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Aqua International

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M. A. Nazeer

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NRS Publications,
BG-4, Venkataramana Apartments,
11-4-634, A.C.Guards,
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- Editor

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India safeguarded aqua farmers' interests at WTO

Indian shrimp farmers continue to grow aquaculture sustainably, both for their business and for environmental health. We are at a unique juncture where seafood is becoming one of the most important and sustainable global food sources with India as one of the top shrimp producers in the world.

The growth in Mud Crabs is exhibited by the shedding of the outer shell. Before moulting, a new exoskeleton is developed below the old, hard and dead shell. During the moulting process, the old shell is cast off. The formation of the new shell and casting of the old shell is energy taking process which is called moulting. The growth in the size of the crab after moulting occurs due to the endo-osmosis of water by the body tissue and thus the moulted crabs increase in their size.

Dear Readers,

The September 2022 issue of *Aqua International* is in your hands. In the news section you may find news about ...

Addressing the international conference titled 'Sustainable Development in Hill and Coastal Ecosystems' organized by M. S. Swaminathan Research Foundation, Chennai in both online and offline mode during August 7 to 9, 'Aquaculture and fisheries in hilly and coastal ecosystems', emerging techniques, new opportunities in aquaculture and fisheries and contribution of these sectors in addressing food and nutritional security of the hill and coastal dwellers, Dr M. V. Gupta, aquaculture scientist and World Food Prize Laureate 2005 opined that fish has not received adequate attention in global food debate and food security issue, although it contributes significantly to food, nutritional and livelihood security of poor in developing countries. He highlighted on 'National Fish for All' launch and initiatives taken by Prof. Swaminathan, initiation of 'Fish for All' Research and Training Centre in Tamil Nadu, new Ministry of Fisheries, Animal Husbandry & Dairying created by GoI, above Rs 20,000 crores allotted in PMMSY programme, that we need to improve lives of people in hilly and coastal ecosystems of India. Dr R. Ramasubramanian said that poor vulnerable people depend on bio-resource of hills and coastal ecosystems in India for their livelihood.

Mr Matthew Wood, CEO, SCD Probiotics, USA, said that Indian shrimp farmers continue to grow aquaculture sustainably, both for their business and for environmental health. We are at a unique juncture where seafood is becoming one of the most important and sustainable global food sources with India as one of the top shrimp producers in the world. Launched in 1972 as a statutory body of the Union Ministry of Commerce and Industry, MPEDA is all set to celebrate the Golden Jubilee of its eventful existence with India's marine exports touching 1.4 million tonnes (Rs.57,586 crore) as against just 35,523 tonnes in the year of inception and the delectable products finding a stamp of approval from seafood gourmets from across the globe. Union Minister of State for Commerce and Industry Smt. Anupriya Patel will kick-start the event in the city on August 24. The function at Grand Hyatt in Bolgatty Island will also see the distribution of MPEDA Export Awards and Champions trophy of MPEDA Golden Jubilee Marine Quest 2022. The event will be attended by Mr Diwakar Nath Misra, Joint Secretary, Department of Commerce, Govt. of India and Seafood Exporters Association of India (SEAI) National President Mr Jagadish Fofandi. MPEDA Chairman Mr Dodda Venkata Swamy said that Golden Jubilee comes amid its continued efforts to capitalise on the milestones reflected in its fundamental focus on capture fisheries, value-added products and market promotion, besides establishing a pan-India network while invigorating quality and sustainability. MPEDA has decided to chalk out an export development plan to target export of 20 billion US dollars in the next five years. "It will require a growth rate of

Contd on next page

Aqua International

Our Mission

Aqua International will strive to be the reliable source of information to aquaculture industry in India.

AI will give its opinion and suggest the industry what is needed in the interest of the stakeholders of the industry.

AI will strive to be The Forum to the Stakeholders of the industry for development and self-regulation.

AI will recognize the efforts and contribution of individuals, institutions and organizations for the development of aquaculture industry in the country through annual Awards presentation.

AI will strive to maintain quality and standards at all times.

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about 15 percent. We need to sustain and accelerate the growth tempo to meet this target", he pointed out. Chairman said that the are readying to host the 23rd edition of the biennial India International Seafood Show (IISS). The February 2023 event at Kolkata will provide an ideal platform for interaction between Indian exporters and overseas importers of India's marine products.

A.P Chambers of Commerce and Industry Federation, in coordination with National Fisheries Development Board organised a webinar on "Development of Coastal Aquaculture Facilities at Mulapolam, Srikakulam district, in PPP Mode", as part of promoting food processing industry in Andhra Pradesh. Speaking on the occasion, AP Chambers' president Pydah Krishna Prasad requested NFDB to set up its office at either Vijayawada or Visakhapatnam, as the board has no office in Andhra Pradesh. AP Chambers president-elect Potluri Bhaskara Rao said AP is a leading producer of aquaculture products. It is appropriate that an NFDB office is opened in the state to boost exports. NFDB representatives explained that as per their master plan, aquaculture will be developed over 70 acres in PPP mode at Mulapolam in Srikakulam district in two phases. The estimated cost of the project is ₽120 crore under which nursery and hatchery complexes will be set up for marine and brackish water fish seeds for supplying them to fish farmers.

Union Minister of State for Commerce and Industry Smt. Anupriya Patel, in her online address said the government is implementing prompt measures in coordination with all pertinent departments to ensure that India's income from marine exports hit Rs one lakh crore within three years. We are making efforts to boost the exports through our embassies abroad. Our target is to contribute 10 per cent of the global exports in the marine products sector. Pointing out that all foreign markets have gone stricter on inspection of marine products in the post-Covid era. The Minister said it has become 100 per cent for Vannamie shrimps in Japan. Presence of antibiotics in the products is a major issue in EU countries, America, Australia, Korea and Thailand. Minister said, MPEDA has been adopting top-rate checking systems as part of its creative strategy to overcome such issues. Noting that the future holds very bright for seafood owing to its rising domestic consumption and increasing demand the world over, she said, its health benefits are immense. Thus the consumption pattern of the world population is shifting towards seafood.

In the Articles section – *Crab Culture: A Potential Species for Mariculture* *authored by*

Shyam Kumar, Abhinav Prakash, Anjali Kumari, ICAR - Central Institute of Fisheries Education, Mumbai, discussed that the growth in mud crabs is exhibited by the shedding of the outer shell. Before moulting, a new exoskeleton is developed below the old, hard and dead shell. During the moulting process, the old shell is cast off. The formation of the new shell and casting of the old shell is energy taking process which is called moulting. The growth in the size of the crab after moulting occurs due to the endo-osmosis of water by the body tissue and thus the moulted crabs increase in their size. Since the moulted crab utilizes the deposited energy for moulting, they comparatively weigh less and they contain more amount of water. The newly moulted crabs having watery meat and soft exoskeleton are known as 'water crabs'. Such water crab remains defenceless and becomes an easy prey to other animals, mainly by the other hard mud crabs. The new formed shell of the moulted crabs becomes hardens 3 to 4 days later moulting. The frequency of moulting generally more injuveniles and sub-adults, while it is less in adults. The hard-shelled crabs are known as "meat crabs", which fetch a higher price.

Another article titled ***Blue Carbon Ecosystem – A Mitigating Tool For Climate Change,*** *authored by* Manimekalai. D, Velmurugan. P, Padmavathy. P and Deepika. S, Fisheries College and Research Institute, Tamil Nadu Dr J. Jayalalithaa Fisheries University, Thoothukudi, said that tidal marshes are coastal wetlands with deep soils that are built through the accumulation of mineral sediment and organic material and then flooded with salty water brought in by the tides. Almost all of the carbon in tidal marsh ecosystems is found in the soil, which can be several meters deep. Tidal marshes filter pollutants from land runoff and hence help maintain water quality in coastal areas. They provide critical habitat for many stages of the life cycle of important marine species, which is essential for healthy fisheries and coastal marine ecosystems. Tidal marshes also serve as a buffer to coastal communities, absorbing some energy from storms and floods and helping to prevent erosion. Tidal and freshwater marshes are being lost at a rate of 1-2% per year. Major threats to tidal marsh ecosystems include draining for coastal development, conversion to agriculture, and rising sea levels.

Article titled ***Shrimp Hemocyte Iridescent Virus (SHIV): An Emerging Potential Threat to the Shrimp Aquaculture Industry,*** *authored by* David Waikhom, College of Fisheries, Central Agricultural University (Imphal), Lembucherra, Tripura, Soibam Ngasotter, College of Fisheries, Central Agricultural University (Imphal), Lembucherra, Tripura, Laishram Soniya Devi, ICAR-Central Institute of Fisheries Education (CIFE), Mumbai, informed that the Shrimp hemocyte iridescent virus (SHIV) is an emerging virus that has a huge potential threat to the shrimp aquaculture industry. The affected fish exhibit clinical signs such as slight loss of colour on the surface, anorexia (animal stop feeding), softshell, mutilated antennae, empty stomach and gut, whitish to yellowish head of carapace due to pale hepatopancreas, slightly reddish body in 1/3rd of the infected shrimps. Other signs include loss of swimming ability and sinking to the pond bottom, distinct white triangle area under the carapace at the base of rostrum, white head and yellow gills, atrophy (shrinkage) of hepatopancreas with fading of colour (yellowing), slightly whitish muscle and mutilated antennae are remarkably observed in affected Macrobrachium rosenbergii.

Results in Shrimp, Fish and Crab farming can be achieved as per specifications when the pond management guidelines are followed. Farmers and Integrators have to give sufficient time and attention to farm management and check the developments there to ensure results. When you invest your hard earned money into it, a little more care and attention can prevent losses and help in profitable farming all the time.

Readers are invited to send their views and comments on the news, special feature and articles published in the magazine which would be published under "Readers Column". Time to time, we shall try to update you on various aspects of Aquaculture sector. Keep reading the magazine Aqua International regularly and update yourself. Wish you all fruitful results in your efforts.

M.A.Nazeer
Editor & Publisher
Aqua International

Aquaculture and Fisheries in Hilly and Coastal Ecosystems

The International Conference titled 'Sustainable development in hill and coastal ecosystems' was organized by M. S. Swaminathan Research Foundation (MSSRF), Chennai in both online and offline mode during August 7th to 9th 2022. Year 2022 is proclaimed as International Year of Artisanal Fisheries and Aquaculture and 7th August is birthday of Prof. M. S. Swaminathan. On the 2nd day, in Technical Session-5 namely 'Aquaculture and fisheries in hilly and coastal ecosystems', emerging techniques, new opportunities in aquaculture and fisheries and contribution of these sectors in addressing food and nutritional security of the hill and coastal dwellers were discussed by eminent experts. This session was chaired by Dr Modadugu V. Gupta, renowned aquaculture scientist and World Food Prize Laureate 2005, who opined that fish has not received adequate attention in global food debate and food security issue, although it contributes significantly to food, nutritional and livelihood security of poor in developing countries.

Dr Gupta highlighted on 'National Fish for All' launch and initiatives taken by Prof. Swaminathan, initiation of 'Fish for All' Research and Training Centre in Tamil Nadu, new Ministry of Fisheries, Animal Husbandry & Dairying created by GOI, above Rs 20,000 crores allotted in PMMSY programme, that we need to improve lives of people in hilly and coastal ecosystems of India. Session Coordinator Dr R. Ramasubramanian said that poor vulnerable people depend on bio-resource of hills and coastal ecosystems in India for their livelihood.

As first speaker, Dr Kuldeep K. Lal, Director, ICAR-National Bureau of Fish Genetic Resources, Lucknow spoke on 'Fish genetic resources (FGR) of upland regions, their management and utilization'. Hill finfish genetic diversity in India extends between subzero-20°C temperatures with 258 species, provides ecosystem services, of which 203 are Himalayan. Indigenous and exotic sport fishes are source of livelihood in upland regions, golden mahaseer is iconic species. Major stressors upon FGR in nature are construction of dams, barrages, pollution, destruction of habitats, wanton destruction of fishery.

Dr Lal discussed about exotic trouts as stenothermal species; status of fish production in hill states; sport and capture fisheries, aquaculture of exotic species, culture of Pengba as livelihood opportunities provided by upland FGR; emerging package of practices for hill aquaculture (integrated fish farming in mid-hill region in polytanks, culture of rainbow trout in flow-through system, RAS in Ladakh); science-based interventions and community involvement; diversification; recognizing species with native importance; region-specific practices, regional relevance and co-management; selective breeding programme {fast-growing trout feral stocks produced with cryopreserved sperm (CS)}; quality seeds and inputs; trout feed developed by ICAR - DCFR. He informed about CS used to cross - breed trouts in Nilgiris in 1998; community aquaculture for multiple benefits; Blue Bioeconomy Model and ABS (Access Benefit Sharing); Aquatic Animal Disease Surveillance & INFAAR taken up at Himachal Pradesh, Uttarakhand, Jammu & Kashmir; that 'Taxonomic impediment' limits sound management of biodiversity; strategies for harmonizing conservation and stock enhancement; that hill ecosystem can play a role in intensification of aquaculture; captive breeding technologies established for important upland species.

Dr E. Vivekanandan, Emeritus Scientist, ICAR-Central Marine Fisheries Research Institute, Kochi spoke on 'Climate trends, impacts and adaptation strategies in coastal ecosystem'. Coastal and marine ecosystem service value in India estimated at 24 billion US $/year. Blue Growth Strategy (BGS) is an opportunity to promote jobs and growth in these ecosystems; issues to BGS include unsustainable fishing, habitat degradation, climate change, land use changes. He discussed about critical habitats in the ecosystems and keystone species(s) giving ecosystem services; climate change (CC) pathway from atmosphere to oceans; expansion of 'oxygen minimum' zones; GHG accumulation in atmosphere and ocean acidification; storm surges impacting fish resources and altering coastal livelihood. In Indian marine fishery, there is decline of one-third of stocks, mean fish size caught, CPUE, fish catch potential. Important finfishes nearing the potential yield in coastal waters, changes in fish distribution pattern, relative fish biomass in coastal waters changing at population, ecosystem and individual levels.

He explained projected changes in marine fish catch potential by middle and end of this century in world and India relative to year 2000; options to reduce impact of other stressors and relieve fish stocks from CC; requirement of synergistic action plan; expanding 'No take' zones, restoring critical habitats, shelter zones; changing from open access to controlled access to fishing grounds; reducing fishing pressure in coastal waters; adoption of ecosystem approach to fisheries management; financing CC adaptation and mitigation measures. We must stop revenue from coming down for fishing communities.

