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CFSI Executive Committee

1. Dr Debajit Sarma- President
2. Dr N. N. Pandey – Vice president
3. Dr Deepjyoti Baruah- Joint Secretary and I/C Secretary
4. Dr M.S. Akhtar – Treasurer
5. Mr. S. K. Mallik – Member
6. Dr. K. Victoria Chanu- Member
7. Mr. R. S. Tandel – Member

Editor's Desk

I am indebted to the CFSI members & awardees who have contributed the stories on hill fisheries & aquaculture for the second volume of CFSI. This newsletter reflects the diverse activities of CFSI during the period of September 2017 to August 2018. I must thank all the executive committee members of CFSI for their preparations of this important newsletter 2018.

Ritesh S. Tandel, Scientist

President's Corner

Warm Greetings to you all.

It is my pleasure to write this inaugural President's Corner! I am profoundly honored to inform you that Coldwater Fisheries Society of India, founded in 2012 by ICAR-DCFR, Bhimtal is becoming the leading source of coldwater fisheries science and management information in India. The mission of CFSI is to strengthen the linkage between multiple stakeholders and impart knowledge and information organizing different events in the country for improving the fish production, sustainability of cold water fishery resources and aquatic ecosystems, conservation and rehabilitation of endemic coldwater fishes and promoting the development of fisheries professionals. The society has conducted several national and international scientific events during 2012-2018 and also started publishing the informative newsletters. Further, you would be happy to know that, the society is introducing its first and foremost journal on the occasion of the foundation day of the ICAR-DCFR on 24th Sep, 2018. I convey my sincere gratitude and appreciation to all the life members of CFSI for their constant overwhelming support and the executive committee for their hardworking to bring out the Journal of Coldwater Fisheries. I also appreciate the effort of Mr. Ritesh Tandel, Editor and the entire team for bringing out the timely publication of the second CFSI newsletter.

Debajit Sarma, Director



Secretary's Column

Warm welcome to you all.

CFSI is introducing its second informative newsletter on the gracious occasion of the foundation day of the ICAR-DCFR on 24th Sep, 2018. This is a wonderful platform to gather your views and voices to formulate new strategies towards an insight of coldwater fisheries and aquaculture. On this wonderful day, I invite you to take this opportunity to read the second volume of newsletter containing the recent activities and articles on coldwater fisheries. The list of updated life members will also help you to familiarize and socialize among yourself.

Deepjyoti Baruah, Senior Scientist

Hill Fisheries & Aquaculture

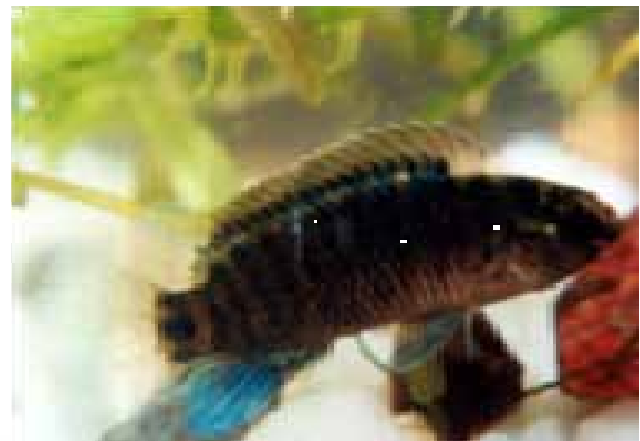
1. Indigenous freshwater ornamental fish of northeast india - A perspective

S.K. Das

India's ornamental fish industry is still at its infant stage and an unorganized sector. The international markets for Indian fish are principally based on wild caught native species. The country exports mostly the indigenous varieties of ornamental fish to the international market and the Northeast India contributes to more than 85 % of total volume. The Northeast India comprising of eight states with their diversified freshwater resources harbour several important fish species of ornamental value. Some of these species are rare and endemic to only this region. A good number of indigenous fishes of the region therefore attract many hobbyists in several parts of the world. Unfortunately, many of the Northeast Fish species of ornamental value have become vulnerable due to over exploitation, degradation of water bodies, pollution, indiscriminate fishing activities, poisoning etc. Therefore, there is an urgent need to conserve the fish germplasm of the region through better management practices, captive breeding and rearing , open ranching etc. The importance of conservation of ornamental fish in India was first realized with launching of the fish germplasm project by ICAR-NBFGR, Lucknow under the National Agriculture Technological project (NATP) in 1999-2000. About 18-20 prioritized fish species of ornamental value of western ghat and Northeast were successfully captive bred during 2000-2004 under laboratory conditions. Among the Northeast fish, a few of them such as danio, rasbora, gouramis, *Channastewartii* etc could be induced bred with little effort on number of occasions indicating possibility of producing them on mass scale (Das, 2004). The protocols of breeding some the varieties were also disseminated to potential

