



KERALA UNIVERSITY OF FISHERIES AND OCEAN STUDIES
KUFOS

PANANGAD, KOCHI



DIRECTORATE OF EXTENSION
REPORT ON THE EXTENSION ACTIVITIES OF
THE DIRECTORATE OF EXTENSION
(2022-23)

Funded by Government of Kerala

Prepared by
Prof.(Dr.) Daisy.C.Kappen,
Director of Extension

Kerala University of Fisheries and Ocean Studies (KUFOS), Panangad, Kochi-682506



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Acknowledgement

This report is an outcome of the 15 extension projects implemented by Directorate of Extension, Kerala University of Fisheries and Ocean Studies (KUFOS) during the year 2022-23. These projects are funded by Government of Kerala. The project team wishes to place on record its deep sense of gratitude to the honourable Vice-Chancellor of KUFOS, Prof.(Dr.) K Riji John for his constant support and suggestions regarding the implementation of these projects.

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1. Introduction

Extension, the vital link connecting the technological development with the production system, plays a crucial role in the development of the country. Transfer of technologies which is indispensable for the development in any sector can bring a multitude of advantages to the academic, industrial and social life as a whole. It will contribute to enhancing the quality of life and financial well-being of the individuals, which are essential for the economic growth of the country.

Fisheries sector has witnessed tremendous developments both in aquaculture and capture fisheries. Introduction of mechanization in the marine fisheries sector in the early fifties coupled with the use of advanced techniques in aquaculture sector revolutionised fish production scenario of the State. Efforts were made to disseminate the technologies with the objective of augmenting fish production, creating gainful employment, ensuring food and nutritional security, creating awareness on conservation of fishery resources etc. But it has not yet reached the desired extent as envisioned. Though so many institutions, -State/Central/NGO's- are engaged in the transfer of various technologies aimed at the development and welfare of the fish farmers and fisherfolk, fisheries sector continues to be one of the most backward areas. Lack of awareness about various welfare schemes implemented by State/Central Government agencies still continues to be a major barrier in availing of the benefits from different agencies, hindering their socio-economic development to a great extent. One of the remedies is to strengthen the extension services to the community. Taking into account these aspects, Kerala University of Fisheries and Ocean Studies (KUFOS) has implemented various extension projects aimed at the total development of the fisheries sector. These projects have helped in creating mass awareness about the various technologies in the field of fisheries, augmenting fish production and protein supply to the community by adopting innovative aquaculture practices in an eco-friendly and sustainable manner, creating more employment opportunities in the concerned field, leading to an increase in their income and improvement in the quality of life and ensuring livelihood security to them.

2. Extension Projects

Directorate of Extension, Kerala University of Fisheries and Ocean Studies (KUFOS) implemented the following Plan Projects funded by Government of Kerala during the year 2022-23.

I. Village adoption for enhancing the fish production and creating employment opportunities to the fish farmers and fisherfolk in Kerala

Kerala University of Fisheries and Ocean Studies (KUFOS) is implementing the plan project "Village adoption for enhancing the fish production and creating employment opportunities to the fish farmers and fisherfolk in Kerala" from the year 2015 onwards. The major objective of this project is boosting diversified aquaculture practices and allied activities in an eco-friendly and sustainable manner so as to increase the fish production of the State, creating more employment opportunities to fish farmers and fisher folk, thus ensuring livelihood security to them. The programmes conducted under this project during the year 2022-23 are as follows:

Field Visit at Mathilakam Block Panchayath

The activities of the project were initiated by conducting a field visit to Mathilakam Block in Thrissur District on 25/05/2022 based on the request by the Mathilakam Block Panchayath members Sri. R. K. Baby and K A Hafsal. Members from KUFOS, Dr.Gijo Ittoop, Asst. Professor (PI of Village Adoption Project), Sri. Saneer N.S, Fishing Technology Assistant and Sri Renjith.R, Field Assistant visited the proposed sites so as to know the possibilities of promoting cage aquaculture of commercially important fishes in Canoli canal of Mathilakam block Panchayath. After the field visit a meeting was organized with the Block Panchayat and decided to conduct a workshop on the proposed activities such as cage aquaculture, pen culture and biofloc culture at Mathilakam Block Panchayath for the prospective farmers.

Field Visit at Mathilakam Block Panchayath



One-day awareness programme at Mathilakam Block Panchayath

One-day awareness programme conducted on July 8th, 2022, at Mathilakam Block Panchayat hall was inaugurated by Smt. C. K. Girija, President, Mathilakam Block Panchayat. In all Twenty-five farmers and members of the Block Panchayath attended the programme. Dr.GijoIttoop (Asst. Professor) Shri. Saneer N.S. Fishing Technology Assistant and Sri. Arun Das engaged classes on Cage aquaculture, Pen Culture and Biofloc farming respectively. A field visit was also organised as part of the one-day awareness programme to the cage aquaculture unit at Puthenvelikkara and Vannamei biofloc culture unit at Kodungalloor and a survey was conducted by distributing questionnaires to find out prospective farmers for establishing demonstration units in the Panchayath.

Sri.Saneer N S engaging a session on cage culture



Sri. Arun Das engaging a session on Biofloc farming



Field Visit



Initiation of cage aquaculture

From the participants of the awareness programme, three farmers who had shown keen interest in the cage aquaculture were selected to form a beneficiary group for establishing the demonstration unit. Water quality parameters of the proposed site were tested and found ideal for the installation of the cage culture units. A demonstration unit consisting of 6 cages was installed in Anapuzha, Kodungalloor Municipality of Thrissur District, and stocked with Seabass and Etroplus seeds. All the activities were undertaken with the cooperation and participation of the Panchayath which are essential for the successful implementation of the project. Periodic checking and monitoring of the water quality parameters, growth assessment etc, were carried out for ensuring better growth rate and survival of the stocked fishes.

Cage aquaculture unit established at Anapuzha, Kodungalloor Municipality



Semi-RAS-Biofloc Culture of Vannamei at KUFOS

Semi-RAS-Biofloc culture of Vannamei was initiated at KUFOS on July 18th, 2022 in 10000 litre water. Imhoff reading, pH and ammonia readings were taken every day. When the Imhoff reading exceeded 8-10 cm, the circulatory system with settlement tank was operated. When pH was low, sodium bicarbonate was added at the rate of 250g/10000L. When ammonia increases, probiotics (50g Bactoforce with 1Kg sugar in 10L water fermented overnight) were added. Salinity was maintained at 15 ppt using 35 kg Aquamin plus 125 kg rock salt for 10000L water. Freshwater was added to compensate for evaporation. Stocking was done with 2500 nos of Vannamei seeds from Saphthagiri hatchery, Andhra Pradesh. After five months of stocking, harvesting was done on December 5th 2022. Feeding (Growell Nutriva number 1, 2, 3, 4) was done at the rate of 4-6% body weight in 4 rations initially and 2 times in the last 2 months. All the cultured shrimp was found to be healthy. No mortality was reported. The average size of shrimp was between 25-35 gm.

Semi-RAS-Biofloc Culture of Vannamei at KUFOS



Training on “Seed production and culture techniques of Snakeheads”

As part of the project, a four-day training programme on "Seed production and culture techniques of Snakeheads" was organized by the Directorate of Extension in association with Faculty of Fisheries Science at Kerala University of Fisheries and Ocean Studies, Panagad Kochi, Kerala from 18th to 21st October 2022. The programme was inaugurated by the honourable Vice Chancellor, KUFOS, Dr. K. Riji John in the presence of Director of Extension, Dr. Daisy C Kappan and other faculties. The main objective of the training program was to create awareness and developing skill and confidence among the farmers to venture into the culture of snakeheads which has enormous potential in Kerala, on account of its high demand in the local markets. Altogether 27 farmers and interested students of KUFOS were given hands on training. During these four-day training programme, classes covering various topics on seed production and culture techniques of snakeheads were engaged by Dr. Anwar Ali P.H, and Dr. Binu Varghese Asst. Professors of the Faculty of Fisheries Science and Shri. Arun Das, consultant and entrepreneur, Business Incubation Centre, KUFOS. Sessions on basic principles of aquaculture, prospects and possibilities of snakehead culture, selection of snakehead brooders, hypophysation, demonstration classes on seed production of Pearl spot, various culture techniques of snakeheads such as culture in silpaulin lined ponds, earthen ponds and in unused biofloc tanks with RAS (Recirculatory Aquaculture System), financial analysis, live feed culture, rearing of spawn, artificial feed preparation, weaning of fry for pelleted feed, value addition of products from snakeheads, health management in aquaculture, anti-microbial resistance and alternative strategies and Fish as a nutrient rich food included in the programme were engaged by experts in the respective fields. To attract more farmers and motivating them for adopting the technologies, officials from State Fisheries Department were invited for delivering a talk on the various schemes implementing by the Government of Kerala. The farmers were taken for a site visit to understand the farm infrastructure, hatcheries, and aquarium complex of KUFOS. A feedback from the participants at the end of the programme indicated that they are interested in the technology and confident in adopting various practices recommended for snakehead culture. The

Honourable Vice-Chancellor of KUFOS distributed certificates to the participants. A training manual on new trends in aquaculture named "Malsyakrishi-NoothanaSankethikaVidhyakal" was prepared and distributed to the participants of the programme.

Glimpses of the training programme.



Celebration of Radio Kisan Diwas

In accordance with request from All India Radio (AIR), Kochi, faculties from KUFOS took part in the one-day celebration of Radio Kisan Diwas in Chembu Grama Panchayath, Kottayam on 15/02/2023. The theme of the programme was agriculture for sustainable development at Chembu Grama Panchayath. As there was sufficient water supply in the village, they wanted to improve paddy and coconut cultivation, and introduce millet cultivation, and were interested in increasing fish production through aquaculture. Dr. Daisy C Kappen, Director of Extension, and Dr.Gijo Ittoop, PI of village adoption project explained various services offered by KUFOS in the aquaculture and allied sectors.



II. Earn While You Learn (EWYL)

The concept of this programme is to develop entrepreneurship among the students undergoing various courses in the University. Aquaculture and allied subjects dominate in their curriculum and a thorough hands-on exposure in the field will enable them to understand the basic concepts through a more practical oriented approach, to prepare them as capable professionals and turn them to job creators rather than job seekers. This programme, apart from giving practical exposure, will also enable them to be self-sufficient, confident and efficient managers. Kerala University of Fisheries and Ocean Studies (KUFOS) is implementing this project by utilizing the infrastructure facilities available in the University.

Earn While You Learn Programme-Guidelines

Preamble: Earn While You Learn programme is envisaged to strengthen the link between learning process and field-oriented farming practices. This will reinforce the instructional curricula discharge at class room on the one hand and 'lab to land' on the other. It will also help to improve the farming practices by getting innovative ideas from the students (land to lab). This mechanism will help the students to acquire professional competency in the field of fisheries and allied areas.

- Students of KUFOS will be entrusted with this programme, and it will be voluntary in nature. Participating students will be given certificate.
- Areas identified for Earn While You Learn Programme are:
 1. Aquaculture-mono/polyculture of variety species
 2. Integrated farming
 3. Cage/Penculture
 4. Ornamental Fish Culture
 5. Aquaponics
 6. Value addition
- The students will be grouped into batches of 10 each and each group can opt one of the above mentioned areas of activity.
- Sales will be through Amenity Centre, KUFOS.
- Service of labourers can be availed of during the period of the programme as per requirement.
- Sixty per cent of the profit generated through the programme shall be disbursed to the students.
- Remaining portion of the profit and input cost shall be refunded to the University.
- Periodic maintenance of the infrastructure facilities shall be done by the University.
- The programme will be jointly implemented by the Directorate of Extension and faculties concerned.
- There shall be a report authenticated by the monitoring committee.
- There shall be a stock register maintained by the faculty concerned, countersigned by the Deans of the respective school.
- The programme shall be monitored by a committee consisting of the Director of Extension as the chairperson and a faculty member as convener and one faculty nominated by the honorable Vice Chancellor. Dean of the faculty concerned shall be an Ex-Officio member.

Objectives :

1. To build capacity and to develop skill among the undergraduate students.
2. To create and enrich entrepreneurship capabilities.
3. To develop attitude for team work and dignity of labour.
4. To develop competitive marketing capabilities utilizing common amenity centre/sales counter.
5. Integrate of various production activities such as seafood processing, quality control, waste reduction, recycling and value addition.

1.Café@kufos '22 snack and beverage

The Earn While You Learn programme provides opportunities to the students to earn while they are learning through entrepreneurial projects, thus preparing them to shoulder professional assignments with the relative ease. The University provides its budding entrepreneurs with necessary guidance and resources to initiate and run their entrepreneurial ventures or promote entrepreneurship.

During the Year 2022-23, The Food Science and Technology Department under the School of Ocean Science and Technology initiated the Earn While Learn Programme, titled 'CAFE@KUFOS' with snacks and beverages sale on November 23rd & 24th, 2022, which was held together with "SWARAM" the arts fest of the university. Snacks including dates roll, gulab jamun, bread omlet, paani puri, popcorn and beverages were the main items prepared by the students and put up for sale opposite the main gate of the University. All the 29 students of M.Sc. Food Science and Technology (Batch 2022-2024) took an active part in organizing the sale. The team was divided into 5 committees: Stall, Marketing, Finance and Purchasing, Sales, Cleaning and Cooking.

The stall committee was responsible for setting up the stall opposite the main gate of the University. The stall was very well organised and had two different sections, one for issuing coupons, and the rest for the sale of different food items. The marketing committee prepared the posters, banners, invitation cards and decorating items. The committee gave good publicity and invited people for the fest personally as well as through the social media. The finance committee efficiently budgeted the programme and took care of the financial matters. The sales committee did a spectacular job at the sales with the help of the members from the cleaning committee. The cleaning committee also did an appreciable job in keeping the sales area and the working area neat and tidy. The cooking committee, the cornerstones of the programme, did an amazing work in preparing all the items hygienically and properly packing the items.

The Food Stall had snacks, drinks and pickled items. On the first day, November 23rd, the dates roll had a huge demand and sold for Rs.40 and gulab jamun for Rs.30 and different beverages like Honey ball crush, pineapple juice, butter milk and tea. The paani puri was a great hit among the students. On the second day, 24th November, different flavoured limes and teas were introduced and it there a huge sale. Combo offers were also available like pineapple juice and gulab jamun for Rs.40. The stall was a great success and gave the department recognition in the university. Everybody loved the food. As emphasis was given on quality of the product, the profit was less, but still appreciable. An amount of Rs.2058 was the profit from the programme.

Inauguration of the stall



The students relishing food



2. Culinary Fest

The Culinary fest organized by the Department of Food Science and Technology, titled 'SWAD' was conducted on 6th and 7th December, 2022 as part of 'Earn While You Learn' programme. Snacks, including Chicken and vegetable cutlets, Pazhampori, Flower pot, Sandwiches (veg and non-veg), Noodles cakes, Swiss rolls, etc. and refreshing juice items including Grape juice, Milk sarbath, Bubble tea, Mojito and Flavoured black tea, other products like Plum cake, Pickle, Cookies, Jam, Squashes (Orange, Hibiscus, Grape), Carrothalwa, Sipup, Saltedlubica, etc. were prepared and sold. The stall was arranged in the college campus near the canteen. The students of M.Sc. Food Science and Technology (Batch 2021-2023) took an active part in organising the EWYL programme. The students were divided into 5 committees: Stall, Marketing, Finance, Sales, Cleaning and Cooking.

Glimpses of the programme



3. Department of Fish Processing Technology, Faculty of Fisheries Science

The Fish Processing Technology Department under the Faculty of Fisheries Science initiated EWYL programme for the year 2022-2023. It was a great opportunity for the students to develop entrepreneurial development among themselves and helped to develop various skills among students and also to aid in leadership development, proper time management and, financial management. It also helped in improving the practical capability of students apart from their theory classes. Such an approach by the University will help budding entrepreneurs to come up with their business skills.

As part of Earn While You Learn programme students of BFSc 2019 batch students were divided into 3 groups and were given 3 miniprojects.

Project 1: Preparation of soup powder from *Ambassis spp.* (Glassy perchlet).

