNA gene of approximately 400 bp was achieved with primers SU16SF (5′GACGAGAAGACCCTGTG-GAGC3′) and SU16SR (5′ACTTAGATAGAAACTGACCTG3′) for the sea urchin flesh samples from 9 sea urchin samples collected from Negombo in the Western province of Sri Lanka. Maximum likelihood analysis was carried out for these 9 sequences and the other two *S. variolaris* 16S rRNA gene sequences available from China and the USA. The phylogenetic tree showed the Sri Lankan specimens clustering in 1 clade and the China and USA sequences in a different clade. Genetic diversity calculated using DNASP indicates relatively low genetic variation within the Sri Lankan population. Specifically, 4 segregating sites and identified 2 haplotypes among the 9 sequences. The haplotype diversity (Hd) was calculated at 0.22222, and nucleotide diversity (π) was 0.00230. The average number of nucleotide differences (K) was 0.88889. These results highlight that the Sri Lankan population of *S. variolaris* shows low genetic diversity with regard to the 16S rRNA gene and gives important genetic information that can be used for future studies on how populations change over time, how the species evolve, and how to protect it. Understanding the genetic diversity of *Stomopneustes variolaris* is pivotal for informed conservation efforts and sustainable management of marine biodiversity in Sri Lanka.

Keywords: Black sea urchin, *Stomopneustes variolaris*, genetic variation

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Climate impact and Resilience

A preliminary study on estimating blue carbon in seagrass beds of the Negombo estuary, Sri Lanka

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Vegetated coastal ecosystems have promising potential as organic carbon sinks for mitigating climate change. However, significant gaps remain in our understanding, particularly concerning the tropical seagrasses in South and Southeast Asia. Thus, the objective of the current study is to quantify the stocks of organic carbon in the seagrass beds. The study was conducted in Negombo Estuary, situated on the western coast of Sri Lanka, in the Gampaha District. For the study, specific locations were chosen, namely Pitipana on the north shore and Kurana and Bolawalana on the eastern shore. In the selected study areas, only three seagrass species, namely *Halophila ovalis*, *Halophila becarii*, and *Halodule pinifolia*, were identified. A total of, 36 undisturbed soil core samples were collected, both vegetated (27) and non-vegetated/bare samples (9), using a 1m soil core sampler. Non-destructive vegetative samples were obtained by systematic placement of 50 cm × 50 cm quadrats. Vegetative samples were sent for elemental analysis, but the results of the test is yet to be received. Each soil subsamples were oven-dried at 60°C for 48-72 hours until a constant weight was achieved. The dried samples were then combusted at 450°C for 5 hours to determine the loss on ignition (LOI), which was used to calculate the percentage of organic matter (OM). Organic carbon content was estimated using a carbon conversion factor of 0.34, specifically for seagrass sediments. The results of the one-way ANOVA statistical test confirmed the significant difference in carbon content among the three study sites ($p < 0.05$). At Pitipana, all identified seagrass species were recorded, both Kurana and Bolawalana showed only a single species, *Halodule pinifolia*. Post hoc analysis reveals that Pitipana exhibits a significantly higher total carbon value of 113.405 ± 28.982 Mg C ha^{-1}, contrasting sharply with Kurana (77.583 ± 17.66 Mg C ha^{-1}) and Bolawalana (77.536 ± 17.905 Mg C ha^{-1}). This preliminary study will contribute to future long-term investigations of seagrass blue carbon. Analyzing the carbon content of vegetative samples using an elemental analyzer aims to enhance the understanding of seagrass ecosystems and their role in carbon sequestration.