entrepreneurs of Assam in two batches with support received from MPEDA, Ministry of commerce Kochi. Unfortunately, the trained entrepreneurs could not establish a sustainable business on captive bred indigenous ornamental fish due to non existence of domestic markets and quarantine facilities. Moreover, the international market is extremely unpredictable. If there is demand for one species today, the next year the demand shifts to another fish species. It is worth mentioning that many of our indigenous ornamental fish species (both male and female) have already reached expert fish breeders of South east Asia through Indian exporters. For example, Rasbora is being extensively bred in Malaysia and so called "Miss Kerala", *Puntiusdenisonii* is being bred on large scale in Indonesia. The international market thus no longer depends on some of the Indian origin fish. A day may also come in near future when the important species of *Channa* and *loaches* of northeast India are sold in the global market as Made in China or Indonesia. The CITES (Convention on International Trade in Endangered species on wild fauna and Flora) also advocates trading of only captive bred ornamental fish species.

The Indian domestic market is largely based on exotic fish species. Therefore, there is tremendous scope for promoting this sector. The captive bred good quality exotic ornamental fish can also find place in the global market. The potential entrepreneurs can now explore the possibility of importing good quality brood stock for captive breeding and rearing in India for promotion of the exotic ornamental fish sector. To create a sustainable business of indigenous ornamental fish, we need to popularize our indigenous varieties for the domestic market. We have in fact failed to realize the importance and beauty of our own fish species at home. If the people in foreign countries are passionate about Indian fish, why not we? Thus, we need to explore the domestic market for indigenous



ornamental fish species. For example, the western ghat fishes can be popularized in north or eastern India while the Northeast fish can become popular in south and western parts of the country. Unless we find markets for our own fishes within the country, the indigenous Ornamental fish sector of India shall never flourish or sustain as no potential entrepreneurs shall come forward to adopt the technologies being generated by different Indian research institutes for commercialization. In 2008, several issues related to sustainable harvest and conservation of indigenous ornamental fish of the country were discussed during the first international green certification workshop held at Kochi (MPEDA, 2008).

2. Water harvesting cum fisheries in poly-lined pond

Ghanshyam Nath Jha, Amit S Charak, Narinder Paul and Ravneet Kour

In spite of the existing potential of fish production, the present status of fish production in district Doda is very low and divulged about tremendous scope of boosting fish production and farmers' income many fold. This needs, farmer's awareness about the recent advancement in the fish farming technologies and new interventions.

Keeping in view of the above facts and to attract more farmers towards fisheries business at least by starting back-yard ponds by harvesting rainwater, Krishi Vigyan Kendra-Doda of Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu imparted several training programmes including on "Water harvesting cum fish farming in poly-lined pond (An ICAR-DCFR technology)" at several villages of district Doda. Under Front Line Demonstration, we established few poly-lined ponds at different villages like at village Malnai which was inaugurated by the

Hon'ble Vice-Chancellor, Dr. PK Sharma of SKUAST-Jammu in the gracious presence of Dr. R.K. Arora, In-charge KVKs of SKUAST-Jammu, and subsequently at village Poneja, Rounda and Gwari. Vice-Chancellor while inaugurating the poly-lined pond at village Malnai urged that this technological intervention made by KVK-Doda under is very much useful in water conservation, irrigation in one hand and for generating secondary income from fish farming in the other hand. This technological intervention is also fulfils Hon'ble Prime Ministers dream of "Per Drop More Crop" and "Doubling the Farmers Income". He urged that the water stored in this pond can be efficiently used for irrigating the crops nearby the pond. Dr. RK Arora, In-charge KVKs of SKUAST-J appreciated the KVK scientists for introducing Poly-lined pond for fish farming in the district. He urged that poly-lining technology is low cost technology and poly-sheet of about 200 GSM is very good for sufficiently storing water either in earthen type pond or cemented tank with cracks. The sheet is very easy to install in the pond with good self-life of about 5-6 years.

