



5th International Symposium on Cage Aquaculture in Asia



CAA5

25-28 November, 2015
Kochi, India



Programme Guide

**Cage
Aquaculture
for Food
Fortune
&
Future**

CAA5

5th International Symposium on
Cage Aquaculture in Asia

25-28 November, 2015

Hotel Radisson Blu

(Formerly Dream Hotel)

Elamkulam, Kochi, India

The Venue

Hotel Radisson Blu

(Formerly Dream Hotel)

Centrally located on the arterial SA Road, the Radisson Blu offers visitors to Kochi a convenient, comfortable and cosmopolitan experience. Less than ten minutes drive from Ernakulam Junction railway station and the Vyttila mobility hub, the hotel also offers convenient access by road to Kochi International Airport. Facilities include a 24 hour coffee shop, fine dining restaurants offering both Asian and continental cuisine, a spa and three themed lounges. The conference facilities include Convention Center, Banquet Hall, Conference Hall and Boardroom

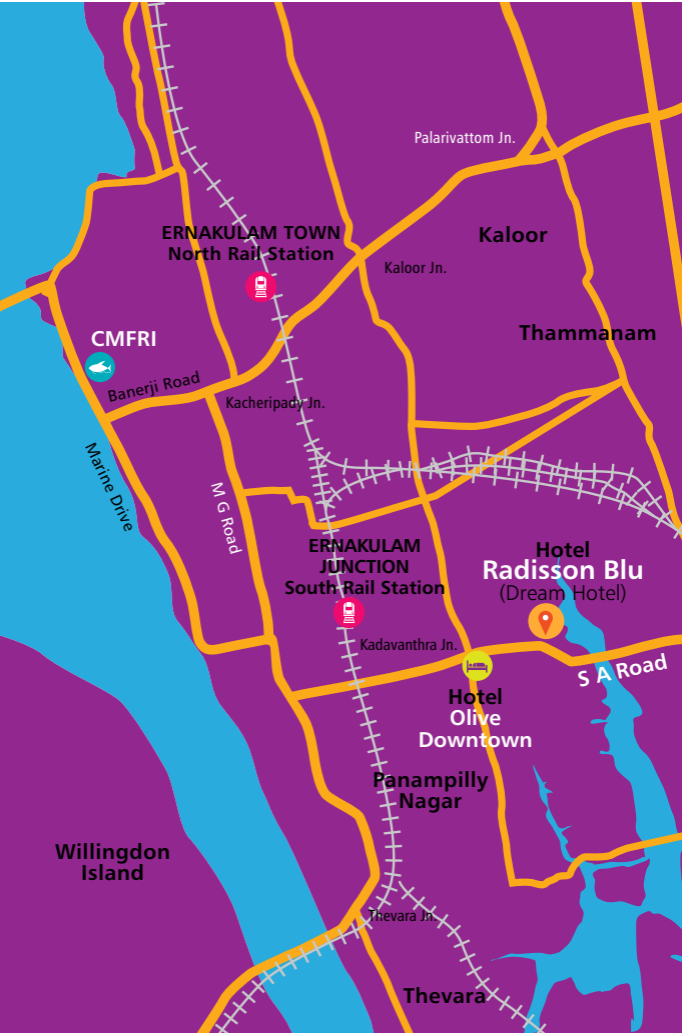
Tel: (+91-484) 4129999

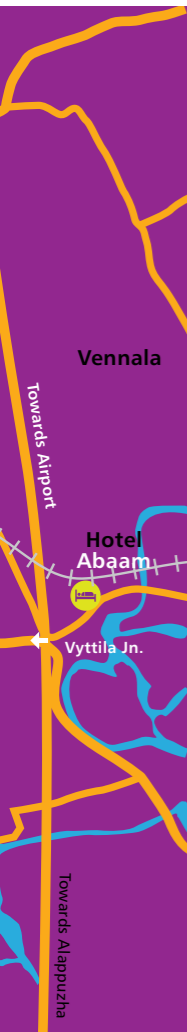


Contents

How to Reach the Venue	6
Symposium Halls - Layout.....	8
CAA5 Programme Schedule	9
Technical Sessions	9
Session I	9
Session II	10
Session III	11
Session IV	12
Session V.....	13
Session VI.....	14
Poster Sessions.....	15
I. Marine production systems	15
II. Inland production systems	17
III. Breeding and seed production.....	18
IV. Nutrition and feed	18
V. Health and environment management	19
VI. Economics, livelihood and policies	21
List of Exhibitors.....	22
CAA5 Committees & Chairpersons.....	23
Cultural Programme	24
Tourist Destinations	26
Important Telephone Numbers	28

How to Reach the Venue





The Venue

Hotel Radisson Blu



Accommodations



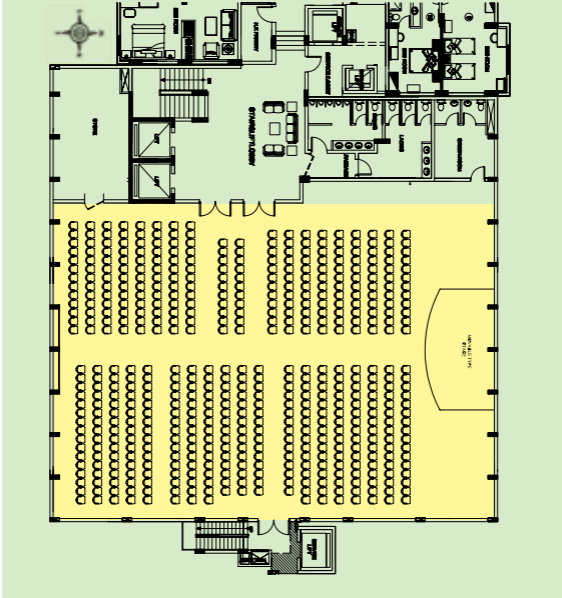
CMFRI



Rail Stations

Symposium Halls - Layout

Conference hall (14th floor)



Exhibition hall (12th floor)



CAA5 Programme Schedule

25 November 2015, Wednesday

REGISTRATION 08:00 - 09:30 hrs

Inauguration 09:30 - 11:05 hrs

High Tea 11:05 - 11:45 hrs

Symposium Theme Lecture

11:45 - 12:15 hrs **Greening the Asian cage aquaculture construct**
Mohan Joseph Modayil (India)

Technical Sessions

Session I

12:15 - 15:55 hrs **Marine Production Systems**
Chairs: Ketut Sugama (Indonesia)
C. N. Ravishankar (India)
Rapporteurs: Sujitha Thomas, M. Muktha

Keynote Address

12:15 - 12:35 hrs **Cage aquaculture prospects in India**
Leena Nair (India)

Lead lectures

12:35 hrs **Automation in cage operations and new designs**
Trond Severinsen (Norway)

12:50 hrs **Development of a viable cage farming system for marine finfish production in India: the way forward**
G. Gopakumar (India)

Lunch & Poster Session 13:05 - 14:05 hrs

14:05 hrs **Prospects and challenges in seacage farming in tropical Asia**
Niels Svennevig (Vietnam)

14:20 hrs **Cage culture of lobsters in Asia**
Clive Jones (Australia)

MPS-O 01 to 08

14:35 hrs MPS-O 01 **Innovations in cage farming along the west coast of India: a regional approach**
Philipose, K. K.*, Syda Rao, G., Krupesha Sharma, S. R., Jayasree Loka, Senthil Murugan, T., Vaidya G. Narayana, Sonali S. Mhaddolkar, Srinivasa Rao, K. and Praveen Dube

14:45 hrs MPS-O 02 **Advances made by RGCA in open sea cage culture of Asian seabass *Lates calcarifer* in India**
Damodar. P. N.*, Johnson D' Cruz and Thampi Sam Raj, Y. C.