Keywords: Blue carbon, climate change, organic carbon, seagrass, vegetated coastal ecosystems

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Awareness of plastic and microplastic pollution among undergraduates in Sri Lanka

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The emerging global attention regarding plastic pollution and its environmental impact has raised awareness and engagement globally. This research aims to understand the awareness level and engagement concerning plastic and microplastic pollution among students undertaking university degrees in Sri Lanka. Questionnaires were distributed to a sample of 70 undergraduates across eight universities using freely accessible Google forms. The majority of students were from science, agriculture and arts faculties. All respondents were familiar with plastic pollution and aware of its impact on the environment. However, only 63% were aware of the term "microplastic pollution" and its impact on the environment. The dissemination of information among university students was prominently attributed to social media and university education. 85.9% of students actively practising to reduce single-use plastic consumption in their lives to reduce environmental pollution. However, 92.9% of students felt that more educational awareness campaigns should be conducted among the public and school children to promote behavioural changes and to ensure environmental sustainability. Of that, 55.6% of students participated in initiatives like beach clean-ups and solid waste management training to counter plastic and microplastic pollution. The study uncovered 15 distinct organisations in Sri Lanka dedicated to addressing plastic pollution. The study found that a significant proportion of undergraduates were aware of plastic and microplastic pollution and its environmental impacts. The use of eco-friendly products, implementation of effective waste management plans, establishment of recycling collection points, proper recycling practices and consumer choices were identified as key solutions. This study identified the importance of creating awareness among the public and school children to help mitigate pollution and promote a sustainable future in Sri Lanka.

Keywords: Plastic pollution, microplastic pollution, awareness, Sri Lanka

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Poster Presentations

Are dunes effective in storing carbon? A case study from Bundala and Kalametiya, Sri Lanka

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Carbon storage is one of the major ecological services, provided by the coastal ecosystems. In that aspect, mangroves, tidal/salt marshes, and seagrass meadows are considered the most carbon-dense coastal ecosystems in the world. Hence, coastal ecosystems play an important role in climate change mitigation by storing large amounts of carbon within their ecosystem pools. Dunes are also an important coastal ecosystem that provides various ecosystem services such as coastal protection from storms and high waves, reducing natural flooding, and providing habitats for specific floral/faunal species. However, the information available on carbon storage in dunes is scarce in Sri Lanka. Therefore, the study mainly focused on assessing the soil organic carbon (SOC) content in the Bundala dunes. In total, 135 dune soil samples were analyzed for carbon. Soil sub-samples were collected from nine depth ranges; 0-15, 15-30, 30-45, 45-60, 60-75, 75-90, 90-120, 120-150, and 150-180 cm, and soil carbon was analyzed using Loss On Ignition method. Soil properties (pH, conductivity, dry bulk density) were measured in each sample. Independent sample T-test and Kruskal-Wallis test were carried out using R-4.2.2 statistical software. According to the results, SOC content in dunes was present in the topsoil layers (0-30cm) only. The carbon content of 0-15cm and 15-30cm were 9.12 ± 1.80 Mg C ha^{-1} and 1.50 ± 1.52 Mg C ha^{-1} ($p < 0.05$) respectively. The total average SOC content of dunes was 10.62 ± 2.63 Mg C ha^{-1} which was insignificant when compared with the neighbouring mangrove forest in Kalametiya which was 1094.75 ± 16.07 Mg C ha^{-1}. However, there was no significant effect of soil properties on the SOC content in the selected study sites. In conclusion, dunes are not very effective in storing soil carbon despite the significant ecological role being played by dunes. However, it is highly recommended to conserve dunes as that may help to increase soil carbon stocks with high species richness.