Dr A. Padiyar, Project Manager, World Fish,


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Eliminate undesirable algae
Before
After
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Inhibit the growth of Vibrio spp.
Before
After
Improve water color
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Good quality of water prevents fish/prawn infections, making high profit of production
Before
After
* COMPOSITION:
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***Dosages can be adjusted according to the water conditions and practices.
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Bhubaneswar, Odisha spoke on 'Scaling nutrition-sensitive and gender-equitable fisheries and aquaculture technologies through partnership in Odisha'. Through convergence and partnership programmes with Departments and institute, fish farming in Gram Panchayat tanks was done by participation of about 8000 women SHGs, emphasis given on major carp - Amblypharyngodon mola polyculture, latter for household consumption in villages. Dr Padiyar discussed about policies for long term lease of GP tanks to women SHGs, fish farming in agriculture farm ponds (10x10 and 20x20 sq.mt multipurpose tanks), development of A. mola seed production technology as important small Indigenous Species and success obtained in its breeding in commercial scale, promotion of hygienically solar dried fish by women SHGs in coastal villages in ten solar driers already set up, fish-based nutrition in ICDS Anganwadi Centres as supplementary nutrition programme. According to him, bridging science innovations and Government development programmes is essential for sustained impacts at scale in nutrition-sensitive approaches.

Dr Bikram K. Baliarsingh, Technical Advisor, GIZ, Bhubaneswar spoke on 'Integrated aquaculture initiative in Eastern Ghats of Odisha'. He discussed about a case study of ST-dominated Kundra Block of Koraput district, Odisha where farmers have used good quality seeds, better management practices, dyke-planted vegetables and aquaponics system. In 378 sq.mt pond, IMC yearlings were stocked for composite fish culture with proper liming, manuring, feeding. He pictorially explained the concept, set-up and operational procedure of aquaponics, issues and advantages of aquaponics in fish farming. He highlighted usefulness of the technology in terms of fish production and net income obtained; both had been high in comparison to that of previous years.

As the last speaker, Dr S. Velvizhi, Scientist and Head, MSSRF Fish for All Research and Training Centre, Poompuhar spoke on 'Value chain improvements in small-scale fisheries (SSF) sector – experiences of MSSRF'. She discussed about women involvement in SSF in pre-harvest, harvest, cleaning (prawn, squid), processing, transport and marketing sectors; that overfishing affects livelihood; value chain stages (post-production, processing, distribution, consumption); causes of fish loss in value chain activities; fish loss and waste along value chain in SSF; important challenges faced by SSF; FAO voluntary guidelines for securing sustainable SSF. While discussing about MSSRF experiences in SSF development, she mentioned about economic enhancement, social development, environmental conservation, adoption of responsible fishing practices.

She informed about community-based marine resource management initiative; introduction of sustainable fishing gears; low carbon emitting gears; fisher-friend mobile application (FFMA) as a decision making tool for SS fishers where value-added information on ocean condition in local language provided; FFMA helps in resolving human – wildlife conflict in Odisha coast ('No fishing zone' alert at Gahirmatha wildlife sanctuary, Rusikulya, Devi and Dhamra river mouth). Value-added fish food products are diversity in consumption with aquatic foods, she explained consumption and income pathways in achieving household food and nutritional security, increase in household level income through collective action, promotion of small-scale aquaculture that will improve diversity in production, integrated aquaculture in mangrove areas with seabass and mud crabs, location-specific integrated fish farming system. According to Dr Velvizhi, we should give concurrent attention to livelihood concerns of people and concerns relating to conservation and management. MSSRF is engaged in improving fish value chain, especially reducing post-harvest loss. Towards the end of this session, some of the registered participants online, including News communicator Subrato Ghosh, raised questions for further knowledge and experts provided answers to questions patiently.

Member of Rajya Sabha Beeda Mastan Rao meets Union Minister of Food Processing Industries

Nellore: On August 9, 2022 Rajya Sabha Member Mr Beda Mastan Rao met Mr Pashupati Kumar Paras, Head of Central Food Processing Industries Department at his residence.

On this occasion, Mr Mastan Rao brought to the attention of the Minister various problems in the processing units in Aqua sector and thus the many challenges faced by Aquaculture sector.

The last date for grants to food processing industries and dairy industries has been fixed as August 10, and the minister responded positively to the request made by Mr Mastan Rao to extend the deadline by one month and to solve the other problems.


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SCD Probiotics, USA, CEO, Matthew Wood visits Indian aquaculture market

Matthew Wood with aquaculture stakeholders during his visit in Bhimavaram, Andhra Pradesh.

August 06, 2022: Mr Matthew Wood, Founder and CEO of US-based SCD Probiotics, visited India's Aquaculture market recently, following the launch of its aquaculture product BioAH Aqua.

BioAH Aqua is a probiotics-based product for soil and water health in shrimp and fish farming. BioAH Aqua is imported to India by BIOAH Probiotics Private Limited and marketed / distributed by Reddy Drugs Laboratories (RDL). It is manufactured with SCD Probiotics' patented technology in Kansas City, MO, USA at their US FDA-certified facility.

BioAH Aqua is an active, synergistic community of 14 live, fermented beneficial bacteria (probiotics) and the postbiotics they make; postbiotics are bioactive and health promoting compounds, including organic acids. The microbes from BioAH Aqua work together to balance shrimps' growing environment and make it safer by controlling toxic element levels in the water, controlling excessive organic matter, out-competing pathogenic microbes, and stimulating shrimps' immune systems. These improvements also result in a better flavor (reducing "off-flavor" shrimp), good yield results and improved FCR and reduced mortality rates.

"It was my pleasure to meet many stakeholders in aquaculture farming in India's aquaculture capital Bhimavaram and to visit some of the most promising ponds in the Krishna District", said SCD Probiotics CEO Mr Matthew Wood. "I'm very happy to have been able to engage in further conversations about how we can help Indian shrimp farmers continue to grow aquaculture sustainably, both for their businesses and for environmental health.

We are at a unique juncture, where seafood is becoming one of the most important and sustainable global food sources, with India as one of the top shrimp producers in the world. We have seen high enthusiasm and wide acceptance for BioAH Aqua, and are planning to introduce many other farm care products here in India in the near future".

About SCD Probiotics

SCD Probiotics was founded in 1998 as Sustainable Community Development, with a mission to create products that replace the toxic chemicals in our lives — using the power of probiotics to restore health and balance to our soil, our food, our bodies, our homes and our planet. Inspired by the probiotic communities who work together to encourage life and health at their most foundation levels, the company uses 24+ years of microbiome research and scientific precision to design health-building products that deliver proven results by mirroring nature as closely as possible.

Headquartered in Kansas City, Missouri, USA, SCD Probiotics develops, manufactures, and commercializes probiotics and probiotic biochemicals for industrial, consumer, aquaculture and agricultural applications worldwide.

India safeguarded aqua farmers' interests at WTO: Minister Goyal

MPEDA's 50th year celebrations begin

Rise in seafood consumption brightens MPEDA'S future in Golden Jubilee year, say speakers

MPEDA headquarters in Kochi, Kerala

Kochi, August 25: The government safeguarded the interests for the country's marine farmers even in the last round of WTO discussions, Union Commerce Minister Mr Piyush Goyal has said.

India is working towards realising marine exports worth Rs One Lakh Crore by 2025, Mr Goyal revealed at the Golden Jubilee celebrations of the Marine Products Export Development Authority (MPEDA) inaugurated by Union Minister of State for Commerce and Industry Ms Anupriya Patel here on August 24.

In his video speech at Grand Hyatt in Bolgatty Island here, Mr Goyal made four proposals for a comprehensive development of the country's marine resources. "Identify 20 markets for items that contribute to 90 per cent of the exports, prepare state-wise export development plans in consultation with state administrations, aim at exports worth 20 billion dollars in the next five years and, four,raise the lives of fishermen by reducing their risk, creating awareness among them, increasing their income and shielding them against middlemen," he said at the two-hour function, where Ms Patel released LegaSea, a coffee-table book on the occasion of MPEDA completing 50 years.

Mr Goyal noted that the country has a potential to add two lakh Shrimp farmers "in the next few years". This will increase its production from the present 40,000 tonnes to seven lakh tones, which is nearly 18 times today's production, he said, hailing MPEDA's role in enabling India enjoy a quantum leap in global rankings from the 13th to the fourth position during the last decade.

Minister Ms Patel, said the government is implementing prompt measures in coordination with all pertinent departments to ensure that India's income from marine exports hit Rs one lakh-crore within three years."We are making efforts to boost the exports through our embassies abroad," she said. "Our target is to contribute 10 per cent of the global exports in the marine products sector."

Pointing out that all foreign markets have gone stricter on inspection of marine


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products in the post-Covid era, the Minister said it has become 100 per cent for vannamie Shrimps in Japan. Presence of antibiotics in the products is a major issue in EU countries, America, Australia, Korea and Thailand, she added.

Ms Patel said MPEDA has been adopting top-rate checking systems as part of its creative strategy to overcome such issues.

Noting that the future holds "very bright" for seafood owing to its rising domestic consumption and increasing demand the world over, Ms Patel said, its health benefits are immense. "Thus the consumption pattern of the world population is shifting towards seafood," she added.

Mr Hibi Eden, MP, noting that marine products make stupendous contributions towards India's exports, called for better livelihood care of the country's fish workers who play a crucial role in the marine sector.

MPEDA Chairman Mr Dodda Venkata Swamy, welcoming the gathering, said the organisation is making coordinated efforts to form a chain that would guarantee sustainability and high quality of seafood.

Overlapping with the country's 75th Independence Day festivities under Azadi ka Amrit Mahotsav, the event was addressed by MPEDA former heads Mr T.K.A Nair (ex-Principal Secretary & Advisor to Prime Minister), Mr K.B. Pillai and Ms Leena Nair, Kerala State Industrial Development Corporation Chairman Mr Paul Antony (Kerala's former Chief Secretary), MPEDA ex-Chairman A. Jayathilak (Additional Chief Secretary) and Seafood Exporters Association of India (SEAI) National President Mr Jagadish Fofandi.

The function also saw the distribution of the MPEDA Export Awards for Outstanding Performance (2019-20 and 2020-21) under seven categories. These went to the best manufacturer exporters of marine products based on an offline selection mode.

A cultural programme by MPEDA members and their families followed.

MPEDA, founded in 1972 as a statutory body of the Ministry of Commerce and Industry, has taken India's marine exports to 1.4 million tonnes (Rs.57,586 crore) as against 35,523 tonnes in the year of inception.

Development of coastal aquaculture over 70 acres in Andhra Pradesh

Vijayawada: AP Chambers of Commerce and Industry Federation, in coordination with National Fisheries Development Board (NFDB), on Friday organised a webinar on "Development of Coastal Aquaculture Facilities at Mulapolam, Srikakulam district, in PPP Mode", as part of promoting food processing industry in Andhra Pradesh.

Speaking on the occasion, AP Chambers' president Pydah Krishna Prasad requested NFDB to set up its office at either Vijayawada or Visakhapatnam, as the board has no office in Andhra Pradesh. AP Chambers president-elect Potluri Bhaskara Rao said AP is a leading producer of aquaculture products. It is appropriate that an NFDB office is opened in the state to boost exports.

NFDB representatives explained that as per their master plan, aquaculture will be developed over 70 acres in PPP mode at Mulapolam in Srikakulam district in two phases. The estimated cost of the project is ₹120 crore under which nursery and hatchery complexes will be set up for marine and brackish water fish seeds for supplying them to fish farmers.

Representatives of AP Food Processing Industries Federation (APFPIF), Seafood Exporters Association and Delta Aqua Farmers Association participated in the webinar.

NFDB chief executive C. Suvarna and senior NFDB, Hyderabad, officials N. Venkatesh, L. Narasimha Murthy, Arul Bosco Prakash, and Manne Persis were among those who participated in the webinar.

UPSC Essentials: One word a day – Aquaculture

Two researchers from Tamil Nadu Fisheries University have developed a portable device to check water quality in aquaculture ponds

Nagapattinam: Two researchers from Tamil Nadu Fisheries University have developed a portable device to check water quality in aquaculture ponds. Dr D Kesavan and Dr M Ramar from the College Of Fisheries Engineering (CoFE) affiliated to Tamil Nadu Dr J Jayalalithaa Fisheries University (TNJFU) have developed the device, which they call 'Pocket-size Device for Water Quality Assessment in Aquaculture' or 'miniaturised colourimeter.' They have applied for patents for the device.

"Water quality management is essential for profitable and sustainable aquaculture. Tools that can accurately determine pH are essential as even decimal differences are significant. We have developed a technology that can read pH accurately and on the spot. It will be a simple, economical, portable, user-friendly device," said Dr D Kesavan, Head of the Department of Basic Sciences in CoFE.

According to researchers, aquafarmers mostly use reagent-based colour testing kits for evaluation of water quality parameters such as pH, dissolved oxygen and nitrite. They add a reagent having halochromic material to the water sample to develop a colour, which they compare to a standard scale. In the technology developed by CoFE researchers, a sample is taken in a tube and a special reagent formulated by them is added.

Then, the tube with the mixture is placed in the miniaturized colourimeter. It shows values correlated with a standard table to get the pH value (from 6.0 to 9.0) of the pond water. "In the method of manual observation of colour, there are no or fewer colour differences for one value to another. The colours developed for different pH can be in the same region and manual observation can lead to error. In our technology, we use the miniaturized colourimeter to give accurate readings of pH," said Ramar.

The researchers said it is the device along with special reagent and the test tube would only about Rs 1,000 compared to the typical colour code-based manual testing kit which costs over Rs 13,000. The researchers said they are implementing the technology in villages of Muttam, Panangudi, Manjakollai, Vadagudi and Akkaraipettai of Nagapattinam district to monitor the pond water quality.

The invention has received funding from Tamil Nadu's State Council for Science and Technology and the Union government's Unnat Bharat Abhiyan Scheme. It has secured second place in the recent competition conducted by TNAU's Regional Coordinating Institute (RCI) and is now been recommended for National Selection conducted by IIT-Delhi. Dr N Manimehalai, Dean in-charge of CoFE, said, "We are encouraging research not just among teaching staff, but also students, especially at the undergraduate level. More patents are applied from our institute."