14:55 hrs MPS-O 03 **Cage culture in the northern Persian Gulf**
Hamid Rezaï*, Mohammed Hosseiny, B., Hesam Haji Mirza and Mehrdad Shekarkarchi

15:05 hrs	MPS-O 04	An introduction to spatial planning for sustaining small scale cage culture and integrated aquaculture Dineshbabu. A. P.*, Sujitha Thomas, Rajesh, K. M., Shailaja, S. and Prathibha Rohit
15:15 hrs	MPS-O 05	Preliminary study on cage culture of cobia <i>Rachycentron canadum</i> in the Gulf of Mannar, Thoothukudi, Tamil Nadu Felix, N.*, Balamurugan, U. and Arasamuthu, A.
15:25 hrs	MPS-O 06	Culture of juvenile spiny lobster <i>Panulirus polyphagus</i> in open sea cages in Maharashtra Veerendra Veer Singh*, Imelda Joseph, Anulekshmi Chellappan, Punam A. Khandagale, Nilesch A. Pawar, Vaibhav D. Mhatre, Thakur Das, Ramkumar, S. and Purushottama, G. B.
15:35 hrs	MPS-O 07	Growth of hatchery produced green mussel spat integrated with finfish culture in open sea cage: implications for integrated multitrophic aquaculture (IMTA) Laxmilatha, P.*, Pattnaik, P., Prasada Rao, M. and Ritesh Ranjan
15:45 hrs	MPS-O 08	Advances made by RGCA in cage farming of cobia <i>Rachycentron canadum</i> in India Johnson D' Cruz.*, Damodar. P. N. and Thampi Sam Raj, Y.C

Session Conclusion 15:55 - 16:05 hrs

TEA BREAK 16:05 - 16:15 hrs

Session II

16:15 - 18:30 hrs	Inland Production Systems Chairs: Alice Ferrer (Philippines), J. K. Jena (India) Rapporteurs: Molly Varghese, Ritesh Ranjan
Keynote Address	
16:15 - 16:35 hrs	Enclosure aquaculture in inland waters of India V. V. Sugunan (India)
Lead lectures	
16:35 hrs	Responsible cage fish farming: integrated approaches K. G. Padmakumar (India)
16:50 hrs	Cage aquaculture in inland open waters of India: retrospect and prospect A. K. Das (India)
17:05 hrs	Cage aquaculture in reservoirs: the Indian experience Uttam Kumar Subuddhi (India)
IPS-O 01 to 06	
17:20 hrs	IPS-O 01 Present status, potential and prospects of cage culture for fisheries enhancement in Indian reservoirs Sharma, A. P., Sarkar, U. K.*, Mishal P., Karnatak, G. and Das, A. K.

17:30 hrs	IPS-O 02	Cage culture of catfish <i>Pangasianodon hypophthalmus</i> in Krishnarajasagar Reservoir, Karnataka: a case study Krishna Rao, D. S.*, Ramakrishna, N. R., Nagaraju, P., Ramakrishna, Jagadeesh, B. R. and Karthikeyan, M.
17:40 hrs	IPS-O 03	Effect of stocking density on growth of <i>Tor khudree</i> fingerlings in floating cages in the Kerwa Reservoir, Madhya Pradesh Uttam Kumar Subuddhi*, Rajesh Kumar Choudhary, Nirmal Biswas, Archan Kanti Das and Rohan Kumar Raman
17:50 hrs	IPS-O 04	Prospects for cage culture of the exotic carp <i>Barbonymus gonionotus</i> in a freshwater composite fish farming system in Birbhum District, West Bengal Das, B. K.*, Roy, A. K., Rout, S. K., Trivedi, R. K., Chowdhury, S. and Sahu, S.
18:00 hrs	IPS-O 05	Cage culture of groupers in protected bays and creeks of the Andamans Dam Roy, S.*, Krishnan, P., Kamal Sarma, Grinson George, Murugesan, S. and Benny Varghese
18:10 hrs	IPS-O 06	Cage culture as a new avocation for women empowerment: a case study Shoji Joseph*, Imelda Joseph and Bobby Ignatius

Session Conclusion 18:20 - 18:30 hrs

Cultural Programme Followed By Dinner 19:00 hrs

26 November 2015, Thursday

Session III

09:30 - 11:55 hrs	Breeding and seed production Chairs: Niels Svennevig (Vietnam), S. D. Tripathi (India) Rapporteurs: Rema Madhu, P. R. Divya
Keynote Address	
09:30 - 09:50 hrs	Recent advances in breeding and seed production of marine finfish G. Gopakumar (India)
Lead lectures	
09:50 hrs	Cage aquaculture in Asia: can lessons be learned from the Norwegian salmon story? Asmund Bjordal (Norway)
10:05 hrs	Cage aquaculture in Indonesia Ketut Sugama (Indonesia)
10:20 hrs	DNA extraction and next generation sequencing applications in caged fish farming C. N. Ramchand (India)

BS-O 01 to 06

10:35 hrs	BS-O 01	Hatchery seed production and cage farming of tiger grouper <i>Epinephelus fuscoguttatus</i> in Andaman and Nicobar islands Thinesh Santhar, D.*, Vijayakumar, S. and Thampi Sam Raj, Y. C.
-----------	---------	--

10:45 hrs	BS-O 02	Development of low cost recirculatory system for marine finfish broodstock maturation Ritesh Ranjan*, Biji Xavier, Sekar Megarajan, Biswajit Dash and Shubhadeep Ghosh
10:55 hrs	BS-O 03	Advances made by rgca in breeding and seed production of cobia <i>Rachycentron canadum</i> Dhandapani, K.*, Johnson D' Cruz and Thampi Sam Raj, Y. C.
TEA BREAK 11:05 - 11:15 hrs		
11:15 hrs	BS-O 04	Micron meshed cages for nursery rearing of hatchery produced green mussel <i>Perna viridis</i> spat Anil, M. K.*, Mary Rinju, R., Raju, B., Hillary, P. and Leslie, V. A.
11:25 hrs	BS-O 05	Domestication and broodstock development of orange spotted grouper <i>Epinephelus coioides</i> in land based recirculatory systems Biji Xavier*, Ritesh Ranjan, Sekar Megarajan, Biswajit Dash, Loveson Edward and Shubhadeep Ghosh
11:35 hrs	BS-O 06	Satellite nursery rearing of Asian seabass <i>Lates calcarifer</i>: bridging the gap between hatchery and the farmer Kailasam, M.*, Krishna Sukumaran, Aritra Bera, Makesh, M., Babita Mandal, Rekha, M. U., Prem Kumar, Gouranga Biswas, Subburaj, R., Thiagarajan, G. and Vijayan, K. K.
Session Conclusion 11:45 - 11:55 hrs		