Keywords: Dunes, carbon stocks, coastal zone, mangrove, Sri Lanka

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Assessment of livelihood vulnerability to climate change: A case study of coastal fisheries value chains in the Western and Northwestern provinces of Sri Lanka

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The fisheries sector is one of the most vulnerable to climate change, yet its impacts on the livelihoods of value chain actors remain underexplored. This study evaluates the socio-economic vulnerability of the coastal fisheries value chain in the Western and Northwestern provinces of Sri Lanka using the livelihood vulnerability index (LVI), which measures vulnerability (scale: 0–1) across 15 criteria, including community exposure for the extreme weather events, livelihood sensitivity, and socio-economic capacity for the adaptation. Using stratified sampling techniques, data were collected using a pre-tested semi-structured questionnaire administered to 100 stakeholders from various value chain segments, such as 40 fishermen, 30 fish sellers (assemblers, wholesalers, and retailers), 20 fish processors, and 10 fish exporters. Preliminary findings reveal significant livelihood impacts from climate extremes such as storms, droughts, sea-level rise, salinity intrusion, and beach erosion. Fishermen, scoring an LVI of 0.72, are the most vulnerable due to direct exposure to extreme weather and limited resources for adaptation. Fish processors show moderate vulnerability (LVI = 0.64), facing a 17% increase in post-harvest losses during unpredictable weather, particularly in dried fish production. Wholesalers (0.61) and retailers (0.58) encounter a 21% reduction in fish availability during climatic variability, with wholesalers experiencing greater risks due to higher operational scales. Exporters, the least vulnerable group (LVI = 0.51), face a 14% fluctuation in access to high-value fish species. Climate change reduces annual fishery yields by 24 %, significantly affecting livelihoods and supply chain stability. Additionally, damage to coastal infrastructure, including harbors and storage facilities, leads to a 16% increase in operational costs for value chain actors. This study highlights the differential livelihood vulnerability across value chain actors and emphasizes the urgent need for targeted interventions, such as climate-resilient infrastructure and diversified income strategies, to enhance resilience and adaptive capacity.

Keywords: Livelihood vulnerability index, climate change, adaptive capacity, coastal fisheries, value chain

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Oceanography and Hydrography

Python algorithm for two-dimensional sediment distribution modelling in sedimentary basins interpreting satellite gravity anomalies: A case study on Mannar Basin

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The sedimentary basins exhibit complex sediment distributions, essential for hydrocarbon exploration and environmental studies. Traditional models, which assume constant sediment density, often fail to address this complexity. Previous studies have shown that in basins with thick sediment layers, sediment density varies quadratically with sediment height. The lack of software capable of accurately modelling sediment distribution considering this quadratic variation poses a significant limitation in the field. To address this research gap, our study introduces an algorithm that two-dimensionally models sediment distribution in sedimentary basins by interpreting satellite gravity anomalies. The algorithm accounts for the quadratic variation of sediment density with height and interprets satellite gravity anomalies to delineate sediment distribution within a 2D framework. The algorithm is developed using Python (Numpy, Pandas, and Matplotlib) in a Google Colab environment and was validated against existing models designed for constant sediment density by comparing gravity responses attributed to subsurface layers, excluding the sediment layer. The validated algorithm was then applied to the Mannar Basin and modelled the sediment distribution along two selected horizontal lines. The sediment height along the modelled lines ranged from a minimum of 0.365 km to a maximum of 5.154 km, with measurements taken at 1 km intervals using gravity modelling techniques. This study is unique as it not only advances the accurate modelling of sediment distribution but also extends its applicability to various oceanic structures with high sediment thickness characterized by density contrasts. Future work includes converting the algorithm into a software package to enable scientists to accurately model sediment distribution considering the quadratic variation of sediment density in sedimentary basins.

Keywords: Gravity method, python programming, quadratic density variation, sedimentary basin, sediment distribution modelling

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Establishment of a common datum for Colombo sea level monitoring stations C & D (GLOSS ID: 33)