Glassy perchlet was procured as by catch from net. Fish was cleaned, gutted, dried and pulverized. Ingredients for the preparation of soup powder were purchased and each ingredient was dried and grounded separately. Soup powder mix was standardized and sensory analysis was done for the preparation of a standard fish soup powder mix.

Soup powder mix Fish soup



Project 2: Preparation of a marination mix for ready-to-fry Tuna fish.

Tuna fish was purchased from Chambakkara market. It was immediately cleaned and eviscerated and kept in freezer until use. Ingredients for marination were purchased and different marination mix was prepared and applied in fish at various concentration and sensory analysis was done to find out the acceptable perfect marination mix for tuna fish.



Project 3: Preparation of ready- to- fry dried marinated shrimp.

Shrimp was purchased from Chambakkara market and was beheaded and peeled. Ingredients for marination were purchased and mixed with shrimp in different concentrations and was standardized using sensory analysis. Marinated shrimp was dried in a dehydrator to prepare ready- to- fry dried marinated shrimp.



The work done by students will help in increasing the research capability of students in their future endeavours. This year, the programme was concentrated more on research work than on product

preparation and distribution. Three groups prepared the products very well and standardized them using sensory analysis. The team work of the students helped in the success of the EWYL programme during 2022-2023.

4.Aquaculture-earn while you learn programme

The programme was in a low phase due to continuous examinations and practical's of the B.F.Sc students. September onwards students have been engaging in Ornamental Fish and Aquatic Plants propagation programme. The repairing of tanks, procurement of fishes, aquatic plants, feed, accessories etc. are progressing.

III. Centre for Audio Video Recording and Transfer of Technologies in Fisheries

As part of the Plan Project "Centre for Audio Video Recording and Transfer of Technologies", a well-equipped Audio Video Recording Studio with all facilities both for audio and video recording started functioning during the year 2018. Currently, a Cameraman cum NLE Editor is working in this project . In addition to documenting the activities and achievements of the university in teaching, research and extension, instructional films in diversified aquaculture activities, production of value added fishery products etc. are also taken up for transferring the technologies to the fish farmers and fisherfolk along the coastal area. Ten DIY videos on preparation of Value-added fishery products has already been produced. Since the lack of adequate knowledge about the various technologies in the field of fisheries sector still acts as a major constraint in the wide-spread adoption various technologies, such an approach in communicating different technologies through Audio Visual aids to the target group will definitely help in disseminating the technologies at a faster rate, leading to augmentation of production from the fisheries sector, increasing the rate of adoption of practices etc. As per the decision of the Governing Council, Directorate of Extension is outsourcing the above facilities to various institutions and started creating income for the University. An amount of Rs.64,750/- (Sixty four thousand seven hundred and fifty only) was earned during the year 2022-23 by outsourcing the studio facilities. The following activities were carried out during the year 2022-23.

2022

APRIL

- Photography and Videography of campus visit of officials from US consulate Chennai on 01-04-2022.
- Photography of seminar and discussion on National Education Policy on 06-04-2022.
- Shooting of the preparation of value added product “fish ball” for Department of Fish Processing Technology, FFS, KUFOS on 07-04-2022.
- Photography of campus visit of Multi National guests on 21-04-2022.
- Discussion and submission of Biofloc technology Shooting script on 22-04-2022.
- Photography of campus visit by officials from State Fisheries Department on 25-04-2022.
- Photography of Research Council Meeting on 28-04-2022.**MAY**
- Photography of the training programme on “preparation of Value-Added fishery products” conducted by Department of Fish Processing Technology, Faculty of Fisheries Science, KUFOS from 17th to 19th May 2022.
- Video Recording of the talk by Dean Faculty of fisheries on 18th May 2022 for including University film.
- Video editing of University film from 12th to 17th May 2022.
- Video editing of the PG and PhD admission video promotion materials for social media platforms from 18th to 21st May 2022.
- Editing of recipes video on “preparation of fish ball and fish cutlet” arranged by the Department of Fish Processing from 17th to 23rd May 2022.
- Photography of campus visit of French delegates on 24th May 2022.

JUNE

- Photography of orientation programme of 2021 BFSC batch on 2nd June 2022.
- Videography and Photography of one day state level workshop on “Inland fisheries and aquaculture development in Kerala: vision 2025 & foundation stone laying of academic block of Faculty of Fisheries Science and Faculty of Fisheries Management, KUFOS” On 6th June 2022.
- Photography of “World Ocean Day Celebration 2022” Organized by Department of Marine Biosciences, Faculty of Ocean Science Technology, KUFOS on 8th June 2022.
- Videography and Photography of “Celebrating the International Yoga Day 2022” On 21st June 2022.
- Editing of International Yoga Day Video on 22nd June 2022.
- Video Recording of preparation of fish finger arranged by the Department of Fish Processing Technology for the production of videos on value added fish products - 23rd June 2022.
- Video Recording of preparation of squid rings arranged by the Department of Fish Processing Technology for the production of videos value added fish products on 28th June 2022.

JULY

- Photography of “Placement Readiness Enhancement Workshop” organized by Placement cell, Faculty of Fisheries Engineering on July 6th & 8th 2022.
- Photography of Two Day Training Programme on “Fisheries And Aquaculture For Kerala Grameen Bank Officers” Organized by Faculty of Fisheries Science and Directorate of Extension on 7th July 2022.
- Photography of one day seminar on “Aquaculture- New Technologies” organized by Directorate of Extension and Mathilakam Block Panchayath at Mathilakam Block Panchayath Hall on 8th July 2022.
- Photography of “Scuba Diving Workshop” Conducted by NCC Unit and Physical Education Department, KUFOS on 8th July 2022
- Photography of “National Fish Farmer's Day- One Day Training Programme on Emerging Aquaculture System and Practices” on 11th July 2022.
- Photography of “ Fulbright-Nehru Specialist Seminar on Agent Based Modelling of Larval Transport” and Training on “MIKE Hydrodynamic Modelling and Optimization of Estuarine & Costal Circulation Models” organized by Nansen Environmental Research Centre(India) on 12th & 15th July 2022.
- Photography of meeting with Kumbalam Panchayath President and ward members by Director of Extension to discuss about the implementation of the plan project “Karimeen Gramam” at Kumbalam Village on 20th July 2022.
- Photography of sent off programme of 2018 BFsc batch organized by Faculty of Fisheries on 22nd July 2022
- Photography of “World Mangrove Day 2022” organized by Centre for Climate Resilience and Environment Management at Puthuvypu on 25th July 2022.
- Photography of Seminar on “ WTO MC-12 Draft on Indian Fisheries Sector” organized by Pandit Karuppan Chair in association with Centre for Field Consultancy and Data Analysis under the Directorate of Extension on 26th July 2022.
- Video Recording of the selection of brooders at Western campus on 22nd July 2022 for producing film on “Fresh water fish farming”.
- Video Recording of preparation of fish burger on 27th July 2022 arranged by the Department of Fish Processing Technology for the production of videos on value added fish products.
- Photography of sent off programme of Dr. Sreenivasagopal on 29-07-2022 **AUGUST**
- Videography and Photography of 8th Convocation of KUFOS on 4th August 2022.
- Photography of “Comprehensive Development Plan for Chellanam” organized by KUFOS & Department of Fisheries, Govt. of Kerala on 5th August 2022.
- Photography of Campus Placement conducted in KUFOS on 5th August 2022.
- Photography of two day hands on training in “Fruit and Vegetable Processing” organized by Department of Food Science and Technology in collaboration with Business Incubation Centre, KUFOS on 5th & 6th of August 2022.
- Photography of one day workshop on “Fisheries and Ocean Based Extension in Kerala-Perspective and Possibilities” organized by Directorate of Extension on 6th August 2022.
- Sorting, Editing and E-mailing of degree certificate distribution photos of 8th convocation from 9th August to 25th August. 2022
- Videography and Photography of “Pitch Fest 1.0” organized by CASRED on 10th August 2022.

- Photography of Independence Day celebrations and flag hoisting on 15th August 2022.
- Video Editing of preparation of fish finger and fish burger arranged by the Department of Fish Processing Technology for the production of videos on value added fish products throughout the month of August 2022
- Audio and Video Recording of the MOOC course on Canning Technology by Dr. Abhilash Sasidharan on 19th, 20th, 22nd, 23rd and 26th August.
- Photography of Pookkala Mathsaram organized by staff club on 30th August.

SEPTEMBER

- Audio and Video Recording of the MOOC course on Canning Technology by Dr. Abhilash Sasidharan on 2nd September 2022
- Audio and Video Recording of the MOOC course on Food Packaging Technology by Dr. Maya Raman on 5th September 2022
- Video Editing of the MOOC course on Food Packaging Technology by Dr. Maya Raman on 6th & 12th September 2022.
- Video editing of the short film on Vannamei shrimp farming on 6th September & 14th September 2022.
- Audio and Video Recording of the MOOC course on Fish as Food by Dr. Maya Raman on 17th September 2022
- Video editing of short film on "Karimeen Krishi oru amukham" on 16th & 17th September 2022.
- Video Editing of the MOOC course on Fish as Food by Dr. Maya Raman from 19th to 30th September 2022.
- Video Recording of preparation of fish cutlet and fish fillet arranged by the Department of Fish Processing Technology for the production of videos on value added fish products on 15th September 2022
- Video Recording of Bio-floc Culture at Western Campus of KUFOS on 15th September 2022.
- Preparation of Shooting Script for the production film on "Fresh water fish farming" on 22nd & 23rd September 2022.
- Video Recording of fresh water fish farms at Malampuzha –Nelliampathy area on 24th & 25th September 2022 for the purpose of producing a documentary film on "Fresh water fish farming."
- Video recording of Bio-floc water quality testing process on 27th September 2022
- Video Recording of preparation of Shrimp fritters on 27th September 2022 arranged by the Department of Fish Processing Technology for the production of videos on value added fish products.
- Photography of aquarium visit by students and teachers of "The Freethinking School", Kakkanad. on 30th September 2022

OCTOBER

- Video Editing of the MOOC course on Food Packaging Technology by Dr. Maya Raman 6th & 7th October 2022.
- Video Editing of the MOOC course on Fish as Food by Dr. Maya Raman from 10th to 14th October 2022.
- Photography of "PM Kisan Samman Sammelan 2022" programme conducted at KUFOS Seminar hall on 17th October 2022
- Photography of four day training on "Varal Krishi" from 18th to 21st October 2022 organized by Directorate of Extension.



- Video Recording of preparation of Fish Biryani arranged by the Department of Fish Processing Technology for the production of videos on value added fish products on 26th October 2022.
- Photography of Anti-Drug programme organized by NSS KUFOS on 28th October 2022

NOVEMBER

- Photography of “Keralapiravi dhinam and Bharanabasha – Mathrubaksha Malayala dhinaghosham” jointly organized by Directorate of Extension and Staff club, KUFOS on 1st November 2022
- Photography of visit of the Guests from Nansen Centre India on 4th November 2022
- Photography of Department of Fisheries Extension, Economic & Statistics for creating the Department profile on 10th November 2022
- Photography of Workshop on “Anti-Microbial Resistance” organized by Faculty of Fisheries Science and Department of Aquatic Animal Health Management on 19th November 2022
- Photography of three day Training programme on “Paduthakulathile mathsy krishi” organized by Department of Extension from Nov 23rd to Nov 25th 2022.
- Photography of Arts Festival of KUFOS conducted by Students Union from 23rd to 25th November 2022.
- Photography of Constitution Day Pledge on 25th November 2022
- Photography of Talk on “India Mother of Democracy” as part of constitution day organized by Directorate of Extension on 28th November 2022

DECEMBER

- Photography of “Open day” celebrated at KUFOS campus as part of Agricultural Education Day on 3rd December 2022
- Photography of Language room/computer lab for creating department profile(AAHM) for the ICAR Accreditation on 5th December 2022.
- Photography of student's visit to KUFOS aquarium from different schools on 9th December 2022
- Photography of “ KUFOS Premier League Cricket tournament on 10th & 18th December 2022.
- Photography of Aquatic Animal Health Management labs for creating department profile on 19th December 2022
- Editing of MOOC video on Canning Technology from 5th to 31st December 2022.**2023**

2023

JANUARY

- Video Editing of preparation of fish cutlet and fish fillet arranged by the Department of Fish Processing Technology for the production of videos on value added fish products from 3rd to 10th January 2023.
- Photography of workshop on R software organized by Directorate of Research on 16th January 2023
- Video editing of preparation of Shrimp fritters arranged by the Department of Fish Processing Technology

for the production of videos on value added fish products from 17th to 21st January 2023.

- Photography of Seminar on "NAAC Accreditation and Planning for SSR Preparation" by Dr. Sajimon Abraham (Professor & IQAC member, MG University) organized by IQAC KUFOS on 25th January 2023
- Photography of Republic Day celebrations at KUFOS on 26th January 2023.
- Photography of retirement of Mini Joseph (Section Officer) on 31st January 2023.

FEBRUARY

- Photography of field visit and inspection at Anapuzha cage farming site by PI of village adoption project on 1st February 2023.
- Photography of Extension counsel meeting on 3rd February 2023.
- Video Recording of preparation of fish sausage arranged by the Department of Fish Processing Technology for the production of videos on value added fish products on 7th February 2023.
- Photography of orientation programme of 2022 BFSc batch on 8th February 2023.
- Photography of Anti Ragging Awareness class by Harikumar G (SI of Police) on 13th February 2023.
- Photography of Radio Kisan Divas 2023 jointly organized by AIR Kochi & Chembu Gramapanchayath in collaboration with KUFOS at Chembu on 15th February 2023.
- Photography of Guest Talk by Dr. George Iwama on 16th February 2023.
- Photography of "Skill Development Programme on Value Added Fish Products & Fish Feed Formulations" organized by Business Incubation Centre, KUFOS in collaboration with Department of Fish Processing Technology, Faculty of Fisheries Science, KUFOS on 16th February 2023.
- Photography of Scholarship distribution ceremony conducted by the Manappuram Foundation for the rank holders of MBA Batch on 22nd February 2023.
- Photography of Guest Talk by Dr. Dileep Vasudevan on 23rd February 2023.
- Photography of seminar on "Science for Society – Bio discovery from Coastal Oceans" by Dr. Punyasloke Bhadury (IISER, Kolkata) as part of National Science Day celebrations 2023 on 28th February 2023.

MARCH

- Video Editing of preparation of fish sausage arranged by the Department of Fish Processing Technology for the production of videos on value added fish products from 1st to 4th March 2023.
- Photography of Technical and Stakeholder Workshop on "Concepts and Misconcepts on Vembanadu Lake- A Way Forward" organized by CARMC, KUFOS on 18th & 19th March 2023.
- Photography of "FisHackathon- Fisheries Entrepreneurship Technology Event" organized by KUFOS Business Incubation Centre 29th February 2023.
- Photography of Evoque organized by Department of Business Administration and Management, Faculty of Fisheries Management, KUFOS on 30th March 2023.

IV. Farm Advisory Services

Introduction

An increase in fish production depends upon many factors namely, the expansion of the area under aquaculture, diversification of culture technologies and cultivable fish species and a system of information transfer from the research and development centres to the farming households. The prime objective of aquaculture or fisheries extension is to persuade and help aqua farmers and fishing communities to improve socio-economic condition and livelihood through their farming practices for increased fish production and income. Though a great deal of technology development and transfer has taken place in aquaculture, a broad network of extension system to reach the clientele at large is yet to be established. Effective extension services are required to support the existing farmers and the new entrants for effectively promoting equitable and sustainable development of aquaculture that will contribute to overall rural socio-economic life. Quick and large scale motivation of fish farming communities is essential to learn and use the technologies and mobilize essential materials and technical inputs at their doorsteps.

Lack of knowledge about the improved practices in aquaculture and allied sectors is one of the major constraints in the adoption of better management practices so as to increase the fish production of the State and ensuring better quality product for export. Creating due awareness on brackish water and marine aquaculture practices among local population and students will help to adopt the improved practices in aquaculture and allied activities in a sustainable manner which will help increasing the fish production, creating more employment opportunities and ensuring nutritional and livelihood security to them. Conducting capacity building programmes like training cum demonstration programmes, creating awareness through mass media on various aspects of aquaculture, harvest and post harvest technologies will ultimately increase their level of knowledge and skill among the farmers.