Session IV

12:05 - 14:55 hrs	Nutrition and Feed Chairs: Nguyen Huu Dung (Vietnam), G. Gopakumar (India) Rapporteurs: Joe K. Kizhakudan, Biji Xavier	
Keynote Address		
12:05 - 12:25 hrs	Indian aquaculture feed industry and its support to cage farming P. E. Vijayanand (India)	
Lead lectures		
12:25 hrs	Global scenario of feed and nutrition in cage culture Kristoffer Lunde (Norway)	
12:40 hrs	Application of micro-feeds in marine finfish culture in Vietnam Nguyen Huu Dung (Vietnam)	
NF-O 01 to 05		
12:55 hrs	NF-O 01	Dietary phosphorus requirement of juvenile carp <i>Cyprinus carpio</i> fed graded levels of magnesium hydrogen phosphate Kim, J. D.*, Yoon, H., Lee, D. H., Won, S. G. and Ra, C. S.
Lunch & Poster Session 13:05 - 14:05 hrs		
14:05 hrs	NF-O 02	Evaluation of brewery waste based feeds on growth, feed utilization and body composition of cage reared striped catfish <i>Pangasianodon hypophthalmus</i> in a tropical reservoir in Maithon, Jharkhand Hassan, M.A.*, Md. Aftabuddin, Meena, D. K., Mishal, P., Dasgupta, S. and Sharma, A. P.

14:15 hrs	NF-O 03	Precision drone algorithm for feed delivery in sea cages Reshma, B.*; Rahul, B., Rishi Sreedhar, Muhsina Latheef and Ratnabhai, U.
14:25 hrs	NF-O 04	Evaluation of brewers spent grain as feed ingredient in diets of GIFT tilapia cultured in reservoir cages Felix, N*. and Rajesh Kumar
14:35 hrs	NF-O 05	Effect of <i>Gracilaria</i> sap supplementation on growth, proximate composition and hematological parameters of <i>Labeo rohita</i> Vikas Kumar*, Sharad R. Surnar, Sharma, O. P., Saini, V. P., Ekta Singh and Aman Singh

Session Conclusion 14:45 - 14:55 hrs

Session V

15:00 - 17:15 hrs **Health and Environment Management**
Chairs: Asmund Bjordal (Norway), K. K. Vijayan (India)
Rapporteurs: Geetha Sasikumar, D. Divu

Keynote Address

15:00 - 15:20 hrs **Fish health: a Norwegian experience**
Brit Hjeltnes (Norway)

Lead lectures

15:20 hrs **Use of remote sensing in the context of cage aquaculture**
Trevor Platt (UK)

15:35 hrs **Fish health management in cage aquaculture**
K. K. Vijayan (India)

15:50 hrs **Microbial diseases of Asian seabass *Lates calcarifer***
Indrani Karunasagar (India)

16:05 hrs **Diseases of groupers in sea cage culture in Indonesia**
Murwantoko (Indonesia)

TEA BREAK 16.20 - 16.30 hrs

HE-O 01 to 05

16:30 hrs HE-O 01 **Utilizing satellite remote sensing data and oceanographic information for identifying cage aquaculture sites and scheduling cage maintenance**
Grinson George*, Phiros Shah, Mohammed Shafeeque, Trevor Platt and Shubha Sathyendranath

16:40 hrs HE-O 02 **Experimental studies on community structure and succession of foulers on cages in Vizhinjam Bay, Kerala**
Santhosh, B.*; Anil, M. K., Vinod, K., Rani Mary George, Jasmine, S., Unnikrishnan, C., Jose Kingsley, H., Hillary, P., Udayakumar, A. and Benziger, V. P.

16:50 hrs HE-O 03 **Outbreak of *Vibrio alginolyticus* infection in cobia *Rachycentron canadum* cultured in floating cages**
Rameshkumar, P.*; Abdul Nazar, A. K., Jayakumar, R., Pradeep, M. A., Kalidas, C., Tamilmani, G., Amir Kumar Samal, Anikuttan, K. K., Rajendran, P. and Sirajudeen, S.

17:00 hrs HE-O 04 **Non-specific immune response in mud crab *Scylla serrata* induced by cells or lipopolysaccharide extracts from *Altermonas stellipolaris* strain ANT82**
Jigang Chen* and Jifang Yang

17:10 hrs HE-O 05 **Hydrobiological investigations during cage culture of catfish *Pangasianodon hypophthalmus* in Saroda Sagar Reservoir, Chattisgarh**
Ranjan K. Manna*, Dharmendra K. Meena, Suman Kumari, Subrata Das, Subhendu Mandal, Sarkar, U. K. and Sharma, A. P.

Session Conclusion 17:20 - 17:30 hrs

Cultural Programme Followed By Dinner at CMFRI Campus 18:30 hrs

27 November 2015, Friday

Session VI

09:30 - 12:55 hrs **Economics, Livelihood and Policies**
Chairs: Clive Jones (Australia), P. S. B. R. James (India)
Rapporteurs: K. Vinod, N. Aswathy

Keynote Address

09:30 - 09:50 hrs **Aquaculture governance: balancing increased food production and environmental sustainability**
Marius Dalen (Norway)

Lead lectures

09:50 hrs **Aquaculture policy and legislation in India**
P. Ravichandran (India)

10:05 hrs **Institutional credit support for cage aquaculture in India: policy interventions**
K. Palanisamy (India)

10:20 hrs **Cage aquaculture in India: legal perspectives**
Jacob Joseph (India)

EL-O 01 to 12

10:35 hrs EL-O 01 **Marine cage farming to empower fishermen self help groups in India: a perspective**
Philipose, K. K.*, Jayasree Loka, Senthil Murugan, T., Krupesha Sharma, S. R., Vaidya G. Narayana, Sonali S. Mhaddolkar, Srinivasa Rao, K. and Praveen Dube

10:45 hrs EL-O 02 **Information source utilisation by farmers involved in cage culture of finfishes: a study in coastal Karnataka**
Swathi Lekshmi, P. S.*, Prathibha Rohit, Dineshbabu, A. P., Sujitha Thomas, Rajesh, K.M. and Geetha Sasikummar

10:55 hrs EL-O 03 **Cage aquaculture: a tool for participatory management of coastal waters and fish stocks**
Joe K. Kizhakudan*, Geetha, R., Ponniah, R. and Sundar, R.

