



The Inland Fisheries News

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From Director's Desk



The past few decades have seen both a quantitative and qualitative downfall in riverine fisheries. Earlier, fishermen bothered about the commercially important fish. Gradually they were forced to be less choosy. Now it is only the small fish. How did it come to happen? Production of major carps in the early '60s was 26.6 kg a hectare. Thirty years later, between 1990 and 1995, it fell to just 2.5 kg a hectare. Moreover, some species have already been lost and more may follow an irreplaceable loss. Contrary to what most think, pollution isn't the major cause for fish decline. It is increased water abstraction and siltation/sandification of the river bed. For example between '70s and '90s, the Ganga level at Allahabad had gone down by four meters (during post monsoon – period of maximum water availability). What has this meant for fish? Fish used to breed in the shallower areas and their ideal breeding grounds are no longer available. Their habitat has shrunk, both in terms of breeding and feeding area. The Ganga Action Plan has improved water quality but fisheries have definitely gone down. Again, the water level is to blame 'A cup of water may have enough nutrients but you can't get a kg of fish from it'.

HYDROLOGICAL STATUS AND PRODUCTION POTENTIAL OF SIANG, DIBANG AND LOHIT – THE THREE FORE RUNNERS OF RIVER BRAHMAPUTRA

River Brahmaputra, a moving ocean of North East, rises from the snout of Chemayungdung mountains near Tachhog (Tomchok) about 100 km south east of Lake Manasarovar. Running nearly 1250 km in a shallow valley through Tibet as river Tsangpo it enters India near Tuting in Siang district of Arunachal Pradesh and is called Siang or Dihang. The river is joined by two equally famous trans Himalayan tributaries Dibang and Lohit (entering India near Mipidon and Lahao in Dibang and Lohit districts respectively of Arunachal) at Saidiya, the entry point in Assam. After joining with the two tributaries the river assumes the name Brahmaputra in Assam.

Water quality of three rivers at a glance

Some of the important water quality parameters of three rivers are given below : Parameters

Parameters	Siang	Dibang	Lohit	
			Parsuram kund	Central Lohit (Alubari ghat)
Total Alkalinity (mg ^l ⁻¹)	62.67	35.72	38.4	58.28
Conductance (µ mhos)	141.3	99.8	102.4	143.3
Total dissolved solids (mg ^l ⁻¹)	71.3	50.5	50.8	72.2
Calcium Ca ⁺⁺ (mg ^l ⁻¹)	14.72	7.68	7.68	15.36
Total Hardness (mg ^l ⁻¹)	60.8	38.4	38.4	57.6

Common features of the three rivers are low water temperature (10.7 to 14.8°C), high transparency (128.0 to 164.0 cm), rich oxygen (9.02 to 10.2 mg l⁻¹) and organic matter (1.632 to 2.47 mg l⁻¹) and poor nutrients Nitrate – (0.015 to 0.025 mg l⁻¹) and phosphate (0.005 to 0.043 mg l⁻¹). But considerable difference has been observed in respect of alkalinity, conductance, dissolved solids, calcium and hardness, all being comparatively higher in Siang and lower in Dibang. The above water quality parameters are almost similar in Siang river from Yembung to Diramghat but they differ considerably in Lohit in two stretches being comparatively much lower near Parsuram Kund and higher in central Lohit. The increase in the values of above chemical parameters is due to the impact of highly alkaline Digharu river joining Lohit near Alubarighat.



A view of river Dibang.

Fisheries of the three rivers

The average fish landing of Siang at Yembung, Pansighat and Oiramghat, Dibang at Roing and Shantipur market and Lohit at Alubarighat are on av. 91.0 kg day⁻¹, 105 kg day⁻¹ and 62.5 kg day⁻¹ respectively. The main fishery in all the three rivers are of *Tor putitora*, *Neolisochilus hexagonolepis*, *L. dero*, *L. dyocheilus* and *Scizothorax richardsoni* representing almost 80.2 to 89.4% of the total production. Miscellaneous trace fishes also form sizeable component of the catch (10.6 to 19.8%) while major carp, catfishes and minor carp are completely absent. The fish production potential of these rivers are 50.5, 59.3 and 67.3 kg ha⁻¹ yr⁻¹ in Siang, Dibang and Lohit respectively

Threat to the environment

Although the above rivers have sizeable population of Mahseer and other cold water species but large scale deforestation in Arunachal Pradesh and soil erosion has posed severe threat to the environment. In addition to heavy siltation, mass killing of fishes using explosive materials is another factor responsible for damaging the natural fishery of these rivers. Thus, there is an urgent need to protect the environment before these fishes get vanished from these rivers in Arunachal Pradesh and Assam.