The main objectives of the project are :

- To conduct capacity-building programmes with the aim of improving various information related to inputs; like feed, seed and brood stock in aquaculture and post harvest operations.

- To disseminate technology through publishing success stories, farm related news or projecting the project results in relevant scientific journals/local publications.
- To examine the possibilities of providing online services to farmers

The following programmes were conducted during the period of 2022-23

1. Awareness programme on “Vannamei and Pearl spot farming techniques”

As part of the Plan project entitled “Farm Advisory services”, an awareness programme was conducted on the topic “Vannamei and Pearl spot farming techniques” titled for 150 farmers of Aquafarmers' Federation, Alappuzha on 11/04/2022 at Abaam Pearl, Thuravoor. The programme was inaugurated by Ms. DaleemaJojo, MLA Aroor and felicitated by Prof. (Dr.) Daisy C. Kappen, the Director of Extension, KUFOS, Prof. (Dr.) M Rosalind George, Dean, Faculty of Fisheries Science and Dr. Safeena, M.P, Principal investigator of the Project. The inaugural session was followed by lecture sessions on the topic on 'Vannamei farming practices by Dr. K Dinesh, HoD, Dept. of Aquaculture KUFOS: Other classes were on Pearl spot farming. As part of this programme cash awards were distributed to the meritorious students among the farming community by the Aqua Farmers' Federation.

Prof. (Dr.) M Rosalind George Dean, Faculty of Fisheries Science, addressing the participants



Prof. (Dr) Daisy. C. Kappen, Director of Extension addressing the participants



Dr. Safeena M P, PI of the project addressing the participants



Distribution of Awards to the meritorious students among from farming community



2.Training Programme on “Paduthakulathile Matsykrishi”

1. A three-day training programme, “PaduthakulathileMatsykrishi’ was organized at KUFOS from 23rd to 25th November 2022. In all, 15 selected fish farmers and students of KUFOS attended the training programme. The programme was inaugurated by Prof. (Dr) Daisy. C. Kappen, Director of Extension, KUFOS, and presided over by Prof. (Dr.) Devika Pillai, Director of Research, KUFOS. Prof (Dr.) K. Dinesh HoD, Dept. of Aquaculture. offered felicitations. At the end of the inaugural function, Dr. Safeena M.P, Principal Investigator of the project, proposed the vote of thanks followed by lecture sessions by prof (Dr.) K. Dinesh on the topic “Problems and possibilities in Aquaculture”, construction of Paduthakulam (Silpaulin pond) by Sri. Binoj Philp, “Basic Principles of Aquaculture” by Smt. Shalumol Salas., “Suitable fishes for Paduthakulam” by Smt. Dona and “Maintenance and rearing of fish fry in Paduthakulam” by Smt. Amritha Krishnan. On the second day, the sessions were conducted on “Fish feed preparation” by Dr. Bindhi. S. Kumar (Assistant Professor, St. Albert’s College) and Smt. Divya T. Babu (FO Dept. of Fisheries Ernakulam) explained the “Activities of Dept. of Fisheries to the farmers”. Dr. Safeena M.P, (Assistant Professor Dept. of AAHM) has offered a session on “Fish diseases and their Treatments” followed by a session on “Fish culture and marketing” by Vishnu.R. Nair (Research Associate CIFT). Dr, Gijo. Ittoop (Assistant Professor Dept. of AAHM) engaged a session on “The Use of medicinal plants in Aquaculture”.After the completion of the training sessions on the third day, the certificates were distributed by Prof. (Dr.) Daisy. C. Kappen, Director of Extension and a field visit was also arranged for the participants to the farms of two successful farmers near Chalakkudy for providing field level exposure. A handbook titled “Matsykrishi Ariendathellam” for the aqua farmers is being prepared, and steps are taken to publish it.

Prof. (Dr) Daisy. C. Kappen, Director of Extension, KUFOS inaugurating the three day workshop



Dr. Safeena M P, PI of the project, engaging session



3. Trial culture of Blue Green Algae-Spirulina

Spirulina is a multicellular filamentous blue-green algae like a spiral of thin threads under the genus, Arthrospira the phylum Oscillatoriaceae. It has been utilized in aquafeeds as a protein and vitamin supplement as well as a complementary nutritional component for fish, prawns and poultry. Spirulina is a promising source of food or feed, as evidenced by the biomass' composition, which includes its high protein content, low nucleic acid content, presence of high concentrations of vitamins and other growth factors, and presence of a cell wall that is easier to digest than that of other microbes. Feeding on spirulina helps improved disease resistance and an raise in the survival rate of fishes. It can grow optimally in pH range of 9-11 and there is least chance of contamination by other microbes. The mass culture of spirulina can generate new hope for the aqua farmers by generating employment opportunities in rural and urban areas.

As part of the project, a spirulina culture unit has been established at KUFOS for the purpose of technology transfer to the fish farmers. Zarrouk media was used for the indoor culture in 25 litre plastic cans. The harvested spirulina cultures were dried and the proximate composition was analysed. This dried spirulina is also used for capsule-making using a manually-operated machine. Action has been initiated to produce spirulina on a large scale by establishing an outdoor unit with 100 litre capacity tanks.

Stock culture and Laboratory culture system of spirulina in 20 L tanks



V. Exhibition Unit with Field Consultancy/ Lab to Land Services

Kerala University of Fisheries and Ocean Studies has been participating in various exhibitions organized by different Govt./NGO/Private institutions right from its inception. Besides these, the university also conducts exhibitions so as to make aware of the people about the research activities and the various technologies available at KUFOS. Conducting such events in the field of fisheries will aid in the development of fisheries sector through transfer of technologies to the farming community, creating awareness on environmental protection, conservation of fisheries resources, sustainability, responsible fisheries etc. Aquaclinics arranging along with exhibitions ensure the service of the experts working in different sectors of fisheries which will help in solving the problems of the farmers. The exhibition unit established at KUFOS has rich collections of specimens, models of various fishing crafts and gears, visual aids showing the activities and the achievements of KUFOS, aquarium tanks for setting up of aquariums while participating in exhibitions including a TV for the display of various activities in the field of teaching, research and extension. During the year 2022-23 KUFOS participated in 12 exhibitions .

1. 24th International Book Festival, Kochi

Kerala University of Fisheries and Ocean Studies(KUFOS)participated in the Exhibition "24th Kochi International Book Festival" from 1st to 10th April 2022 at Ernakulum organized by Antharashtra Pusthakolsava Samithi, Kochi. The objective of the programme was to promote reading and encourage writing, and to make high quality literary activities accessible to everyone in the State of Kerala.The function was inaugurated by the Spanish writer Oscar Pujol and presided over by Hon. Chief Justice Thottathil B Radhakrishnan (Rtd.) A stall of size 3m x 3m.was allotted to KUFOS. The exhibition was scheduled from 9am to 8pm. Since the Directorate of Extension does not have sufficient man power for setting up the stall, the service of two technical hands were availed of setting up the stall. Brochures and leaflets showing the activities and achievements of KUFOS in the field of teaching, research and extension were distributed to the public. Besides

these, the leaflets on various technologies developed and standardized at KUFOS viz. cage culture of pearlspot, seabass, giant trevally etc. were also distributed to them as part of the transfer of technology process.

Exhibition Stall at Book Festival, Ernakulam



developed and standardized at KUFOS ie. Cage culture of pearlspot, seabass, giant trevally etc. were also distributed. Since the Directorate of Extension did not have sufficient man power for setting up the stall, the service of two technical hands were availed of for setting up and dismantling the stall.

Exhibition stall at Kottayam



2. Farmer Fest Karshakasree – Karshika Mela

Kerala University of Fisheries and Ocean Studies(KUFOS) participated in the Exhibition "Karshakasree-Karshika Mela" from 11th to 15th May 2022 at Kottayam organised as part of the prize distribution ceremony of Malayala Manorama 'Karshakashree Award' for 2022. The function was inaugurated by Sri V.N Vasavan, the honourable Minister for Cooperation and presided over by Smt. Bincy Sebastian, Chairperson, Kottayam Municipality. A stall of size 3m x 3m.was allotted to KUFOS. Various models of fishing craft, gears, cage culture and visual aids showing the activities and achievements of the University were displayed in the stall. Govt. Institutions viz. Rubber Board, Kerala Veterinary and Animal Sciences University, Kerala Agricultural University, Department of Fisheries, Kerala etc. participated in the exhibition. The exhibition was scheduled from 9am to 8pm. Brochures and leaflets showing the activities and achievements of KUFOS in the field of teaching, research and extension were distributed to the public. Besides these, the leaflets on various technologies



3.Higher Education and Career Expo

Kerala University of Fisheries and Ocean Studies (KUFOS) participated in the Exhibition "Higher Education and Career Expo" organized at Government Engineering College Campus, Darmashala, Kannur from 28th to 29th May 2022. The programme aims to provide better information to students, parents and the public regarding courses, educational institutions, emerging careers, entrance exams, scholarships, aptitude tests and various

universities and other higher educational institutions. It was also planned to provide information regarding careers and courses available for specially abled students and cover further job prospects in different courses. It was organised in connection with the comprehensive education development programme conducted in the Thaliparamba assembly constituency. The function was inaugurated by Smt. R. Bindu, honourable Minister for Higher Education and presided over by Sri. M.V. Govindan Master, Minister for Local Self Government . A stall of size 3m x 3m.was allotted to KUFOS. Visual aids showing the activities and achievements of the University were displayed in the stall. Govt. Institutions viz. NUALS, Kerala Veterinary and Animal Sciences University, Kerala Agricultural University, M.G. University, Central University of Kerala etc. participated in the exhibition. The exhibition was scheduled from 9am to 6pm. Since the Directorate of Extension did not have sufficient man power for setting up the stall, the service of two technical hands were availed of for setting up the stall. Brochures and leaflets showing the activities and achievements of KUFOS in the field of teaching, research and extension were distributed to the public. Besides these, the leaflets, brochures on various technologies developed and standardized at KUFOS were also distributed. Well over 1000 students and approximately 200 public participated in the event and visited the stall.

Exhibition Stall at Government Engineering College, Darmashala, Kannur



4.Knowledge dissemination workshop & Exhibition GoI-GEF-UNDP India High range Mountain Landscape Project

Knowledge dissemination workshop & Exhibition GoI-GEF-UNDP India High range Mountain Landscape Project was organised by Haritha Kerala Mission, Kerala Forest Wildlife Department and UNDP at Kovalam, Thiruvananthapuram on 29 and 30th June 2022. The Programme was inaugurated by Sri. V.P Joy IAS, Chief Secretary, Government of Kerala and presided over by Dr. T.N Seema, Co-ordinator Navakerala Mission. A stall of size 3m x 3m was allotted to KUFOS. Visual aids showing the activities and achievements of the University were displayed in the stall. Biodiversity Board, Gramapanchayaths from Ernakulum, Idukki and

Thirissur Districts participated in the exhibition. The exhibition was scheduled from 9.30am to 7.30 pm. Brochures and leaflets showing the activities and achievements of KUFOS in the field of teaching, research and extension were distributed to the public. Besides these, an aquarium was setup to showcase the hatchery bred indigenous fish in the UNDP project. The People's representatives from the Grama Panchayat, officials from various state departments, community members, civil society organisations etc . participated in the exhibition.

Exhibition Stall at Kovalam, Thiruvananthapuram



5. Health Expo (Arogyamela Exhibition)

Kerala University of Fisheries and Ocean Studies(KUFOS) participated in the Exhibition Health Expo organized by Palluruthy Block Panchayat at St. Peters higher secondary school, Kumbalangi on 27th August, 2022. The objective of the exhibition was to create public awareness on health and welfare schemes of the Government. The health expo was inaugurated by Sri. P. Rajeev, The Honourable Minister for Industries and Law, Government of Kerala, and was presided over by Sri. K.J Maxi MLA, Kochi constituency. In order to participate in the expo, a 3m x 3m stall was allotted to KUFOS. In this stall, visual aids showcasing the various activities and achievements of the University were displayed. Besides, brochures and leaflets elaborating the activities and achievements of KUFOS spanning teaching, research and extension in the fields of fisheries and ocean science were distributed to the visitors and public. Other participants in the exhibition included Health Department and the Grama Panchayats coming under Ernakulum District. The exhibition, scheduled from 9.00 am to 4.30 pm was attended by people's representatives from the Grama Panchayat, officials from Various State Government departments, civil society organisations and the local communities.

Exhibition stall at St. Peters higher secondary school, Kumbalangi



6. Mathrubhumi Agriculture Fest at Palakkad.

The Mathrubhumi Agri Fest is a regular event conducted with the aim of displaying the techniques and products of Agriculture, and to provide markets for farmers, thereby assisting in promoting the development of the agricultural sector. The programme was organized at Indira Gandhi Municipal Stadium, Palakkad from 7th 11th October, 2022. The programme, Mathrubhumi Agriculture fest -2022 was organized as part of Mathrubhumi centenary celebrations. The programme was inaugurated by Sri. P. Prasad, The Hon. Minister for Agriculture and was presided over by Sri. M.V Shreyamskumar, M.D., Mathrubhumi. The event hosted around 150 stalls and included seminars, panel discussions, open forums and exhibition of agricultural products. There was active involvement of many dignitaries including Members of the Parliament and State Legislative Assembly, scientists, officials from Government organisations, business professionals as well as huge participation of the farmer community in the fair. The exhibition was scheduled on all the five days from 10.00 a.m. to 8.30 p.m. A stall of the size 3m x 3m was allotted to KUFOS. Extension visual aids showing the activities and achievements of the University were displayed in the stall. To impart knowledge on fishing practices and post-harvest techniques, traditional fishing trap and other gears and fishery by-products were exhibited in this fair. Besides, brochures and leaflets elaborating the activities and achievements of KUFOS were distributed to the visitors. Agriculture, Fisheries, and Veterinary Departments of Government of Kerala, Central organisations such CIFT, CPCRI and several Nationalised banks participated in the exhibition. A major welfare scheme for farmers was announced by the hon'ble Minister for Agriculture in this fair. The farmers shared their apprehensions and raised queries during the open forum. The fair ended on 11th October, with a resolution emphasising the need to give due recognition to farmers.

Exhibition Stall at Indira Gandhi Municipal Stadium, Palakkad



7. Mega Exhibition “Centennial Vista – 2022”

The mega exhibition Centennial Vista – 2022 was organized by UC College, Aluva as part of their centenary celebrations from 7th to 12th, November, 2022

The Programme was inaugurated by Sri. Anwar Sadath, the honorable MLA of Aluva constituency and presided over by Dr. M. I. Punnose, Principal, UC College Aluva. An exhibition stall of the size 3m x 3m was allotted to KUFOS. Visual aids showing the activities and achievements of the University were displayed in the stall. Fishery by-products prepared by the Department of Food Processing Technology of KUFOS and the models of traditional fishing crafts and other gears were exhibited. Brochures and leaflets showing the activities and achievements of KUFOS in teaching, research and extension were distributed to the public. Several other central and state Government organisations including CMFRI, Kerala Police, Cochin Shipyard, ISRO, NPOL, M.G University and corporates like Malayala Manorama and Mathrubhumi participated in the exhibition. The exhibition was scheduled from 09.00am to 8.00 pm. The participation of the University in the event was fruitful in generating interest among the visitors in the field of fisheries and aquaculture

Exhibition stall at U C College ,Aluva



8. Kerala Fish Fest - 2022 at Thiruvananthapuram.

Fish fest -2022 was organized by the Department of Fisheries at Putharikandam Maidan, Thiruvananthapuram as part of celebrations of World Fisheries Day,2022 from 18th to 21st, November 2022. The event was planned to serve as a platform for fishermen, fish farmers and the general public to understand the major activities and services rendered by institutes/departments/agencies for conservation and development of the fisheries sector. The four day Fish fest (Matsyotsavam -2022) was inaugurated by Sri. V. Abdurahiman, The Hon'ble Minister for Fisheries and presided over by Sri. Antony Raju, The Hon'ble Minister for Transport, Kerala. An exhibition stall of the size 3m x 3m was allotted to KUFOS. Visual aids showing the activities and achievements of the University spanning teaching, research and extension in the fields of fisheries and ocean science were displayed in the stall. The focal themes allotted to the university were courses, admission and processing and value added products. Accordingly, visual aids elaborating the required details on courses, and the products and techniques in the field of fish processing technology were displayed. In addition to these, samples of fishery by- products were also displayed. Leaflets and brochures covering related information were distributed to the visitors and public too. The event turned out to be a crowd puller with highlights such as marine and fresh water aquaria, fish products, fishing equipments and latest techniques displayed in about 50 stalls. Offices under the State Fisheries Department (14 Districts), Matsyafed and other Central and State Government organisations and R&D institutions such as CMFRI, MPEDA, CIFT, CIFNET, CUSAT and Kerala University participated in the exhibition. Interactive sessions with stakeholders, open forums and cultural programmes were also part of the event. The exhibition was scheduled from 10.00 am to 9.00 pm on all days. Since the Directorate of Extension did not have sufficient manpower for setting up the stall, the services of two technical hands were availed of for the same. Fish fest -2022 provided a good platform for signifying the role of the university in supplying professionally qualified human resources and in the upliftment of the fisheries sector.