TEA BREAK 11:05 - 11:15 hrs

11:15 hrs EL-O 04 **Techno-economic viability of open sea cage farming of cobia *Rachycentron canadum* undertaken by a fishermen self help group**
Abdul Nazar, A. K.*, Jayakumar, R., Tamilmani, G., Sakthivel, M., Rameshkumar, P., Amir Kumar Samal, Johnson, B. and Gopakumar, G.

11:25 hrs EL-O 05 **Women empowerment through aquaculture in India: strengths and weaknesses**
Kripa, V.*, Mohamed, K. S., Jagadis, I., Jenni, B., Alloyicious, P. S. and Linoy Libini

11:35 hrs	EL-O 06	Open sea cage culture in India: policy requirements and opportunities Shyam S. Salim*, Philipose, K. K., Imelda Joseph, Bobby Ignatius and Abdul Nazar, A. K.
11:45 hrs	EL-O 07	Empowerment of Sidi adivasi tribes through sea cage farming technology Mohammed Koya, K.*; Sreenath, K. R., Gyanranjan Dash, Swatipriyanka Sen, Vinay Kumar Vase, Divu, D., Suresh Kumar Mojjada and Mahendrakumar Fofandi
11:55 hrs	EL-O 08	Cage culture of pearlspot <i>Etroplus suratensis</i> for livelihood enhancement of the fisherwomen of central Kerala Daisy C. Kappen*, Madhusoodana Kurup, B., Mohanakumaran Nair, C., Raju, M. S., Dinesh, K., Salin, K. R. and Saneer, N. S.
12:05 hrs	EL-O 09	Gender mainstreaming and impact of self help groups on cage farming in Vembanad Lake: a case study Vipinkumar, V. P.*, Bobby Ignatius, Pushkaran, K. N., Harshan, N. K. and Athira, P. V.
12:15 hrs	EL-O 10	Community based fish cage culture: an employment generation option for rural youth at Palasawada and Kadavai villages in Maharashtra Chavan, B. R.*, Singh, H., Pai, R. and Mahadkar, U. V.
12:25 hrs	EL-O 11	Adoption of CMFRI technology for sea cage farming: a success story from Ramanathapuram District, Tamil Nadu Johnson B.*, Abdul Nazar, A. K., Jayakumar, R., Tamilmani, G., Rameshkumar, P. and Gopakumar, G
12:35 hrs	EL-O 12	Small scale cage farming initiatives in Karnataka: a case of successful technology adoption leading to rural livelihood transformation Sujitha Thomas*, Dineshbabu, A. P., Rajesh, K. M., Prathibha Rohit, Swathi Lekshmi, P. S. and Nataraja, G. D.
Session Conclusion		12:45 - 12:55 hrs
Lunch & Poster Session		13:00 - 14:00 hrs
Plenary Session		14:00 - 15:00 hrs
Valediction		15:00 - 16:00 hrs

Poster Sessions

I. Marine Production Systems

(MPS-P 01 to19)

25 November 2015, Wednesday 13:05 - 14:05 hrs

Rapporteurs: A. K. Abdul Nazar, K. K. Anikuttan

MPS-P 01	HDPE sea cage culture systems for Andaman islands, India Thinesh Santhar, D.*, Vijayakumar, S. and Thampi Sam Raj, Y. C.
MPS-P 02	Growth rate of cobia <i>Rachycentron canadum</i> in relation to cage environment in a marine cage farm off Karwar, Karnataka: a case study Philipose, K. K.*, Jayasree Loka, Krupesha Sharma, S. R., Senthil Murugan, T., Vaidya G. Narayana, Sonali S. Mhaddolkar, Srinivasa Rao, K. and Praveen Dube

MPS-P 03	Sea cage culture of cobia <i>Rachycentron canadum</i> through participatory mode at Mandapam, Tamil Nadu
	Kalidas, C.*, Rameshkumar, P., Tamilmani, G., Johnson, B., Jayakumar, R., Anbarasu, R., Rajendran, P. and Abdul Nazar, A. K.
MPS-P 04	Identification of potential sites for sea farming along the coast of Maharashtra using remote sensing data
	Shirdhankar M. M.*, Thakare, A. U., Patil, S. V., Tibile, R. M., Pokshe, S. P., Sing, H. D., Mini Raman and Prakash Chauhan
MPS-P 05	Growth performance of pompano <i>Trachinotus blochii</i> in two farming environments
	Boby Ignatius* and Shoji Joseph
MPS-P 06	Pompano (<i>Trachinotus blochii</i>) farming: an intermediate crop in coastal hyper-saline shrimp ponds in Gujarat
	Vinay Kumar Vase*, Divu, D., Sreenath, K. R., Gyanranjan Dash, Mahendrakumar Fofandi, Suresh Kumar Mojjada and Mohammed Koya, K.
MPS-P 07	Comparative evaluation of growth performance in Asian seabass <i>Lates calcarifer</i> in seawater and freshwater
	Karnatak, G.*, Vikash Kumar, Philipose, K. K., Mishal, P. and Sharma, A. P.
MPS-P 08	Demonstration of high value palinurid lobster culture in small scale cage holdings in Raigad District of Maharashtra
	Veerendra Veer Singh*, Ramkumar, S., Nilesh A. Pawar, Punam A. Khandagale, Vaibhav D. Mhatre, Thakur Das, Umesh H. Rane and Purushottama, G. B.
MPS-P 09	Capture based aquaculture of lobsters in open sea cages: sustainable use of natural resources
	Divu, D.*, Suresh Kumar Mojjada, Gyanranjan Dash, Sreenath, K. R., Vinay Kumar Vase, Mahendrakumar Fofandi and Mohammed Koya, K.
MPS-P 10	Grow out culture of lobsters in wooden net cages at Thoothukudi, Tamil Nadu
	Kalidas, C.*, Ranjith, L., Kavitha, M., Sekar V. Rayar, Jesuraj, N. and Madan, M. S.
MPS-P 11	Suitability of the bigeye trevally <i>Caranx sexfasciatus</i> for cage aquaculture in coastal waters
	Rajesh, K. M.*, Prathibha Rohit, Dineshbabu, A. P., Sujitha Thomas, Swathilekshmi, P. S. and Nataraja, G. D.
MPS-P 12	Indian halibut <i>Psettodes erumei</i>: a new resource for grow out culture in India
	Rekha J. Nair*, Gopalakrishnan, A., Somy Kuriakose and Zacharia, P. U.
MPS-P 13	Enhancement of spiny lobster production by cage culture: a new horizon for traditional lobster fishery in India
	Saleela, K. N.*, Anil, M. K. Santhosh, B., Radhakrishnan, E. V. Unnikrishnan, C. and Raju, B.
MPS-P 14	Low cost capture based multispecies culture system for coastal waters off Goa
	Manju Lekshmi, N.*, Sreekanth, G. B., Pandey, P. K. and Singh, N.P.
MPS-P 15	Cage as a tool to validate growth parameters of oil sardine and Indian mackerel
	Pralaya Ranjan Behera*, Shubhadeep Ghosh, Hanumantha Rao, M. V. and Biswajit Dash
MPS-P 16	Cage culture of the Pacific white shrimp <i>Litopenaeus vannamei</i> at high stocking density in a creek in Andhra Pradesh
	Sekar Megarajan*, Ritesh Ranjan, Biji Xavier, Pattnaik, P., Biswajit Dash and Shubhadeep Ghosh