The final results of this ICAR-DCFR technology, and intervention made by KVK-Doda are still to be compiled. However, till date it is recorded that by poly-lining of ponds, farmer can store the rain water round the year which enables them to convert their pond from seasonal to perennial. This harvested water is being used for irrigation of the vegetables grown nearby the pond and rearing fish like Chinese carp in the pond. Farmers namely, Mr. Maskoor (village Malnai), Mr. Sandesh Kumar (Village Poneja), Mr. Amit Kumar & Mr. Manjeet Kumar (village Rounda) and Mr. Bhanu (village Gwari) reported good growth of the Chinese carp in the poly-lined pond. They are also using this stored water for several other purposes like irrigating the vegetables grown nearby the pond, and all farmers are happy.



3. Tirthan valley – An adventure-centric getaway for sports fisheries

Deepjyoti Baruah and R.S. Patiyal

Tirthan valley, situated in Kullu district of Himachal Pradesh is a hub for many fishing and adventure camps. The valley is named on the river Tirthan which originates from the icy cold glacial springs of Hanskund and meets the river Beas at Larji. Tirthan valley is an angler's paradise, abound with an impressive population of exotic brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*) and thus offering one of the finest river angling spots in the world. Fishing with rod and line is legal in this valley and the anglers need to seek for License from the concern Department of Fisheries, Government of Himachal Pradesh before settling for angling. The anglers mostly choose fly fishing over the usual spoons spinners and baits to catch the trout in the valley. Casting at the appropriate formation, water depth and usage of the line and fly is the key in this water to strike a Himalayan trout. Apart from the exciting opportunities in trout fishing, Tirthan valley makes equally for an exciting holiday experience for tourist all around the world. The valley is an offbeat destination and is ideal for trekking flanked by the dense coniferous forests and sprawling alpine meadows. The verdant Great Himalayan National Park (GHNP) makes the valley even more ideal for wildlife and bird watching and strolling into tiny hilly hamlets of Gushaini, Nagini, Banjar, Sairopa and Shoja, gives an opportunity to discover the nestled fruit orchards, farm terraces, wooden curved houses and homestays and local hospitality. Therefore, someone has rightly pointed that Tirthan valley is one such hidden gem of the country. Effort has been made by the Trout Conservation and Angling Association (Kullu), Himachal Angling, Himachal Tourism, Trout Farmer's Association, Adventure Camps, ICAR-DCFR, CFSI, NFDB and many such organizations



have come forward to conserve this prestigious fish of the Tirthan valley by restoring the habitats of the fish, prohibiting illegal methods of fishing in the area and angling by catch and release. Angling competitions and interactive workshops are being organized in this valley for the anglers, entrepreneurs, scientists, academicians, government officers, businessmen, photographers, travellers and scholars and converse are made on the restocking the valley with improved strains of exotic trouts, which is the lifeline for many dwellers adjacent to the valley. It is believed that a superior and healthy stock of fish will not only benefit the local people through their conservation efforts, but will also promote the riparian vegetation of the valley, the insect fauna, birds, mammals and reptiles from this eco-friendly sport of angling.

4. Indian coldwater fishes manifest better nutrient composition for human health

Debajit Sarma, M. S. Akhtar, Prakash Sharmand & Ciji A

The concept of healthy or the functional food or nutraceuticals is becoming popular in global food scenario because of its positive link with spreading of lifestyle diseases. As a consequence of this, the evaluation of nutritional and functional quality of food and food ingredients is becoming indispensable. Worldwide, many food components are being taken up for evaluation of nutritional and functional quality. Among the long array of the functional foods, fish has a long history of preventing humankind from many chronic lifestyle diseases of old ages, and it is taken equally by rich and poor people for their inherent functionality and nutritional potential respectively.