Exhibition stall at Putharikandam Maidan, Thiruvananthapuram





9. KAVILAqua show- 2022

The Exhibition was organised by Kerala Aqua Ventures International Limited (KAVIL) at Aluva as part of the ornamental fish culture development scheme of KAVIL from 24th to 27th December 2022 with the objective of providing a unique opportunity for the public to see and enjoy the display of ornamental fishes and to provide a platform for the ornamental fish farmers to promote and sell their products and exchange business ideas. The Programme was inaugurated by Sri. S. Sarma, former Minister for Fisheries and presided over by Sri. Ullas Thomas, President, Ernakulam District Panchayat. A stall of size 3m x 3m was allotted to KUFOS. The stall featured visual aids showcasing the University's accomplishments and activities. In accordance with the theme of the event and the demand of the organisers, three Aquariums (one planted, one Marine and one Cichlid Tank) were displayed.

Other participant organisations included NBFGR, CMLRE, Matsyafed and the Department of Fisheries, Kerala. The show was scheduled to run from 9:00 am to 8:00 pm every day. Brochures and leaflets detailing KUFOS's initiatives and successes in the areas of teaching, research and extension were made available to the public. Overall, the trade show served as an effective venue for disseminating information on the facilities and services offered by the University in the theme area, to the public and to the entrepreneurs.

Exhibition stall at Aluva



10. 29th ICFoSST (Indian Convention of Food Scientist and Technologists)

29th ICFoSST (Indian Convention of Food Scientist and Technologists) was jointly organized by the Association of Food Scientist and Technologists (India), Kollam and Cochin Chapter; CSIR-CFTRI, DRDO-DFRL and Musaliar College of Engineering, Thiruvananthapuram at Al-Saj Convention Centre, Kazhakkootam, Thiruvananthapuram from 5th to 7th January 2023. Deliberation, networking and the exchange of knowledge and partnerships between various stake holders for addressing the issues related to food sector was the objective of the programme. The “Food Expo” was organized to provide an opportunity for food industries, analytical laboratories, ingredient manufacturers and educational institutes to showcase their products and services. The Programme was inaugurated by Dr. Ravishankar C.N., Vice-chancellor, CIFE, Mumbai and presided over by Dr. Sridevi A Singh, Director, CSIR-CFTRI. The focal theme of the event was “Innovative smart solution for agro and marine food processing to achieve sustainable nutritional security”, with 10 sub themes covering various areas of food processing technology. The programme included 10 technical sessions, six poster sessions and student counselling. KUFOS was given a stall measuring 3m x 3m. The stall featured visual aids showcasing the University's accomplishments and activities. Other than this, value-added fishery products from the University were also displayed in this event, to fit into focal theme of the convention. CIFT, CFTRI, and the TKM group of institutions were the other significant participating organisations. The exhibition was open from 10:00 am to 8:00 pm every day. Brochures and flyers detailing KUFOS's initiatives and successes in the areas of teaching, research, and extension were made available to the public and the visitors.

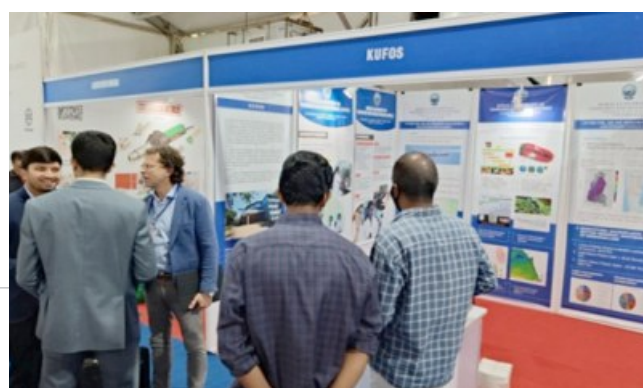
Exhibition stall at Al-Saj Convention Centre, Kazhakkootam, Thiruvananthapuram



11. 5th Edition of India Boat & Marine show -2023

India Boat & Marine Show-2023 was organized by Dept. of Industries, Govt. of Kerala, Indian Coast Guard, Cochin Port Authority, Kerala Maritime Board and Cochin Shipyard at Cochin on 27th to 29th January 2023. The Programme was inaugurated by Sri. Antony Raju, Hon. Minister for Transport, Govt. of Kerala, and presided over by Sri. Hibi Eden M.P. A stall of size 3m x 3m. was allotted to KUFOS. Visual aids showing the activities and achievements of the University were displayed in the stall. The exhibition was scheduled from 11.00am to 9.30 pm. Brochures and leaflets showing the activities and achievements of KUFOS in the field of teaching, research and extension were distributed to the public. Since the Directorate of Extension did not have sufficient man power for setting up the stall, the service of two technical hands were availed for setting up the stall.

Exhibition stall at Kochi



12. ICES/FAO-WGFTFB-2023

ICES/FAO Working Group on Fishing Technology and Fish Behaviour (WGFTFB23), Symposium on Innovations in Fishing Technologies for Sustainable and Resilient Fisheries was organized jointly by Bay of Bengal Programme & National Fisheries Development Board and the programme was hosted by Department of Fisheries, Government of India at Taj Gateway Hotel, Ernakulam from 13th to 17th, February, 2023.

The symposium was inaugurated by Sri. Jatindra Nath Swain, IAS Hon. Secretary, Dept. of Fisheries, Govt. of India, presided over by K.N Madhusoodanan, Hon. Vice Chancellor, CUSAT. A stall of size 3m x 3m. was allotted to KUFOS. Visual aids showing the major activities and achievements of the University were displayed in the stall. The participants include 60 experts from ICES-FAO, senior officials from Government, Universities and National Research Institutions from EIGHT Bay of Bengal Rim countries (India, Bangladesh, Maldives, Sri Lanka, Thailand, Myanmar, Indonesia and Malaysia). Central Institutions such as CIFT, CMFRI, FSI, INCOIS, CIFNET etc. were participated in the exhibition. The exhibition was scheduled from 9.00am to 5.30 pm. Since the Directorate of Extension did not have sufficient man power for setting up the stall, the service of two technical hands were availed of setting up the stall. Brochures and leaflets showing the activities and achievements of KUFOS in the field of teaching, research and extension were distributed to the public.

KUFOS stall at Taj Gateway Hotel, Ernakulam



VI. Centre for Field Consultancy and Data Analysis

A massive amount of data is being produced each and every day in the 21st century is which makes the data revolution in a way that we have never imagined. The collection of data or repository of data will help the policymakers, researchers and business to formulate objectives, schemes, products and services. Fisheries sector generates huge amount of data because of disaggregated nature of production and consumption, multiple levels and types of technologies and impact of various agro climatic and socioeconomic factors. The existence of this centre is justified at this context. The ultimate objective of this Centre is to provide fisheries sector data through a single window.

The major objectives :

- To collect world region-wise fisheries sector data relating to resources, production, fisheries trade, etc.
- To Collect data on production of fish in India and Kerala, species- wise and category wise and its documentation.
- To Collect data relating to marine products export, fishery resources, fisherfolk, etc., of Kerala and India and its documentation.
- To impart training and development services on demand.
- To take up consultancy services in Project preparation and evaluation.
- To suggest policy measures based on the findings of the study.

Data Compiled by the centre

During this academic year of 2022-23, the centre has compiled the following data.

1. Kerala Fisheries profile at a glance
 - a. General fisheries profile at a glance
 - b. Profile of Kerala Marine fisheries sector
 - c. Profile of Kerala Inland fisheries sector
2. Fisherfolk Population in Kerala (2000-2021)
 - a. District-wise Marine fishermen population distribution
 - b. District-wise Inland fishermen population distribution
 - c. District-wise active and allied fish workers
3. Fish Production in Kerala
 - a. Marine fish production (1980- 2021)
 - i. District-wise marine fish production (2012-2021)
 - ii. Species-wise marine fish production(2000-2021)
 - b. Inland fish production
 - i. District-wise inland fish production (2012-2021)
 - ii. Species wise inland fish production(2012-2021)
4. Indian fisheries profile at a glance
 - a. Marine Fisheries sector
 - b. Inland Fisheries sector
5. Marine fisheries potential of India
6. Fishermen population of India (2000-2021)
 - a. Indian Fishermen Population (Marine and Inland fisheries sector)
 - b. Indian Fisherfolk Population(Gender wise)
 - c. State wise Fisherfolk population
 - d. State-wise Fisherfolk (Gender wise)
 - e. Active Fishermen in marine fishing - State wise
 - f. Active Fishermen in inland fishing –State wise
7. Fish Production in India (1980-2021)
 - a. Marine fish production
 - b. Marine fish production of Maritime States and Union territories
 - c. Inland fish production
 - d. State-wise Inland fish production

The secondary data were collected from the various issues of Economic review of Government of Kerala, Handbook on Statistics in India and CMFRI respectively.

Programmes conducted

The WTO's 12th Ministerial Conference was held in Geneva from 12-17 June 2022. Fishery subsidy negotiations were the major agenda of this programme. Fisheries is a common endowment of humanity; hence sharing such resources should be equitable. An imbalance in the agreement is a threat to future generations. For, sustainability, big subsidizers must take greater responsibility for reducing their subsidies and fishing capacities. However, the negotiations raised certain apprehensions in the country where millions of poor people depend on fisheries sector for their livelihood. Countries like India need ample policy spaces to meet the future developments of this sector. India needs Special and Differential Treatment to protect the livelihoods of poor fishers and address food security concerns of the nation. Moreover, India needs sufficient policy space and time for developing the fisheries sector and implementing disciplines that would curb 'harmful' subsidies on illegal, unreported, unregulated and overfishing, which would, in turn, lead to better protection of Indian fish stocks. In view of this, the Pandit Karuppan Chair and the Centre for Field Consultancy and Data Analysis under the Directorate of Extension of Kerala University of Fisheries and Ocean Studies organized a one-day seminar on "WTO MC-12 Draft on Indian Fisheries Sector" at KUFOS on 26/7/2022 to examine the implications of WTOs negotiations on the fisheries sector of the country.

Registration for all delegates was done by Google Forms. About 100 participants from various institutes including students, researchers, exporters and representatives from the fishing community participated in the programme.

The inaugural session began at 10.00 am. Prof. (Dr.) K. Riji John, Vice Chancellor, KUFOS; Prof. (Dr.) B. Manoj Kumar, Registrar i/c, KUFOS; Smt. C. S. Sujatha, Governing Council member of KUFOS and former Member of Parliament ; Prof. (Dr.) Daisy C. Kappen; Director of extension, Dr. Devika Pillai, Director of Research, Dr. V Ambilikumar, Dean of Faculty of Fisheries Management; Mr. B Sreekumar, Former Secretary and Director (i/c) of MPEDA; Dr. Martin Partick, Professor(Rtd) ; and Dr.Tharian George, Joint Director (Rtd.),RRII, were all present. Dr. Rajesh K, Principal Investigator of the plan project Centre for Field Consultancy and Data Analysis, proposed the welcome address. The presidential address was delivered by Prof. (Dr.) B. Manoj Kumar, Registrar of KUFOS. The programme was inaugurated by lighting the ceremonial lamp by the Hon'ble Vice Chancellor of KUFOS in the presence of other dignitaries. After the inaugural address by the honourable Vice Chancellor, Smt. C.S. Sujatha, the guest of honour expressed her views on the impact of the WTO MC 12 draft on the Indian fishing industry. Prof. (Dr.) Daisy C Kappen, Director of Extension, Prof.(Dr.) Devika Pillai, Director of Research and Prof.(Dr.) V. Ambilkumar, Dean, FFM, KUFOS offered felicitations for the programme followed by vote of thanks by Dr. Afsal E. M., Head of the Department , Department of Business Administration and Management. The inaugural ceremony came to an end at 11.00 am.

After the tea break, the panel discussion began at 11.15 am with the keynote address by Mr. B Sreekumar, Former Secretary and Director (i/c) of MPEDA;. Dr.Tharian George, Joint Director (Rtd),RRII, and Dr. Martin Partick, Professor (Rtd)

Glimpses of the seminar

Mr. B. Sreekumar, began his presentation with a conceptual framework of global fishery exports. The major components of global fisheries were capture fisheries and aqua culture occupies approximately 90.3 MTs and 87.5 MTs respectively. India occupies second and third positions in world aquaculture and capture fish respectively. Trend analysis for the past one decade shows that in India aquaculture production is increasing, whereas marine fish production is decreasing. Simultaneously, the exports from India marked a hike in terms of quantity and value. Frozen shrimp is the major export item (75%) from India. Frozen fish (6%), frozen squid and cuttle fish (4%) are other important products. In recent years, the Western countries insisted certain quality control measurers for exporting products from India and MPEDA validates such catch certificates. CATCH, a web based application introduced by the EU made it compulsory to document details of the marine fish catch, during fishing

which is meant for export. The Seafood Import Monitoring Program (SIMP) of USA also insists on similar conditions to restrict IUU (illegal, unreported and unregulated) or misrepresented seafood entering the US.

In the fisheries sector, Govt. of India launched various schemes to support fisherfolk through flagship programmes, such as Pradhan Mantri Matsya Sampada Yojana, which strives to create direct employment for 15 lakh fishers and fish farmers, and about three times this number as indirect employment opportunities. This programme aims to double the income of fishers, fish farmers and fish workers by 2024. The total amount of Rs 20050 crores, allocated to this sector comprises central share of Rs.9407 crore, State share of Rs 4880 crore and beneficiaries contribution of Rs 5763 crore. However, when compared the amount is less. Out of 3.77 million fisher folk, 67.3% belongs to the BPL category. Moreover, the fishing sector is losing working days due to manmade (such as trawl ban) or natural constraints (such as cyclones). The availability of fish, such as oil sardines and mackerel, has drastically reduced in India. In this context, it is necessary to discuss the significance of WTO Agreement on Fisheries subsidies.

Prima facie, WTO Agreement is against harmful subsidies that cause over fishing. Overfishing is pressing sustainable development challenge; approximately 34% of the marine fish stocks has already been exploited beyond sustainable levels. This undermines the livelihood of the communities depending on fish for food security and for jobs. The subsidy applies only to marine wild capture fishing and fishing related activities at sea, subsidies to aquaculture, inland fisheries and land-based activities are not affected. The estimated subsidies provided by the Government of India are too less (2077 crore), to compare China (54750 crore), EU (28,500 crore) and US (25500 crore) in the fisheries sector. India needs Special and Differential Treatment to protect the livelihoods of poor fishers and address food security concerns of a nation, have the necessary policy space for developing the fisheries sector, and sufficient time to put in place systems to implement the disciplines under overcapacity and overfishing, illegal, unreported unregulated and overfished. India believes that fisheries agreements must be seen in the context of existing international instruments and the laws of the sea. The sovereign rights of coastal States to explore and manage living resources within their maritime jurisdiction, enshrined in international instruments, must be protected.