-
- MPS-P 17 **Site selection for open sea cage culture using spatial analytics**
Mini K. G.*, Grinson George, Jayasankar, J., Sathianandan, T. V., Somy Kuriakose and Phiros Shah
-
- MPS-P 18 **Mathematical modelling of sea cage dynamics**
Sreenath, K. R.*, Rahul, B., Gyanranjan Dash, Divu, D., Mohammed Koya, K., Swatipriyanka Sen, Vinay Kumar Vase, Suresh Kumar Mojjada, Mahendrakumar Fofandi, Sonia Kumari and Makwana, N. P.
-
- MPS-P 19 **Design and development of an effective low cost floating seed cage suitable for nursery rearing of Asian seabass, *Lates calcarifer***
Biswajit Dash*, Ritesh Ranjan, Shubhadeep Ghosh, Maheswarudu, G., Biji Xavier, Sekar Megarajan, Madhumita Das, Loveson Edward and Balaram Dandapat
-

II. Inland Production Systems

(IPS-P 01 to12)

25 November 2015, Wednesday 13:05 - 14:05 hrs

Rapporteurs: K. Mohammed Koya, Sekar Megarajan

-
- IPS-P 01 **Engineering components for cage farming in inland open waters of India**
Das, A. K.*, Sharma, A. P., Vikash Kumar, Sarkar, U. K. and Philipose, K. K.
-
- IPS-P 02 **Cage culture for rearing fish fingerlings in reservoirs**
Kiran Dube*, Kohli, M. P. S., Langer, R. K., Chandra Prakash, Neelam Saharan, Tiwari, V. K., Latha Shenoy, Reddy, A. K. and Lakra, W. S.
-
- IPS-P 03 **Effect of artificial substrates on the growth of *Macrobrachium rosenbergii* in floating net cages**
Mitesh H. Ramteke*, Kiran Dube, Reddy, A. K., Tiwari, V. K. and Raju, K. D.
-
- IPS-P 04 **Scope for enhancing reservoir fisheries productivity in Uttar Pradesh through cage culture**
Peyush Punia, P. S.
-
- IPS-P 05 **Survival and rearing of hilsa *Tenualosa ilisha* in floating cages at Ukai Reservoir, Gujarat**
Biswajit Dash*, Ritesh Ranjan, Shubhadeep Ghosh and Suresh, V. R.
-
- IPS-P 06 **Density dependent growth, survival and lactate dehydrogenase activity in golden mahseer fry reared in floating cages**
Akhtar, M. S.*, Sarma, D., Pandey, N. N., Mallik, S. K., Halder, R. S., Kumar, S. and Singh, A. K.
-
- IPS-P 07 **Cage culture of milk fish *Chanos chanos* in a brackishwater pond at Kochi, Kerala**
Imelda Joseph* and Sarimol, C. N.
-
- IPS-P 08 **Cage culture of seabass *Lates calcarifer* in brackishwater fish ponds at Kakinada, Andhra Pradesh**
Pedapoli Sandeep*, Guguloth Balaji, Kurva Raghu Ramudu and Chamundeswari Devi, B.
-
- IPS-P 09 **Asian seabass *Lates calcarifer* as the most promising candidate species for cage culture in brackishwater in Kerala**
Imelda Joseph*, Bobby Ignatius and Shoji Joseph
-
- IPS-P 10 **Trimming of cheliped legs reduces cannibalism and increases survival in green mudcrab *Scylla serrata* reared in cage system**
Shyne Anand, P. S.*, Balasubramanian, C. P., Panigrahi, A., Christina, L., Gopal, C., Ghoshal, T. K. and Vijayan, K. K.
-

-
- IPS-P 11 **Sustainable intensification of production from pokkali farming system through cage farming**
Vikas, P. A.*, Shinoj Subramanian, John Bose and Zacharia, P. U.
-
- IPS-P 12 **Scope of low volume cages in openwater brackishwater finfish aquaculture**
Krishna Sukumaran*, Kailasam, M., Makesh, M., Gauranga Biswas, Prem Kumar, Aritra Bera, Babita Mandal, Rekha, M. U., Subburaj, R., Thiagarajan, G. and Vijayan, K. K.
-

III. Breeding and seed production

(BS-P 01 to 07)

26 November 2015, Thursday 13:05 - 14:05 hrs

Rapporteurs: R. Jayakumar, Amir Kumar Samal

-
- BS-P 01 **Status and way forward in marine finfish seed production for sea cage farming in India**
Gopakumar, G.*, Abdul Nazar, A. K. and Jayakumar, R.
-
- BS-P 02 **Induced maturation and spawning of *Lutjanus argentimaculatus* in open sea cage in the Arabian Sea**
Madhu, K.*, Rema Madhu, Rethesh, T., Tinto, T., Venugopalan, K. M. and Mohandas, M. P.
-
- BS-P 03 **Quality seed: innovative hatchery design for healthy farming of *Mugil cephalus***
Sharad R. Surnar*, Aman Singh, Vikas Kumar, Kiran Waghmare, Mangesh Bhosle and Ekta Singh
-
- BS-P 04 **Captive breeding of lemon damsel fish *Pomacentrus moluccensis* in Andaman and Nicobar islands**
Raymond Jani Angel, J.*, Anuraj A., Saravanan, K., Benny Varghese, Kiruba Sankar, R. and Dam Roy, S.
-
- BS-P 05 **Captive breeding of skunk clownfish *Amphiprion akallopisos* in Andaman and Nicobar islands**
Anuraj, A.*, Raymond Jani Angel, J., Saravanan, K., Venkatesh, R., Thakur, K., Lohith Kumar, Kiruba Sankar, R. and Dam Roy, S.
-
- BS-P 06 **Genetic stock structure investigations on *Metapenaeus dobsoni* from Indian coast using mitochondrial ATPase 6/8 genes**
Francis, K. X.*, Sandhya Sukumaran, Wilson Sebastian and Gopalakrishnan, A.
-
- BS-P 07 **Captive maturation of Asian sea bass *Lates calcarifer* in open sea floating cages at Visakhapatnam, Andhra Pradesh**
Biswajit Dash*, Ritesh Ranjan, Biji Xavier, Loveson Edward, Humanantha Rao, M. V., Shubhadeep Ghosh and Maheshwarudu, G.
-

IV. Nutrition and Feed

(NF-P 01 to 13)