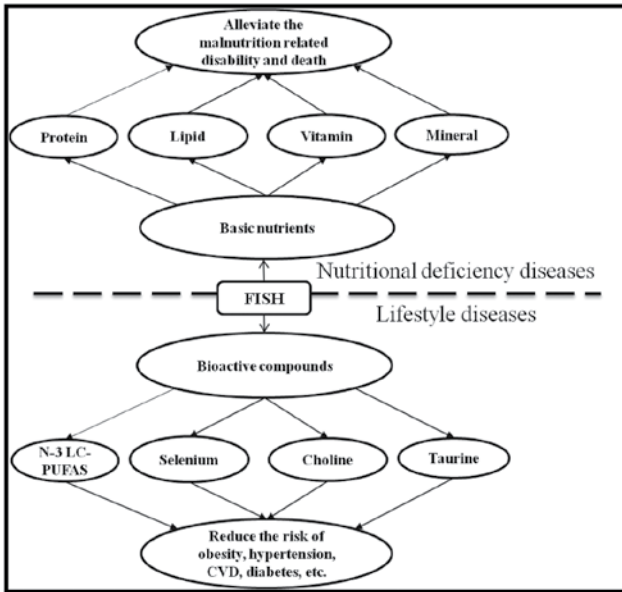


Figure 1. Diagrammatic representation of potential of fish in reducing the double burden of malnutrition and life stylediseases.

Fish not only contains long-chain n-3 polyunsaturated fatty acids (n-3 LC-PUFAs; eicosapentaenoic acid, EPA and docosahexaenoic acid, DHA), it is also a source of other health promoting bioactive components such as vitamin D, B12 and A, selenium, iodine, iron, zinc, choline, taurine, etc. Because of the presence of these intrinsically balanced desirable nutrients and inherent bio-active component, fish comes to everyone’s plate irrespective of rich or poor, young or old, healthy or unhealthy.

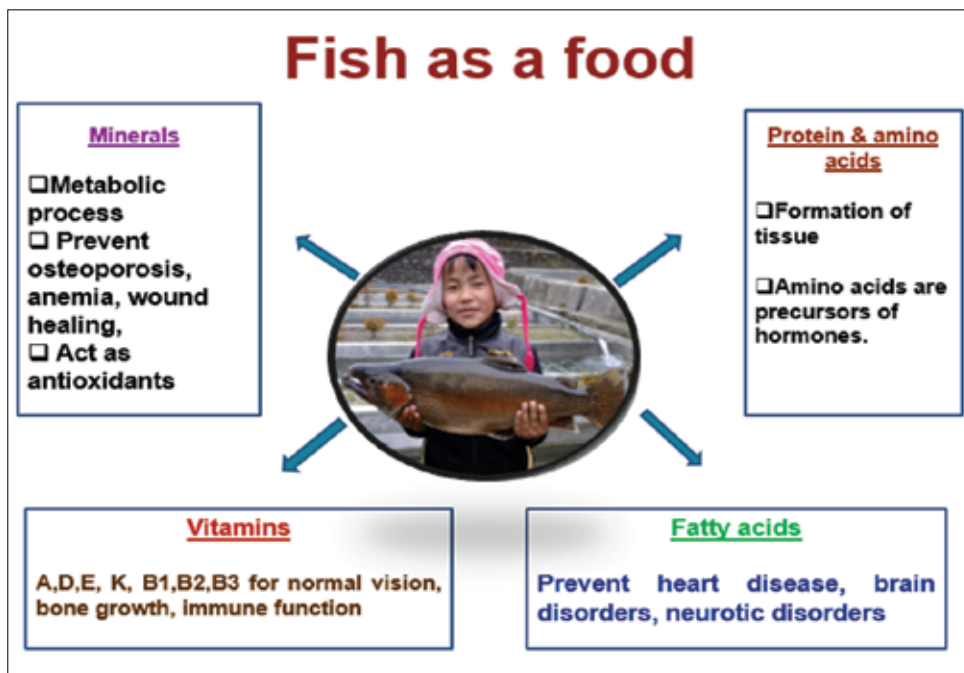
Due to the growing preferences of fish by health conscious people, nutritional and functional information of new fish species are coming into

light. As a consequence, more and more indigenous fish species get recruited into the food fish category, and therefore, the per capita consumption of fish is increasing at the global level from 15.7 in 2006 to 17.2 kg/person/year in 2010.