The discussant of the seminar, Dr.Tharian George, spoke about the political economy of the WTO agreement. WTO originated after a series of eight rounds of discussion, spanning over the past 48 years. According to him, the world recession (capitalism's crisis), after the Cold war, the abolition of state capitalism, and the debt-trap of developing countries led to political changes in the world. Prima facie, the agreement is a bundle of paradoxes that are well suited the developed countries. Well-developed countries prepared suitable policies for their own interests, for example, the common agriculture policy, which helped US and European countries, once they were net importers of food, exporters of agricultural products such as cereals, milk etc. The basic problem with the Agreement on Agriculture is that, raw fish are treated as industrial products, and value-added products as agricultural products. The statistics of 2021 revealed that the total value of fishery products across the world is \$129.30 billion, out of that 80% of the export consists of raw fish and 20 % of them are in value-added products. At the same time, it is worthwhile to note that, developed countries are exporting 55% of raw fish, whereas developing countries export 45% only, 67% were below poverty line. These fishers directly engage in fishing, get just about 40 to 50 days a year for fishing after trawl bans and weather warnings that prevent fishing ventures. The lack of sufficient number of fishing days is one of the key reasons for poverty among the fishing community, according to the participants at the seminar. The subsidy provided to fishers by the government is equivalent to \$15 and they sought to discontinue it through the WTO agreement, said economist Martin Patrick, who chaired the seminar. Simultaneously substantial support is provided to fisherfolk in countries such as Sweden and the Netherlands.

Following the academic deliberations by the experts, many participants such as Mr. Charles George, Mr. Rajesh, Dr. Jyothish, Mrs.Sangeetha, Dr. Asha Vijay etc. actively participated in the discussion. The seminar was concluded by stating that fisherfolk in India suffer from various problems such as loss of fishing days, exploitation by middlemen, and poor catch etc. Comparing the existing problems, as far as Kerala fisherfolk are concerned, withdrawal of subsidy may not be an issue, as they were receiving only a negligible support to buy



kerosene. However, this is not true for the rest of the States, such as Karnataka or Gujarat. The Government has already taken certain legal measures (Catch Certificates for EU exports, promoting square mesh, SIMP exports to the USA, introducing vessel monitoring systems) to ensure the quality of the fishery products and sustainability of the sector, which need cooperation from the fisherfolk, in the form of maintaining prescribed mesh size or not catching small (juvenile) fish.

The valedictory session started at 3.30 pm. The certificates were distributed to the participants by the Director of Extension, Dr. Daisy C Kappen and Principal Investigator of Pandit Karuppan Chair, Dr. Rajesh K.

Paper publication

1. A research paper on the topic “WTO's agreements on fisheries subsidies and it's implication on India” is completed and send to a journal for review.
2. Article on **Inland fisheries in Kerala** is in the final stage.

Initiatives are being taken to publish 4 papers in the UGC care list journal

Dr. Rajesh K delivering the welcome address



Prof. (Dr.) B. Manoj Kumar, Registrar of KUFOS delivering the presidential address.



Guest of Honour, Smt C.S Sujatha expressing her views on the effect of WTO MC 12 draft on Indian fisheries community.



Director of Extension, Prof. (Dr) Daisy C Kappen, delivering the felicitation address



B Sreekumar (Former Secretary & Director (i/c) of MPEDA) delivering the keynote address



Glimpses of the Seminar



VII. Establishment of Training - cum -Demonstration Centres in Cage Aquaculture at Kollam and Kannur Districts of Kerala

The current project is envisaged to establish cage culture units in two geographical zones of Kerala; North zone and South zone. In the North zone, Payyannur, Kannur District, has been selected and in the South zone, Munroethuruth, Kollam was selected for the implementation of the project. The programme is being operated under the Plan Project of Kerala University of Fisheries Ocean Studies (KUFOS) funded exclusively by Government of Kerala. The project was started in January 2019. The major objective of the project is to train interested beneficiaries in two geographical zones of Kerala (Kannur and Kollam Districts) and establish cage culture units for further demonstration and popularization of the technology. This has been successfully demonstrated with the assistance of the Directorate of Extension, KUFOS.

In the first few months, the team surveyed and followed the pilot projects operated by the farmers for better understanding the existing practices of cage culture along various places of Kannur and Kollam towards suggesting improvisation. It is fact that the culture of aquatic organisms in cages is getting popular in these regions, but farmers are not fully aware of the scientific principles of this technology. In order to create better awareness among the farmers on the scientific methods and recent developments in the field of cage aquaculture, KUFOS conducted a One Day Seminar on 01.03.2019 with the participation of 97 farmers and conducted the same awareness class at Munroethuruth, Kollam on 13.06.2019. The department of fisheries also collaborated with the programme. The inputs for the projects were procured from various agencies adhering to the Government norms. In both sites, 6 units (3 cages in a single unit) were erected with the dimension of 2x2x1.5 m for a single cage. Each cage unit was assigned to a group of three beneficiaries. Altogether 6 groups of beneficiaries (18 beneficiaries) were formed at each site. Furthermore, the beneficiaries were provided with fish seed, feed, freezers for storing the

feed, as well as other inputs that were necessary. A total number of 4230 *Lates calcarifer* fingerlings were stocked with a stocking density of 250 no. of seed/ cage at Kollam. In Payyannur, only 4 units were stocked with *Lates calcarifer* with a stocking density of 350/ cage. The culture period was from November to June 2021. A one-day seminar was also conducted for all beneficiaries at Payyanur on 28/11/2020 and at Kollam on 09/01/2021 with the help of a cage culture expert. The project team has provided all the necessary technical support to the beneficiaries. Regular monitoring of water quality, feeding pattern and health of animals were also done. Harvest of both the sites was done during the first week of June. A total of 385 kg of fish was obtained from Payyanur site and a total of 394 kg fish was harvested from Kollam site. The weight and length of the fish varied from 1400 g to 350 g/ fish and 44 cm to 17 cm / fish respectively. The beneficiaries from both the sites got the highest farm gate price available in the market.

Activities and achievements (2022-2023)

- In Payyanur and Kollam, the cleaning and other upkeep works of all the cages were done after the harvest.
- A review meeting was conducted at KUFOS Regional Centre, Payyanur on 28th February 2022 and presented the details of research activities which include completed, ongoing and future research work. The Principal Investigator evaluated the work in progress of each activity and gave necessary suggestions
- After the cleaning in Kollam, two groups were provided seeds of *Etroplus Suratensis* to stock in their cages *Etroplus suratensis* in their cages (March 2022)

stocking *Etroplus suratensis* seeds.



- One beneficiary group in Payyanur established a cage culture unit at Thuruthi, Payyanur. They stocked about 270 number of *Etroplus suratensis* seed. (April 2022)

New cage culture unit



- As part of the project, a preliminary study of 'Biofouling of *Mytella strigata*' started at Payyanur cage unit area with the help of KUFOS regional centre on February 2022

Preliminary study of Biofouling of *Mytellastrigata*



- Along with the biofouling study, the impact of biofouling of *Mytella strigata* on cage/pen culture farmers were also studied.

visiting various cage culture units



- For the second phase of the project, limited tenders were invited for the supply of Asian Sea Bass Seed and for the supply of low-value frozen fish that can be used as feed ingredient (a total of 5 tonnes to Munroethuruthu and Payyanur).
- Provided seed and feed to the cage culture units at Payyanur and Kollam.
- A total number of 4230 *Lates calcarifer* seed were stocked with a stocking density of 250 no. of seed/ cage at Payyanur, Kannur (18/11/2022) and Kollam (29/11/2022).

Seed stocking



- The project team provided all the necessary technical support to the beneficiaries. Regular monitoring of water quality, feeding pattern and health of animals were also done.
- In Kannur, two cages were partially harvested two times in a month on 21/05/2023 and 28/05/2023. In total, only 30 kilograms of fish were harvested. The maximum size of harvested fish is 40.7cm and its weight is 870g, the minimum size of harvested fish is 27cm, and its weight is 255g.

Harvesting



- At Kollam, all groups are continuing their farming. *cage culture units at Kollam*



- The research team regularly visit various farms and ponds in the Kannur and Kasaragod Districts for analysing the physico-chemical parameters of water and to find out the problems and issues being faced by the aquaculture farmers in their culture systems

VIII. Expansion of Facilities of Museum and Public Aquarium

The AGK Menon Memorial Museum of Aquatic Animals established at KUFOS during the year 2016 houses a rich collection of finfish and shellfish specimens from marine and inland waters of India which are on display, and attracting school and college students, researchers and the general public. The main objective is to impart education and awareness among them about aquatic bio-diversity and to build up their competence and confidence

The ornamental fish culture and aquarium keeping have assumed considerable significance as an international hobby, and all these have been proved to be lucrative in the global trade scenario. Though the ornamental fish trade with a turnover of US \$ 8 billion and an annual growth rate of 8 per cent offers lot of scope for development, India's share in ornamental fish trade is estimated to be less than 1% of the global trade and the major part of the export trade is based on wild collection. Taking into account this, KUFOS focused on popularizing and developing entrepreneurship in ornamental fish culture and conducting training-cum demonstration programmes on ornamental fish culture with a view to enabling them in starting small - scale units. The public aquarium at KUFOS named after the visionary, former Hon'ble Vice Chancellor of Kerala Agricultural University, Dr. A.M Michel, is an exhibition-cum-education center on ornamental fishes. It was opened to the public at a function held on 4th April, 2013 by Shri. K.Babu, The Hon'ble Minister for Fisheries, Ports and Excise, Govt. of Kerala to mark the second anniversary of KUFOS. The complex consists of two wings with a total of 46 tanks of assorted sizes-20 each of the size 4'x2'x2.5', four of the size 7'x2'x2' and two plasma tanks. The entrance has a central Koi pond stocked with a variety of koi fish and two beautiful artificial waterfalls. Nearly 1500 fish of different aquatic environment comprising well over 25 species of indigenous and exotic freshwater fishes, such as loach, Miss Kerala, barb, gold fish freshwater shark, angel fish, tetras, guppy, platy, molly, swordtail, arowana, pacu, yellow sun catfish, eel, severum, dollar fish, different varieties of cichlids, gouramies, parrot fish, Oscar, devil fish, giant freshwater prawn, brackish water fishes viz. Mullet, milk fish, pearlspot and marine fishes like damsel, clownfish, sea anemone, tentacle anemone, butterfly fish, banner fish surgeon fish etc. are on display in combination with several indigenous and exotic aquatic plants set in different styles. In order to make the project self

sustainable, a nominal entry fee of Rs.20/- for adults, Rs.10/- for students is being charged. The fishes kept in the Public Aquarium in addition to providing entertainment to those visiting, also motivate the people to start small scale units. Along with the public aquarium, models of different crafts, gears and photographs showing the activities and achievements of KUFOS in teaching, research and extension are also displayed in a separate building which attracts students, The public and officers from different institutions. In addition to this, Faculties of various departments of KUFOS are using this facility to engage classes to the B. F. Sc. students.

IX. Modernization and upgradation of Instructional Field training facility

The Project on Modernization and upgradation of Instructional field training facility operating under the Department of Aquaculture with the major objective of improving and upgrading the instructional farm of the University is a prestigious project of the Directorate of Extension, KUFOS. Having been blessed with sufficient quantity of brackish and freshwater, our instructional farm has been practising the culture of freshwater fishes like Catla, Rohu, Mrigal, Common Carp, Pangasius, Tilapia, Murrel, Olive Barb etc. and shrimps like *P. vannamei* and *P. monodon* and brackishwater fishes like *Lates calcarifer* and *Etroplus suratensis*. The farming is mainly practised to give hands-on training to the students and also to generate internal revenue for the University. As part of the various courses under the Department of Aquaculture, students are regularly deployed in the instructional farm for improving and improvising their skills in seed production, nursery rearing and grow-out operations. Students are given the opportunities to do their own aquaculture entrepreneurship during the eight semester of B. F. Sc. programme. So, there is an absolute requirement of updating the farming techniques and protocols for attaining the appreciable fisheries professionalism among the students. The farm facilities are also used for Earn While You Learn programme, Post Graduate, PhD research. Through the current project, new farming strategies like Pen culture and Cage culture was taken up to demonstrate the technology to the students and farming community. Regular training programmes are organized for the needy people in aquaculture and allied activities. Two areas with the individual plot size of 5 cents each were cleared and deepened for the installation of cage and pen. One of the major activities undertaken during the Plan period

was the stocking of the installed pen in the farm premises. The species stocked is *Lates calcarifer* and grow out culture is in progress. A portion of the labour requirement of the farm was met from this fund. It is necessary to continue this project for modernizing the farm further.

X. Model Fish Processing Plant and Training Centre

The fisheries sector, both in the inland and marine sectors of Kerala State, provides enormous employment opportunities to the people. Unlike the other products, the very low shelf life of the harvested fish acts as a major constraint in marketing the diversified fishery products both in the domestic and export market. The fishes can be stored only for a few hours after it reaches the ground. Thus, knowledge on the shelf life of the fishes and different ways to preserving them for ensuring quality are very important and essential to transfer the same to the target group. The above project aims to provide better solutions to these problems by making the fisherfolk aware of the ways of preservation of fish and preparation of various value-added fishery products under hygienic conditions. It will definitely help in creating more employment opportunities to the fisher folk including the womenfolk along the coastal areas of the State and lower sections the society, thus leading to women empowerment and uplifting the society. Equipment for imparting quality training on various aspects of post - harvest technologies were purchased and facilities established under this project is being utilize for imparting quality training to the fisher folk including the women and students on various aspects viz. techniques of preservation, preparation of value-added products, handling of processing and laboratory equipment, quality evaluation methods, sanitation and marketing practices etc. As part of this project, the following training programmes were organized.

1. Training on “production and marketing of value-added products from seafood”

A two-day skill development training programme on “Production and marketing of value-added products from seafood” was conducted on 12th and 13th April, 2022 at Malappuram by Kerala Aqua Farmers Federation (KAFF), Malappuram District Committee. The training programme started with a formal inauguration. It was followed by a lecture session on value-addition of seafood by Dr. Abhilash

Sasidharan, followed by hands in training. About 15 participants attended the training. Hands on training was provided the preparation of fish pickle, battered and breaded products including fish cutlet, fish ball, fish finger, Butterfly Shrimp and Shrimp tail-On. The methods of preparation, including preparation of fish mince and cutting of Butterfly Shrimp, Shrimp tail On were demonstrated. The programme came to an end by 5.30pm on 13th April 2022.

Session on Production and marketing of value-added products from seafood



Hands-on Training: Preparation of Value-Added Products



Products prepared



2. Training on “value-added and dried seafood products”:

Inaugural session



A two-day skill development training programme on “Value-Added and dried seafood products” was conducted from 17th to 20th May 2022 at the Department of Fish Processing Technology; KUFOS. The training programme was scheduled for the women belonging to five different Kudumbashree units in Ernakulam District. A total of 22 participants attended the four-day programme. Eleven participants from Munambam region attended the programme on 17th and 18th May 2022 and the remaining 11 participants from Paravoor region attended the training on 19th and 20th May 2022. The training programme commenced with a formal inauguration by Prof. (Dr.) Radhika Rajasree S R, HOD, Fish Processing Technology, KUFOS. Formal session began with a lecture on “Value-addition and drying of fish” by Dr. Abhilash Sasidharan, Principal Investigator MFPTC. For the first day hands-on training in for the preparation of fish pickle was provided followed by initial steps of drying which includes butterfly cutting and salting of fish. On the second day, a lecture session on “Retail Marketing” was offered by T R Ananthanarayanan Iyer, Food Technology, Food Safety & Business expert, Foodastha. Along with the production of fish cutlets the remaining procedures for drying including blanching of the salted fish, drying using heat pump dryer and packaging of dried fish using vacuum sealer were demonstrated. The programme came to an end by 4.30pm on 20th May 2022.

