

# **INDIAN FISHERIES ABSTRACTS**

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# **CONTENTS**

	<b>Page No.</b>
<b>1. Entries</b>	<b>1 - 22</b>
<b>2. Author Index</b>	<b>A-1 to A-5</b>
<b>3. Subject Index</b>	<b>S-1 to S-2</b>
<b>4. Taxonomic Index</b>	<b>T-1 to T-2</b>
<b>5. Serial Index</b>	<b>P-1</b>



## ENTRIES

1. Abhilash, R.; Prakasam, V. R. (Department of Environmental Sciences, University of Kerala, Thiruvananthapuram-695 581 (India)). **Oxidative stress responses of the fish, *Oreochromis mossambicus* exposed to Thiodan.** Geobios (India) (2008) v. 35(1) p. 201-205.

Investigations carried out on the effect of sublethal concentrations of thiodan (35% E.C), on superoxide dismutase (SOD), catalase (CAT), reduced glutathione (GSH) and malondialdehyde (MDA) in the liver and kidney tissues of the freshwater fish, *Oreochromis mossambicus* showed initial increase in SOD and CAT activity levels at the low and intermediate sublethal concentrations, whereas a sharp decline at the highest sublethal concentration. Similar trend was observed for GSH, but MDA exhibited general increase at all sublethal concentrations. It indicated toxic perturbations in the antioxidant defense system of the fish exposed to the highest sublethal concentration.

2. Akhtar, Md. Shahbaz; Saravanan, S.; Kumar, Shivendra (Division of Fish Nutrition and Biochemistry, Central Institute of Fisheries Education, Mumbai (India)). **Iron - is its strength recognized in fish nutrition?** Fishing Chimes (June 2008) (India) v. 28(3) p. 39-41.

Proper assessment of iron requirement is quite difficult for individual fish species. Thus, the mineral nutrition is one of the most critical areas in fish nutrition as fish can extract minerals from both water and diets. The nutritional and physiological roles of iron has been studied only in a few species. This aspect has to be therefore studied in many species of fishes and shellfishes. So, the fish nutritionists need to give their special attention to this sector. The significance of these elements in general physiology and metabolism as well as their interaction with other nutrients would be an area of research interest. It is essential to develop methodologies for determining mineral requirement in relation to the composition of surrounding water. It is hoped that the importance of Fe, emphasised in this contribution, will receive wider attention.

3. Alam, Md. Noor (Department of Zoology, Giridih College, Giridih - 815 301, Jharkhand, (India)). **Physico-chemical characteristics of Pachamba pond, Giridih (Jharkhand).** Environment & Ecology (India) (2008) v. 26(2) p. 662-664.

The paper deals with the analysis of physico-chemical parameters of a fresh water pond of Giridih. Parameters like temperature, pH, DO, alkalinity and chlorides were investigated. A significant seasonal variation in these parameters was recorded.

4. Anjanayappa, H. N.; Shivaprakash, S. M.; Benakappa, S.; Somashekara, S. R.; Krishna Bhat C. H.; Shivappa, M. U. (Department of Fisheries Resources & Management, Karnataka Veterinary, Animal and Fisheries Sciences University, College of Fisheries, Mangalore - 575 002 (India)). **Food and Feeding Habits of Mullet, *Liza macrolepis* (Smith) from Mangalore Region.** Environment & Ecology (India) (2008) v. 26(2) p. 584-587.

The study deals with the nature and composition of food items, feeding habits and intensity of feeding of *Liza macrolepis* from Mangalore region. This species was found to feed mainly on decayed organic matter, diatoms and algae indicating a bottom feeding habit. Sand grains showed more or less increasing trend with increasing length of fish while, the decayed organic matter showed a decreasing trend with increase in size of the fish. Diatoms and algae were found relatively in greater proportion in small sized fishes than large sized. Active feeding was observed during September to January while poor feeding was noticed during June to August, which was the peak breeding season of the fish.

5. Annappaswamy, T. S.; Reddy, H. R. V. (Department of Fisheries Resources and Management, College of Fisheries, Karnataka Veterinary, Animal and Fishery Sciences, Mangalore - 741 252, Karnataka, (India)); Nagesh, T. S. (Faculty of Fishery Sciences, West Bengal University of Animal and Fishery Sciences, Kolkata - 700 094, West Bengal, (India)). **Reproductive biology of Indian sandwhiting, *Sillago sihama* (Forsk.) from estuaries of Dakshina Kannada, Southwest coast of India.** Journal of Inland Fisheries Society of India (2008) v. 40(1) p. 44-49.