26 November 2015, Thursday 13:05 - 14:05 hrs

Rapporteurs: Jayasree Loka, Linga Prabu

-
- NF-P 01 **Efficacy of formulated feeds on growth and body composition of *Etroplus suratensis* reared in cages**
Sayooj, P.*, Vijayagopal, P. and Vijayan, K. K.
-
- NF-P 02 **Growth response of spiny lobster *Panulirus homarus* fed on formulated experimental diets under confinement**
Saleela, K. N.*, Beena Somanath and Palavesam, A.
-

NF-P 03	Sodium/iodide symporter cloning and expression response to dietary potassium iodide inclusion in yellow catfish <i>Pelteobagrus fulvidraco</i> Youling Gao*, Chunling Wang, Chutian Ge and Guoying Qian
NF-P 04	Growth and plasma distribution of phosphorus and magnesium in far eastern cat fish <i>Silurus asotus</i> fed graded levels of magnesium hydrogen phosphate Kim, J. D.*, Yoon, T. H., Lee, D. H., Won, S. G. and Ra, C. S.
NF-P 05	Suitability of cyclopoid copepod <i>Diacyclops</i> sp. from Karwar waters as a potential live feed for larval rearing of marine finfish and shellfish Jayasree Loka*, Sonali S. Mhaddolkar, Purbali Saha, Santhosh, B. and Philipose, K. K.
NF-P 06	Bacterial flora of rotifers fed with different microalgal diets in outdoor mass culture tanks Jayasree Loka*, Sonali S. Mhaddolkar, Purbali Saha and Philipose, K.K.
NF-P 07	Growth and feeding performance of sea urchin <i>Salmacis virgulata</i> in an indoor minicage grow out system Raju Saravanan*, Jawahar, P., Francis, T., Ahilan, B., Santhakumar, P., Chandrasekar, S., Syed Sadiq, I., Shanmuganathan, A. and Abdul Nazar, A. K.
NF-P 08	Bioencapsulation of <i>Artemia</i> nauplii using medicinal plant extracts for growth promotion in <i>Danio rerio</i> fry Teepica Priya Darsini Deivamarudachalam* and Srinivasan Ponnuraj
NF-P 09	Toxic impact of coal mine effluent on nutritionally important biomolecules in different organ systems of the catfish <i>Clarias batrachus</i> Kalpana C. Lakra* and Banerjee, T. K.
NF-P 10	Microalgal diversity in a tropical estuarine ecosystem with special reference to its potential use in finfish and shellfish larviculture Sandeep, K. P.*, Sivaramakrishnan, T., Ambashankar, K., Syama Dayal, J., Balasubramanian, C. P. and Kumaraguru Vasangam, K. P.
NF-P 11	Effect of biofloc on growth, proximate composition and digestive enzyme activities of <i>Etroplus suratensis</i> Anjali P. Thilakan*, Manju Lekshmi, N., Sreekanth, G. B., Singh, N. P., Ratheesh Kumar, R. and Pandey, P. K.
NF-P 12	Efficacy of <i>Chaetoceros calcitrans</i> enriched <i>Artemia salina</i>, <i>Bacillus stratosphericus</i> (AMET1601) and nitrifying bacterial consortium as probiotics in <i>litopenaeus vannamei</i> culture Karthik, R., Gokulalakshmi, E.*, Angelin C. Pushpam and Vanitha, M. C.
NF-P 13	Improved growth and reduced cannibalism in Asian seabass <i>Lates calcarifer</i> fed with estradiol enriched feed Aritra Bera*, Babita Mandal, Krishna Sukumaran, Makes, M. Subburaj, R., Thiagarajan, G., Rajababu, D. and Kailasam, M.

V. Health & Environment Management (HF-P 01 to16)

26 November 2015, Thursday 13:05 - 14:05 hrs

Rapporteurs: Raja Swaminathan, Charan Ravi

HE-P 01	Impact of cage aquaculture on the plankton community in Kabini, a large reservoir in Karnataka Preetha Panikkar* and Krishna Rao, D. S.
---------	---

HE-P 02	Harvest of farm associated wild fish assemblages in estuarine cage farms: implications for farm management and livelihood Geetha Sasikumar*, Nataraja, G. D., Shridhara, B. and Prathibha Rohit
HE-P 03	Does sea cage farming influence carbon sequestration in the sea? Assessment of carbon sequestration capacity of plankton near cage farming sites at Mandapam, Gulf of Mannar, Tamil Nadu Anikuttan, K. K.*, Abdul Nazar, A. K., Jayakumar, R., Tamilmani, G., Johnson, B., Rameshkumar, P., Amir Kumar Samal and Hanumanta Rao, G.
HE-P 04	Occurrence of ichthyophthiriasis in <i>Pangasianodon hypophthalmus</i> cultured in cages in Maithon Reservoir, Jharkhand, India Vikash Kumar*, Karnatak, G., Sahoo, A. K., Das, A. K. and Sharma, A. P.
HE-P 05	Ecology and biodiversity of open sea cage farm at Mandapam, India Molly Varghese*, Vinod, K., Joshi, K. K., Ramamoorthy, N. and Thomas, V. J.
HE-P 06	Fouling of cage nets at Villundi in Palk Bay, south-east coast of India Vinod, K.*, Molly Varghese, Joshi, K. K. and Ramamoorthy, N.
HE-P 07	Encrustation by bivalves in a tropical marine cage farming system Geetha Sasikumar*, Prathibha Rohit, Rajesh, K. M., Dineshbabu, A. P., Sujitha Thomas, Nataraja, G. D., Yogesh Kumar, K., Sharath Kini and Sanal, C.
HE-P 08	Biodiversity of macrofouling organisms in a marine cage farm at Karwar, west coast of India Sonali S. Mhaddolkar*, Jayasree Loka, Dineshbabu, A. P., Vaidya G. Narayana and Philipose, K. K.
HE-P 09	Microbial quality of water around open sea cage farm sites on the Arabian coast of India Sivaraman, G. K.*, Mohammed Koya, K., Divu, D., Ashish Kumar Jha, Remya, S., Renuka, V. and Suresh Kumar Mojjada
HE-P 10	Stereomicroscopic and high resolution SEM studies of gill, mouth cavity and lateral line of pompano <i>Trachinotus blochii</i> using chemical method of tissue drying Amir Kumar Samal*, Abdul Nazar, A. K., Jayakumar, R., Tamilmani, G., Rameshkumar, P., Sakthivel, M., Anikuttan, K. K. and Ravi K. Avadhanula
HE-P 11	Establishment and characterization of two morphologically different cell lines from fin tissue of the pompano <i>Trachinotus blochii</i> Sobhana, K. S.*, Sheethal Mary Sunny, Githa Ann George, Shuchi Agarwal, Kalidas, C., Sakthivel, M., Rema Madhu, Madhu, K. and Joshi, K. K.
HE-P 12	Bacteriophage based control of bacterial infections commonly encountered in farmed flounder <i>Paralichthys olivaceus</i> Kim, J. D.*, Lee, J. H., Kang, B. J., Jun, S. Y. and Kang, S. H.
HE-P 13	Accurate identification of parasitic infestations for effective management and treatment in aquaculture Guguloth Balaji*, Sandya Chinna Rajesh and Kurva Raghu Ramudu
HE-P 14	Keratinization of epidermis in the ornamental catfish <i>Chaca chaca</i>: histological and scanning electron microscopic investigations Arup Mistri*, Swati Mittal and Ajay Kumar Mittal