Many farmers giving up aquaculture this season

Kakinada: Many aqua farmers have not taken up aquaculture during this August due to adverse weather conditions, high feed rates and uncertainties over power subsidy.

Power subsidies are based on zones. A large number of farmers are outside these zones and hence have been excluded from the subsidy scheme. They feared taking up aquaculture because the high power tariffs may not leave enough profit margin for them, particularly in view of prices of fish going down.

Aqua sources say adamant attitude of state government in not reducing or controlling feed rates, apart from not extending power subsidy to all aquafarmers, will cause the government a loss of ₹6,000 crore by way of various taxes. More importantly, about 25 lakh to 30 lakh workers have lost employment.

Andhra Pradesh Aqua Farmers Association convener Gadiraju Subba Raju said they had submitted representations to government a number of times seeking resolution of their problems. As the government has not responded, most of the farmers who have leased lands have given up their cultivation. Only those who own the land are raising fish, as their overhead costs will be lesser.

Subba Raju demanded that the state government stabilise feed rates and extend power subsidy to all, so that all aquaculture farmers could benefit.


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Webinar on Strengthening Seafood Processing in India

The Webinar titled 'Aquaculture and seafood of India and strengthening seafood processing in India' was organized by Associated Chambers of Commerce and Industry in India (ASSOCHAM) on 26/8/2022. Dr J. Balaji, IAS, Joint Secretary (Marine Fisheries), Dept of Fisheries, Ministry of Fisheries, Animal Husbandry & Dairying, Govt of India and Dr (Smt) C. Suvarna, IFS, Chief Executive, NFDB, Hyderabad were Guests of Honour in this programme.

As 1st speaker, Mr M. Lendhe, Global Segment Head – Seafood, Aditya Birla Group (Chemicals) audio-visually spoke on 'Strengthening seafood processing in India'. He described seafood as high-protein diet, its importance in food security and livelihood; global seafood consumption – now vs future; that high value species will drive growth in seafood trade; enhancement of fish products & productivity including technology infusion and adaptation; developments made in inland fisheries and aquaculture, marine fisheries, mariculture and seaweed cultivation, fisheries in Himalayan and NE states, ornamental and recreational fisheries. In post-harvest management, we have cold chain and market infrastructure, fishing harbours, landing centres, deep sea fishing. In global trends in world's marine fish stocks, there has been 24.2% decrease of stocks of fish that are fished within sustainable levels.

Mr Lendhe showed video on Air-flown salmon and its opportunities in India, its RAS farming, high retail price of salmon fillets and streaks. From harvesting, landing, processing, distribution, retail & food services and finally consumers – making sure that supply chain is traceable. Seafood market driven by rise in per capita consumption, growth in organized food retail, online and offline gaining momentum in seafood sales. Major industry drivers are increasing population, increase in consumption of protein-rich food, consumer preference of seafood over red meat, good packaging, etc. He highlighted on importance of value addition in seafood, growth opportunities (minced fish meat based products, salted and dehydrated fishes in retail packs, etc), and that India seafood entrepreneurs should venture into value-added seafood products (SP) and processing and export of high-value SP.

Dr M. Sharma, Managing Director, Mayank Aquaculture Pvt. Ltd, veteran shrimp farmer & expert spoke about production and export of farmed shrimps from India, we have to look into entire value chain and its improvement. Disease issues and increase in cost of production may be setback for farmers to produce more, should be looked into. Farmers and processors should help each other. He highlighted on how success achieved in shrimp farming in Ecuador, importance of value addition in India, that should be improved. If farmers get success, others like hatchery owners, feed millers, exporters will get success. Markets should be developed for domestic consumption of farmed shrimps; all together value chain people should get united.

Sri A. Dash, Former Vice-Chairman, MPEDA emphasized on value addition for hatchery owners, feed millers and others, at different levels; better seed and feed; spoke about importance of critical innovations in finfish/shrimp feed technology and others; species diversification in aquaculture; better infrastructure, importance of road connectivity, more electricity coverage as priority sector; modern hygienic auction centres; supporting suppliers and middlemen who do play a role; better financing needed in aquaculture; that crop insurance needed for small holder farmers; importance of improved breeds and genetic lines of fishes & shrimps (SPR broodstock) as in Ecuador.

Dr (Mrs) S. Monteiro, Director of Fisheries, Govt of Goa stated that new entrepreneurs are coming in RAS, Biofloc culture; she focused on open sea cage culture in Goa; increase in fish production will help in processing and export. Farmed mussels can be exported, seaweeds hold huge potential, cultured seabass has potential in processing industries in Goa, Pangasius catfish culture also promoted.
Dr K. Mishra, President, Odisha Seafood Exporters Association spoke about hike in price of crates at processing plants; shortage of raw material (shrimp) in post-COVID pandemic situation; banking support needed and bankers need to understand the trade intimately for non-standardized item like shrimp. Wholesome approach needed from bankers, exporters, farmers which will help to scale up export to greater magnitude. The issue of residues of banned antibiotics and medicines in shrimps should be seriously looked into; India gets a bad name when rejection of consignments happens. Such antibiotic sale should be strictly restricted.
He also spoke about understanding intelligence of international market, value addition, remarkable achievement in export growth that happened in India in recent past and keeping on rising in export trade.

Dr J. Balaji, IAS in his speech discussed about marked increase in aquaculture production that took place in India due to collaborative approach between farmers, exporters, entrepreneurs and others. Resilience in export sector established, confidence among all

Contd on Page 28

UdazH Marks Its Celebratory 1st year with an Award for The Fastest Growing FMCG Product in Healthcare and Wellness Sector

Mumbai, Aug 1: udazH, a novel initiative by ***Serene Envirotech Solutions Pvt.*** Ltd., to combat oxidative stress, has won accolades in its very first year! It has bagged the coveted award for being the ***"Fastest Growing FMCG Product in Healthcare and Wellness Sector"***. About a year ago udazH championed innovation in the preventive healthcare sector. The Molecular Hydrogen ***inhaler*** and Hydrogen ***water bottles*** launched as portable, personal wellness products, have revolutionized the wellness industry. ***Serene Envirotech*** was established to provide cutting-edge, innovative solutions and services in the field of preventive healthcare and wellness. The first person to confirm and publish the miraculous uses of the hydrogen molecule in human healthcare was the Japanese scientist Dr. Shigeo Ohta.

Dr Babu Sudhakar, founder Chairman & Managing Director of Serene Envirotech Pvt Ltd received the Award

By introducing the first-of-their-kind Hydrogen water bottles and Hydrogen inhaler through its udazH line of products, ***Serene Envirotech*** has made an effort to introduce this innovative technology in India.

Dr Babu Sudhakar, the Founder Chairman & Managing Director of Serene Envirotech Pvt. Ltd believes that, *"We are indeed glad to share that the initial response from select clients to whom these products were offered, has been very overwhelming. This has paved the way to put in place a robust strategic plan for Market Expansion. Thus, it is indeed heartening to have received this award on behalf of Serene."*

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Having taken the marketing world by storm with their introduction of udazH, the one year old brand is all set to take the bigger leap!

The team is convinced that this award shall inspire them and their business partners to work even harder to make the brand udazH a great success story in the Indian healthcare industry.

Contn from Page 26

members of value chain, equity and happiness should be established among all players. He highlighted some features of 'Atmanirbhar Bharat' (on which PMMSY scheme is based); that farmers, processors, aggregators should work together, problems of antibiotic residue will come down. Dr Balaji opined that proper market of produced fishes and shrimps is an issue, domestic market should grow. Mentoring support needed in addition to subsidy-oriented programmes. Mechanism of environment protection should be there, he also spoke about going out and fishing in high seas and distant marine waters.

Finally Mr. Ranendra P. Swain, Hon'ble Minister-in-Charge, Dept of Agriculture, Farmers' Empowerment and Fisheries & ARD, Govt of Odisha and Chief Guest of Webinar discussed elaborately with facts and figures on the resource (potential water area), growth and success achieved in fish and shrimp production in recent years in Odisha, prospects of different sectors of fishery & aquaculture (freshwater, brackishwater, marine) in the state, fish and shrimp export trend. He emphasized on compliance with food safety standards, traceability and certification to rise to higher position in seafood export sector. This Webinar was nicely moderated by Mrs. Perminder J. Kaur, Senior Director, ASSOCHAM East and North-East. News communicator Subrato Ghosh participated in it.


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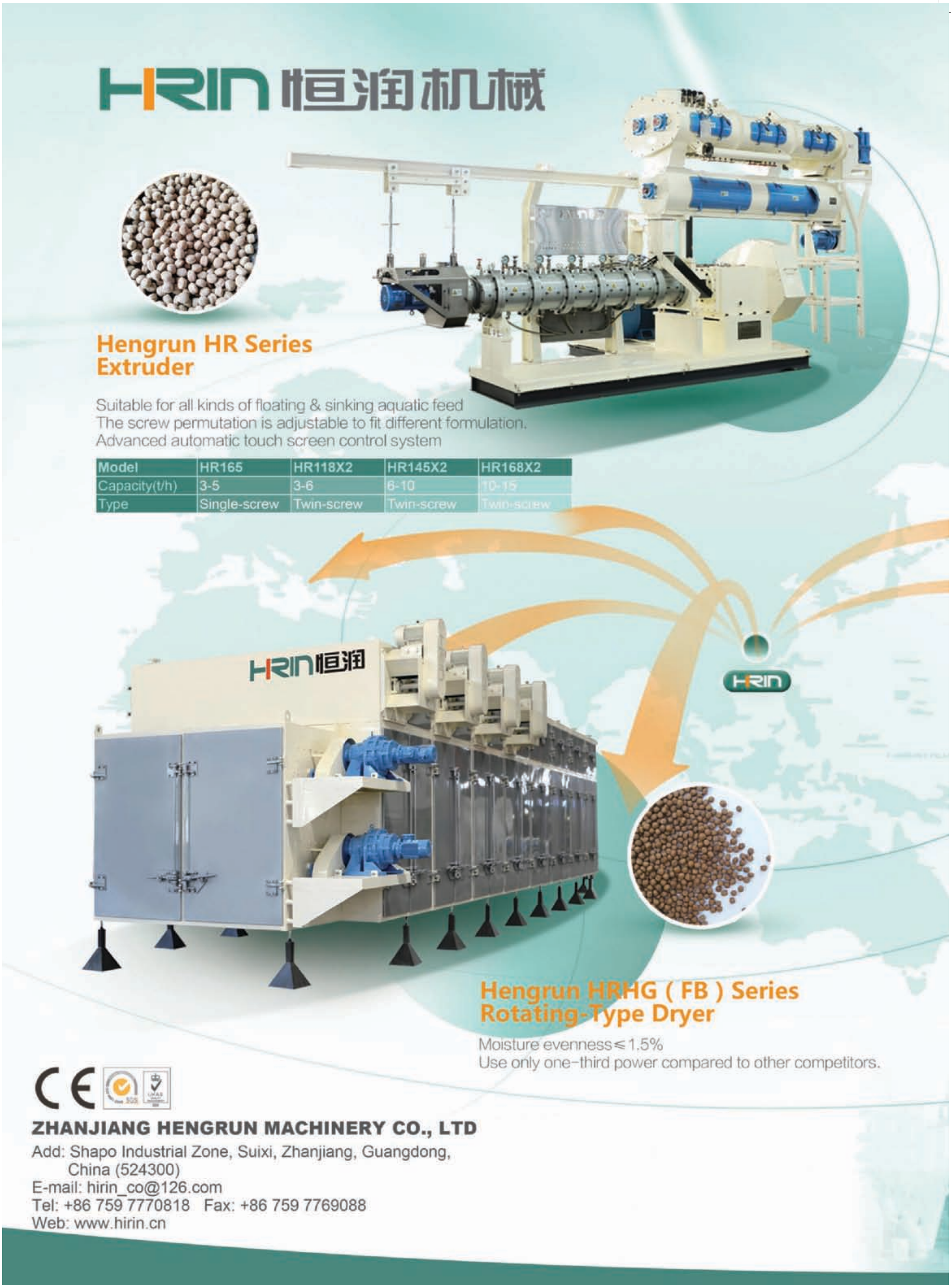
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Crab Culture: A potential species for Mariculture

Shyam Kumar, Abhinav Prakash, Anjali Kumari
ICAR - Central Institute of Fisheries Education, Mumbai, Versova, Andheri (W), Mumbai - 400 061
E: shyam.aqcpa604@cife.edu.in

Abstract:
The crab culture has a large number of variations as compare to the other types of aquaculture like the use of wild seedstock and hatchery produced. The farming systems also exhibits variation from extensive to intensive, monoculture to polyculture; and mangrove farm to well-constructed ponds or fattening cages. There is no specific way to farm mud crabs, but techniques, technologies and principles have been developed a lot so that it can be adapted to meet the specific needs of farmers and governments wishing to develop mud crab aquaculture businesses.

Introduction:
The culture of the mud crab has been started 100 years ago in China and for the past 30 years throughout Asia. Majority of crab aquaculture production relies on wild-caught stock, as larval rearing has not yet reached a commercially viable level for stocking into aquaculture farms. The major limitation restricting the further expansion of mud crab culture is the inadequate supply of crab seed for stocking enclosures. Even at the present magnitude of the mud crab culture industry, quantities of crab seeds caught by fishermen are insufficient to meet demand. Apart from this, it is also causing the loss of mangrove forest, over exploitation of wild stocks. The seasonal nature of availability of seed crabs compounds the supply problem. There are various species of mud crab which occur in mangrove swamps and nearby intertidal and subtidal muddy habitat throughout tropical to warm temperate zones where they form the basis of small but important in shore. The size, high meat yield and delicate flavour of crabs are sought after as a quality food item. As they are simply caught by means of simple traps or nets, they remain alive for considerable periods after capture (Gillespie and Burke 1992) and are of high value. The animal is an important source of income for small-scale fishers throughout the Asia-Pacific region. There are four commercial viable species of mud crab which are sold live in market like *Scylla Serrata*, *S. Tranquebarica*, *S. Paramamosain* and *S. Olivacea* that are the focus of both commercial fisheries and aquaculture production throughout their distribution

Habit and habitat:
The crabs are generally found in the shallow coastal waters, lagoons, estuaries, backwaters, brackish water lakes, the mangroves and inter-tidal swamps of east and west coast as well as in the creeks and bays of Andaman and Nicobar Islands. They select sandy or muddy slush bottom for their life cycle. Both the species prefer to remain buried under the substratum during the day and are active in the night. The larger species *(S. Tranquebariea)* remains buried under the substratum, the smaller species (S. *Serrata)* remains in the burrows made at the bottom most part of the embankments in a brackish water canals and fish farms. Both the species wander into brackish water area during their post-larval stage (megalopa stage). Early juveniles abound the inter-tidal region, while the adults occupy a deeper portion of the estuaries. After reaching maturity, adults migrate, especially the berried females to the sea for breeding. S. *Tranquebarica* is free-living and frequents open areas of estuaries, whereas *S. Serrata* is more common in mangrove areas.