EIA OF RIVER SABARMATI AND MAHI IN GUJARAT

Scientists of CIFRI as part of their ongoing research on Environmental Impact Assessment of important river systems of India conducted EIA of the west flowing rivers of Gujarat.

The two rivers Sabarmati and Mahi pass through Gujarat only in their last phase (downstream). Upstream the rivers are not much polluted. Downstream these rivers while coming through Gujarat get polluted as about 100 industrial clusters of 600 industrial units comprising major industries of Gujarat viz. textile, engineering, vegetable oil, chemical and cement, drain their varied effluents. As a result both the rivers are polluted causing habitat stress to fishes.

The river Sabarmati from origin to Gandhi-nagar is free from pollution. Between Gandhi-nagar to Ahmedabad, the stretch receives waste water discharge and the quality of water deteriorates gradually. In this stretch to take a specific example of Sabarmati Bridge site where it is heavily polluted the water quality values are pH (8.22), sp. conductivity (1948 μ mhos cm), COD (116.4 mg l⁻¹) and Chloride (107.92 mg l⁻¹), whereas in the upper unpolluted stretch the water quality values show pH (7.96), sp. conductivity (270 μ mhos cm), COD (4.4 mg l⁻¹) respectively. The stretch from Ahmedabad to Gulf of Cambay is being exploited for commercial fishing and this stretch is the tidal stretch. The river Mahi from origin to Vijaypur, Agarwada, Godera is free from pollution but the stretch from Vasad to Nandeswari is heavily polluted due to industrial effluents together with sewage waste discharged from Vadodara. This deteriorates the water quality drastically especially

during summer and winter seasons. The water quality parameters at upper stretches of river Mahi at Lunawala, indicate pH (8.26), sp. conductivity (230 μ mhos cm), alkalinity (160 mg l^{-1}) and low levels of phosphate and nitrate against heavily polluted areas in the lower stretch like Nandeswari site where the values are pH (7.58), sp. conductivity (2900 μ mhos cm), COD (218 mg l^{-1}), alkalinity (340 mg l^{-1}) and rich phosphate and nitrate. The stretch of river Mahi from Devaka to its end at Gulf of Cambay is a tidal stretch and used for commercial fishing.



Effluent discharge in river Mahi

The metal contamination at the stressed stretch of both the rivers was significant. At Nandeswari site of River Mahi receiving petrochemical and sewage effluents, the sediment quality showed significant concentration of Zinc (63.3 mg l^{-1}), copper (71.95 mg l^{-1}), lead (12.35 mg l^{-1}) and cadmium (1.95 mg l^{-1}). The Sabarmati bridge site of River Sabarmati also indicated higher values of metals.

ECONOMICS OF RIVERINE FISHERIES UNDER DIFFERENT PROPERTY REGIMES

The investigations to work out economics of riverine fisheries under different property regimes were conducted in three stretches of Ganga river system. These included river Ganga (Kanpur to Farakka) under open access; river Yamuna (Yamuna Nagar to Panipat) under private (contractor); and river Ghagra (Ghagra Barrage to Faizabad) under co-operatives. Rivers are the property of State

Government Departments, namely, Fisheries, Forests, Revenue and the village Panchayats. In some stretches more than one department staked their claim, and leased the stretch to different parties for fishing. It created tensions among local fishers and resulted in an overall degradation of fish stock of the stretch. No contractual arrangements existed in the

Comparison of the economics of riverine fisheries under different property regimes were conducted by scientists of CIFRI. This study is the first attempt of its kind in inland capture fisheries in India.