ICAR-Directorate of Coldwater Fisheries Research (ICAR-DCFR) took the responsibility of evaluating the nutrient composition of Indian Himalayan fishes under the umbrella of ICAR’s network project “Nutrient profiling and evaluation of fish as a dietary component”. All together, nutrient composition data of 23 coldwater fish species is available now and the Directorate has come out with bulletin on it. Overall, all coldwater fishes are good in one way or the other in their nutrient load and dietary nutrient contribution potential.

Nutrient quality of rainbow trout (Oncorhynchus mykiss)

Fish proteins are easy to digest: High quality & easy to digest protein - fish is composed of short-length fibers aids in digestion. The protein in seafood is also easier to digest because it has less connective tissue than red meats and poultry. One gram of protein per pound of body weight is required to build ideal physique. Knowing how much protein to eat is easy, but actually taking action and eating your protein requirements is much harder to do. We can’t afford to buy meal replacement drinks from the store every time you want to consume protein. The better alternative is to get them from foods such as red meat, fish, poultry, dairy, and nuts.



S.No	Items	Protein Content
1.	Whole Eggs	7g/egg
2.	Milk	8g/cup
3.	Canned Tuna	26g/can
4.	Ground Beef	25g/100g
5.	Chicken	25g/100g
6.	Turkey:	25g/100g
7.	Whey	20-24g/scoop
8.	Salmon	25/100g
9.	Almonds	20g/cup

CFSI Events

National Seminar on 'Strategies, Innovations and Sustainable Management for Enhancing Coldwater Fisheries and Aquaculture'

Coldwater Fisheries Society of India in collaboration with Zoological Society of India has organized a national seminar on 'Strategies, Innovations and Sustainable Management for Enhancing Coldwater Fisheries and Aquaculture' from 22-24 September 2017 at ICAR DCFR Bhimtal, Uttarakhand. The three

days programme witnessed technical sessions along with lead talks by different subject experts, oral and poster presentations. Exhibition stalls were organised for display of research and development activities of fisheries based ICAR institutes of the country. Various deliberations in the seminar are expected to culminate in a roadmap to augment coldwater fisheries and aquaculture production in India. On the occasion, an Abstract Book on the seminar thematic areas, Souvenir, a Newsletter by Coldwater Fisheries Society of India (CFSI) and a book entitled 'Aquatic resources and fish diversity.

Recommendations

- Developing sustainable stock enhancement models for natural waters in hill states for improving fish yields.
- Up-scaling the existing culture technologies of targeted upland fish species for optimizing the input use, resource efficiency and climate adaptations.
- Promoting fish-centric science-based recreation ecotourism entrepreneurship for livelihood support to rural youth.
- Out-scaling trout farming through viable co-operative modules in target hill states for improved production and value addition.
- Involving institutions in skill development program of line department and fishers in improved coldwater fish culture and enhancement technologies.
- Diversification in hill aquaculture with potential species through suitable mix of indigenous and exotic species for improving fish production.
- Providing enabling policy inputs for stock enhancement strategy in natural water bodies for improved livelihood opportunities.



Rainbow trout muscle is reasonably a good source of iron supplying



Metabolize proteins, production of hemoglobin and red blood cells. Deficiency can lead to iron deficiency anemia, chronic anemia, cough, and pre-dialysis anemia, eradication of different causes of fatigue.

Zinc 1.79 mg/100g of muscle is sufficient to maintain good health in humans



Involve in most metabolic pathways in plants and animals including human, Deficiency can lead to loss of appetite, growth retardation, skin changes and immunological abnormalities.

Higher selenium content (1.66mg/100 gm of muscle) Higher than most of the marine



Prevent carcino-genesis and other chronic diseases, acts as an antioxidant in man.

Rich source of potassium (1447 mg/ 100 g of muscle)



Potassium relief from stroke, blood pressure, heart and kidney disorders, anxiety and stress, as well as enhanced muscle strength, metabolism, water balance, electrolytic functions, and nervous system.