Session on Retail Marketing by T R Ananthanarayanan Iyer



Hands-on training on drying of Tilapia



Fish Cutlet prepared by Participants



3. Awareness programme on “Entrepreneurial prospects in seafood value - addition”

A one-day Seafood Awareness Programme on “Entrepreneurial Prospects in Seafood Value-Addition” was conducted on 11th August 2022 at Melepura Tharavad, Chavakkad, Thrissur. The programme was commenced with a formal inauguration followed by a lecture session on “Entrepreneurship Opportunities in Seafood Value Addition” by Dr. Abhilash Sasidharan. In all 20 participants attended the programme. The second session was handled by Prof.(Dr.) Radhika Rajasree on “Seafood Valorisation and Byproduct Development”. After the lunch break, the third session was engaged by Dr. Shyni K on “Chilling and Freezing Technology for Seafood products”. The final session was handled by T R Ananthanarayanan Iyer on “Retail Marketing”. The programme came to an end by 5.30pm.



4. Awareness programme on “seafood based entrepreneurship opportunities”

A one-day Seafood Awareness Programme on “Entrepreneurial Prospects in Seafood Value-Addition” was conducted on 17th January 2023 at Mullurkkara, Thrissur. The training programme was commenced with a formal inauguration. It was followed by a lecture session on “Seafood Based Entrepreneurship Opportunities” by Dr. Shyni K. In all 15 participants attended the programme. The other sessions were handled by Mrs. Ahana Vijayan (Senior Research Fellow, KUFOS) and Mr. Arun Das N H (Incubation Centre, KUFOS) On “Seafood Valorization and Byproduct Development” and “Aquaculture practices & opportunities” respectively. The programme came to an end by 5.30pm.

5. Introductory Session on Seafood Based Entrepreneurship Opportunities



Preparation of DIY training videos on processing and value-addition of fish

For the preparation of the DIY videos, the below-listed value-added products were selected. Demonstration videos on fish pickle and fish balls were prepared. In order to improve the training, booklet on Value addition of fish, literature such as “Book on Tropical fishery products by Dr. K. Gopakumar” and “Value-added fish products by Subhendu Datta” were collected. Shooting and editing of demonstration videos of the following ten value-added fish products were completed.

1. Production of fish pickle
2. Fish balls
3. Battered and breaded fish fillet
4. Fish burger
5. Fish sausage

6. Fish finger
7. Fish pickle
8. Battered and breaded squid rings
9. Fish biriyani
10. Fish fritters

Product development

Standardized and Prepared new value-added fish products such as Fish Crackers, Fish Jerky, Gravalax and Marinated and dried fish were prepared prior to the Technology Release Day conducted on 15th December 2022 and ICAR Agriculture Day on 3rd December 2022 at KUFOS. The developed products were kept for sale during the exhibition on ICAR Agriculture day and were sold out.

Products kept for sale during ICAR Agriculture Day



Products Developed - Fish Crackers



Marinated Anchovy



PANDIT KARUPPAN CHAIR

XI. Livelihood Status of Marine Fishermen in Kerala in the Post COVID-19

Kerala is one of the most active marine States in India, with a coastline of well over 590 km and an Exclusive Economic Zone (EEZ) of 218536 sq. km. The state is endowed with 44 rivers, 30 reservoirs, 45 backwater bodies, and is rich in marine wealth. There are 222 marine fishing villages and 113 inland fishing villages in this sector. The coastal line of Kerala is spread over nine coastal districts such as Thiruvananthapuram, Kollam, Alappuzha, Ernakulam, Thrissur, Malappuram, Kozhikode, Kannur and Kasaragod. Among this, the population of fishermen is the highest in Thiruvananthapuram with 1.73 lakh people, which is followed by Alappuzha with 1.32 lakh. The fishing sector contributed approximately 1.76% percent of the GVA and total export of marine product from Kerala is 182430 MT during the year 2021-22 (GoK, 2021-22). Among the nine coastal states of India, Kerala holds the third position in terms of fisherfolk population (GoI, 2021-22). The total populace of fisherfolk residing in the State of Kerala is estimated to be 10.54 lakh, which includes 8.12 lakh in the marine sector and 2.42 lakh in the inland sector (GoK, 2022). Out of this, the number of active fishermen is 2.40 lakh (1.90 lakh in marine sector and 5.08 in the inland sector).

The COVID-19 pandemic had a devastating impact on all sectors across the globe, particularly the fishery sector; Kerala is also not an exception. During the lock-down period, fishing was banned and the fishing harbours and landing centres were closed, which directly affected not only the fisherfolk but also the workers engaged in fish vending, peeling, curing, and harbour-related work. (GoI, 2020). Kerala allowed low intensity fishing operations by artisanal fishers by the first week of April, 2020, about two weeks after imposing the first lock down. It can be seen that a total per day loss of Rs. 58 crore and an accumulated loss of Rs. 3481 crore for 60 days since lock down were incurred (Ramachandran et al., 2020). This loss was estimated from fish landings, price realisation both at the landing centre and retail markets as well as reduction in export earnings. The income loss from fisherfolk was approximately 130 crore and the immediate lockdown and closure of landing centres left many fisherfolk locked in different places and around, 6.4 lakh tons of fish production was at a standstill. The continuous lockdown affected the fisherfolk livelihoods, especially their income and employment. Fishers also suffered during corona, in addition to increasing their debt and loans became uncollectible. Though the fisheries sector ban was completely lifted and the harbours and landing centres started to function, it takes lot of time for the stake holders to get a feel of a vibrant fish market. Fisherfolk are reeling under severe crisis with lockdown, fuel price hike, weather warning, poor landing, etc. Therefore, this study is to investigate the impact of the COVID-19 pandemic on the livelihood of marine fisherfolk and to identify the changes and challenges that have arisen in their livelihoods during and after the pandemic.

The project mainly studies the livelihood status of marine fisherfolk in Ernakulam in the post Covid 19 period. The main objectives are:

- To study the socio-economic profile of marine fishermen community;
- To study the livelihood changes of marine fishermen in Ernakulam in the post Covid Period.

This study employed a purposive sampling approach to gather data from marine fisherfolk in Kerala, with a specific emphasis on the Ernakulam District. Primary and secondary data sources were used in this study. Primary data was collected through personal interviews using a well-structured questionnaire by strictly observing the Covi-19 protocol. Respondents were selected based on simple random sampling. Data was collected from the coastal fishing villages of Ernakulam District, including Chellanam, Munamabam, Vypin, Puthuvypin, Nayaramabalam, Fort Cochin, Puthenthode, Kannamali, Malipuram, Njarakkal, Cherai, and Thoppumpady from January 2022 to January 2023. The sample size was estimated to be 384 using Cochran's formula. Secondary data was collected from articles, journals, and government-authorized reports. From the survey, The profile of fisherfolk revealed that the fisheries sector is male-dominant and older generations are more engaged in fishing than the younger. Fishing communities are dominated by Hindus (59.6%) and Christians (38.0 %). The majority of fishers (64%) had education upto the primary level (Up to 7th). There are 78.4% of households being nuclear in nature and greater part of the fisherfolk belong to BPL category (89.8 %). Government housing schemes have significantly benefited the fisherfolk community, with an impressive

95.3% of them now residing in their own homes. The majority of these households enjoy essential amenities such as safe drinking water, electricity, and sanitation facilities. Due to the inconsistent income generated from fishing and the pursuit of higher education by some family members, a shift towards stable income jobs has become prevalent among the fisherfolk family (53.9%). A minimal proportion of working women, accounting for only 15.8%, is observed in each fishermen family. It was found that 93.8 % of the fishermen were traditional fishermen. Fishing is the main source of income for fishermen, most of whom are directly and indirectly engaged in fishing activities. The study also reveals that fisherfolk primarily rely on other fishing boats for their livelihood, with shared vessel ownership being common (84.4%), while only a minority (15.6%) own their own fishing assets such as gears, crafts, and engines due to high costs and maintenance. Regarding occupational flexibility, the study indicates that 56.8% of fisherfolks are fully committed to fishing and lack the skills for alternative employment during the off-season. They experience complete unemployment during fishing holidays.

The Majority of fisherfolk (71.6 %) are working in motorized boats, with 47.4% operating as partners, 20.1% as employees, and 3.3% as boat owners. Corona virus affected around 29.7% of fisherfolk. It is reasonable to assume that 69.3% of the population are unaffected, followed by 1.0% of fisherfolk are unsure about the effect. The lockdown reduced the daily income and employment of fisherfolk. Because of fishing restrictions, 40.6 % of fishermen could not fish during the pandemic period. However, many of those who went had extreme (19.5%) or moderate losses (27.6%). Almost 10.4% of fisherfolk refuse to disclose their losses. On the other hand, there were 53.1 % of fisherfolk who faced moderate losses after the pandemic. Following the outbreak of Covid-19, there was a noticeable overall increase in fishing costs, with a higher proportion of fisherfolk incurring expenses between Rs. 10,000 to Rs. 1 lakh/year. The economic impact of the pandemic, coupled with external factors such as fluctuating oil prices, has led to higher operational expenses for fisherfolk, posing potential challenges to their livelihoods. Research reveals that fisherfolk often grapple with substantial debt burdens and a lack of effective saving habits. Around 45.3% of fisherfolks carry debts ranging between Rs. 80,000 and Rs. 1 lakh, while 39.8% have debts exceeding Rs. 1 lakh. A significant number of fishermen borrow money primarily for family expenses rather than fishing, with money lenders being the predominant source of loans for marine fisherfolk (41.1%), contributing to elevated levels of indebtedness in their lives. Despite fishermen noting an enhancement in their social well-being, they grapple with various challenges in their livelihoods. One critical concern is the escalating fuel costs and the unjust pricing of their catch, as intermediaries exploit this situation. The younger generation within the community is reluctant to enter this field due to these issues, resulting in a labour shortage in the marine sector, which has been addressed by the influx of migrant labourers. Similarly, they are not yet able to deal with uncertain risks like Covid-19. Hence, it is imperative for the government to implement effective policy measures to address the challenges faced by fisherfolk in both their livelihoods and daily lives. The project was completed on 31st March, 2023.

Glimpses of the of the Survey and Data collection







XII. Business strategies and models for managing fisheries sector and marketing of fish products: A study with special emphasis on COVID- 19 Outbreak in Kerala

During the initial 3 months, literature survey was conducted to identify the theoretical aspects regarding the subject. There are not so many literature which supports the topic, so field visit was considered as the means to gather the information from the fisherfolk. As a part of field visit, different fish markets at chellanam, Vypin, Andhakaranzhy, Chambakara, Palluruthy and Thevara were visited. The survey was mainly focused on the modern hygienic fish markets which were listed by Kerala State Coastal Area Development Corporation (KSCADC).



Later on, in the year of 2022-2023, a questionnaire was framed based on the information collected through the pilot study and field visit. There were certain problems regarding the questionnaire and was reframed as per the requirement of the project. Secondary data was collected from other fisheries institutions like CIFT. Primary data was collected from the markets at Paravoor, and Thevara. working on data collection from the Ernakulam District.

XIII. MOOC (Massive Open Online Courses)

MOOC is a widely researched development in distance education, introduced in 2008 and became popular since 2012. It aims to combine the concept of distance learning and the idea of “*Education for all*”. The term 'MOOC' represents open access, global free, video based instructional content, videos, problem sets, assignments and forums released through an online platform to high volume participants aiming to take up courses. There are now thousands of MOOC available worldwide from several hundred colleges, universities and other institutions of higher learning. Learners can sign up for a variety of MOOC at no cost or reasonably low cost, study their own space, and earn educational credentials from globally recognized universities. These offer the opportunity for life-long learning and for students to engage with material that may not be available at their institution.

MOOC at KUFOS

Vision:

To provide high quality, affordable education for all

Mission:

To establish KUFOS Massive Open Online Course Platform/Centre (KUFOS *e-learning centre*), An education at platform for delivering online courses and training programmes in Fisheries, Ocean Studies and allied subjects targeting unlimited participation and open access.

MOOC Office, SWAYAMPRAKHA CLASS-ROOM and Recording facilities at KUFOS

(a)

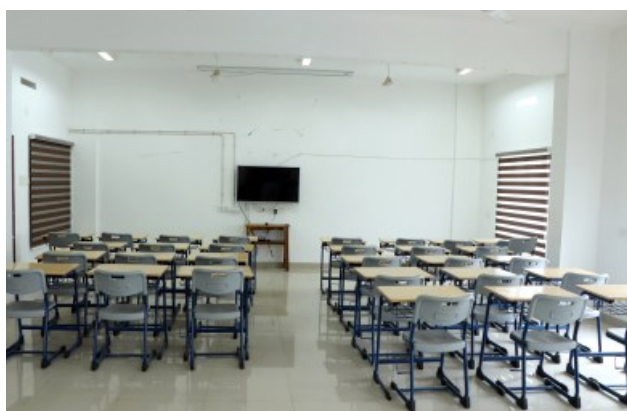


(b)



Monitor

Studio Light



Live Visual Mixer



Scanner+Printer



Wireless Lavalier microphone



8 TB external HDD



Memory cards and pendrive

Milestones Achieved:

1. Kerala University of Fisheries and Ocean Studies has been recognized as a NPTEL Local Chapter (LC ID: 4755). Dr. Maya Raman (Associate Professor, Dept. of Food Science and Technology) is recognized as a SPOC (Single Point of Contact) in NPTEL Local Chapter.
2. MOOC guidelines for credit transfer have been prepared for the University and these are in practice.
3. Steps and decisions have been taken for developing MOOC courses under NPTEL/ ICAR.
4. Purchased equipment (Laptop, Vision mixer, Camera accessories, Recording accessories, Hard-disks, Printer, Monitor etc.).



5. Infrastructure development for MOOC room-KSCADC is in progress.

6. Designing and developing MOODLE an e-learning platform for KUFOS, including certificate courses, workshops, training programmes, talks, etc.

7. Workshop attended:

(a) ICAR-NAARM training workshop “*Course Management through MOOCs*”

The ICAR-NARM training programme was attended by Dr. Maya Raman, Associate Professor and Dr. Blossom K. L., Assistant Professor. This training workshop was conducted at ICAR-NAARM from 6 to 10 June, 2022. Twenty one professors from different Universities with expertise in horticulture, agriculture and fisheries attended this programme. The course outline included development of course content, script preparation, recording using power point, editing/ graphics using Camtasia, and uploading the same to you tube. Later, hands-on training was given on moodle platform where the course needs to be developed. Different aspects of course including assignments, quiz, label, H5P, etc. were introduced. The Lab, software and administration aspects were also familiarized.

8. Workshop/ Training organized

(a) Institution level Hands-on Training on Learning Management System (MOODLE)

Organized Institution level Hands-on Training on Learning Management System (MOODLE) through online mode, in association with the Digital University of Kerala and The Kerala State Higher Education Council for the faculty from 23rd to 27th June 2022. The training was led by Dr. Santhosh H.K., Associate Professor, SreeNeelakanda Government Sanskrit College, Pattambi, and his team. This workshop provided the necessary training to the faculty of higher education institutions in the State to use MOODLE as their learning management system (LMS). In all, Forty faculty members attended this training.

(b) NPTEL Soft Skill Training Programme

The NPTEL Soft Skill Training Programme was given exclusively for Local Chapter students who have completed at least one NPTEL course successfully. This was free for all the students. Only pre-final year/final year graduates were permitted to apply for the training. The Participation certificates were provided to the students who scored a minimum of 90% attendance throughout the programme and attended the final mock interview sessions. Objectives of this training were to improve employability skills and make the candidate industry-ready. This programme included topics such as, oral communication skills, writing skills, resume building, importance of presenting oneself and interview skills, importance of social networking in the context of job search and a doubt clearing section. The training programme was held from 22nd to 27th August 2022 through online mode from 5.30pm -7.00 pm. A total of forty students were trained. On the last day, resume building with the help of the trainers was undertaken on one to one basis, followed by mock interview as the ending session. Mock Interview was held on 30th and 31st December, 2022 through online mode. The trainers shared their Social Networking ID's for assistance in future. These interactive classes were informative and helpful for the students. KUFOS also received an appreciation letter from NPTEL for coordinating this training programme in a successful manner.