stretch with open access, while for others the river was leased out for one year. In case of co-operatives the lease was generally renewed with same co-operative, but, for private contractor, there was no certainty of renewal as leasing was done through open auction. The contractors generally engaged local fishermen or professional fishing party for fish harvesting. They used higher energy gears (dragnets) with small mesh size to have the maximum catch. Under other two property regimes, mostly, lower energy gears (gill net) were used. The annual fishing was highest under private regime efforts (293 days) as compared to open access (282 days) and co-operative regimes (147 days). Therefore, the probability of irrational exploitation was higher under private property regime, due to type of fishing practices adopted and limited lease (harvesting) period. Furthermore, the fishers under this system were remunerated very poorly, when compared to their counterparts under other regimes. The annual and daily catch per fisher family was the highest in case of open access (1432 and 5 kg respectively). The cost structure revealed lowest annual costs for fishers of co-operatives, due to lower fishing effort and sharing of fishery requisites. The better marketing practices yielded them maximum fish price (Rs. 34.82 per kg). The annual net returns were highest (Rs. 29870) for fishers under open access, but, net returns per kg of fish harvested and output – input ratio were the maximum for fishers of co-operatives (Rs. 30.21 and 7.55, respectively). It indicated the highest working efficiency under co-operative regime. The study concluded that the contractual arrangements in riverine fisheries should be welcomed for better fisheries management. The fisheries institutions like co-operatives should be preferred during leasing out the rivers. Involvement of fisher institutions should be promoted to make these reforms a success.

HUMAN RESOURCE DEVELOPMENT

Awards

Dr. M. Sinha, Director was awarded Fellowship by the Association of Aquaculturists, Bhubaneswar.

Dr. R.S. Panwar, Principal Scientist and Dr. R.N. Seth, Sr. Scientist were awarded Fellowship by Bioved Research and Communication Centre, Allahabad.

Dr. K. Chandra, Principal Scientist was awarded Fellowship by the Royal Society of Chemistry, London and was also authorised to use the designation Chartered Chemist.

Dr. M.A. Khan, Dr. B.C. Jha and Shri A. Hajra, Senior Scientists were awarded the Fellowship of Inland Fisheries Society of India.

Sri Ranjan Kumar Manna, Scientist has been awarded Doctor of Philosophy in Science on 24th November, 1999 by Jadavpur University.

Dr. V.V. Sugunan, Principal Scientist was invited to act as an Expert Panel Member in the Conference on Aquaculture in the third millennium, conducted as a part of the Aquaculture and Seafood Fair-2000 held at Hotel Central Plaza, Bangkok from 20th to 25th February 2000.

MANPOWER DEVELOPMENT



Sarvasri Brahmane Manoj and Praveen Maurya, Scientists, are deputed for 70th FOCARS Training Programme conducted by NAARM, Hyderabad, from 2nd June 2000 to 1st October 2000.

EXTENSION SCENE

CIFRI's Mass – awareness campaigns

A series of mass awareness campaigns were organised in the coastal areas of Midnapore district of West Bengal to educate the fish seed collectors to stop destruction of fish and shell fish seed. The local Village Panchayats, State Fisheries Departments were involved in the campaigns. The Doordarshan Kendra, Calcutta made a coverage of the programmes and telecast the same. It is heartening to note that as a sequel to our last years campaigns, 17 per cent of the seed collectors responded to our request and adopted fish conservation measures.

Demonstration on Pen Culture Technology



Netting in the demonstration site of pen culture in Amda beel

Realising the scope and importance of pen culture technology, the Institute has taken initiative to demonstrate the technology in the flood plain lakes of West Bengal in the first phase. The idea of demonstration is not only to educate and motivate the fishermen community to adopt the technology but also to undertake refinement measures to make the technology location specific suitable.

The Institute demonstrated giant freshwater prawn and carp culture in pens located in Amda beel under Dakshin Bishnupur Fisheries Cooperative Society of Nadia District.

The giant freshwater prawn *M. rosenbergii* culture in pens recorded a production rate of 670 kg ha⁻¹ in 4 months. Since prawn feed was highly expensive and the fishermen were reluctant to use it, locally available mussle meat available in plenty in the beels was included in the feed.

The package of practices were taught step by step to the members of the fishermen cooperative societies.

Raising of table size carp was also done under pen culture from the same system. A combination of carps at a ratio of *Catla catla* (30%), *Labeo rohita* (30%), *Cirrhinus mrigala* (30%) and *Hypophthalmichthys molitrix* (10%) was stocked @ 10,000 nos. per hectare. Fishes were fed with conventional locally available feed. A production rate of 845 kg ha⁻¹ in 4 months period was obtained from the pen.