Reproductive biology dealing with spawning, size at first maturity, sex ratio and fecundity of *Sillago sihama* estuaries of Dakshina Kannada along southwest coast of India has been studied during April 1998 to March 1995 fish spawns from August to March with peak during September-October and February. Males attain sexual maturity at 212 mm (TL) while females at 226 mm (TL). Studies on sex ratio revealed that females attain larger size than males. The fecundity ranged from 57,685 to 13,47,340 with an average of 5,24,714 eggs. Linear relationships were found between fecundity and fish length, body weight and gonad weight.

6. Arunkumar, L. (Department of Zoology, Mayai Lambi College, Yumnam Huidrom - 975 008, Manipur (India)). ***Bangana chindwinicus*, a new species of cyprinid fish (Cypriniformes : Cyprinidae) from Manipur, India.** Aquacult (2008) (India) v. 9(1) p. 13-22.

*Bangana chindwinicus*, a new species of benthopelagic cyprinid fish from the Chindwin basin of Manipur, India is described here. It is characterized by the following combination of characters: prominent snout with two rows of tubercles separated by a wide groove, lateral line scales 37-38+3-4 (total 40-41), circumpeduncular scales 20, lateral transverse scales 8/1/5, scales between vent and anal fin base 3-4, gill rakers 49, predorsal scales small and arranged irregularly with varying numbers of 13-15, and origin of pelvic fin under 4<sup>th</sup> branched dorsal fin ray.

7. Binu, K. S.; Prakasam, V. R. (Department of Environmental Sciences, University of Kerala, Kariavattom, Thiruvananthapuram - 695 581 (India)). **Water quality of Vamanapuram river passing through Chirayinkeezhu Gramapanchayat, Kerala.** Geobios (India) (2008) v. 35(1) p. 153-156.

Water quality of samples collected from Vamanapuram river passing through Chirayinkeezhu panchayat (Kerala) is within the limits for drinking water except in rainy season, when turbidity and iron were high. The river water is safe for domestic needs after proper treatment.

8. Biswas, B. K. (Central Inland Fisheries Research Institute, Barrackpore, Kolkata - 700 120); Sugunan, V. V. (Indian Council of Agricultural Research, KAB II, Pusa, New Delhi - 110 012 (India)). **Fish diversity of Brahmaputra river system in Assam, India.** Journal of Inland Fisheries Society of India (2008) v. 40(1) p. 23-31.

Fishes from selected sites of the Brahmaputra river system in Assam were collected and identified during 1987 to 2000. A total of 151 species under 93 genera, 35 families and 10 orders were recorded. Important records were: *Colisa labiosus* (Day), *Gagata sexualis* Tilak, *Hemibagrus microphthalmus* (Day), *Lepidocephalichthys annandalei* Chaudhuri, *Nangra assamensis* Sen and Biswas, *Nemacheilus pavonaceus* (McClelland), *Pangio pangia* (Hamilton), *Pillaia khajurjai* Talwar, Yazdani and Kundu, *Puntius fraseri* (Hora and Misra) and *Rama rama* (Hamilton). Out of the 151 species recorded, 73 were considered as food fish as well as ornamentals, 26 with only food value, 21 as commercially important food fish as well as ornamentals, 10 as only commercially important food fish, 8 with only ornamental value, 7 commercially important exotic food fish, 3 commercially important food fish as well as sport fish, 1 food fish with sport value, 1 commercially important food fish with ornamental and sport values and one did not fall in any of this category. Conservation status of the species was assessed.

9. Bora, Indira Baruah (Department of Zoology, Bahona College, Jorhat, Assam, India); Borah, Bibha Chetia (Fisheries Research Centre, Assam Agricultural University, Jorhat, Assam, (India)). **Gonadal development and fecundity of Gangetic Mud Eel *Monopterus Cuchia* (Hamilton-Buchanan) in Assam.** Journal of Inland Fisheries Society of India (2008) v. 40(1) p. 69-74.

Gonadal development and fecundity of commercially important fish species *Monopterus cuchia* (Ham-Buch) was studied using live samples from natural resources. The gonado-somatic ratio (GSR) and maturity index indicate that the maturity cycle of the fish extends from February to August, while the breeding season is restricted from May to August, with peak during July. Presence of only one batch of maturing ova indicates that the species breeds only once in a year. The relative fecundity value ranges from 0.5 to 1.54 indicating very low fecundity. Low GSR value ranging from 0.30 to 18.08 in female also supports low fecundity of the species.

10. Chakrabarti, Padmanabha; Chowdhury, Srimoyee Hazra (Department of Zoology, Burdwan University, Burdwan - 713 104, West Bengal (India)). **Histoarchitectural and functional aspects of Olfactory Rosette of the cyprinid fish, *Cyprinus carpio* (Linnaeus).** Journal of Inland Fisheries Society of India (2008) v. 40(1) p. 39-43.