Highlight Points

- 1. The Commercial crab culture is one of lucrative and profitable aquaculture business for small-scale fisherman across the globe.
- 2. There are various species of mud crab which occur in mangrove swamps and nearby intertidal and subtidal muddy habitat.
- 3. The crabs are basically carnivorous and prefer to feed on slow-moving and bottom-dwelling animals such as bivalve molluscs, small crabs and dead and decayed animal materials.
- 4. The mud crabs are generally sold in live condition for both local consumption and live export trade.
- 5. There are four commercial viable species of mud crab-like Scylla *Serrata*, *S. Tranquebarica*, *S. Paramamosain* and *S. Olivacea*.

Life history:

The mud crab megalopais non-selective among estuarine habitats (seagrass, mud or sand) while crablets (juvenile mud crabs) strongly select for a seagrass habitat, indicating that living within seagrass beds likely increases their survival. This supports the theory that mud crabs settle out of the plankton in the near shore region of the coastal shelf and colonize in the estuaries. Crablets makes shelter in a variety of in shore habitats including reed beds, areas of aquatic macrophytes, under stones and within the mud and sandy sediments.

The maturation of mud crab is a step-wise process where they pass through an apparent physiological maturation before becoming functionally mature. In *S. serrata,* the 01 stage of maturation for a male occurs from carapace width (CW) 90–110 mm, while from CW 140–160 mm males develop their characteristic "large-claw" and mating scars on their sternum and front walking legs developed apparent. A sudden change in the chela height to CW ratio has also been linked to functional maturation of males in *S. paramamosain*. The absence of mating scars does not confirm that a male is immature, as these can be lost between moults. In immature *Scylla* spp., a chitinous protrusion from the sternite engages the abdomen, preventing it from opening, so that abdominal disengagement is required before either males or females can mate. In female mud crabs, the characteristic U shape of their abdominal flap, heavily pigmented abdomen and highly setose pleopods together with a well-developed fringe of setae is a more obvious sign of maturation. The Copulation typically follows the change of the abdomen from the more triangular immature female to the more rounded, broad form.

Typically, males guard mature females, cradling them prior to their moult. The male carries the female underneath him using three pairs of walking legs. The male can successfully mate and transfer spermatophores (packets of sperm) into the female's spermatheca once she has moulted and is soft-shelled. During copulation, which may last 7–18 hours, the male turns the female upside down. The female stays in the protection of the male until her shell is fully hardened, which may be several days. The subsequent development of the ovary can be seen by depressing and pushing forwards the first abdominal segment next to the carapace on female crabs. The colour of ovaries change as they mature, progressing from transparent through to yellow and finally dark orange, although a more accurate description of the maturation process can be obtained through microscopic examination.

Sexual Identity:

Sex can be identified in juveniles measuring 35 mm in carapace width (CW) by the shape of the abdominal flap. In a male, the abdominal flap is slender and triangular, while it is broad and triangular in immature and semi-circular in matured and berried females. In case of both sexes, the abdominal flap in live crabs is folded firmly against the ventral side of the body.

Food and Feeding Habits:

Both the species of mud crabs are carnivorous. They feed on slow-moving and bottom-dwelling animals such as bivalve molluscs, small crabs and dead and decayed animal materials. These crabs are often known as scavengers in spite of that they cannot catch alive stirring prey.

Moulting:

The growth in mud crabs is exhibited by the shedding of the outer shell. Before moulting, a new exoskeleton is developed below the old, hard and dead shell. During the moulting process, the old shell is cast off. The formation of the new shell and casting of the old shell is energy taking process which is called moulting. The growth in the size of the crab after moulting occurs due to the endo-osmosis of water by the body tissue and thus the moulted crabs increase in their size. Since the moulted crab utilizes the deposited energy for moulting, they comparatively weigh less and they contain more amount of water. The newly moulted crabs having watery meat and soft exoskeleton are known as 'water crabs'. Such water crab remains defenceless and becomes an easy prey to other animals, mainly by the other hard mud crabs. The new formed shell of the moulted crabs becomes hardens 3-4 days later moulting. The frequency of moulting generally more injuveniles and sub-adults, while it is less in adults. The hard-shelled crabs are known as "meat crabs", which fetch a higher price.

Growth:

In the field culture, the early juvenile crabs (15 to 60 mm in CWl3 to 20 g in TW) grow at a rate of 7 to 13g per month, while juvenile crabs (60 to 80 mm / 25 to 70g) shows a monthly growth of 10 to 12 mm and 45 to 95g. In sub-adult and adult stages, the monthly growth works out to 9 to 10 mm and 100 to 130g. The *S. Tranquebarica* attains a maximum size of 220 mm and 2.5 kg and the *S. Serrate* attains l60 mm and l *kg* in the wild.

Maturity:

The attainment of maturity in female crabs can be identified by change in the shape of the abdominal flap, from triangular to half-round horse-shoe shaped. For males, there is no external morphological character to identify the mature ones. The size at maturity for a female is about 120 mm for *S. Tranquebarica* and 83mm for *S. Serrata*). After the commencement of maturity, the development of ovary takes place internally. Initially, the colour of the ovary is bright orange which later changes to deep yellow before extrusion of eggs. The inner ovarian development is determined by pressing down between the carapace and abdominal flap. The mature egg is visible by its yellowish colour.

Mating:

The copulation occurs between a hard male and a freshly moulted soft female. Prior to copulation, a hard male climbs over the back of hard female crab, clasping her by his chelipeds and first two pairs of walking legs. This formation is known as "doubler" or "pre-mating embrace" which continues for around 2-3 days. The pair divorces when the female approach the moulting. The female moults which

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is called as "pre-copulatory moult". The male helps the female throughout the pre-copulatory moulting. After the moulting occurs, the male embraces the soft female again for the real mating. The male gently turns the female over on her back by the help of his chelipeds, while the female discloses her abdominal flap and holds the male in position. The copulation continues for around 6-8 hours. During the copulation act, the male deposits spermatophores in the seminal receptacles of the female.

Breeding:

When the eggs become ripe, they are fertilised with the help of stored spermatophores. After that, they are extruded and remain as "mass" or 'sponge" and attached to the hair-like branches of 04 pairs of appendages of the abdominal flap. The egg mass as a whole, attached to the abdominal flap is called as *"berry".* The number of eggs in the beny varies from 2 to 3 million for *S. Tranquebarica.* The eggs measure 0.2 to 0.3 mm in diameter. The incubation period is about 2 weeks, during which time, the colour of the eggs gradually changes fromorange to brown and then to black. The stored spermatophores are used for more than two spawning. The mud crabs are continuous breeders as evidenced by the occurrence of ovigerous and berried females throughout the year in the coastal water

Hatching:

As part of health management, the berried crabs obtained either from wild or from the culture pond or from the captive brood-stock facility should be treated with 10 ppm malachite green and methylene blue dipping for 5 minutes, which would ensure the eradication of harmful bacteria from the eggs. This treatment would enhance the hatching rates. The berried females should be kept individually in 500-litre capacity fibre glass / cement tanks covered with black cloth to cut the light. Before the liberation of larvae, the abdominal flap of the mother crab makes frequent jerking movements and the egg mass get loosened. Also, the jabbing of walking legs over the egg mass takes place, before hatching first zoea larvae from the eggs. Normally, the release of larvae occurs in the early morning hours, which is a continuous process, lasting for 3 - 5 hours. The liberated zoea larvae are photo-tactic, i.e. attracting towards the light.

Larval Stages:

Before releasing the larvae, the colour of the eggs becomes black, which is due to the formation of eyes of the larva, The larva which emerges after piercing the egg membrane is called as "zoea'. There are 5 zoea and Imegalopastages (post-larval) before attaining the first crab stage. The interval between zoeal stagesis 3 - 4 days and the megalopa takes 11-12 days to become the first crab stage. The size of the first and fifth zoea is 1.2 mm and 3.5 mm in length respectively, while the megalopa measures 2.5 mm in carapace length. The first crab stage, which measures 37 mm in carapace width. The zoeal larvae are highly carnivorous and feed on larvae / adults of zooplankton including zoeal larvae of their own and other crabs, indicating the existence of cannibalism from larval stages onwards. The duration between the first zoea and first crab stage is about one month.

Culture Practices:

The culture of mud crab started from the eighties of the nineteenth century. In the traditional shrimp and fish culture fields, young mud crabs generally migrate through the sluice gate and the grown-up crabs are fished out at the time of partial or final harvest. Initially, the young crabs collected from the wild were stocked in milk fish (*Chanoschanos*) or tiger shrimp (*Penaeusmonodon*) culture ponds as a secondary stock, since the mud crabs do not compete for food either with fish or with shrimp. Later, monoculture for mud crabshas emerged to meet the increased demand and practised in Bangladesh, China, India, Indonesia, Malaysia, Singapore, Sri Lanka, Taiwan and the Philippines on a moderate scale. In order to reduce the dependence on wild seed, efforts were made to raise the seed under the hatchery system and met with varying degree of success in China, India, Malaysia and the Philippines.

Types of Culture:

Four types of culture are practised in South East Asian countries:

1. Mono-culture in grow-out ponds with proper fencing, where juvenile crabs are raised to marketable size over a period of 3 - 4 months.
2. Poly-culture with shrimp, milk fish and seaweed.
3. Fattening process, in which, recently moulted crabs are raised to gain weight in 3 -4 weeks.
4. Rearing of un-riped females till they develop full ovaries.

Pond Preparation:

To prevent the escape of reared crabs from the pond, fencing with suitable materials such as casuarinas poles, bamboo split matting, G.I. chicken wire mesh, plastic-coated galvanised Iron wire mesh, nylon netting and asbestos sheet to a height of one meter are erected either in the inner edge of the pond or on the top of the earthen bund. The fencing is positioned at 45° towards the inner side of the pond to prevent the climbing and escape of small crabs. Since mud crabs are highly cannibalistic, earthen and PVC pipes and worn-out tyres are placed as hideouts / shelters to reduce the fighting among the normal hard crabs and mortality of the soft "water crabs".

Stocking:

The crabs with a size range of 80 to 100grams are stocked at a rate of 1 - 5 / m^2. The stocking with uniform-sized crabs is preferred to avoid fighting and competence for food. The first zoea larvae are stocked at a rate of 30 – 100 / litre in 2 - ton fibre glass / cement larval rearing tanks with filtered seawater and aeration facility.

Grow-out Pond Culture:

The earthen ponds of 0.1 - 0.4 ha in size and rectangular in shape having a sandy or muddy or clay loamy bottom soil are preferred to suit the burrowing habits of the mud crab and provided with 4 meters wide and 0.8 meter deep ditches leading towards the sluice as shelters. The wider axis of the pond is arranged to face the backwater canal in order to have a greater tidal effect through the sluice. A row of earthen mounds is constructed in such a way that they remain submerged during the high tide and visible during low tide, in order to serve as natural habitat. The filtered sea water having a salinity range of 30 - 35 ppt and water temperature of 27 - 29 °C is used daily water exchange at the rate of 80%. The reared crabs are examined periodically by sampling to record their growth and health condition. By employing a lift net with bait preferably in the evening hours, crabs can be obtained for sampling. The crabs should be handled with care and properly tied before measuring their carapace width and weight. At stacking density of 1 crab/m², it grows from an initial size of 50 g to the final weight of 500g in 4 months. The containers used for export of live mud crabs%. The "water crabs" encountered in the final harvest are utilised for fattening purpose.

Feeding:

The reared crabs are fed twice in a day, preferably in the forenoon and in the late evening either with trash fish or mollusc meat (bivalve/ gastropod) at a rate of 5 to10% of stocked biomass, depending upon the observed feeding intensity and the size recorded at a regular and periodical sampling of the reared crabs. The daily rate of feeding for a 4 month culture is expressed as:

Daily feed = No. of crabs x % of Average body weight x % of the feeding dose

Percentage composition of natural food of Scylla Serrata of different on to genic stages

S. No	Food item	Juve-niles	Sub-adults	Adults
1	Unidentified organic matter	42.09	46.30	41.09
2	Inorganic sand shell	9.46	15.04	17.18
3	Plant, algae and sea grass	13.05	12.88	16.0
4	Fish meat and hard parts	17.41	12.18	10.24
5	Molluscs	9.21	7.18	8.58
6	Crustacean	8.20	5.16	4.56
7	Unidentified organic matter	0.57	1.26	2.24

Water Management

In tide-fed ponds, water having a salinity of 10 – 35 ppt is exchanged through the sluice. The water temperature is maintained within the range of 28 - 32 °C and the dissolved oxygen level 5 - 7 ppm. The pH of the water is retained between 7.5 - 8.5. The depth of water is maintained in the culture pond should be 0.5 to 1.0 m. When the crabs tend to come out of the pond, it is an indication of deterioration of quality of pond water.

Transport of Berried Crabs:

For short-time transportation (1 - 6 hrs.), the berried crabs are kept submerged in sea water (salinity- 15-25 ppt) and placed individually in 10 - litre capacity containers such as plastic buckets and metal tins. For longer journeys of 7 - 24 hours, 50 - litre capacity containers with proper provision for aeration are used.

Packing:

The first pair of largest legs with pincers (chelate legs) of each live crab is firmly tied up with the body by jute or nylon thread to curb their movement and to avoid the fighting among them. The wet seaweeds are kept in between the packed layers of crabs to enhance their moist and cool condition during the transport from place to place for local consumption. The tied crabs are washed with fresh seawater and packed either in a bamboo basket or in perforated thermocol box for export purpose.