VISITORS

Shri Hukumdeo Narayan Yadav, Union Minister of State for Agriculture inaugurates the Paryavaran Bhavan of CIFRI, Barrackpore

The Hon'ble Union Minister of State for Agriculture, Shri Hukumdeo Narayan Yadav inaugurated the Paryavaran Bhavan of CIFRI, Barrackpore on 2nd April 2000. He visited the laboratories and evinced keen interest in the research work being conducted by scientists. While addressing the gathering of fishery scientists and administrators the minister opined that science and technology are weapons to fight poverty, backwardness and ignorance. The projects undertaken by the research



Hon'ble Minister inaugurating the Prayavaran Bhavan of the Institute

establishments should have direct bearing on the socio-economic upliftment of Indian rural masses. He acclaimed the Institutes contribution in transforming the inland fisheries in the country from subsistence level to a viable profession.

The minister was earlier apprised of the major activities and achievements of the Institute and its organizational management by the Director of the Institute, Dr. M. Sinha.

Honourable Members of Parliament visit CIFRI

The study group of the Parliamentary Standing Committee on Agriculture consisting of 21 Members of Parliament and 3 officers of the Lok Sabha Secretariat visited CIFRI on 16th June 2000. The committee's visit was for discussing the activities, financial resources, achievements of the Institute and other problems if any. The members were accorded a warm welcome on their arrival in the Institute by the Director, scientists and staff members of CIFRI. Dr. M. Sinha, Director, presented the research activities and achievements of the Institute before the members which was followed by a lively interaction session chaired by the Chairman of the team, Hon'ble Shri S.S. Palanimanickam. All the queries of the Hon'ble members were answered by the Director to their satisfaction. Later on the members visited the laboratories and had discussion with the scientists. The Hon'ble members evinced keen interest in the research work and its management in the Institute and were impressed by the achievements of CIFRI.



Director, CIFRI briefing the Hon'ble members of Parliamentary Standing Committee on Agriculture

Dr. R.S. Paroda, Director General, ICAR visits CIFRI

Dr. R.S. Paroda, Director General, ICAR paid a visit to CIFRI, headquarters, Barrackpore. Dr. M. Sinha, Director, CIFRI apprised him of the activities of the Institute. Dr. Paroda visited all the laboratories and discussed with scientists regarding their research work. He was extremely happy to see the various facilities developed for conducting research and hoped that CIFRI will continue making significant contribution towards inland capture fisheries in India.



Dr. R.S. Paroda, DG, ICAR and Secretary, DARE visits Institute's laboratory

Media Men visits CIFRI

A media team consisting of the correspondents from Business Standard, UNI, Hindustan, PTI, The Hindustan Times, Times of India, Navbharat Times, Univarta accompanied by the CPRO, ICAR visited the Institute on 8th May, 2000. They were apprised of the various research activities and the organizational network of CIFRI by the Director, Dr. M. Sinha. Later on, the team visited the various laboratories and discussed the work programme with scientists to get a first hand knowledge of the research work and achievements in inland fisheries. All were impressed by the research work being done and the human resource management systems being employed in the Institute.



Director, CIFRI highlights Institute's achievements to Media men



MEETINGS

Annual Staff Research Council Meeting

The Annual Staff Research Council Meeting of the Institute was held on 13th & 14th May, 2000. Welcoming Dr. B.N. Singh, ADG (Fy), ICAR, Dr. M. Sinha, Director, CIFRI hoped that his presence would be valuable for constructive evaluation of the research projects. The Project Leaders presented the progress achieved under all the seventeen research projects. After extensive deliberation future project work for 2000-2001 was decided.



Scientists interacting during SRC meeting

Research Advisory Committee Meeting

The Research Advisory Committee meeting of the Institute was held at CIFRI, Barrackpore on 12th May 2000 under the Chairmanship of Prof. H.P.C. Shetty and attended by the members viz., Dr. P. Das, Dr. J.R.B. Alfred, Dr. V.C. George, Mr. Susanta Halder, Mr. B.K. Mondal and Dr. M. Sinha. After discussion on the Action Taken Report of the last meeting, the Heads of Divisions presented the progress and achievements under various projects. After elaborate deliberations on individual projects recommendations for future research programmes were formulated.