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Rising sea levels will pose severe threats to the West Coast, which is densely populated and where main trade hubs are located along the coast. Nevertheless, long-term continuous and consistent sea level records are unavailable even for over 20 years. Collectively, Colombo sea level stations C & D will have completed 20 years of data series by 2026, while ambiguous datum connectivity and continuity between these stations have constrained the use of these data records to estimate long-term sea level change reliably. The datum continuity of these two stations is also significant for hydrography because tidal data are locally calculated and revised from tide station readings over a 19-year Tidal Datum Epoch. While tide gauges measure relative to the local terrain, altimeters measure in a geocentric reference frame. Differentiating between these two types of observations can help identify tide gauge datum problems. This study investigates the datum shift between stations C & D using altimetry and tide gauge differences (ALT-TG) derived from multi-mission gridded altimetry (DUACS) and daily mean data from tide gauges C & D. We used a Bayesian approach combined with statistics to model the piecewise discontinuities and trend changes in time series derived from ALT-TG. The results reveal the most probable trend change point on 24th Oct 2016 with a 0.953 probability of occurrence. The offset amount calculated by least squares solving for the linear trend is 12.534 ± 2.207 cm, which can be attributed to the shifting of station C to the location of Station D at the time of the change point. R2 of the model fitting is 0.628. After adjusting the tide gauge series by the estimated offset, noise reduces, and the trend of the Alt-TG series falls from -0.812 ± 0.127 cm/ year to 0.040 ± 0.015 cm/ year. Consequently, the sea level trend from the tide gauges C & D is rectified from -0.366 ± 0.165 cm/ year to 0.567 ± 0.144 cm/ year, which closely agrees with that of altimetry; 0.366 ± 0.042cm/ year. We suggest retrospection both stations' geodetic levelling and calibration history more precisely to determine the datum discontinuity. We recommend further analysis of GNSS data from a nearby station for any Vertical Land Motion (VLM).

Keywords: Sea level, altimetry, Colombo, datum shift, tide gauge, VLM

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Two-dimensional (2D) gravity modelling of ninety-East Ridge using satellite gravity data

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The Ninety East Ridge (NER) is an aseismic oceanic ridge located in the Eastern Indian Ocean basin, approximately aligning the 90°E meridian. This ridge is the longest bathymetric feature in the Indian Ocean basin and is identified as a product of the magmatism of the Kergueleen Hotspot that occurred during the Northward migration of the Indian tectonic plate. In the northern region, NER is buried beneath the thick sediment layer of the Bengal submarine fan and becomes a prominent bathymetric feature towards the south. This study is focused on constructing the structure of the NER, employing the two-dimensional interpretation method of gravity anomalies over the area. In this method, a series of gravity anomalies calculated with the polygonal method applied to an initial tentative model of the NER is tallied with observed gravity anomalies obtained via satellite altimetry. The sediment and crustal thicknesses were determined along the ridge through forward gravity modelling. The findings suggested that the ridge elevations range from 0.4 km to 1.5 km above the seafloor. The ridge's basement was deduced to be concealed by sediments with a maximum thickness of 6.5 km, with exposure occurring predominantly along the mountain axis. Nevertheless, foreland basin structures filled with sediments were identified at the eastern and western flanks of the mountain. The crustal modelling of the NER was conducted employing the principle of isostatic equilibrium. Gravity models of the ridge reveal that the crustal thickness beneath the mountain averages 30 km, surpassing the typical thickness of the oceanic crust. The migration of mantle materials towards the crust is observed on the western side of certain ridge areas, aligning with the magnetic anomalies documented in those regions. This alignment serves as evidence of distinct movements of the hotspot in that particular area.

Keywords: Ninety East Ridge, gravity anomalies, 2D gravity modelling, polygonal method

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A comparative analysis of frequency modulation and continuous wave modes of sub-bottom profiler in bottom layer investigation