Marketing:

The mud crabs are generally sold in live condition for both local consumption and live export trade. For the marketing purpose, mud crabs are graded as 'extra-large" (1 kg and above), "large" (500 grams to 1 kg), "medium (300 to 500 grams) and "small" (200 to 300 grams). The matured and berried female crabs are usually sold at a higher price. The meaty crabs weighing above 300 grams are considered for live mud crab export, while the smaller-sized crabs (less than 300 grams) and the crabs which have lost their limbs are sold by number in local markets. They are marketed only in live condition, as there is an aversion among the consumers for dead mud crabs.

Reference:

1. Baw, D. E. 1995. Crab culture in India – Present status, future prospects - *India Aqua Industry* Year Book *1995. 12·IB.*
2. Ljong. P. C. 1994. Crab culture io India – Present status, future prospects. *Aqua International* Volume 2. Nos. 4 & 5: 4-1l.
3. Marichamy, R. 1980. Culture of fishes in cages and pens along the coastal waters of India. Proc. Workshop on cage and pen fish culture, Hollo, Philippines. SEAFDEC·IDRC. 41-44.
4. RajapakiaS.. 1986. Culture of mud crab *Scylla serrata* (Forskal) in Tuticorin Bay. Proc. Symp. 00 coastal Aquaculture. *Marine Biology Association. India* Part IV: 1176-1182.
5. Rajapakia S. 1991. Experiments on larval rearing &seed production of mud crab *Scyllaserrata.* Proc. of the seminar on mud crab culture. Bay of Bengal program. 135-141.
6. Vedavyasa Rao, 1973. The crab fishery resources of India. Proc. Symp. Theliving resources of seas around India, 585-59l.

BLUE CARBON ECOSYSTEM – *A MITIGATING TOOL FOR CLIMATE CHANGE*

Email: suman.frmpa906@cife.edu.in

Manimekalai, D*. Velmurugan, P, Padmavathy, P. and Deepika, S

Fisheries College and Research Institute, Tamil Nadu Dr J. Jayalalithaa Fisheries University, Thoothukudi.

Highlight Points

- Blue carbon is the type of carbon that is stored by coastal wetland vegetation such as mangroves, sea grasses and salt marsh grasses.
- Blue carbon ecosystems occupying only 0.2% of the ocean surface, but they contribute 50% of carbon burial in marine sediments, equivalent to the sequestration of 1%–2% of current global CO2 emissions from fossil fuel combustion.

INTRODUCTION

Blue carbon is the carbon stored in coastal and marine ecosystems such as mangroves, tidal marshes and seagrasses. These ecosystems sequester and store large quantities of blue carbon in both the plants and the sediment below. The ability of these vegetated ecosystems to remove carbon dioxide (CO2) from the atmosphere makes them significant net carbon sinks, and they are now being recognised for their role in mitigating climate change. Conserving and restoring terrestrial forests, and more recently peat lands, has been recognised as an important component of climate change mitigation. Several countries are developing policies and programmes in support of sustainable development through initiatives that reduce the carbon footprint associated with the growth of their economies.

The global average atmospheric carbon dioxide (CO_2) concentration rose to 387 parts per million (ppm) in December 2009 (ESRL/NOAA 2009), the highest level it has reached over the past 800000 years (Luthi et al. 2008) and more than 38% above the pre-industrial value of roughly 280 ppm (Raupach and Canadell 2008). There is a broad consensus among the scientific community that this increase in CO_2 is driven primarily by the burning of fossil fuels and changes in land use (Solomon et al. 2007). Land use change results in CO_2 emissions through clearance of natural vegetation, forest fires, and agricultural activities, as well as through the deterioration of ecosystems that serve as natural carbon (C) sinks (Solomon et al. 2007). A more recent approach suggests refocusing efforts from a single emissions reduction strategy to a plan that combines reducing anthropogenic sources of CO_2 (mitigation) with supporting CO_2 uptake and storage through the conservation of natural ecosystems with high C sequestration rates and capacity (Canadell and Raupach 2008).

Global Distribution of Blue Carbon Ecosystems

Policy Relevance

The value of coastal blue carbon ecosystems cross-cuts various political agendas and can therefore be applied

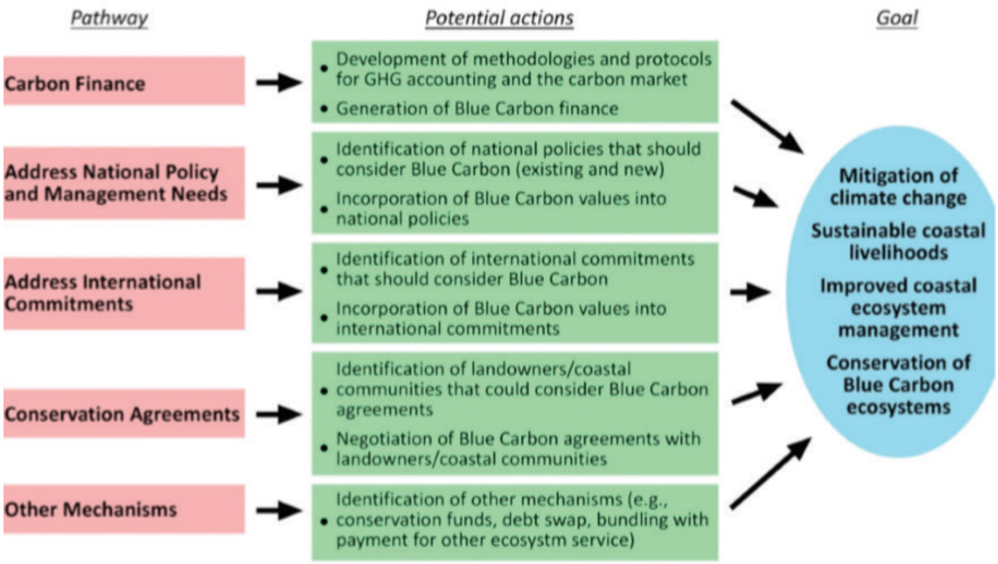


Image credits – top: Matthew D Potenski, inset: Steven Lutz

through various policy pathways to meet shared goals, as outlined in the diagram below.

BLUE CARBON:

The carbon (C) sequestered in vegetated coastal ecosystems, specifically mangrove forests, seagrass beds, and salt marshes, has been termed "blue carbon". Marine ecosystems particularly coastal vegetated ecosystems such as mangroves, seagrasses, and salt marshes have demonstrated capacity for sequestering carbon in both the plant biomass above ground and in the subsurface sediment layer. For that reason, those vegetated areas are now widely acknowledged as important natural sinks for greenhouse gases (GHGs).

Coastal marine systems include mangroves, coral reefs, saltmarshes and seagrasses, with seagrasses capture up to half of the CO_2 emissions from the World's transport sector.

Sea grasses, mangroves and salt marshes along our coast "capture and hold" carbon, acting as a carbon sink. These coastal systems, though much smaller in size than the planet's forests, sequester this carbon at a much faster rate, and can continue to do so for millions of years. Most of the carbon taken up by these ecosystems is stored below ground where we can't see it, but it is still there. The carbon found in coastal soil is often thousands of years old.

The first "Blue Carbon" International Scientific Working Group Meeting was held at UNESCO Headquarters in Paris, France 15to17 February 2011. The meeting was organized by the Intergovernmental Oceanographic Commission (IOC) of UNESCO, Conservation International (CI), and the International Union for Conservation of Nature (IUCN). During three days, thirty participants from ten countries attended to coordinate and guide the establishment of the Blue Carbon Scientific Working Group, which will distribute its recommendations through a meeting report to be published in March 2010.

The efficient preservation of the carbon under these habitats is due to:

1. Slow decomposition rates;
2. Low nitrogen and phosphorous concentrations in plant tissues;
3. Low oxygen levels in the sediments; and the
4. Allocation of a large fraction, often exceeding 50%, of plant biomass production to roots and rhizomes that are buried into the soil.
5. In addition, the entangled network of roots (and rhizomes) and the dense canopy of coastal vegetation protect soil carbon deposits from erosion. Indeed, some vegetated coastal habitats can support organic-rice soils that deserves conservation measures.

Ecosystem	Global extension (km2)	Local net primary production (g C m−2 yr−1)	Global net primary production (Pg C yr−1)	Global loss rate (% yr−1)	Percentage of area lost since the Second World War
Salt marshes	22,000–400,000 200,000	440	0.01–0.18	1–2	–
Mangroves	137,760–152,36 152,308	400	0.06	1–3 0.7–1.7	30–50 >25
Seagrasses	177,000–600,000	278	0.05–0.17	0.9	30
Macroalgae	2,000,000– 6,800,000	94	0.19–0.64	--	--

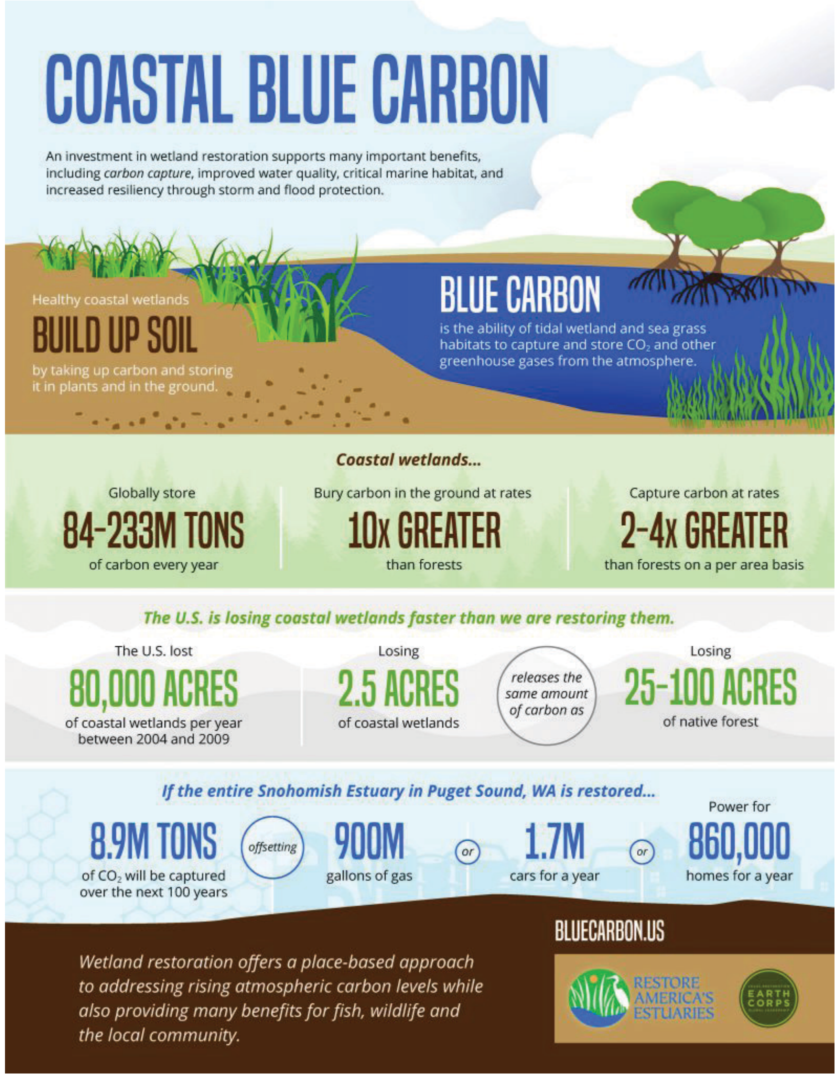
Source: Duarte *et al* 2013

DIFFERENT COASTAL HABITATS

1. MANGROVES

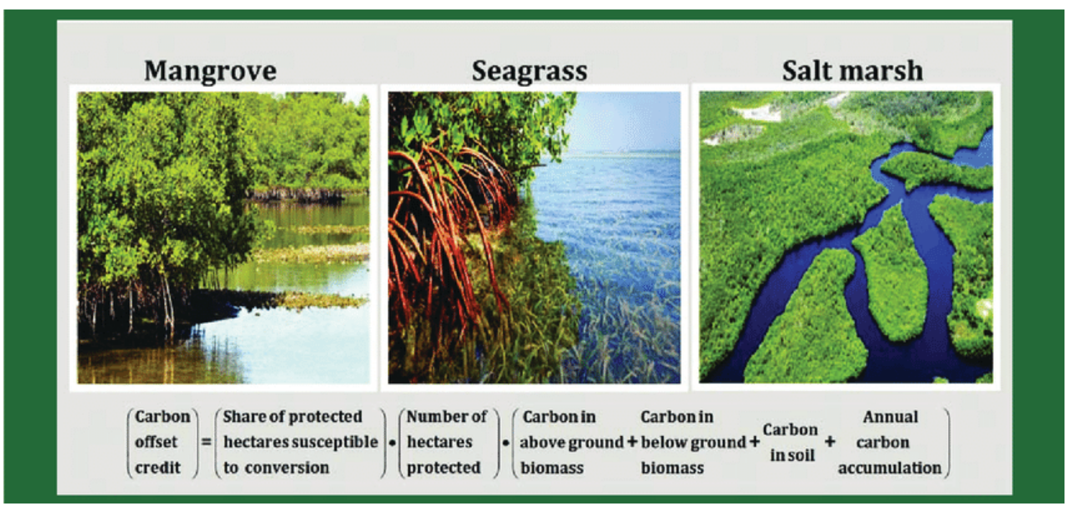
Mangroves are a type of tropical forest, found at the edge of land and sea and flooded regularly by tidal water. It occurs along the coasts of most major oceans in 118 countries, adding ~30–35% to the global area of tropical wetland forest over peat swamps alone. Renowned for an array of ecosystem services, including fisheries and fibre production, sediment regulation, and storm/tsunami protection, mangroves are nevertheless declining rapidly as a result of land clearing, aquaculture expansion, overharvesting, and development. A 30–50% areal decline over the past half-century has prompted estimates that mangroves may functionally disappear in as little as 100 years.