Dr. George John, former Vice Chancellor, Birsa Agricultural University; Dr. S.D. Tripathi, former Director, CIFE and CIFA; Dr. M. Sinha, former Director, ICAR-CIFRI, Barrackpore; Dr. K.K. Vaas, former Director, CIFRI and DCFR; Dr. B.N. Pandey, President, ZSI; Dr. C.N. Ravishankar, Director, CIFT; Dr. S. Raizada, Assistant Director General (Inland Fisheries), ICAR; Dr. S.K. Das, Director, Directorate of Fisheries, Govt. of Assam; Dr. J.R. Dhanze, former Dean, College of Fisheries, Tripura; several other eminent scientists and academicians graces the occasion



Dr Debajit Sarma, Secretary CFSI address the gathering



Dr A.K.Singh Delivering welcome address of National Seminar

CFSI Awards and Fellowship 2017

- (i) **Dr. K.L. Sehgal Award:** conferred to Dr A.K.Singh, Former Director ICAR DCFR Bhimtal for outstanding contribution in the field of coldwater fisheries
- (ii) **Dr. P.C. Mahanta Award:** Mr Balvir Singh Yarki, innovative farmers from Himachal Pradesh
- (iii) **Dr. Shyam Sundar Gupta:** Mrs PurnaSharmam Research Scholar for best poster presentation in National Seminar
- (iv) **CFSI Fellowship :** Dr R. S. Chauhan, Prof. M. H. Balki, Dr. R. N. Bhuyan, Dr. Kamal Jaiswal and Gold Medal for the Life Member of the Society: Dr. F. A. Bhat, Dr.GhanshyamJha, Dr Purabi Mishra

CFSI Awards and Fellowship 2017



North East angling festival 2017

Angling Festival consisted scientists, stakeholders, entrepreneurs on “Mahseer in Recreational Fisheries and Eco-tourism in Northeast India” was jointly organized by ICAR-Directorate of Coldwater Fisheries Research, Bhimtal, Coldwater Fisheries Society of India and Jasingfaa Aqua Tourism Centre, Nagaon during September, 2017 at Jasingfaa Aqua Tourism Centre, Nagaon.

From the very beginning, on the auspicious occasion of National Fish Farmers day on July 10 each year, Jasingfaa Aqua Tourism Centre has been organizing state level angling competition to mark the discovery of induced breeding of fish. However, it has been demanded by the anglers of other North Eastern states that the scope be expanded to cover the anglers of the other North Eastern States in this remarkable event. It has been therefore opened for the anglers of all the North Eastern states since 2013

One can be very enthusiastic about aqua sports like fish angling at Jasingfaa centre and spend hours catching fish there which are open for tourists round the year.

The tourists, of course, have to abide by certain rules and regulations laid down by the management. There are eleven ponds, covering about 75% of the centre that can offer some of the most excited fishing experience. Some of the fish varieties have specially been reared for the purpose. The world famous priced sport fishes Golden Mahseer, locally known as SonaliPithiya, is such a variety though it is absolutely for conservation purpose.



A Brief Profile of updated CFSI Life Members

	Dr Suman Mishra Assistant Professor Affiliation: Dept. of Applied Animal science, BBAU, Rae Bareilly road, Lucknow 226025 Specialization:	Membership No: CFSI/LM/85 drsumanmishra@gmail.com		Miss Jyotismita Thakuria Jr. Scientist Affiliation: Livestock Research station, AAU Specialization: Fish and Fisheries	MembershipNo:CFSI/LM/86 thakuriajyotismita@gmail.com
	Parvaiz Ahmad Ganie Scientist Affiliation: ICAR-Directorate of coldwater fisheries Research, Bhimtal Specialization: FRM	Membership No: CFSI/LM/87 parvaizahmad12@gmail.com		Raja Aadil Hussain Bhat Scientist Affiliation: ICAR-Directorate of coldwater fisheries Research, Bhimtal Specialization: Fish Health	Membership No: CFSI/LM/88 bhataadil08@gmail.com
	Mr. Abhay Kumar Giri Scientist Affiliation: ICAR-Directorate of coldwater fisheries Research, Bhimtal Specialization: Aquaculture	Membership No: CFSI/LM/89 abhayaq.maa@gmail.com		Mr. Biswajyoti Bardolai Scientist Affiliation: FRC, AAU, Jorhat Specialization:	Membership No: CFSI/LM/90 biswajyotifrc@gmail.com
	Bonika Pant Research Scholar Affiliation: College of Fisheries, GBPUAT, Pantnagar Specialization: FRM	Membership No: CFSI/LM/91 bonika09pant@gmail.com		Vibha Lohani Research Scholar Affiliation: College of Fisheries, GBPUAT, Pantnagar Specialization: FRM	Membership No: CFSI/LM/92 Vibhalohani29@gmail.com
	Dr. Poonam Tripathi Assistant Professor Affiliation: MBGPG College, Haldwani Nanital district, U.K Specialization:	Membership No: CFSI/LM/93 mspoonam@reddifmail.com		Mahima Tamta Research Scholar Affiliation: College of Fisheries, GBPUAT, Pantnagar Specialization: FRM	Membership No: CFSI/LM/94 Mahimatamta074@gmail.com