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Sub-bottom profilers (SBP) are effective tools for identifying and characterizing sediment layers beneath the seabed or the bottom of any water body. These devices operate by transmitting low-frequency sound pulses toward the seabed, which reflect from various layers, indicating differences in density and structure. Such reflections are vital for applications such as measuring sediment thickness, detecting buried objects, and identifying bedrock. This research employed the StrataBox HD, a pinger-type Sub-Bottom Profiler, to conduct a comprehensive comparison of two principal operational modes: Frequency Modulation (FM) mode and Continuous Wave (CW) mode. The study aimed to evaluate the performance of each mode in an underwater environment and determine the most suitable mode for investigating geophysical layers, focusing on crucial factors such as penetration depth, layer resolution and data quality. Data were collected at the Jaya Container Terminal (JCT) basin of Colombo Port using both FM and CW modes across five survey lines and analyzed using HYPACK, MATLAB and Python coding. The datasets from both modes were then compared with borehole and grab samples to validate the analysis results. The findings revealed that the FM mode produces higher-resolution layer images with better data quality than the CW mode which is crucial for examining small features and identifying detailed sediment layers. Conversely, the CW mode, with its deeper penetration capabilities, offers a broader view at a lower resolution, making it ideal for mapping the overall structure of the seabed and understanding extensive geological features at deeper depths. The sediment profiling results obtained using both FM and CW modes aligned with the borehole sample data from the basin and confirmed the reliability of these techniques for continuous geophysical evaluations.

Keywords: Sub-bottom profiler, frequency modulation mode, continuous wave mode, marine sediment analysis

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Poster Presentations

Assessment of placer minerals in sediments at Kelani River mouth, Sri Lanka

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The coastal areas of Sri Lanka claim extensive depositional beaches, lagoons, and estuaries, hosting easily exploitable mineral deposits known as beach placers. The heavy minerals in the placers were mainly derived from Precambrian metamorphic rocks, and transported to the coast through the river systems of Sri Lanka. These beach placers are rich in resilient heavy minerals and recognized as one of the most accessible mineral deposits globally. The study was carried out to study beach placer mineral assessment of sediments at the Kelani River mouth. Sediment samples were collected randomly from sixteen locations. Grain sizes were assessed by dry sieving method. Grain size parameters were examined to understand the formation, distribution and transportation of sediments at the Kelani River mouth and associated beach area. The observations showed that the sediments in the beach are black coloured due to the accumulation of ilmenite, and magnetite. Light minerals dominate in some samples, while others are rich in heavy minerals. Magnetite, ilmenite, rutile and garnet are present in varying compositions. Mineral composition shows that a significant amount of heavy minerals are in the study area. Among the heavy minerals, magnetite exhibits a noteworthy presence, averaging 13.21%, followed closely by ilmenite at 42.18%. Rutile is observed in trace amounts, averaging about 0.82%, while garnet and monazite are even less prevalent, with average compositions of approximately 0.12% and 0.07%, respectively. Additionally, other minerals collectively contribute an average percentage composition of approximately 0.06%. These findings contribute valuable insights into the various mineralogical characteristics of the sediments in the study area.

Keywords: Mineral composition, grain size parameters, surface sediments, beach placer deposits, heavy minerals

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Prospecting of garnet-bearing sand deposit in the South-Eastern coast of Sri Lanka

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Garnet itself is a group of silicate minerals that is commonly found in metamorphic and igneous rocks and garnet sand derives the process of weathering and erosion. Garnet sand is known for its hardness and durability, making it valuable for various industrial applications such as abrasive blasting, water jet cutting, water filtration medium and sandpapers. As the current global supply of critically important minerals is insufficient, more mineral reserves should be discovered. Garnet sand deposits are primarily found along the coastal areas, particularly in the southern to southeastern regions of Sri Lanka. This study was conducted to identify and calculate the relative availability of garnet sand at the surface area in the above coastal region. Three surface sediment samples were collected from each location representing beach (high tide line) berm and the vegetation line during March and October in 2023 and the selected locations were Tangalle, Ambalantota, Ussangoda, Hambantota and Kirinda. The collected samples were sieved preceded by a pre-preparation procedure and the grains between 1 mm to 40 µm were separated for further studies. Heavy minerals were separated using the heavy liquid method (bromoform) and panning method followed by microscopic identification. Three portions from each sample were observed through a microscope to maintain accuracy. The highest heavy mineral percentage was observed in the berm of the Hambantota beach (54.2%) followed by the same zone of Kirinda (53%). Amongst concentrated samples of the surveyed points, the highest garnet percentage was reported in vegetation (50.49%) and berm (54.84%) zones of Hambantota beach while the average garnet percentage in other beaches; Ussangoda, Ambalantota, Tangalle and Kirinda were 28%, 22%, 16% and 49% respectively. The other minerals identified were Ilmenite, Zircon, Rutile and quartz. The heavy mineral percentage during the pre-monsoon period (southwest monsoon) was higher than the post-monsoon period.