-
- HE-P 15 **Dynamics of *Vorticella* sp. Infestation in cobia *Rachycentron canadum* larvae and specific growth rate of the parasite**
 Amir Kumar Samal*, Abdul Nazar, A. K., Jayakumar, R., Tamilmani, G., Rameshkumar, P., Sakthivel, M., Anikuttan, K. K. and Ravi K. Avadhanula
-
- HE-P 16 **Effect of asiaticoside on the proliferative activity of epidermis during healing of cutaneous wound in the Indian major carp *Cirrhinus mrigala***
 Neeraj Verma*, Usha Kumari, Swati Mittal and Ajay Kumar Mittal
-

VI. Economics, Livelihood and Policies (EL-P 01 to 08)

27 November 2015, Friday 13:00 - 14:00 hrs

Rapporteurs: P. S. Swathi Lekshmi, P. A. Vikas

-
- EL-P 01 **Comparative assessment of conventional and cage fish farming in Ernakulam District, Kerala**
 Jeyanthi, P.*, Chandrasekar, V. and Nikita Gopal
-
- EL-P 02 **Socio-economic dimensions and SWOT analysis of sea cage farming in Goa**
 Philipose, K. K.* and Aswathy, N.
-
- EL-P 03 **Cage culture as an option for alternative income and livelihood: the experience of the traditional aquafarmers of Kerala, India**
 Imelda Joseph
-
- EL-P 04 **Polyculture of fishes in open water cages: a better option for year round fish production and income**
 Shoji Joseph* and Ajith Kumar, P. B.
-
- EL-P 05 **Participatory approach for standardising cage culture of giant trevally *Caranx ignobilis* in Thiruthipuram backwaters, Kochi, Kerala**
 Daisy C. Kappen*, Madhusoodana Kurup, B., Mohanakumaran Nair, C., Raju, M. S., Dinesh, K., Salin, K. R. and Saneer N. S.
-
- EL-P 06 **Open sea cage culture of pompano *Trachinotus blochii*: an alternative livelihood approach for coastal fishers at Achara, Sindhudurg District, Maharashtra**
 Ramkumar, S.*, Veerendra Veer Singh, Philipose, K. K., Anulekshmi Chellappan, Vaibhav Mhatre, D., Nilesh A. pawar, Punam A. Khandagale, Syamala, K. and Ratheesh Kumar, R.
-
- EL-P 07 **Participatory trial on pen farming of milk fish *Chanos chanos* in Pillaimadam lagoon of Palk Bay, Tamil Nadu**
 Jayakumar, R.*, Abdul Nazar, A. K., Tamilmani, G., Johnson, B., Rameshkumar, P., Amir Kumar Samal, Anikuttan, K. K., Rajendran, P. and Gopakumar, G.
-
- EL-P 08 **Participatory demonstration of sea cage farming of spiny lobster at Thirumullavaram, Kollam, Kerala**
 Santhosh, B.*, Anil, M. K., Philipose K.K., Rani Mary George, Saleela, K. N., Troy Natesan, Unnikrishnan, C., Jose Kingsley, H., Hillary, P., Benziger, V. P. and Muhammed Anzeer, F.
-

Trade Exhibition

**TIMINGS 09:30 - 17:00 hrs
(25 - 27 November 2015)**

List of Exhibitors

ICAR-Central Marine Fisheries Research Institute

ICAR-National Bureau of Fish Genetic Resources

ICAR-Directorate of Cold Water Fisheries Research

ICAR-Central Institute of Fisheries Technology

ICAR-Central Inland Agricultural Research Institute

ICAR-Central Institute of Brackishwater Aquaculture

ICAR-Central Institute of Freshwater Aquaculture

ICAR-Indian Institute of Water Management

ICAR-Central Inland Fisheries Research Institute

ICAR-Central Institute of Fisheries Education

Rajiv Gandhi Centre for Aquaculture (Marine Products
Export Development Authority)

Nansen Environmental Research Centre, India

National Centre for Sustainable Coastal Management

Kerala State Biodiversity Board

State Bank of India

Garware-Wall Ropes

MagGenome Technologies/SciGenom Labs

Aquatic Proteins

Growel Feeds

Weld Eezy

Asian Fisheries Society, Indian Branch

CAA5 2015

Committees & Chairpersons

Committee	Chairperson	Cell No.
Registration, Souvenir & Cultural Programme	Dr. Imelda Joseph	(+91) 9447228514
Programme Co-ordination	Dr. V. Kripa	(+91) 9495317931
Hall Arrangements	Dr. N. K. Sanil	(+91) 9249869305
Presentation Management	Dr. T. V. Sathianandan	(+91) 9947294618 (+91) 9037222435
Help Desk, Conference Kit, Certificates & Memento	Dr. Shyam S. Shalim	(+91) 9746885361 (+91) 9037175273
Rapporteuring	Dr. Prathibha Rohit	(+91) 9916129255
Compering	Dr. Rekha J. Nair	(+91) 9446415736
Exhibition/Trade Expo	Dr. K.K. Philipose Dr. V. P. Vipinkumar	(+91) 9449817334 (+91) 9048540766
Abstract Book, Invitation Card, Programme Guide, Planner	Dr. K.S. Sobhana	(+91) 9037423360
Poster Session	Dr. V. S. Basheer	(+91) 9495678716
Finance	Dr. Somy Kuriakose	(+91) 9446375363
Publicity/Media/Press	Dr. R. Narayanakumar	(+91) 9446804213
Accommodation/Transport	Dr. G. Maheswarudu	(+91) 9656405418
Food & Beverage	Dr. P. Vijayagopal	(+91) 9496280584

Cultural Programme



Thiruvathirakali

A dance form originally performed by women on Thiruvathira day in the Malayalam month of Dhanu (December-January), in order to attain everlasting marital bliss, Thiruvathirakali has become a popular dance form for all seasons. The

dance, which follows a circular, pirouetting pattern accompanied by clapping of the hands and singing, is a celebration of marital fidelity and the female energy.

Mohiniyattam

Believed to have originated in 16th century, it is one of the eight Indian classical dance forms. The term Mohiniyattam comes from the words 'Mohini' meaning a woman who enchants onlookers and 'aattam' meaning graceful and sensuous body movements. The vocal music of Mohiniyattam involves variations in rhythmic structure known as 'chollu'. The Mohiniyattam dance is performed to this accompaniment by the subtle gestures and footwork of the danseuse.



Kuchipudi

Kuchipudi, which derives its name from the village of Kuchelapuram, in Andhra Pradesh, India enjoys a unique place among the Indian classical idioms in that it was originally a male dance tradition, enacting stories from Hindu mythology. It was only in the last 9 or 10 decades that women were introduced to this art form. Kuchipudi is characterized by fast rhythms and fluid movements. The music that accompanies the dance is according to the classical school of Carnatic music.