Mangroves are among the most carbon-rich forests in the tropics. **It is estimated that the average annual carbon sequestration rate for mangroves averages between 6 to 8 Mg CO_2e/ha (tons of CO_2 equivalent per hectare).** These rates are about two to four times greater than global rates observed in mature tropical forests. Organic-richsoils ranged from 0.5m to more than 3m in depth and accounted for 49–98% of carbon storage in these systems.. Mangrove soils consist of a variably thick, tidally submerged suboxic layer (variously called 'peat' or 'muck') supporting an aerobic decomposition pathways and having moderate to high C concentration



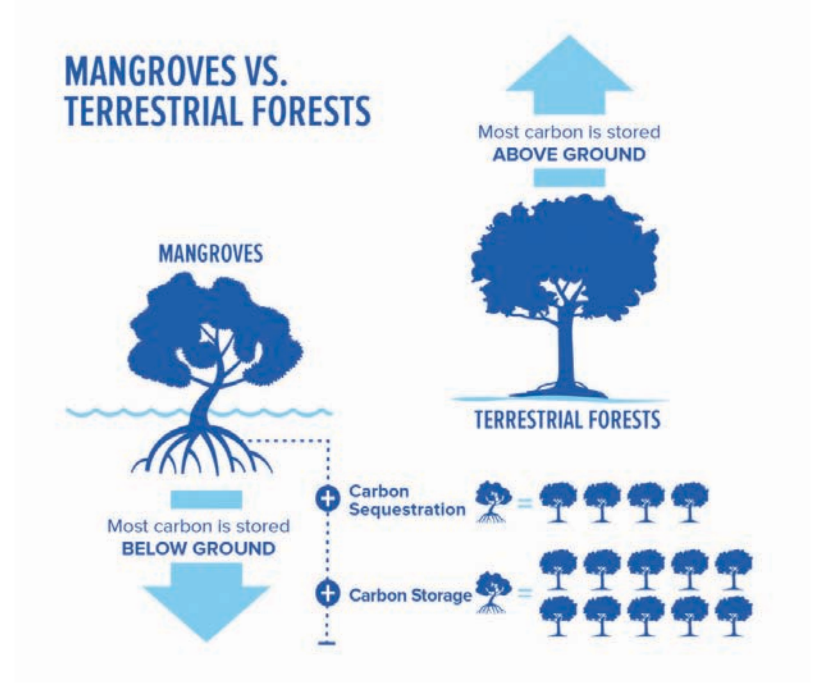
Mangroves provides an ecosystem services, which include: Supporting fisheries by providing important spawning grounds for commercial fish species; filtering pollutants and contaminants from coastal waters and contributing to healthy coastal marine water quality; and protecting coastal development and communities against storms, floods and erosion *.

In the last 50 years, between 30-50% of mangroves have been lost globally and they continue to be lost at a rate of 2% each year*. Major causes of destruction to mangrove ecosystems include deforestation for construction of aquaculture ponds and other forms of unsustainable coastal development. Experts estimate that emissions from the degradation of mangroves can be as high as 10% of total emissions from deforestation globally, even though mangroves account for only 0.7% of tropical forest area.



2. **TIDAL MARSHES**

Tidal marshes are coastal wetlands with deep soils that are built through the accumulation of mineral sediment and organic material and then flooded with salty water brought in by the tides. Almost all of the carbon in tidal marsh ecosystems is found in the soil, which can be several meters deep. It is estimated that the average annual carbon sequestration rate for tidal marshes averages **between 6 to 8 Mg CO e/ha (Mg of CO equivalent per hectare)**. These rates are about two to four times greater than those observed in mature tropical forests.



Tidal marshes filter pollutants from land runoff and hence help maintain water quality in coastal areas. They provide critical habitat for many stages of the life cycle of important marine species, which is essential for healthy fisheries and coastal marine ecosystems. Tidal marshes also serve as a buffer to coastal communities, absorbing some energy from storms and floods and helping to prevent erosion. Tidal and freshwater marshes are being lost at a rate of 1-2% per year*. Major threats to tidal marsh ecosystems include draining for coastal development, conversion to agriculture, and rising sea levels.

3. SEAGRASSES

It is submerged flowering plants with deep roots that are found in meadows. Carbon accumulates in seagrasses over time and is stored almost entirely in the soils, which have been measured up to four meters deep. Although seagrasses account for less than 0.2% of the world's oceans, they sequester approximately 10% of the carbon buried in ocean sediment annually (27.4Tg of carbon per year). Per hectare, seagrasses can store up to twice as much carbon than terrestrial forests. The global seagrass ecosystem organic carbon pool could be as high as 19.9 billion metric tons. Seagrass meadows filter sediment and other nutrients from the water and are constantly building and securing sediment, which buffers coasts from erosion, storms and flooding. They are also important habitats for fisheries and flagship marine species, such as sea turtles and manatees.

Seagrasses are among the world's most threatened ecosystems, with annual global loss of around 1.5% and accelerating in recent decades. Globally, about 29% of Earth's seagrass ecosystems have been lost. Major threats to seagrasses include degradation of water quality due to poor land use, such as deforestation and dredging.

Seagrass from Mediterranean *Posidonia oceanica* is unusual in its ability to capture C. Its vertical growth dynamics and recalcitrant tissues produce a deep mat of plant debris that can extend many meters down into the sediment and persist for millennia, resulting in massive C storage, up to 40–410 kg C m^{-2}

Recently, a first attempt to compile global C data examined 946 distinct seagrass meadows across the globe. They estimated an average C in the top meter of seagrass soils at 2.5 wt % (median 1.8 wt %). Using the rough latest estimates of total area of the Earth covered by seagrass meadows (between 300,000 and 600,000 km), they come to a conservative estimate of a global stock from 4.2 to 8.4 Pg C for the top meter. A preliminary regional breakdown of the areal stock is also provided showing the highest areal stocks in the Mediterranean (372.4 Mg C ha ± 74.5, n=29; [13]) but no details on habitat or species stock distribution can be given because of data set limitations.

BLUE CARBON SINKS

Coastal ecosystems dominated by plants – such as mangroves, salt marshes, and seagrasses –play a critical role in the global sequestration of C that would otherwise remain as atmospheric CO_2 and exacerbate climate change (Chmura et al. 2003; Duarte et al. 2005a; Bouillon et al. 2008; Laffoley and Grimsditch 2009; Nellemann et al. 2009; Duarte et al. 2010; Kennedy et al. 2010). These ecosystems sequester C within their underlying sediments, within living biomass aboveground (leaves, stems, branches) and belowground (roots), and within non-living biomass (eg litter and dead wood). Blue carbon is sequestered over the short term (decennial) in biomass and over longer (millennial) time scales in sediments (Duarte et al. 2005a; Lo Iacono et al. 2008). The rate of sediment C sequestration and the size of the sediment C sink may therefore continue to increase over time (Chmura et al. 2003). For example, at the extreme end, the seagrass (*Posidonia oceanica*) meadows in Portlligat Bay, Spain, and mangrove (Rhizophora mangle) systems in Belize have accreted C-rich deposits >10 m thick and are over 6000 years old (McKee et al. 2007; Lo Iacono et al. 2008). The longevity of blue carbon sinks is impressive when compared with rainforests, which are reported to sequester C for decades or centuries at most (Chambers et al. 2001). Vegetated coastal ecosystems can sequester C from both internal and external sources, they represent a C sink for a larger area.

Blue Carbon and NDCs.

This policy brief examines the existing Intended Nationally Determined Contributions (INDCs) and ratified National Determined Contributions (NDCs) with regard to the inclusion of specific efforts addressing blue carbon ecosystems, namely mangroves, tidal saltmarshes and seagrasses, as climate mitigation or adaptation solutions.

151 countries contain at least one blue carbon ecosystem (seagrass, saltmarshes or mangroves) and 71 countries contain all three.

Inclusion in NDCs

• 28 countries' NDCs include a reference to coastal wetlands in terms of mitigation

• 59 countries include coastal ecosystems and the coastal zone into their adaptation strategies. This can be viewed as an opportunity to include relevant activities in blue carbon ecosystems (mangroves, saltmarshes and seagrasses) for mitigation ambitions, if relevant and as appropriate

Noting this, there is a significant opportunity to include and expand blue carbon ecosystems clearly into the mitigation section of future, revised NDCs of all coastal countries. Overall the climate mitigation opportunity of blue carbon ecosystems shows as:

If half of the annual coastal wetlands loss was halted, emissions would be reduced by a 0.23Gt CO_2 yr^{-1}. This is equivalent to offsetting the 2013 emissions of Spain.

If coastal wetlands were restored to their 1990 extent, it would have the potential to increase annual carbon sequestration 160Mt CO_2 yr^{-1} which is the equivalent to offsetting the burning of 77.4 million tonnes of coal.

CURRENT THREATS TO BLUE CARBON SINKS

Recent assessments suggest that about one-third of mangrove, seagrass, and salt marsh areas have already been lost over the past several decades as a result of reclamation, deforestation, engineering and urbanization, transformation to aquaculture ponds (Green and Short 2003; Duarte et al. 2005b; Silliman et al. 2009), and climate change (Woodroffe 1995; Björk et al. 2008). Coastal eutrophication, siltation, and development have led to seagrass decline (Duarte 2002; Green and Short 2003; Duarte et al. 2005b; Waycott et al. 2009), and mangroves and salt marshes have been damaged by dredging, filling, dyking, drainage, trophic cascades, and invasive species (Valiela et al. 2001; Alongi 2002; Silliman et al. 2005; Silliman et al. 2009). Sea-level rise can erode and flood mangroves and salt marshes (Woodroffe 1995; Silliman et al. 2009), and increase water depths above existing sea grass Currently, blue carbon sinks lose between ~0.7–7% of their area annually (Costanza et al. 1997; Valiela et al. 2001; Alongi 2002; Duarte et al. 2005a; Bridgham et al. 2006; FAO 2007; Duarte et al. 2008; Waycott et al. 2009; Spalding et al. 2010). While the global average annual loss of mangroves has slowed from 1.04% in the 1980s to 0.66% in the 5 years before 2005 (Spalding et al. 2010), seagrass loss rates have accelerated over the past several decades, from 0.9% per year before 1940 to 7% per year since 1990 (Waycott et al. 2009). Such losses reduce their capacity for C storage and have serious implications for human populations that depend on these ecosystems for food, livelihoods, and coastal protection.

When mangroves are converted to aquaculture ponds, C is released back to the atmosphere as a result of both the removal of the forest and, more importantly, the perturbation (and oxidation) of mangrove sediments during pond construction. A recent study (Donato et al. 2011) explored C emissions resulting from mangrove deforestation and land-use change, and estimated that global emissions would be in the range of 0.01–0.12 petagrams C yr^{-1}.

Prolonged eutrophication has led to major seagrass dieoffs. Seagrass roots and rhizomes stabilize sediments, so that such die-offs can result in erosion and release of buried C. Increases in nutrients may reduce the plants' need for extensive roots, and so decrease belowground C allocation. For example, nutrient enrichment in coastal salt marshes in Massachusetts resulted in reductions in root and rhizome biomass and C accumulation (Turner et al. 2009). Similarly, nutrient enrichment of a coastal marsh in South Carolina resulted in a loss of 40 g C m−2 yr^{-1} of soil C (Morris and Bradley 1999).

References

1. Le Quere, C. et al. Trends in the sources and sinks of carbon dioxide.

Nature Geosci. 2, 831–836 (2009).

2. Agrawal, A., Nepstad, D. & Chhatre, A. Reducing emissions from

deforestation and forest degradation. Annu. Rev. Environ. Resour.

36, 373–396 (2011).

3. Duarte, C. M., Middelburg, J. &Caraco, N. Major role of marine vegetation on

the oceanic carbon cycle. Biogeosciences 2, 1–8 (2005).

4. Nellemann, C. et al. Blue Carbon: A Rapid Response Assessment

(United Nations Environment Programme, 2009).

5. McLeod, E. et al. A blueprint for blue carbon: Towards an improved

understanding of the role of vegetated coastal habitats in sequestering CO2.

Front. Ecol. Environ. 9, 552–560 (2011).

6. Jones, H. P., Hole, D. G. &Zavaleta, E. S. Harnessing nature to help people

adapt to climate change. Nature Clim. Change 2, 504–509 (2012).

7. http://www.ramsar.org

8. Waycott, M. et al. Accelerating loss of seagrasses across the globe threatens

coastal ecosystems. Proc. Natl Acad. Sci. USA 106, 12377–12381 (2009).

More Reference can be provided on request.

Shrimp Hemocyte Iridescent Virus (SHIV): An Emerging Potential Threat to the Shrimp Aquaculture Industry

David Waikhom[1], Soibam Ngasotter[1], Laishram Soniya Devi[2]
[1]College of Fisheries, Central Agricultural University (Imphal), Lembucherra, Tripura – 799 210, India.
[2]ICAR-Central Institute of Fisheries Education (CIFE), Mumbai – 400 061, India.
Email: davidwaikhom3@gmail.com

Introduction

Aquaculture is one of the fastest food-producing sectors in the world, which accounts for 46% of the total fish production (FAO 2020). It is the primary source of animal protein for billions of people Worldwide, where capture fishery and aquaculture serves the livelihoods of more than 10% of the global population (Ngasotteret *al.*, 2020). The target of more production in aquaculture needs more intensive farming methods with extreme stocking density and other inputs, which ultimately leads to stress in the cultured system. Due to intense intervention of the farming practices, many viral diseases have emerged in the shrimp aquaculture industry, including White spot syndrome virus (WSSV), Yellow head virus (YHV), Infectious myonecrosis virus (IMNV),etc. Recently,a new emerging virus, known as Shrimp HemocyteIridescent Virus (SHIV) belonging to the family Iridoviridae, has been isolated in China, which cancause high mortalities in white leg shrimp (*Penaeus vannamei*) and other shrimp species. The virus is also capable of infecting freshwater prawn (*Macrobrachium rosenbergii*).

SHIV

Shrimp hemocyte iridescent virus (SHIV) is an emerging virus that hasa huge potential threat to the shrimp aquaculture industry. It is a typical icosahedral structure with a mean diameter of about 150 nm belong to the family Iridoviridae and within the subfamily Betairidovirinae. In March 2019, the Executive committee of the International Committee on Taxonomy of Viruses (ICTV) approved the proposal made by Chinchar*et al.* (2018)that a new species of Decapod iridescent virus 1 (DIV1) in a new genus *Decapodiridovirus* to include SHIV as a strain. To date, DIV1 has been detected in farmed *P. vannamei, P. chinensis, P. japonicus, Cheraxquadricarinatus, Procambarusclarkii, Macrobrachium nipponense*, and *M. rosenbergii* in China since 2014, indicating that DIV1 is a new threat to the shrimp farming industry.Qiu*et al.* identified an iridescent virus named shrimp hemocyte iridescent virus (SHIV), which was isolated from farmed *Penaeus vannamei* in 2014 and also detected in *P. chinensis* and *Macrobrachium rosenbergii*.