RAC meeting in progress

STAFF NEWS

Appointments

Sri A. Nagarjuna Rao, SSG-I	04.01.2000
Sri Brahmane Manoj Pandit, Scientist	27.01.2000
Sri Praveen Mauryee, Scientist	25.02.2000
Sri Sanjeev Kr. Sahu, Scientist	25.02.2000
Dr. S.S. Mishra, Sr. Scientist	18.03.2000
Dr. R.S. Srivastava, Sr. Scientist	17.04.2000
Dr. Srikanta Samanta, Sr. Scientist	15.05.2000
Sri K.K. Sarma, T-5	01.06.2000
Sri Pradipta Sen, LDC	03.05.2000
	(Inter-Institutional Transfer from CAZRI, Jodhpur)
Sri Munshi Ram Rana, SSG-I	13.12.1999
Sri Debasis Singha, SSG-I	08.02.2000
Sri D. Moitra, Sr. Adm. Officer	08.06.2000
	(On transfer from CS&WRI, Jaipur)

Promotions

	Promoted to	Effective from
Dr. V. Kolekar, Scientist (S.S.)	Sr.Scientist	01.07.1995
Dr.M.K. Bandopadhyay, -do-	Sr.Scientist	02.04.1999
Dr. P.K. Katiha, -do-	Sr.Scientist	14.04.1999
Dr. S. Samanta, Scientist	Scientist (S.S.)	03.06.1978
Dr. a.K. Das, -do-	Scientist (S.S.)	21.07.1998
Dr. M.A. Hassan, -do-	Scientist (S.S.)	14.09.1998
Miss Mira Sen, T-7	T-8	01.01.1996
Sri S. Kr. Sadhukhan, T-7	T-8	01.07.1996
Sri A.R. Majumder, T-6	T-7	19.02.1999
Sri C. Muniappa, SSG-I	SSG-II	21.01.2000
Sri K. Mohanan, SSG-I	SSG-II	21.01.2000
Sri S.K. Kar, Superintendent	A.A.O.	15.05.2000
Sri Keshaw Prasad, -do-	A.A.O.	15.05.2000
Sri J.P. Mishra, T-4	T-5	01.01.2000
Sri Camil Lakra, T-4	T-5	01.07.1998
Sri T. Chatterjee, T-4	T-5	01.01.2000
Dr.(Mrs) K. Srivastava, T-4	T-5	01.01.2000
Sri Soumitra Roy, T-4	T-5	31.01.2000
Sri D.Sanfui, T-II-3	T-4	01.01.2000
Sri S.B. Tamang, T-II-3	T-4	01.01.2000
Sri K.K. Dutta, T-II-3	T-4	01.01.2000
SriA.K. Majumder, T-II-3	T-4	01.01.2000
Sri D. Borgoyari, T-II-3	T-4	01.01.2000
Sri Ranjit Singh, T-II-3	T-4	01.01.2000
Sri Donald Singh, T-II-3	T-4	01.01.2000
Sri M.C. Pal, T-II-3	T-4	01.01.2000
Smt. Rina Naiya, T-II-3	T-4	01.01.2000
Sri Arunava Mitra, T-II-3	T-4	01.01.2000
Shri L.K. Parbat, T-2	T-I-3	01.07.1998
Sri P. Singh, T-2	T-I-3	01.01.2000
Sri A.K. Barui, T-2	T-I-3	01.01.2000
Sri S.G. Biswas, T-2	T-I-3	01.01.2000
Sri Bablu Mondal, SSG-I	SSG-II	20.05.2000

Upgradations in next higher scale under Assured Career Progression (ACP) Scheme

	Upgraded to	Effective from
Smt. Sikha Majumder, Sr.Clerk	Rs. 5500-9000	09.08.1999
Sri P.K. Dutta, -do-	Rs. 5500-9000	09.08.1999
Sri Ambika Lal, -do-	Rs. 5500-9000	09.08.1999
Smt. Anita Majumder, -do-	Rs. 5500-9000	09.08.1999
Smt. Narayani Banerjee, -do-	Rs. 5500-9000	09.08.1999
Smt. G. VinodaLaxmi, Jr.Steno.	Rs. 5500-9000	14.12.1999
Sri Swapan Kumar Das, T.K	Rs. 4000-6000	09.08.1999
Sri Karna Bahadur, SSG-II	Rs. 2650-4000	09.08.1999
Sri S. Mahendran, SSG-II	Rs. 2650-4000	09.08.1999
Sri K.K. Dhir, SSG-II	Rs. 2650-4000	09.08.1999
Sri J. Mukhia, SSG-II	Rs. 2650-4000	07.11.1999