Keywords: Garnet, heavy minerals, berm, surface sediment

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Application of GIS and Remote Sensing in Aquatic Science

Micro-temporal shoreline change assessment using UAV photogrammetry

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Micro-temporal coastal studies reveal important information about sudden changes such as shoreline movements, erosion patterns, and ecosystem dynamics. They enhance our understanding of climate change, allowing us to devise adaptation and mitigation measures. Compared to alternative approaches, unmanned aerial vehicles (UAVs) can acquire images at high spatial and temporal resolution. Therefore, the objective of this study was to assess the shoreline change within a month using UAV images. Red Beach in Tangalle, Sri Lanka was selected for this study (estimated length: 500 m, estimated width: 20 m). A DJI Mavic Air drone with a 12 MP camera (1/2.3" CMOS sensor) was used for image acquisition. Flight parameters such as front and side overlap, altitude, speed, ground sampling distance (GSD), and curvature were set to 75% and 70%, 60 m, 5 ms^{-1}, 2 cm, and 70° respectively. Flights were conducted once a week throughout December, with each day morning and evening to observe changes at different tidal phases. Polystyrene signboards were used as ground control points for accuracy assessment. Agisoft Metashape Pro 2.0.3 software was used to process images and generate orthomosaic maps with a combined root mean square error of 1.1501 m. Dry-wet line was selected as the shoreline indicator. Shorelines were extracted using manual digitization and analyzed using the digital shoreline analysis system (DSAS) 5.0 in the ArcMap 10.5 software. According to the high tide and low tide transect statistics during the month (95% confidence interval), the mean shoreline change envelope (SCE) was 8.385 m ± 3.79 mean net shoreline movement (NSM) was 4.94 m ± 5.47 and mean end point rate (EPR) was 7.905 m ± 8.77 m/ month. The beach displayed dynamic behavior during the period of the study, experiencing accretion with high NSM. Continued monitoring is recommended to identify trends and variations across multiple seasons and years.

Keywords: Aerial photogrammetry, coast, conservation, shoreline, short-term

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Aquatic Post Harvest Technology

Extraction and characterization of the gelatin using the skin of spotted Triggerfish (*Canthidermis maculatus*)

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Gelatin, a valuable by-product obtained from bovine and porcine sources, can also be extracted from fish as an alternative. This study focused on extracting gelatin from the skin of the spotted triggerfish (*Canthidermis maculatus*). The main goal was to isolate and analyze the gelatin fromthe fish skin, and then compare it with commercially available gelatin. The skins were treated with a solution containing 0.2 M NaOH and 0.05 M Acetic acid to extract the gelatin. The gelatin yield was approximately 10.35%, and further analysis was conducted on its chemical composition, physical characteristics, and functional properties. The findings indicated that the gelatin derived from spotted triggerfish (SSG) exhibited a proteincontent of 85.25 ± 0.75%, a moisture content of 6.25 ± 0.03%, a fat content of 0.57 ± 0.11%, and an ash content of 2.72 ± 0.13. In contrast, the analysis of commercial gelatin showed a protein content of 86.30 ± 1.17%, a moisture content of 10.30 ± 0.01%, a fat content of 0.24 ± 0.01%, and an ash content of 1.14 ± 0.10%. The gel strength of SSG exhibited a lower value of 52.67±8.39 g compared to the commercial gelatin, which had a higher value of 120.70 ± 13.80 g. The viscosity of SSG is slightly lower at 15.51 ± 1.02 cP compared to commercial gelatin at 17.53 ± 1.08 cP, while its water-holding capacity is also lower at 233.9 ± 15.6% in contrast to commercial gelatin at 457.4 ± 1.05%. SSG demonstrates a fat binding capacity of 376.5 ± 43.0 g, which is higher than the fat binding capacity of commercial gelatin, which is 258.8 ± 3.92 g. The forming capacity of SSG was significantly higher at 66.67 ± 0.00 g compared to commercial gelatin at 23.33 ± 4.71 g. Based on the findings, gelatin derived from the skin of spotted triggerfish has the potential to serve as aviable substitute.