	Kusumlata Goswami Research Scholar Affiliation: College of Fisheries, GBPUAT, Pantnagar Specialization: FRM	Membership No: CFSI/LM/95 kusumlata393@gmail.com		Minakshi Markam Research Scholar Affiliation: College of Fisheries, GBPUAT, Pantnagar Specialization: FRM	Membership No: CFSI/LM/96 Mmarkam043@gmail.com
	Mr. Sumit Kumar Research Scholar Affiliation: Specialization:	Membership No: CFSI/LM/97 Ska9557@gmail.com		Dr. Sudhansu Sekhar Mishra Principle Scientist Affiliation: ICAR-Central institute of Freshwater Aquaculture, Bhubaneswar 751002 Specialization:	Membership No: CFSI/LM/98 Ssmishra60@gmail.com
	Uzma Siddiqui Research Scholar Affiliation: Specialization:	Membership No: CFSI/LM/99 Uzma.labiba@gmail.com		Mr. Rashad Hussain Shah Research Scholar Affiliation: Specialization:	Membership No: CFSI/LM/100 rashadshah91@gmail.com
	Mr. Krishna Tudu Research Scholar Affiliation: Specialization:	Membership No: CFSI/LM/101 Krishnatudu36@gmail.com		Amrita Rani Research Scholar Affiliation: College of Fisheries, West Bengal University of Animal & Fishery Sciences, Kolkata Specialization: Aquaculture	Membership No: CFSI/LM/102 amritardeven09@gmail.com
	Mr. Asim Iqbal Bazaz Research Scholar Affiliation: Specialization:	Membership No: CFSI/LM/103 Asimbazaz786@gmail.com		Dr. Rajesh Assistant Professor Affiliation: College of Fisheries, GBPUAT, Pantnagar Specialization: Aquaculture	Membership No: CFSI/LM/104 Rajeshfish100@gmail.com
	Dr. Naresh Kumar Agarwal Professor Affiliation: Dept. of Zoology, HNB Garhwal University, Badshahithaul Tehri Garhwal, 249199 Specialization: Fish and Fisheries	Membership No: CFSI/LM/105 agrwalnaresh3@rediffmail.com		Mr. Udai Ram Gurjar Research Scholar Affiliation: ICAR- Central institute of Fisheries Education, Mumbai Specialization: FRM	Membership No: CFSI/LM/106 udaigurjarshredev@gmail.com
	Mr. Tarang Kumar Shah Research Scholar Affiliation: College of Fisheries, GBPUAT, Pantnagar Specialization: Aquaculture	Membership No: CFSI/LM/107 Kunnushah4545@gmail.com		Dr. Maniranjana Sinha Ex. Director Affiliation: ICAR- CIFRI Specialization: Fish and Fisheries	Membership No: CFSI/LM/108 Sinha-mr@gmail.com
	Dr. Raj Kumar Assistant Professor Affiliation: SKUAST-Jammu Specialization: Fish and Fisheries	Membership No: CFSI/LM/109 rajpaba77@gmail.com		Dr. Jitendra Sundaray HOD Affiliation: ICAR-CIFA Specialization: Fish Biotechnology	Membership No: CFSI/LM/110 jsundaray@gmail.com
	Mr. Bipin kumar Vishwakarma Research Scholar Affiliation: ICAR- Directorate of Coldwater Fisheries Research, Bhimtal Specialization: Aquaculture	Membership No: CFSI/LM/111 bipin.k.vish@gmail.com		Mr. Santosh Kumar Technical Officer Affiliation: ICAR- Directorate of Coldwater Fisheries Research, Bhimtal Specialization: Fish Nutrition and Aquaculture	Membership No: CFSI/LM/112 Santosh_ishu@rediffmail.com
	Dr. Debangshu Narayan Das Professor Affiliation: Dept. of Zoology, RGU, Arunachal Pradesh 791112 Specialization: Fish and Fisheries	Membership No: CFSI/LM/113 dndas321@rediffmail.com		Manisha Gupta Research Scholar Affiliation: Dept. of Biotechnology, Bhimtal campus, Kumaun university, Nanital Specialization: Biotechnology	Membership No: CFSI/LM/114 guptamanisha1234@gmail.com