9. An outline of NPTEL Approved Courses

Two courses approved and to be delivered through NPTEL platform. The details of the courses are given below:

(a) Canning Technology and Value-Addition of Seafood: -

- Duration of course: 8 weeks

- Total hours: 24
- Total credit: 2
- Course Instructors: Dr. Abhilash Sasidharan and Dr. Maya Raman

The course will provide a comprehensive knowledge on the concepts of canning technology, types of cans, machinery, processes and quality issues and value-addition in seafood.

(b) Food Packaging Technology: -

- Duration of course: 8 weeks
- Total Hours: 24 hours
- Total Credit: 2
- Course Instructors: Dr. Maya Raman and Dr. Jenny Ann John

Food being a highly perishable commodity needs a suitable packaging for extending the shelf life and preserving the nutritional quality. The course will discuss various types of packaging materials and its properties and applications. The course will also cover the regulations and standards associated with it.

XIV. Karimeen gramam

Karimeen, *Etroplus suratensis* was declared as the State Fish of Kerala in the year 2010. The well-known inland fishery for the same is on the verge of collapse due to environment degradation and destructive fishing practices. The enhancement of production can be achieved by conserving the natural resources and improving the aquaculture production. A viable backyard seed production and nursery rearing methodology was developed at KUFOS. Through proper extension and technological intervention the status of Karimeen aquaculture can be revived. This can generate viable employment opportunities at various strata like seed production, nursery rearing for fingerling production, cage/pond aquaculture, value addition, and marketing. This pilot project will be implemented at Kumbalam Panchayath, which is surrounded by Vembanad Lake the historical abode of Karimeen. The fish sanctuaries will be established in a community participatory mode after proper awareness programmes.

Significance:

Karimeen is yet to mark its significance in the aquaculture product basket of the State. It remains as an under performer compared to its vast potential. This scenario can be transformed by the proper technology transfer for seed production, nursery rearing and aquaculture. Once implemented, this will greatly contribute to the economy of the island Panchayath of Kumbalam, where many fisher families reside. The successful demonstration and implementation of the programme may attract new entrants to the field, and technological support will be extended.

Objectives:

Technology transfer, demonstration and training:

- To develop seed production centres ,
- To develop nursery rearing centres ,
- To establish Karimeen Sanctuaries ,
- To promote aquaculture (cage/pond/RAS) activities,
- To promote Value-Addition and to provide Marketing support,
- To create awareness on resource conservation.



Anticipated outcome / deliverables:

- Increased seed production of Karimeen for pond and cage aquaculture
- Increased production of Karimeen
- Employment generation - seed production, aquaculture, value addition & marketing
- Conservation of the Karimeen resource at its natural hub
- Replicable Model for easy adoption elsewhere.

Progress of project implementation in 2022-23

Highlights

- Collected base line information about the Panchayat and Aquaculture activities.
- Sample surveys were conducted to assess the socio-economic status and information needed for the project implementation.
- Project presented before the Panchayat council attended by all the ward members and President on 20.7.2022.
- Project staff were being trained in the fish breeding, larval rearing and aquaculture.
- Streamlined the procurements needed for smooth implementation of the project.

Fish markets, fisheries cooperatives, and the Dept of Fisheries were contacted to collect data about the fishers and fish farmers in the Kumbalam Panchayath. The capture and culture data of *Etroplus suratensis* was collected from traditional fishers and fish markets. Fish farms were visited and inspected for its suitability to implement the project.

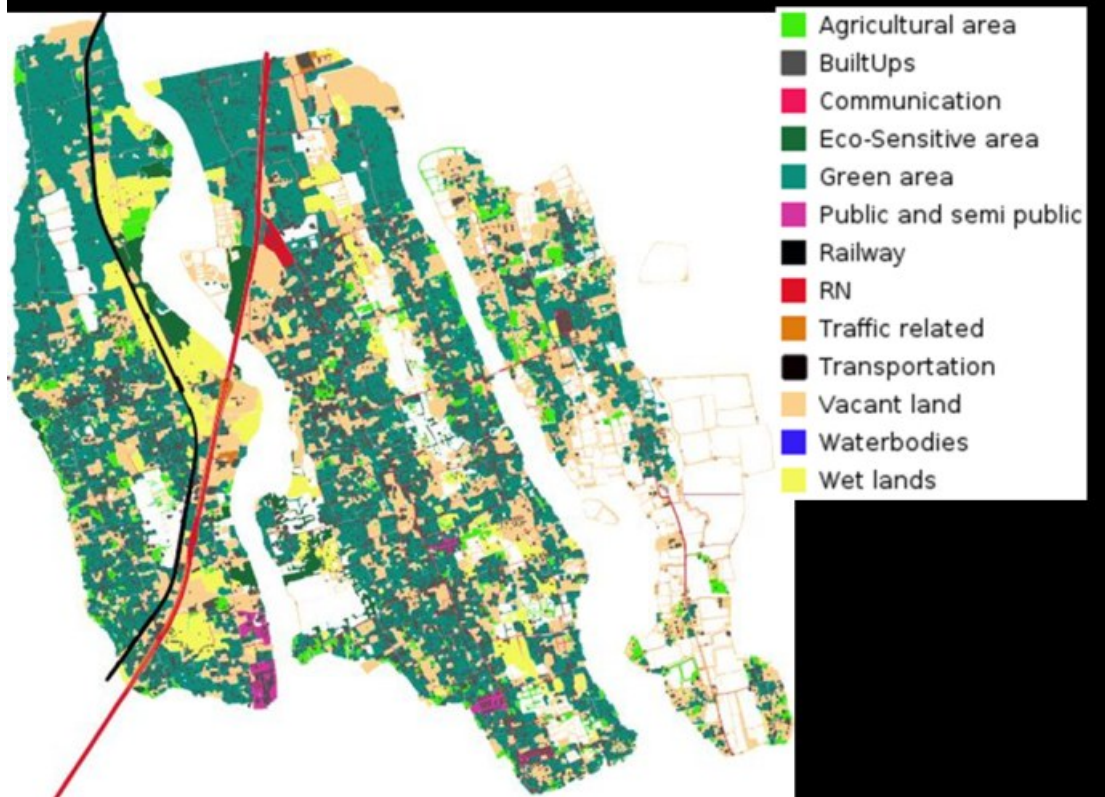
In all, thirty - five households in Kumbalam were visited for the sample survey, and among those 48% had their main income from fishing or fish farming. It was found that 82% of the sampled household preferred fish in their meals, and majority of them prefer backwaters fishes. They were found to spend around Rs.500 to Rs.1000 for 1 to 5 kg of fish per week. Most families said they can't afford karimeen due to the high price. Among the surveyed, 45% of households do not have any facilities or interest in the culture of the fish. The survey observed that majority of fishers believes that there is serious decline in fish population in Kumbalam panchayath due to water pollution and environmental changes.

The availability of Karimeen now averages around 2 to 3 kg per week for each fishers and market information gives an average monthly landings of 750 to 950 kg. Karimeen is available throughout the year, but declines during the monsoon season, wherein it declines to 450 to 500 kg per month. Fifteen fish farms were inspected for the settingup of karimeen seed production units

The technical implementation part of the project was completed (technology development, interactions with the Kumbalam panchayat, designing systems required, streamlining procurement of feeds, accessories etc.) and two meetings were held with the Kumbalam Panchayath President K S Radhakrishnan. He invited to present the project in the Panchayat council meeting held on 20.7.2022. The project was presented with an introductory remark by the Director of Extension, Dr. Daisy Kappen. The queries raised by the ward members were answered, and they welcomed the project. Panchayath also extended support to the establishment of Karimeen sanctuary in the backwater area adjoining KUFOS campus. The modalities for the same will be worked out in the second year of the project implementation. Procurement of tanks for producing and rearing the Karimeen seeds are progressing and necessary purchase orders were issued to the party (about 5 lakhs). The field implementation of project is awaiting the

recruitment of project staff (1 SRF + 2 TA) for which notification was called for recently. Once recruitment is done, exhaustive survey will be done for finding suitable areas for Karimeen farming (one month). After this, awareness and orientation programmes will be organised with the potential beneficiaries. Applications received from the beneficiaries attending the programmes will be verified on the field and the short list of beneficiaries will be prepared.

Area in Sq. Km	Population	Density of Population	Wards	No of House Holds
20.79	42,852	2061.18	18	10,652



**Site visits at Kumbalam grama Panchayat
Name: Anoop Ward :12 Total area: 50cent**



Name: Sethu, Ward: 18, Total Area: 5Acre



XV. Centre for Studies on Gender Concerns in Fisheries and Entrepreneurship Development

The centre would act as an axis to study the Gender issues in Fisheries sector and to recommend suggestions to overcome these issues along with bringing about gender sensitivity and gender perspective in research, extension and educational efforts in fisheries and allied fields set in the larger context of natural resource management. The center also focuses on increasing and facilitating women's role and participation in fisheries development along with men and attaining gender justice in the context of the planned efforts in the socio-economic development in Kerala. As part of the project, the following programmes were conducted.

1. Awareness programme on “seafood based entrepreneurship opportunities”

One-day Awareness Programme on "Seafood-based entrepreneurship opportunities" was conducted on 30th August, 2022 at Karuvatta, Alappuzha District, Kerala. The programme was commenced with a formal inauguration, followed by a lecture session on "Entrepreneurship opportunities in seafood value-addition" by Dr. Abhilash Sasidharan. Prof.(Dr). Radhika Rajasree, HOD, Department of Fish Processing Technology, delivered a talk on "Seafood valorisation and byproduct development". Afternoon session included a lecture on "Chilling and freezing technology for seafood products" by Dr. Shyni K., Asst Professor and Principal Investigator of the project followed by a talk on retail marketing by, Shri. T R Ananthanarayan Iyer, Managing Director, Foodastha, Nettoor. A total of 12 participants attended the programme. The programme came to an end by 4.30pm.

Session on Entrepreneurship Opportunities in Seafood Value-addition



Session on chilling and freezing technology for seafood products



2.Awareness Programme on “Seafood-based Entrepreneurship Opportunities”

One-day Awareness Programme on "Seafood based entrepreneurship opportunities" was conducted on 20th November, 2022 at Engandiyoor, Thrissur District, Kerala. A total of 34 participants attended the programme. The formal session started by a lecture on "basic seafood preservation methods" by Dr. Shyni K, Principal Investigator of the project followed by a talk on "Seafood based value-added products" by Mrs Ahana Vijayan, SRF of the project. Principal Investigator of the project also delivered a talk on "Entrepreneurial opportunities in fish processing sector" during the afternoon session. A demonstration of pre-processing and development of value-added fish products was carried out in the afternoon session and the programme came to an end by 4.30pm.

3.Awareness programme on “Seafood-based Entrepreneurship Opportunities”

One-day Seafood Awareness Training programme on "Seafood-based entrepreneurship opportunities" was conducted on 30th January 2023 at Thalikkulam, Thrissur District, Kerala. Morning session started with a lecture on "Basic seafood preservation methods" by Dr. Shyni K. A talk on "seafood based value added products" was given by Mrs. Ahana Vijayan, SRF, CEFPT, KUFOS, followed by a session on "Entrepreneurial opportunities in fish processing sector" by Dr. Shyni K, Principal Investigator of the project. Demonstration of pre-processing and development of value added fish products was carried out in the afternoon session and the programme came to an end by 4.30pm. In all, thirty-one participants attended the awareness programme.

Session on Seafood Based Value-added Products



Session on “basic seafood preservation methods” by Dr. Shyni K

Demonstration of Pre-processed Marinated products



Product Demonstration





Other Extension Activities

1.Green Fest-2022

Kerala Agricultural Development Society (KADS), Thodupuzha is a registered charitable society working for the welfare of the farmers since 2001. They are providing marketing facilities for the farm produces and value added products by avoiding middlemen exploitation. Kerala Agri Development and sustainable producer company limited (KADS PCL) was registered in the year 2017 to get more benefits to its farmer members which was promoted by its parent organization KADS. Every year KADS and KADS PCL is organizing "Green Fest" which is the seed festival. This programme was not conducted for the last two years due to covid during the year 2022 they informed in that they are celebrating in the month of April 2022 starting from the date of "Pathamudayam", promoting traditional farming method of Njattuvella, a farming based on climate to ensure good productivity and quality and during this celebrations they supplies quality seeds and seedlings and organic inputs. They give recognition to farmers, organise training programmes, seminars, competitions and cultural programmes. The organisers decided to conduct it from 21st April to May 1st 2022 at Thodupuzha and requested to depute a suitable person to engage classes for the farmers on "fish farming". Based on their request Prof. (Dr.) Daisy C Kappen Director of Extension engaged classes on "diversified aquaculture practices" to farmers on 30th April 2022 .



2.World Ocean Day Celebrations

a) Beach clean up

Dr. V.P. Limna Mol and Dr. K.G. Nevin, Department of Marine Biosciences, FOST, KUFOS organised several events as a part of World Ocean Day Celebrations from June 7th to 8th. A Beach clean up initiative was taken up by the Department and the students cleaned up the Mararikulam Beach, Alapuzha. A talk by Dr. R. Senthil Kumar, Scientist-D, CMLRE was also organised on the topic. Off-stage events like poster competition and quiz were also conducted.

Beach clean up by KUFOS students



മാരാരിക്കുളം കടപ്പുറം വൃത്തിയാക്കി കുറുമ്പു വിദ്യാർത്ഥികൾ

മാരാരിക്കുളം കടപ്പുറം ലോക സമുദ്രദിനാചരണത്തിന്റെ ഭാഗമായി കേരള ഫിഷറീസ് സമുദ്രപഠന സർവകലാശാല(കുറുമ്പു)യിലെ വിദ്യാർത്ഥികളുടെ നേതൃത്വത്തിൽ മാരാരിക്കുളം കടപ്പുറം ശുചിയാക്കി. എം.എസ്.സി. മഹൈൻ ബയോളജി വിദ്യാർത്ഥികളാണ് പ്ലാസ്റ്റിക് മാലിന്യങ്ങളും കോവിഡ് മാസ്ക് നീന്തെ മാരാരിക്കുളം കടപ്പുറം വൃത്തിയാക്കിയത്. 31 വിദ്യാർത്ഥികൾ പങ്കെടുത്തു. മാരാരിക്കുളം വടക്ക് പഞ്ചായത്തം ഗം ജെസി ജോസി ഉദ്ഘാടനം ചെയ്തു.

മാരാരിക്കുളം കടപ്പുറം വൃത്തിയാക്കിയശേഷം കുറുമ്പു വിദ്യാർത്ഥിസംഘം അധ്യക്ഷതയ്ക്കൊപ്പം അധ്യാപകരായ ഡോ.കെ.ജി. നെവിൻ, ഡോ.വി.പി. ലിനാമോൾ, ചേർത്തല അസിസ്റ്റന്റ് ഫിഷറീസ് ഓഫീസർ ഐക്യൻട്രൽ ഓഫീസർ ലീന ഡെനിസ് എന്നിവർ നേതൃത്വം നൽകി.



b) Study Tour

A study tour was organized by Dr. V.P. Limna Mol, Department of Marine Biosciences, FOST, KUFOS to Kadalundi Community Reserve and Dharmadom. on 25th March 2022. The biodiversity of the marine habitats found in these places were studied and samples were collected.



3. Fish Farmers Day-National Campaign on "Emerging Aquaculture systems practices"

It was in 2001 that the Government of India declared July 10th as "Fish Farmers Day" to honour the scientists, Hiralal Choudhary, and Dr.K.H.Alikunjhi who successfully conducted induced - breeding in Indian major carps during the year 1957. Every year KUFOS is celebrating "Fish Farmer's Day" in a befitting manner and as directed by the ICAR, a campaign on "Emerging Aquaculture Systems and Practices" was organized as part of the celebrations of 'Azadi Ka Amrut Mahotsav', on 10th July 2022. A one-day training programme was also conducted for the fish farmers on that day.