Keywords: Spotted triggerfish, fish skin, gelatin extraction, characterization

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Comparison of heavy salting and traditional sun drying method for rough triggerfish (*Canthidermis maculate*)

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Salting and drying is a process used to preserve food by reducing the moisture content and water activity. Currently, the traditional sun drying technique is used to preserve rough triggerfish. But it has many drawbacks like environmental issues, climate conditions, large space, high labour costs and cross contaminations. This research aimed to evaluate the effectiveness of the heavy salting technique for drying rough triggerfish and to compare its results with those obtained from the conventional sun drying method. Weight loss of heavy salted and traditional sun-dried rough triggerfish during the drying were 32% and 54% respectively. The process required six days to achieve the moisture level specified in SLSI standard. The heavily salted rough triggerfish attained a moisture content of 50.07% and a water activity level of 0.585. In contrast, the traditionally sun-dried fish reached a moisture content of 39.38% and a water activity of 0.576. The protein contents of heavy salted and the traditional sun-dried rough triggerfish were 41.48% and 46.70% respectively. The final salt contents of heavy salted and traditional sun-dried rough triggerfishes were 17.44% and 14.66% respectively. Soaking 200 g of heavily salted fish in one litre of water for about 40 minutes before cooking can effectively decrease its salt content up to 10.47%. Based on the sensory analysis of cooked products, traditional sun-dried rough triggerfish showed statistically higher consumer acceptability compared with heavy salted rough triggerfish. According to the results of the study heavy salting technique could be considered as a promising preservation technique however further studies should be done to improve the sensory attributes of heavy salted rough trigger fish.

Keywords: Triggerfish, dried fish, heavy salting, traditional drying

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Comparison of hot air-drying technique and traditional sun drying method to dry the small fish variety in a short period (Special reference to anchovies)

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Drying is a traditional and widely utilized method for preserving fish. Dried anchovy, a small species of fish, is preserved through a process of salting followed by sun drying. However, the conventional technique, that is sun drying can result in quality degradation due to cross-contamination as well as extended drying times and increased labour costs. Therefore, the objectives of this research were to find the most effective salt concentration and time for the salting process and to find a drying technique for the drying of anchovy fish, as opposed to the conventional method of sun drying. One hour of drying under 15% salt concentration was selected for the salting procedure. The sun-drying process required a total of 14 hours, while the hot air-drying method only took 8 hours to lower the desired water activity level following SLSI standards. The mean temperature observed during the sun-drying process was approximately 32.08°C, while the temperature for hot air drying was around 36.87°C. The recorded moisture content of the sundried sample was about 29.35% and a water activity level was about 0.556, while the hot air-dried sample achieved a moisture content of 34.65% and a water activity of 0.575. Salt content and protein contents of sundried and hot air-dried samples were about 13.93%, 41.57% and 12.77%, 39.34% respectively. The TVB-N content was found to be 92.81 mg/100g in the hot air-dried sample and 62.8 mg/ 100g in the sundried sample. The weight loss of the sun-dried sample was approximately 68.8%, whereas the hot air-dried sample reported a weight loss of 60.0%. And the hardness of the sun-dried sample was 199.25g/cm^2 and the hot air-dried sample was 91.75g/ cm^2. Based on the results, the hotair-drying technique could be selected as the best drying method to dry the anchovy fish with optimum quality and reduce drying time.