Kathakali

A stylized classical Indian dance-drama noted for the attractive make-up of characters, elaborate costumes, detailed gestures and well-defined body movements presented in tune with the anchor playback music and complementary



percussion. Kathakali has its origins almost 1500 years ago in the early ritual folk dances and dance dramas of Kerala. A distinguishing characteristic of this art form is that the actors never speak but use hand gestures (mudras), expressions (rasas) and rhythmic dancing instead of dialogue.

Ottamthullal

A dance-drama performing art form in Kerala. It was created as a medium to protest against the prevalent socio-political structure and prejudices of society. It went on to become the most popular folk art presented in Kerala temples. Ottamthullal features a solo performer and the distinguishing feature is the performer himself singing and enacting the story.

Kalaripayattu

A martial art which originated in Kerala during the 13th Century AD, it is considered to be one of the oldest fighting systems in existence. Originally practiced in northern and central parts of Kerala and the Tulunadu region of Karnataka, it is now practiced widely in Kerala and in contiguous parts of Tamil Nadu. A Kalari is the school or training hall where martial arts are taught.



Tourist Destinations



Athirappilly Falls

Located on the west-flowing Chalakudy River in the Vazhachal Forest Division, this 24 m (80 ft) waterfall and the nearby Vazhachal Falls are popular tourist destinations. Athirappilly Falls is the largest waterfall in Kerala and is nicknamed 'The Niagara of India'. About 62 km from Kochi.

Valparai

Located 3,500 ft above sea level, Valparai is a hill station on the Anaimalai Hills range of the Western Ghats. About 138 km from Kochi, the route to Valparai passes through the beautiful rain forests of the Western Ghats. While major portions of the land are covered by tea plantations, existing forest areas remain a haven for wildlife.

Munnar

Munnar is a town and hill station located in the Idukki District of Kerala at around 1,600 m (5,200 ft) above sea level, in the Western Ghats range of mountains. The name Munnar is believed to mean 'three rivers', referring to its location at the confluence of the Mudhirapuzha, Nallathanni and Kundaly rivers.



Located about 125 km from Kochi, Munnar is famous for the tea and spices grown here, in addition to the breathtaking scenery.

Thekkady

The very sound of the word Thekkady conjures up images of elephants, unending chains of hills and spice-scented plantations. The Periyar Tiger Reserve in Thekkady is one of the finest wildlife reserves in India and spread across the entire district are picturesque plantations and hill towns that hold great opportunities for treks and mountain walks. Located about 170 km from Kochi, the sanctuary is famous for its dense evergreen, semi-evergreen, moist deciduous forests and savanna grass lands. It is home to herds of elephants, sambar, tigers, gaur, lion-tailed Macaques and Nilgiri Langurs.

Varkala Beach

Located 164 km from Kochi, near the capital city of Thiruvananthapuram, Varkala beach is the only place in southern Kerala where cliffs are found adjacent to the Arabian Sea. This tertiary sedimentary formation is a unique geological feature on the otherwise flat Kerala coast, and is known among geologists as the Varkala Formation and is a geological monument as declared by the Geological Survey of India.

Alappuzha Backwaters

Famous for its boat races, beaches, marine products and coir industry, Alappuzha is a place of immense natural beauty, referred to as the 'Venice of the East'. The speciality of this land is the region called 'Kuttanad' - a land of lush paddy fields referred to as the 'Rice Bowl of Kerala' and one of the few places in the world where farming is done below sea level. This one-time prosperous trading and fishing centre is today a world renowned tourist destination popular for house boat cruises in the backwaters.



Important Telephone Numbers

Symposium Convener	(+91) 9847115515
Symposium Co-ordinator	(+91) 9447228514
Symposium Help Desk	(+91) 9746885361 / 9037175273
Event Manager (OceanColor Holidays Pvt. Ltd.)	(+91) 9447465549

Hotels

Radisson Blu/Dream	(+91-484) 4129999
Olive Downtown	(+91-484) 4222333
Abaam	(+91-484) 2903300

Fisheries R& D Organizations in Kochi

CMFRI	(+91-484) 2394867
CIFT	(+91-484) 2412300
CIFT Guest House	(+91-484) 2317255
NBFGR Kochi Centre	(+91-484) 2395570
FSI	(+91-484) 2225191
CIFNET	(+91-484) 2351493
NIFPHATT	(+91-484) 2352172
MPEDA	(+91-484) 2311979
NIO, Kochi Centre	(+91-484) 2390814
NPOL	(+91-484) 2571000
EIA, Kochi	(+91-484) 2314645
KUFOS	(+91-484) 2700964
CUSAT	(+91-484) 2577550

Airways

Air India (Booking/Enquiry)	(+91-484) 2351260 / 2351295
Cochin International Airport (COK)	(+91-484) 2610115

Railway/Bus station

Ernakulam Junction	(+91-484) 2376131
Ernakulam Town	(+91-484) 2390920
Bus Stand KSRTC, Ernakulam	(+91-484) 2360531

Hospitals

Cochin Medical College & Hospital	(+91-484) 2754000
General Hospital	(+91-484) 2361251 / 2360002
Amrita Institute of Medical Sciences & Research Centre	(+91-484) 2801234
Ayurveda Hospital	(+91-484) 2361206
City Hospital	(+91-484) 2361809
Cochin Hospital	(+91-484) 2378980
Gautam Hospital	(+91-484) 2210510
Indira Gandhi Co-op Hospital	(+91-484) 2206734
Lakshmi Hospital	(+91-484) 2382114
Lissie Hospital	(+91-484) 2401006
Lourdes Hospital	(+91-484) 4123456
Medical Trust Hospital	(+91-484) 2371852
PVS memorial Hospital	(+91-484) 2345470
Sudheendhra Medical Mission	(+91-484) 4077400
Ernakulam Medical Centre	(+91-484) 2807101
Lakeshore Hospital	(+91-484) 2701032
Blood Bank	(+91-484) 2383549

Police

City Police Commissioner	(+91) 9497996990
Crime Stopper Cell	1090

Travels

OceanColor Holidays	(+91-484) 3236603 / 4029902
Balmer & Lawrie Co Pvt.Ltd	(+91-484) 2350122 / 2351023

Notes

A series of horizontal dotted lines for taking notes.

Notes

A series of horizontal dotted lines for taking notes.

Printing Supported by:



Prepared by:

Sobhana K.S., Rahul G. Kumar, A. Kathirvelpandian,
Shoji Joseph, Sandhya Sukumaran

Design: Graficreations

Printed at: Anaswara offset Pvt. Ltd.



ICAR-Central Marine Fisheries Research Institute

Post Box No. 1603, Ernakulam North P.O., Kochi-682 018, Kerala, India

Phone: +91 484 2394867, Fax : +91 484 2394909

E-mail: contact@cmfri.org.in, director@cmfri.org.in

www.cmfri.org.in