Clinical Signs

The affected fish exhibit clinical signs such as slight loss of colour on the surface, anorexia (animal stop feeding), softshell, mutilated antennae, empty stomach and gut, whitish to yellowish head of carapace due to pale hepatopancreas, slightly reddish body in 1/3rd of the infected shrimps in *P. vannamei*(Fig. 1). Other signs include loss of swimming ability and sinking to the pond bottom, distinct white triangle area under the carapace at the base of rostrum, white head and yellow gills, atrophy (shrinkage) of hepatopancreas with fading of colour (yellowing), slightly whitish muscle and mutilated antennae are remarkably observed in affected *Macrobrachium rosenbergii*. The cumulative mortality of SHIV has reached over 80%.

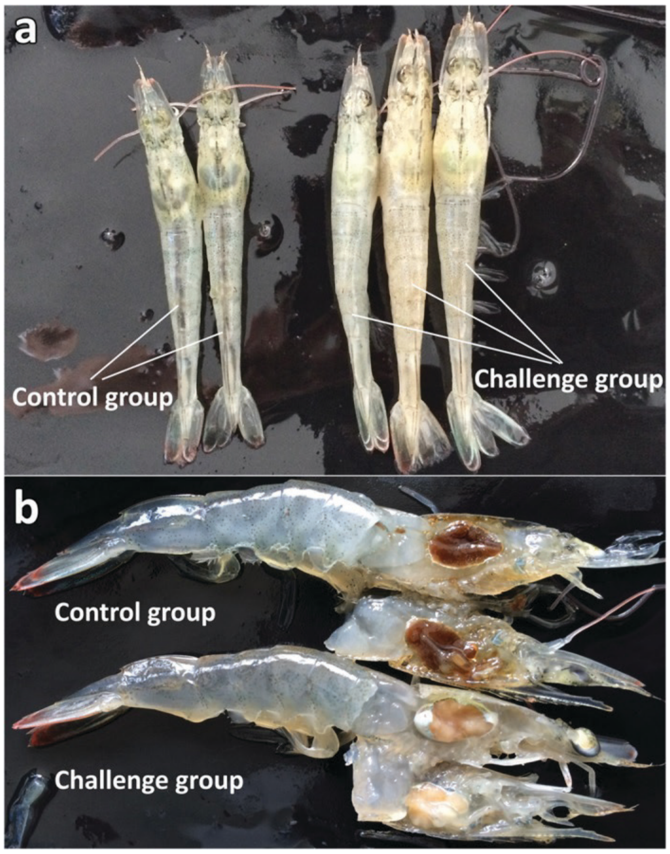


Fig.1. *Clinical signs of* P. vannamei *challenged with the potential iridescent virus compared with those of the control group: (a) External appearance of the shrimp (b) Section of hepatopancreas(Source: Qiu*et al.*, 2017).*

Host Species

So far, SHIV is found to be prevalent inPacific white shrimp, Australian red claw crayfish, giant freshwater prawn, Oriental river prawn, and red swamp crayfish. Also, other known susceptible or carrier hosts include Chinese white shrimp, Japanese tiger shrimp, Superb freshwater shrimp, Ridgetail white prawn, and water fleas. This indicates abroad host range of SHIV.

Target Tissues and Histopathology

The target tissues that can be infected by SHIV includehematopoietic tissue, hemocytes in the following tissue/organs such as gill, hepatopancreas, pereiopods, uropods, pleopods, and muscle.

Histological examination showed that dark eosinophilic inclusions bodies mixed with basophilic tiny staining and shrunken or condensed cell nuclei in the hematopoietic tissue andhemocytes in gills, hepatopancreas, and pereiopods (Qiu*et al.*, 2017).

Geographical Distribution and Spread of the Disease

SHIV is one of the emerging diseases of crustacean, particularly in shrimp. It was first reported in China, and so far, it is currently distributed only in China and Vietnam. However, as per the NACA (2019) report, captured broodstock-size specimens of *Penaeus monodon* from international waters of the Indian Ocean were found to be PCR positive for DIV1.

How Does SHIV Transmit?

Generally, there are two types of disease transmission viz., horizontal and vertical transmission. The horizontal disease transmission is spread/transmitted from one animal to another by direct contact via a medium such as infected feces, fomite or any farm input,etc. In contrast, vertical transmission is the spreading of disease from parent to offspring. In the case of SHIV, the disease is spreading by cannibalism of diseased shrimp or through contact with infected feces indicating only horizontal transmission occurs.

A Threat to Indian Shrimp Farming

SHIV is considered to be a potential threat to Indian shrimp farming due to the following reasons:

1. SHIV infects all stages of farmed shrimps, *P. vannamei,* such as post-larvae, juveniles, and adults.
2. It has a wide host range
3. High infection rate and lethality of the virus
4. Since the initial report of SHIV in 2014 in Zhejiang Province, a targeted surveillance study has shown that the virus is found in 10 other provinces of China, indicating the spread of the virus.
5. Another country in South East Asia, i.e., Vietnam, also recently reported it.
6. DIV1 is reported from wild-collected *P. monodon* from the Indian Ocean.

How to Prevent Disease Outbreaks?

"An ounce of prevention is better than a pound of cure". It implies that prevention is always better than cure from the infection. Some of the following preventive measures that can be taken up to avoid the outbreak from diseases, including SHIV are:

1. Screening of imported brood-stock like *P. vannamei*
2. Screening of all aquaculture inputs having the potential to carry the virus such as seed and live feed
3. Proper biosecurity protocols at the farm levels
4. Screening of cohabiting fauna for the potential carriers of the disease
5. Active farm level surveillance

Conclusion

High demand for food due to the increasing population make more production in food-producing sectors. Aquaculture contribution in this sector is tremendous by adopting high stocking density intensive farming, particularly the shrimp aquaculture industry, which has potentially high-value food. As a result, new emerging diseasesare being reported. Therefore, proper aquaculture practice in shrimp farms should be followed to avoid the outbreak of disease, including SHIV, that hasa potentiallymassive loss to shrimp aquaculture.

References can be provided on request.

Soil Salinization: Major Causes and Management Measures

DettyNebu., Monica K.S., Jayashri Mahadev Swamy., Ganapathi Naik. M
Department of Aquaculture, College of Fisheries, Mangaluru 575 002.
Email: dettynebudevi@gmail.com

Introduction
Soil salinization is a global and dynamic problem and is expected to get worse in future under climate change scenarios, including sea level rise and its effects on coastal areas, rise in temperature and increase in evaporation etc. Soil salinity is a measure of the salt concentration in the soil and is usually expressed as electrical conductivity (EC). Soil salinization is a process by which the salt content of the soil increases to a level that has an adverse impact on agricultural productivity, environmental health, as well as economics and quality of life. It combines a number of processes, including ion exchange, salt transport, salt precipitation, and salt dissolution. Out of 932.2 million ha salt-affected soils worldwide, the extent of human-induced salinization is 76.6 million ha (Shahid *et al.*, 2018). Saline soil naturally occurs in arid and semi-arid areas when evaporation rates are high and there are few freshwater sources to wash away the excess salts from the soil.

Highlight Points

Soil salinization is a serious problem challenging food security in India. It is a global issue of serious concern as it reduces the potential productivity and use of land and water resources. Soil salinization may occur through both natural and anthropogenic reasons. Reclamation and management of saline soil includes technologies like sub surface drainage, adding particular amendments, using alternate agricultural options such as cultivation of salt tolerant crops, saline aquaculture etc.

India's total salt affected area is around 6.74 m ha of which 3.79 m ha sodic, 2.95 m ha saline and 1.25 m ha is coastal saline (18.5%). Saline soils occupy 44% area covering 12 states and one Union Territory, while sodic soils occupy 47% area in 11 states. Salinity is an acute problem in the coastal States of Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Odisha, West Bengal etc. Nearly 75% of salt-affected soils in the country exist in the states of Gujarat (2.23 million ha), Uttar Pradesh (1.37 million ha), Maharashtra (0.61 million ha), West Bengal (0.44 million ha), and Rajasthan (0.38 million ha) (Mandal *et al.*, 2018).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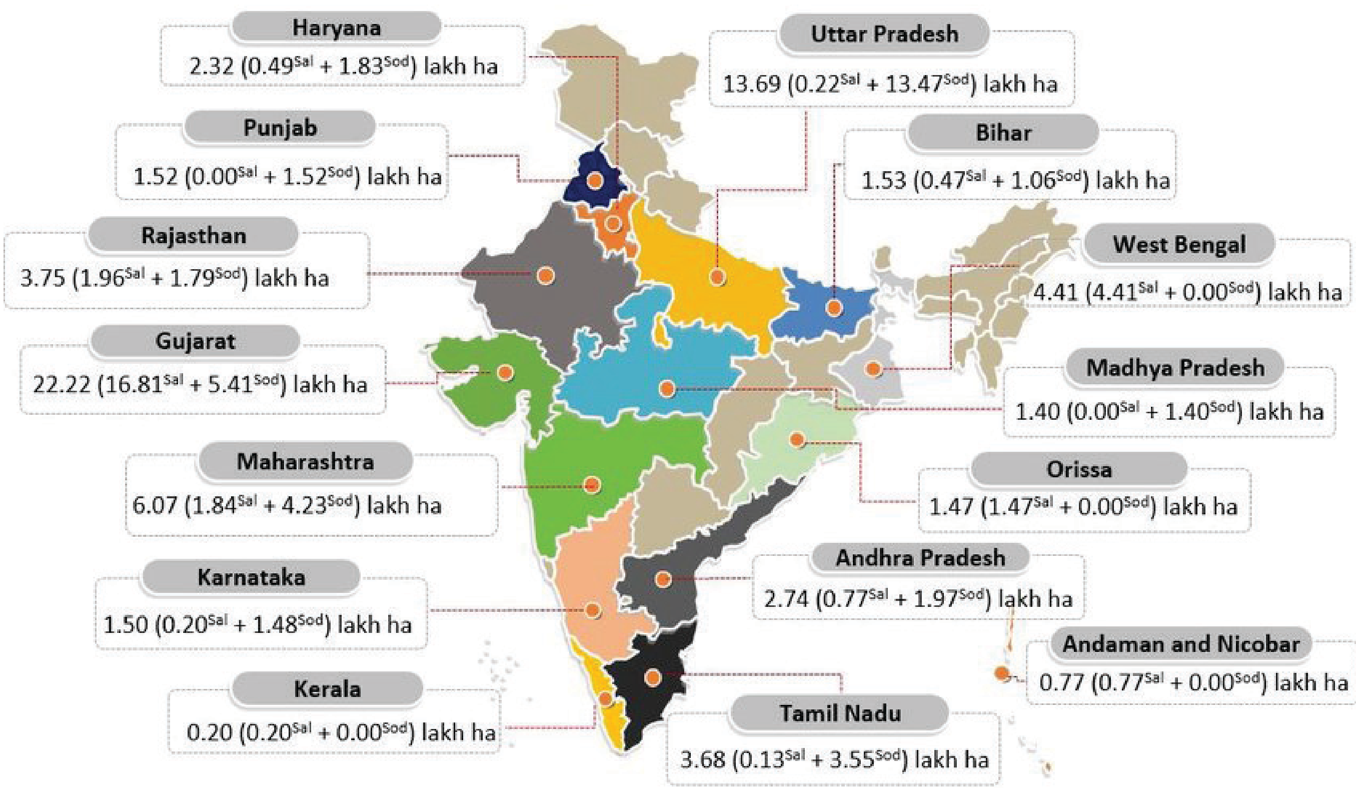
Types of salinization

1. **Saline soils ("white alkali")**: soils containing calcium and magnesium more than sodium as predominant exchangeable cations and sulfate, chloride, and nitrate are the predominant anions. White color due to white crust of salts on the surface. Mostly found in arid or semi-arid regions where less rainfall and high evaporation rates tend to concentrate the salts in soils.
2. **Sodic soils ("alkali soils," or "solonetz")**: soils high in exchangeable sodium compared to calcium and magnesium; sodium carbonate and sodium bicarbonate are the predominant salts. Sodic soils are confined in the Indo-Gangetic plains, arid and semi-arid region of western and central India, and Peninsular region in the southern India.



Adverse impacts

- Transforming fertile and productive lands into barren and deserts.
- Shrinkage of agricultural lands has serious implications for agricultural productivity and quality.
- Salinity affects plant development including germination, vegetative growth, and reproductive development. It also causes osmotic and nutrient stress in plants.
- Altering the biological and physical characteristics of the soil such as low water and air permeability, high runoff, low water holding capacity, surface crusting, and hard setting.
- Affect biodiversity, water quality, supply of water for critical human needs and industry.
- Limits the choice of cultivable crops.
- Damages existing infrastructure, farm machinery, waterways, roads etc.
- Farmers are forced to shift their livelihood and related social constraints like low economic returns, and poor quality of life.

Reasons of Soil salinization

Soil salinization may occur through both natural and anthropogenic reasons.

1. Natural processes of soil salinization (primary salinization)

Weathering of parent material: During the process of weathering of rock minerals or sediments with high salt content, salts are released and made soluble. Salinization occurs in dry places due to low levels of natural precipitation, leaching, and high rates of evaporation; in low-lying areas, it is facilitated by a high groundwater table and locked topography.

Fossil salts: The fossil salt deposits (eg: marine and lacustrine deposits) are also responsible for salinization. Fossil salts can be dissolved under water storage or water transmission structures causing salinization.

Salinization in coastal lands: The ingression of sea-water along the coast increases salt contents in coastal areas. The salt-laden winds and sea sprays carry oceanic salts and cause salinization in coastal areas. The coastal regions are also exposed to the risk of progressive salinization of land due to processes like storms, cyclones, tidal surges, flooding etc.

Transport of salts in rivers: The salts brought down from the upstream by rivers to the plains and their deposition along with alluvial materials cause salinization.

2. Anthropogenic reasons of soil salinization (secondary salinization)

Land clearing for cultivation: Replacement of perennial vegetation with annual crops, may result into soil salinization due to saline seepage process. Change of land use from natural forest vegetation to annual food crops decreases evapo transpiration and increases leaching.

Incorrect irrigation: Indiscriminate use of brackish and saline irrigation water, poor drainage conditions, rising water tables etc, lead to secondary salinization of land and water resources. In the absence of effective soil-water-crop management techniques, salinization may result from irrigation with even high-quality water over time.