Winners of CFSI Photo Contest 2018

As part of Annual Foundation Day of ICAR-DCFR, Bhimtal, Uttarakhand on September 24, 2018, the Coldwater Fisheries Society of India hosted photo competition on the theme Hill Aquaculture & Fisheries. Total seven entries was received from the member of CFSI. The winners are as bellows. A People's Choice award will also be presented at the awards ceremony and will be awarded INR 500 and a citation



First Prize: Bipin Vishwakarma, 3000 INR cash award and a citation



The Tiny Brooder

Second Prize: Neetu Shahi, 2000 INR cash award and a citation



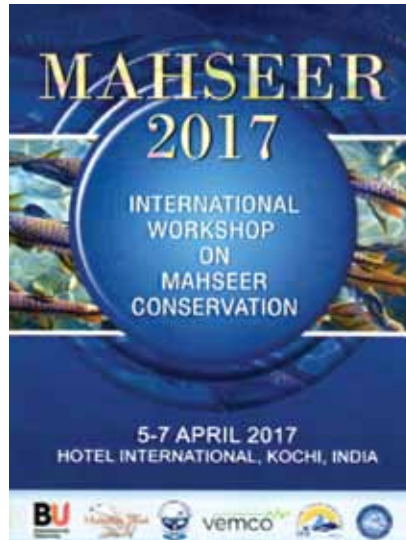
The Snow Trout

Third Prize: Krishna Tadi, 1000 INR cash award and a citation

About CFSI

Coldwater Fisheries Society of India was launched in the year 2012 under the president ship of Late Dr. P.C. Mahanta, Former Director, ICAR-DCFR, Bhimtal. This society was formed with an objective to implement and expand the research and developmental activities for the benefit of various stakeholders of coldwater fisheries sector of India. The society was registered under Societies Registration Act XXI of 1860 (Reg. No. 128/2012-2013) and the first executive committee was formed with its headquarter at ICAR-DCFR, Bhimtal. At present, the society has registered 100 life members comprising of scientist, academicians, entrepreneurs, students and farmers all over the country.

CFSI Publications



CFSI contact

Dr. Debajit Sarma, President, Coldwater Fisheries Society of India, C/o- ICAR-Directorate of Coldwater Fisheries Research, Bhimtal-263136, Nainital, Uttarakhand, India. Website: www.dcfrr.res.in Email ID: coldwatersheriessocietyindia@gmail.com. Contact Nos.: 05942 247280 (O); 8057912707 (M)

CFSI Awards and Fellowship

(i) Dr. K.L. Sehgal Award

Eligibility: Persons involved in coldwater fisheries research and development in India. The award carries a cash prize of Rs. 10000.00, a certificate and a medal along with an invitation to deliver lecture at an institute's forum.

(ii) Dr. P.C. Mahanta Award

Eligibility: is award is for best innovation by farmer in the field of coldwater fisheries sector & award carries a cash prize of Rs. 5000.00 and a citation.

(iii) Dr. Shyam Sundar Gupta Award

Eligibility: is award for best poster presentation. And award carries a cash prize of Rs. 2500.00 and a citation.

(i) CFSI Fellowship and Gold Medal for the Life Member of the Society:

Applicants who are Life Members of the society and have made substantial contribution in the field of coldwater fisheries may apply for CFSI Fellowship and Gold Medal. Details about the CFSI Fellowship and Gold Medal can be obtained from the Secretary, Coldwater Fisheries Society of India, c/o- ICAR-Directorate of Coldwater Fisheries Research, Bhimtal-263136, Nainital, Uttarakhand, India.

CFSI Journal

It is a pleasure to announce that Coldwater Fisheries Society of India, c/o- ICAR- Directorate of Coldwater Fisheries Research, Bhimtal-263136, Nainital, Uttarakhand, India is going to launch **Journal of Coldwater Fisheries**. Details on the journal will be shortly made available in the ICAR-DCFR website.