The programme was Inaugurated by Prof.(Dr.)K Riji John, the honourable Vice Chancellor of KUFOS and presided over by Dr.B Manojkumar, Registrar, KUFOS. Prof. (Dr.) Daisy.C.Kappen, welcomed the dignitaries and participants to the programme. Dr. Rosalind George Dean, Faculty of Fisheries Science gave an overview of fish farmers day to the participants of the training programme. Dr. Devika Pillai, Director of Research and Shri. Joby George, Finance Officer offered felicitations. After the inaugural session, Dr. K. Dinesh, HoD, Aquaculture engaged a session on "Introduction to emerging trends in aquaculture" followed by a session on "Cage aquaculture and Pen culture" by Dr. Daisy C Kappen,

Director of Extension. Dr. G.B. Sreekanth, Scientist, CCARI, Goa delivered a talk on "Fish based integrated farming systems" and Smt. Zeenamol Das, Senior Manager of Kerala Grameen Bank delivered a lecture on "Loans for fish farmers" Mr. Arundas a young entrepreneur engaged a session on "biofloc farming". Response from the participants was collected and a farm visit was also organized at the end of the training programme. During the farm visit activities of the carp hatchery and pearlspot hatchery were explained to farmers in detail by Dr. Binu Varghese. The programme concluded at 04.30 pm.

The Honourable Vice-Chancellor, KUFOS inaugurating Fish Farmers Day



4. A one-day workshop on "Fisheries and Ocean-Based Extension in Kerala"

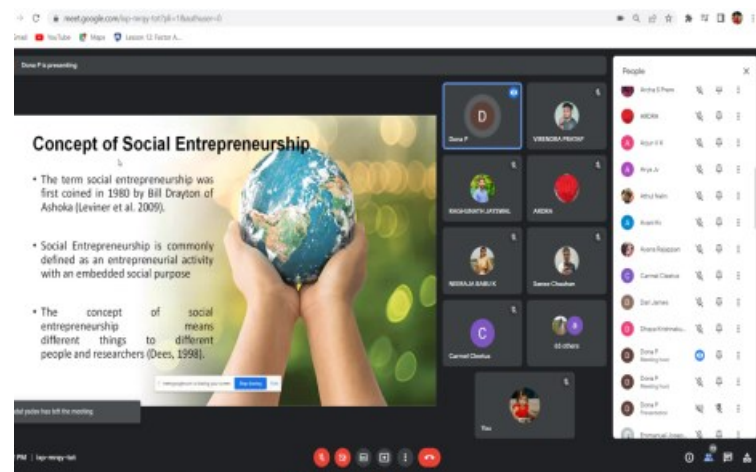
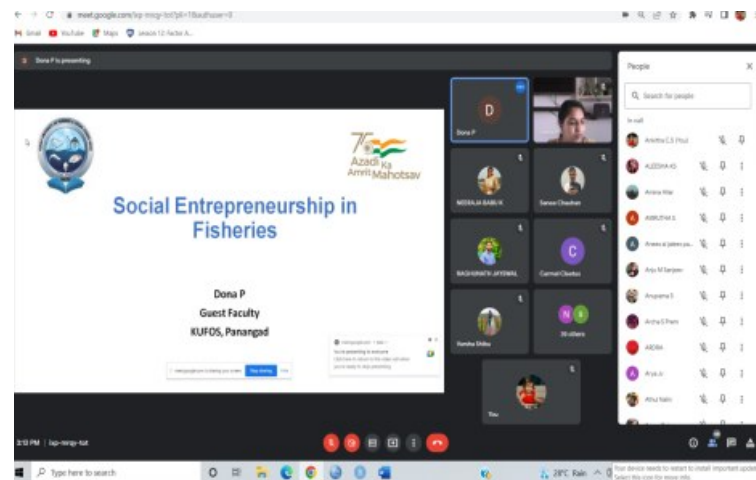
For strengthening the extension activities of KUFOS in the field of fisheries and ocean science, a one-day workshop on "Fisheries and Ocean-Based Extension in Kerala" for all the faculties of KUFOS was organised at KUFOS Headquarters on 6th August 2022. Prof. (Dr.) Daisy C Kappen, Director of Extension, welcomed the gathering. Prof.(Dr.) Riji John inaugurated the programme and Dr B Manojkumar, Registrar presided over the function. Dr. C Ramachandran, Principal Scientist CMFRI and member of the Extension Council delivered a talk on the above topic and clearly pointed out the different sectors in the field of fisheries and ocean science in which the faculties working in their respective sectors can discharge their extension services to the community in an efficient manner. The workshop

provided an idea about the concept of extension, need for extension services, methods of transfer of technologies in the field of fisheries which has already been identified as one of the most backward sectors.



explaining the differences between commercial entrepreneurship and social entrepreneurship. She also explained evolution of concept of entrepreneurship over different centuries. The session provided a clear picture of the concept social entrepreneurship. In addition to this, she also explained some of the famous social entrepreneurs across the world and briefed about the need for social entrepreneurs in the fisheries sector. The speaker also explained a case study of social entrepreneurship in Vembanad Lake. In the concluding remarks, she pointed out the importance of social entrepreneurship in fisheries and also about the financial aid by Central and State government to promote entrepreneurship. At the end of the programme a discussion was also arranged to clear up the doubts of the participants, and the programme ended at 4pm.

Speaker led conducting the session



5. Azadi ka Amruth Mahotsav- lecture on the topic 'Social Entrepreneurship in Fisheries'

As per the decision of Government to commemorate the 75th year of India's Independence as *Azadi Ka Amrit Mahotsav*, Kerala University of Fisheries and Ocean Studies, Panangad organized a lecture on the topic 'Social Entrepreneurship in Fisheries' on 6th August 2022 at 3pm on the virtual platform - Google meet. Mrs. Dona P, Guest Faculty, Fisheries Extension Economics and Statistics Division, Faculty of Fisheries Science, KUFOS conducted the session. The lecture session was organized well with the presence of 74 participants, including both students and faculty members. The session started at 3pm by giving a small introduction about *Azadi Ka Amrit Mahotsav*. The speaker led the session by

6. Cup of Life Programme

Kerala University of Fisheries and Ocean Studies (KUFOS) joined hands with IMA Cochin and the District Administration, Ernakulam to realize the Cup of Life movement by Sri. Hibi Eden, MP to revolutionize the society by spreading awareness about menstrual hygiene. As a run-up to the main event, door-to-door awareness campaign was held inside KUFOS campus by Cup of Life and NSS volunteers on August 25th and 26th, 2022. The Cup of life programme at KUFOS was inaugurated by the Honourable Vice-Chancellor, Dr. K. Riji John in the Academic Block lobby at 10 am on 31st August 2022. Nodal officer Dr. V. P. Limna Mol, Assistant Professor delivered the welcome address and Registrar Dr. B. Manoj Kumar presided over the function. Dr. Devika Pillai, Director of Research, Dr. Daisy C. Kaapen, Director of Extension, and Dr. Rosalind George Dean, Faculty of Fisheries, offered facilitations. The Honourable VC and the dignitaries distributed menstrual cups to the students to mark the inauguration of the programme. Dr. Rejish Kumar, Assistant Professor and NSS Coordinator proposed the vote of thanks. As part of the programme, the volunteers from KUFOS, Akhila Raj P., B.F.Sc. 2019, Dhaya K., B.F.Sc. 2019, Athulya Babu, B.Tech. 2019, Farhan H, B.Tech. 2019, Anju M. Sajeev, MFSc. Fish Processing Technology, Mariyam Johna J, M.Sc. Marine Biology, Aathithya Ajikumar, M.Sc. Biotechnology and Ayana P.P., FOST Research Scholar imparted training to the 855 registered participants and distributed menstrual cups. The participants included students, faculty members, administrative staff, cleaning staff and farm labourers of KUFOS. Detailed discussions were held with the participants on the use and advantages of menstrual cups. The programme was successfully organized, and the training and distribution of menstrual cups was completed by 4 pm



7. Kissan Samman Nidhi

ICAR had directed all Aus/ Instts/ KVKs to make arrangements for the web telecasting of the programme- live streaming of the programme "PM Kisan Samman Sammelan 2022" on 17th October 2022 by the honorable Prime Minister of India. It was also informed that he shall address the farmers and scientists, teachers on that day. In this connection all Vice-Chancellors were requested to ask their faculty, KVKs and invite farmers to campus for attending the programme. As per the direction of the honorable Vice-Chancellor, KUFOS, Directorate of Extension had made arrangements for the web telecasting of the programme in KUFOS Seminar hall. Teachers students farmers, Panchayat ward members, among others, attended the programme. The programme started at 12.30pm. Altogether 75 participants including farmers and officials attended the programme

Web Telecasting of the Prime Minister's talk on 17/10/2022



8. Celebrating Indian democracy- a talk on "India; The mother of Democracy"

As per the request of the UGC to His excellency the Governor of Kerala, as part of celebrating Indian Democracy, His excellency, The Governor of Kerala directed all Universities to organize lectures on the theme "India; The Mother of Democracy" on 26th November, 2022. The Honourable Vice Chancellor i/c of KUFOS entrusted the Director of Extension and Associate Patron of the University to conduct a talk on the above topic to the students. As the said date

was a holiday for the University, the lecture was organized at 4 pm on 28th November 2022. Dr. Arjun M, M (Political Science), an eminent speaker in this field, working as Assistant Professor at Sree Narayana College, Nattika, was invited for delivering the talk. The programme was conducted on 28th November 2022 at KUFOS Seminar hall. Dr. Arjun started his talk by pointing out the significance of our constitution which binds us together as Indians not only as a legal document but also as the socio-political manifesto. He mentioned the extraordinary efforts of making such a revolutionary constitution including the famous Constituent Assembly debates. He emphasized that Democracy, as a way of life, rather than a form of government and continued that Majoritarianism is not democracy, it is only a practical strategy to implement representative democracy, with focus on 'by the people' than 'for the people', from subject to citizenship. He explained the inclusive nature of democracy and freedom to resist. Quoting specific examples from the experiences of former Election Commissions, he explained India's successful story of elections incomparable with the rest of the world, India performing the largest democratic experiment in the world with 90 crore voters, which finally proves, the mother of Democracy. His talk included the views of Constitutional morality and significance of local self-government in India.

At the end of the programme, the students and faculties of KUFOS interacted with the resource person for more clarification on different aspects and additional information on constitutional matters.

Talk by Dr. Arjun M, Asst Professor, S N College, Nattika



Oath-taking by the staff on Constitutional Day



9. Agricultural Education Day-Open Day on December 3rd 2022

Indian Council of Agricultural Research (ICAR) has directed to observe the 3rd December of every year as "Agricultural Education Day" which is the birthday of the first Union Minister for Agriculture of India who adorned the position on 15 August 1947, and as the first President of independent India, Bharath Ratna, Dr. Rajendra Prasad. It was also directed that the day be celebrated by inviting school children to the University, and they be engaged in a day-long activities as debate competition, essay-writing, exhibitions, interaction with the Agricultural Scientists, policy makers etc. and exposition to inspiring lectures by reputed professionals.

KUFOS has been celebrating Agricultural Education Day since 2016 in a befitting manner by inviting the students from various schools, colleges etc. and providing an opportunity to them to familiarize themselves with the activities and achievements of the University in teaching, research and extension. Such an approach would definitely, help in developing interest among the students in aquaculture and allied sectors of fisheries and also for choosing fisheries as their professional career, and create enthusiasm to engage themselves in the relevant sectors of fisheries for research and development. As part of the celebrations, the University used to open all its facilities for the students, faculty, staff and public for familiarizing themselves with the various aspects of fisheries and aquaculture to the stakeholders.

In the current year, an “Open Day” function was conducted on 3/12/2022. Students of various schools and colleges, including the public, were invited to the University campus for providing an opportunity to them to familiarize themselves with the activities of the University in the field of teaching, research and extension. An inaugural function was organized at the beginning of the celebrations. Prof. (Dr.) M. Rosalind George, The Hon'ble Vice - Chancellor i/c inaugurated the celebrations of the “Open Day” at 10.00 am in the western campus of KUFOS. Prof. (Dr.) Daisy C Kappen, Director of Extension welcomed the gathering and Prof. (Dr.) B Manojkumar, Registrar i/c presided over the function. Prof. (Dr.) Devika Pillai, Director of Research offered felicitations. As part of the celebrations, an exhibition, student teacher interaction, lecturers, etc. were organized. The public aquarium of KUFOS was opened to the visitors without charging the admission fee. A sales counter was specially opened for ornamental fishes, food fishes, value-added fisheries products etc. for selling these products at subsidized rates to the students and public. A drawing competition for the students on the theme, “Integrated Farming” was organized which attracted a large number of students. Students were given a chance to visit the aquaculture farms on the western campus wherein different aquaculture techniques were explained and demonstrated to them. The traditional food items like “Tapioca fish curry” and “sour butter milk” were prepared and served to the visitors. Altogether 600 students, teachers and public visited the University on the day. Dr. Dinesh Kaippilly, Professor and Head, Department of Aquaculture, proposed the vote of thanks.

Glimpses of the celebrations of the “Agricultural Education Day” on December 3rd 2022





10.Sustainable Agricultural Development programme

For preparing an Action Plan for the “Sustainable Agricultural Development of Thrithala constituency” a meeting was organised at Block Panchayat community hall, Kootanad on February 26th 2022. Speaker of the Legislative Assembly, Sri. M B Rajesh presided over the function. Based upon the survey conducted and resources on available in this area, scientists and other experts from various fields viz. agriculture, livestock, fisheries etc. explained the possibilities of their respective fields for the sustainable development of the Thrithala constituency. Prof.(Dr.)Daisy C Kappen Director of Extension delivered a talk on “Possibilities of Aquaculture and allied activities for the sustainable fisheries development in Trithala constituency”

Prof.(Dr.)Daisy C Kappen delivering a talk on “Possibilities of Aquaculture and allied activities in Trithala constituency”



11. Radio talks by the Faculties

Sl.No.	Name of the Faculty	Topic	Date of Recording
1.	Dr. Dona P	Possibilities of fish farming in Kerala	3/11/22
2.	Smt. Shalumol Salas	Principles of Aquaculture	3/11/22
3.	Dr. P H Anwar Ali	Snakehead -a Candidate species for aquaculture in Kerala	3/11/22
4.	Dr Binu Varghese	Seed production and culture of pearlspot	4/11/22
5.	Smt. K Harsha	Possibilities of Mussel farming in Kerala	3/11/22
6.	Dr. Safeena M P	Importance of disease management in fish farming	4/11/22
7.	Dr. K Dinesh	Vanmaei shrimp farming	7/11/22
8.	Smt. Amritha R Krishnan	Integrated fish farming	7/11/22
9.	Dr. Gijo Ittoop	Cage Aquaculture	7/11/22
10.	Mr. Arundas N H	Biofloc farming	7/11/22
11.	Miss Aswathi T	Fish farming in silpaulin tanks	7/11/22
12.	Miss. Chandana B L	Prospects of ornamental fish farming	7/11/22

CONCLUSION

Conclusion

Kerala University of Fisheries and Ocean Studies (KUFOS), the first Fisheries University in the country was established for the development fisheries and ocean studies in the State of Kerala. The University has excellence in the field of teaching , research and extension so far. Department of Extension under KUFOS, at present, is implementing 14 extension projects funded by Government of Kerala aimed at the integrated development of the community, viz. social, cultural, financial etc. These projects significantly contributed to improving the quality of life of the fisherfolk and fish farmers and also helped in enhancing their socio-economic status and welfare. The projects like "Village Adoption for empowerment and Capacity-building ensuring livelihood of Fisherfolk in Central Kerala" aimed at empowering the fish farmers of the Panchayats also helped in preserving the indigenous fish species that are facing threat leading to their extinction.

The Directorate of Extension has introduced an environment - friendly farming system focusing freshwater fish/prawn culture, brackish water fish/shrimp culture, ornamental fish culture, cage culture integrated farming etc. by utilizing the water resources available in private and public sectors of the villages. Besides being efficient in transfer of relevant technology to the fisherfolk, including women beneficiaries, it was with a gender-sensitive approach that the projects were implemented. Through constant and continuous effort the rate of adoption of the technologies by the farmers in the adopted villages increased to a great extent and the technology gap existing at present between the research system and the farmers could be minimized.



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PANANGAD, KOCHI