Sri M.L. Saha, SSG-II	Rs. 2650-4000	10.12.1999
Sri B.N. Krishnappa, SSG-II	Rs. 2650-4000	09.08.1999
Sri Gunadhar Dhibar, SSG-II	Rs. 2650-4000	17.12.1999
Sri Sankar Bose, SSG-II	Rs. 2650-4000	05.01.2000
Sri G.J. Roundale, SSG-II	Rs. 2650-4000	23.01.2000
Sri Umesh Chowdhury, SSG-II	Rs. 2650-4000	24.03.2000
Sri G.C. Paramanick, SSG-II	Rs. 2650-4000	21.02.2000

► Merit increments

	No. of Increments	Effective from
Dr. A. K. Chottopadhyay, T-8	One	01.01.1998
Sri P.S.C. Bose, T-5	One	01.07.1997
Sri Laduram Mahaver	Three	01.01.2000
Sri S. Bejoy Nandan, T-5	Three	08.09.1999
Sri P. Dasgupta, T-5	One	01.07.1999
Sri H.C. Banik, T-4	One	01.01.1999
Sri B.L. Singha, T-II-3	Three	01.01.2000
Sri N.C. Biswas, T-II-3	Two	01.01.2000
Sri U.K. Chatterjee, T-II-3	Two	01.01.2000
Sri B.N. Das, T-I-3	One	01.01.2000
Sri C.K. Vava, T-I-3	Three	01.01.2000
Sri K.K. Das, T-2	One	01.01.2000

► Transfer

Sri Tarun Kr. Kabasi, Sr.Clerk	Calcutta to Barrackpore
Sri Jagnath Banerjee, Asstt.	Calcutta to Barrackpore
Sri S.P. Ghosh, T-5	Barrackpore to Farakka
Sri Gulab Shaw, SSG-III	Hoshangabad to Barrackpore
Sri K. Dharma Raju, LDC	Bangalore to Eluru
Sri V.G. Dhindore, T-1	Hoshangabad to Bangalore
Sri J. Mukhia, SSG-III	Allahabad to Farakka
Sri Fazal Khan, SSG-I	Allahabad to Farakka
Kum. Kalyani Sarkar, SSG-I	Allahabad to Barrackpore
Sri A. Sahani, SSG-III	Barrackpore to Malda
Sri G.C. Barman, Sr.Clerk	Calcutta to Barrackpore

► Retirement

Sri K.S. Banerjee, T-5	31.01.2000
Sri A.R. Majumder, T-7	31.03.2000
Sri R.C. Satapathy, T-5	31.03.2000
Sri S.N. Sadhukhan, T-I-3	31.03.2000
Sri Badal Lal Singha, T-II	03.05.2000
(Permanently incapacitated for further service)	(Forenoon)

LIBRARY

► New Additions (Books)

- *Encyclopedia of mass media and social development (1-2 Vols.)* by Yadav, K.P. (Ed.).
- *Encyclopedia of rural sociology (1-5 Vols.)* by Kumar, Arvind (Ed.).
- *Encyclopedia of environmental pollution and cleanup (Vol.1-2)* by Meyers, Robert A & Diane Kender Diltrick (Eds.).
- *The freshwater fishes of Indian region* by Jayaram, K.C.
- *Fish ecotoxicology* by Braunbeck, T., D.E. Hinton & B. Striet.
- *Limnology and remote sensing – a contemporary approach* by Kondratyev, K. Ya & N.N. Filatov.
- *Fish swimming* by Videler, John J.
- *Encyclopaedia of environmental analysis and remediation (1-8 Vols.)* by Meyers, Robert A. (Ed.).
- *A multi-volume comprehensive treatise (1-12 Vols.)* by Rehm, H.J. & G. Reed (Eds.).
- *Encyclopaedia of microbiology (2nd ed., 1-4 Vols.)* by Lederberg, Joshua.
- *Encyclopaedia of molecular biology (1-4 Vols.)* by Creighton, Thomas E. (Ed.).
- *Aquaculture and the environment* by Joseph, M. Mohan.
- *Cellular microbiology* by Cossert, Pascale & ors.
- *Biochemistry (4th ed.)* by Stryer, Lambert.
- *Management and ecology of river fisheries* by I.G. Cowx.
- *Recent trend in aquaculture* by Agarwal, V.P.

O B I T U A R Y

The members of staff of CIFRI express their deep sense of sorrow at the sudden and untimely demise of **Shri Ram Udgar Mochi, SSG-II** posted at Barrackpore whose tragic end came on 3rd March, 2000.

May the departed soul rest in peace.