Keywords: Anchovy, dried fish, hot air drying, preservation, sun drying

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Revealing unique herbal holy mangrove (*Acanthus ilicifolius*) bubble teas with natural spices for diverse age preferences

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Acanthus ilicifolius (Holy Mangrove) is a medicinal plant found in mangroves in tropical Asian countries, including Sri Lanka. Holy Mangrove leaves can be used in the production of mangrove tea. There is no study or data available on the introduction of Bubble Tea made from Holy Mangrove tea and the status of Bubble Tea consumption among adults above 35 years old. This study aimed to introduce a Holy Mangrove tea-based Bubble Tea with three natural spices for different age groups [16-24, 25-34, and 35 and above] and determine group members' preferences for its attributes (taste, color, aroma, and appearance) using hedonic points, as well as identify the most preferred flavor among the three spice options based on participant feedback. The leaves were collected from Rekawa Lagoon, Sri Lanka. Leaves were cleaned, dried under sunlight using a dryer and ground into a fine powder. The tea was infused with spices each separately. Fresh milk, tapioca pearls, sweeteners, and ice cubes were added to create bubble tea. This pilot study was limited to a small sample size of seven individuals including males and females from one age group, which may impact the generalizability of the findings. The Friedman test was conducted on the mean value data and Multiple Linear Regression was utilized in MINITAB 19. There was no statistical median difference in all sensory attributes among the three spicy flavours within the three age groups (Friedman Test: $p > 0.05$). The results of the multiple linear regression Test showed; that the taste of the Bubble Tea emerged as the critical factor influencing their choice. Based on these observations, it can be concluded that if this new product is introduced to the market in all three flavours, it can attract all age groups.

Keywords: *Acanthus ilicifolius*, bubble tea, natural spices, Sri Lanka

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Formulation of novel herbal tea blends from *Rhizophora mucronata* hypocotyl and *Sonneratia caseolaris* fruit

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The growing popularity of herbal tea blends and the need to incorporate under-utilized food in the value addition of tea products has sparked interest among producers and consumers. This study aimed to formulate two herbal tea blends using two true mangroves *Rhizophora mucronata* hypocotyl and, *Sonneratia caseolaris* fruit. Sensory evaluations were conducted byprofessional tea tasters using a nine-scale Hedonic test. The most preferred blends were identified as follows: 60% Ceylon green tea with 39% *R. mucronata*, 0.5% cardamom, and 0.5% peppermint; 70% Ceylon green tea with 15% *S. caseolaris* fruit, 10% lemongrass, and 5% peppermint. pH, Color, Turbidity, and Total soluble solids were determined in all tea blends. Total plate count, Yeast and Mold count, Total Coliform count, *Salmonella spp*. as wellas Cadmium and Lead levels were measured. The *S. caseolaris* blend demonstrated the highesttotal antioxidant capacity (1.47 ± 0.06 mg TE/g DW) and total flavonoid content (232.95 ± 2.81 mg RE/g DW) in hot water extracts. All blends showed similar total polyphenol content. Proximate analysis provided insights into the nutritional composition of each blend. Total platecount, Yeast and Mold, Total Coliform count, and *Salmonella* spp. were within the International Organization for Standardization (ISO) ranges. Cadmium was not detected in any blend, while lead was found in trace amounts in the *S. caseolaris* blend (0.21 mg/ kg). These results suggest Ceylon green tea blended with the aforementioned herbs can serve as recommended value-added tea beverages. Introducing sustainable harvesting will encourage communities to actively participate in conservation efforts while also providing alternative sources of income.

Keywords: Novel herbal tea, *Rhizophora mucronata*, *Sonneratia caseolaris*

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