Over extraction of groundwater: It brings salts to soil surface where they get precipitated when water evaporates

Canal water seepage: Introduction of the canal irrigation projects without proper provision of drainage has led to wide spread salinity in the country. Continuous seepage from the canals has resulted into rise in water tables and subsequent upward flux of salts to the surface, water-logging and soil salinization.

Anthropogenic reasons of soil salinization

Eg: Tungabhardra in Karnataka; Indira Gandhi Nahar Pariyojana (IGNP), Chambal and Tawa in Rajasthan and Madhya Pradesh; and Mahi and Ukai in Gujarat.

Influence of brackish water aquaculture: Conversionof agricultural lands to brackish water fish or shrimp farming has been a major threat to the coastal agriculture in tropical countries. The introduction and storage of saline water in the aquaculture farm influence salinity of soil in adjacent agricultural fields due to seepage.A buffer of 60 m around aquaculture was suggested to protect such salinization of soil (Khan *et al*, 2000)

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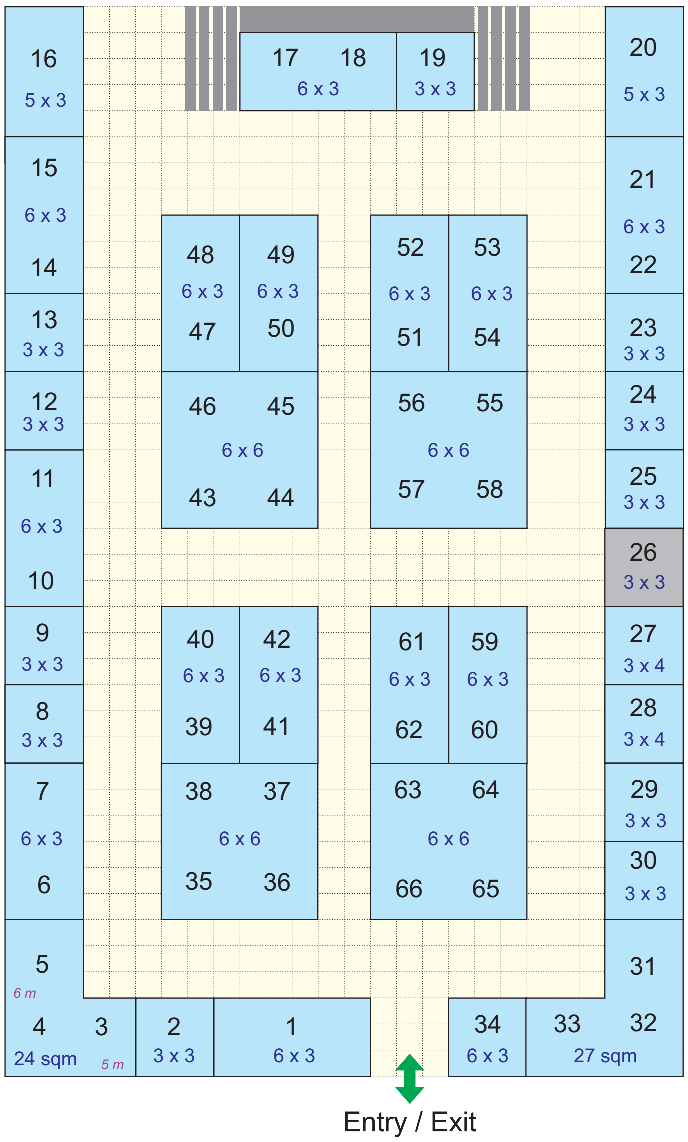

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Over-use of agro-chemicals: Over-use of chemical fertilizers and soil amendments (lime and gypsum) may also lead to soil salinization

Reclamation and management of saline soils

Not all soils that has been damaged by salt can be practically and profitably recovered. While it is possible to partially restore alkali and sodic soils by adding particular amendments and managing them thereafter but black soils and soils affected by coastal saltwater cannot be totally reclaimed.

There may be two approaches to tackle problem of soil salinity. One to reclaim salt-affected soils and other to manage salt-affected soils as they exist, i.e., without reclamation, using alternate suitable agricultural options such as cultivation of salt tolerant crops, saline aquaculture etc.

Salt leaching: Done by ponded fresh water or sub-surface drainage. Irrigation management are some of the effective intervention to tackle the problems of water-logging and soil salinity

Chemical amendments: Soluble calcium sources (e.g., gypsum, calcium chloride) and acids or acid formers are used as amendments for reclaiming sodic soils. Gypsum followed by pyrites has emerged as the most preferred and acceptable chemical amendment for sodic soils in India due to their easy availability and low cost.

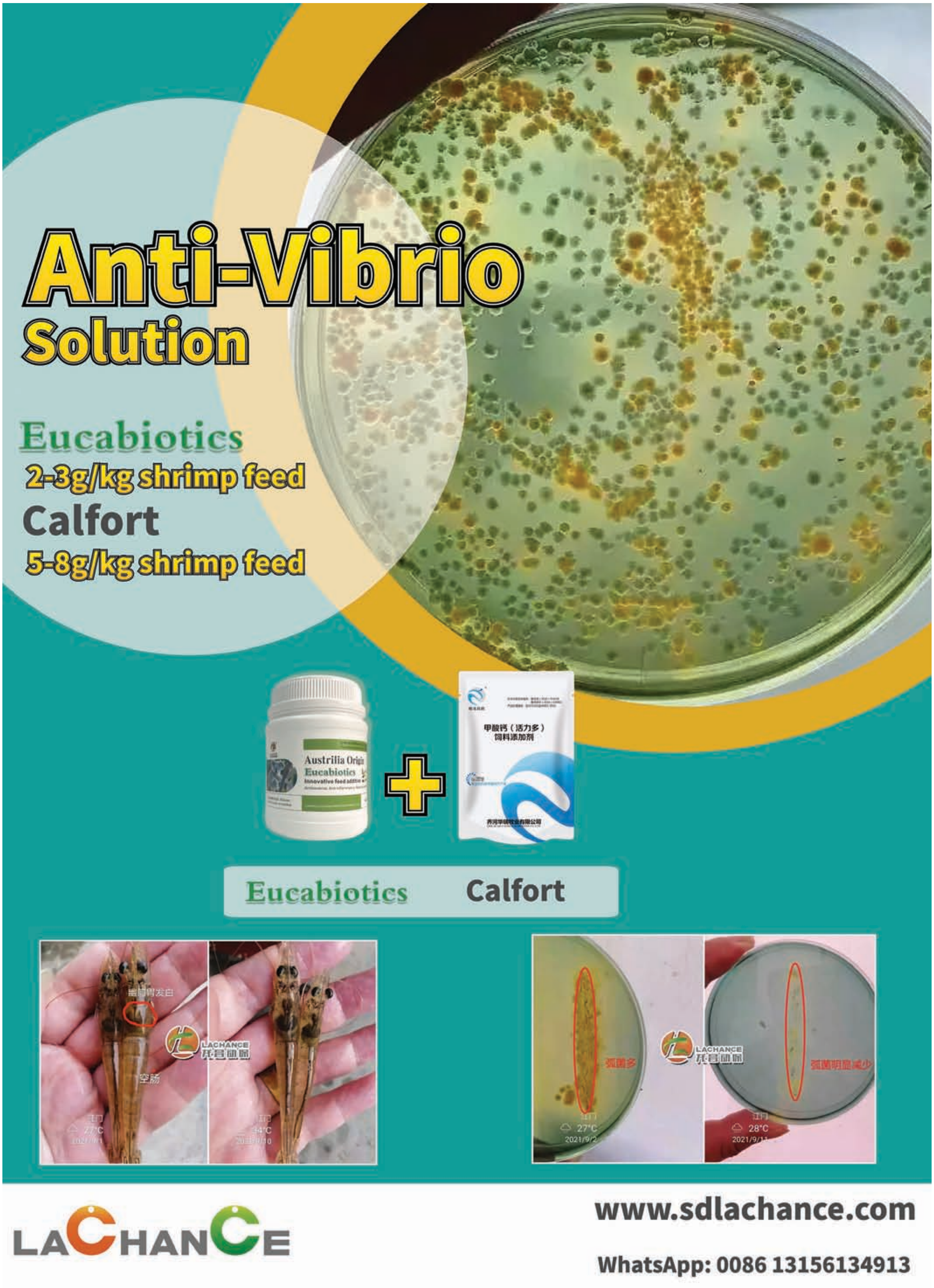
Phytoremediation: Growing of salt tolerant trees, shrubs, and grasses is a cost-effective and environmental-friendly way of restoring salt-affected soils. Phyto-accumulation, also known as phyto-extraction, is the process by which plants remove excess salts from soil through root absorption and store them in their biomass. It lowers the amounts of soluble salts and exchangeable sodium in soil. Additionally, they increase soil organic carbon and nutrient content, which gradually enhances the physical, chemical, and biological (microbial population) characteristics of soils as well as total soil productivity

Bioremediation: The method of bio-remediation, which integrates plant and microbial interactions. The ability of microbes to quickly adapt to environmental changes and deterioration makes them valuable contributors to the sustainability and upkeep of any ecosystem. Microorganisms have a number of distinctive traits, including the ability to withstand salt stress, genetic diversity, the ability to synthesise suitable solutes, the ability to produce hormones that promote plant growth, the capacity for biocontrol, and interactions with agricultural plants. In a salt-stressed environment, rhizosphere microorganisms may help plants grow and produce more.

Halophilic bacteria have the potential to remove sodium ions from soil and increase metabolic and enzymatic activities in plants. The bacterial inoculation improved soil properties by decreasing soil p^H.A low-cost microbial bio-formulation "CSR-BIO," a consortium of Bacillus and Trichoderma spp. This bio-formulation acts as a soil conditioner and nutrient mobilizer and has been found to increase the productivity

Cultivation of salt tolerant crops: This technique is viable and cost effective and suits well to the small and marginal farmers. Salt tolerant varieties of rice, wheat, mustard, and other crops, grasses, shrubs, fruit trees, and medicinal and aromatic plants have been developed/identified for commercial cultivation in salt-affected soils. Tissue culture techniques find usefulness in developing suitable salt-tolerant trees and crops of high economic value.

Saline aquaculture: Inland saline aquaculture is being commercially practiced in many saline tracts of Australia, Israel and USA. This knowledge was used in India also to make the saline water-flooded soils profitable. The experience in many parts of south-western Haryana and Punjab have shown that the degraded soil and water resources could be put to profitable use by shrimp and fish farming (Purushothamanet *al.*, 2014).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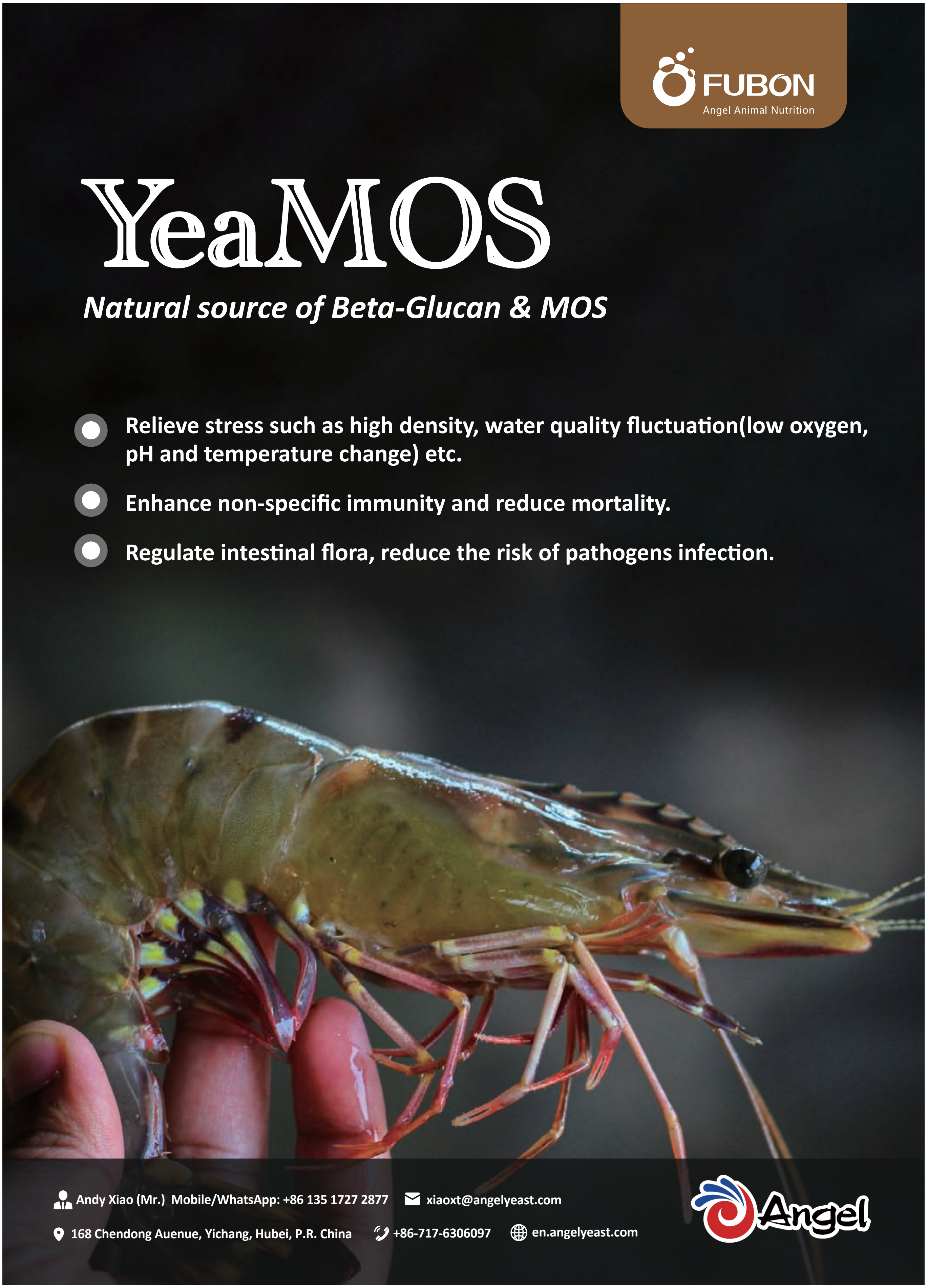
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