The histological architecture and functions of the different cells lining the olfactory epithelium in *Cyprinus carpio* (Linnaeus) have been studied. The olfactory organ consists of 25-26 lamellae arranged in rostrocaudal orientation. The olfactory epithelium encloses a central lumen called central core. The sensory epithelium is composed of olfactory receptor cells, secondary receptor cells, supporting cells, basal cells, mast cells, sensory and non-sensory mucous cells. The non-sensory epithelium is made up of ciliated supporting cells, stratified epithelial cells, basal cells and mucous cells. Different cells on the olfactory epithelium have been correlated with the functional significance of the fish concerned.

11. Dash, Biswajit (Visakhapatnam Regional Centre of Central Marine Fisheries Research Institute, Pandurangapuram, Visakhapatnam, A.P. (India)); Demin, Zhang (College of Life Science and Biotechnology, Ningbo University, Zhejiang Province, P. R. China). **Microbial Biofertilisation in Sustainable Aquaculture: A New Approach.** Fishing Chimes (June 2008) (India) v. 28(3) p. 37-38.

The use of biofertilisers in aquaculture assumes great significance in view of increasing costs of chemical fertilisers and also the continual loss of nitrogen from soil and water because of the process of denitrification in aquatic ecosystems. Nitrogen is the basic element required for production processes in aquatic systems. On a global basis, the biological and chemical nitrogen fixation rates were 9.1 and  $2.1 \times 10^{10}$  kg respectively and nitrogen is an inert element and cannot be used by the biota unless reduced. The reduction of nitrogen is an energy intensive process. Most of the fertiliser industries adopt Haber-Bosch process where nitrogen and hydrogen react to form ammonia at a temperature of about 300°C and at as high as 200-1000 atmospheric pressure. The process of biological nitrogen fixation is performed by the organisms with maximum efficiency at 300°C and 0.1 atmospheric pressure. The process of nitrogen fixation is carried out by the enzyme nitrogenase made of two metalloprotein components, namely molybdoferrodoxin and azoferrodoxin.

12. Gautam, R. K.; Shah, Sunil; Singh, Nirbhay; Irshad, Shaikh (Department of Zoology, School of Life Sciences, Dr. B. R. Ambedkar University, Khandari Campus, Agra-282 002 (India)). **Changes in certain enzymological parameters in Nuvan induced fresh water teleost *Channa punctatus* (Bloch).** Aquacult (2008) (India) v. 9(1) p. 73-74.

The effect of sublethal concentration (0.024 ml/l) of organophosphate compound "Nuvan" on *Channa punctatus* were studied after 24, 48, 72 and 96 hour. The result indicates increased activity of Serum Glutamic Oxaloacetic Transaminases (SGOT) and Glutamic Pyruvic Transaminases (SGPT) in serum of all treated fish.

13. Ghosh, Nandita (RLJDMC DAY Public School, Raniganj, Burdwan-713 347, India); Barua, Basabi (Department of Botany, T. D. B. College, Raniganj, Burdwan 713 347, (India)). **Enumeration of Pitfalls of Mahabir Colliery in Raniganj, WB Presumed to Have Become Wetlands.** Environment & Ecology (India) (2008) v. 26(2A) p. 966-967.

This communication enumerates the abandoned coal pits in Mahabir Colliery of Raniganj, district Burdwan. The objective of this work was to draw attention to such abandoned pits which gained the characteristics of wetlands under the regime of natural phenomena constituting a life sustaining system for the micro-and macrophytes and their animal associates. As many as 10 such wetlands were listed which deserved primary attention for their management and optimum sustainable utilization.

14. Giri, S.; Pradhan, P.; Chakraborty, S. K. (Department of Zoology, Vidyasagar University, Midnapore - 721 102, West Bengal, (India)). **Studies on hydrobiological status of Kansai and Dwarkeswar rivers In West Bengal, India.** Journal of Inland Fisheries Society of India (2008) v. 40(1) p. 59-64.

Kansai and Dwarakeswar are two freshwater rivers in West Bengal, joining the Haldi and Rupnarayan rivers respectively. The present study was carried out to assess the physical and chemical characteristics, microbial load, diversity and distribution of macrophytes, phytoplankton, zooplankton and macrobenthos in the two rivers during July, 2001 to June, 2003. A total of 84 macrophytes, 29 phytoplankton, 65 zooplankton, 50 macrobenthos (13 molluscs, 6 oligochaetes, 20 insects and 11 decapods) were recorded. The results of Sorensen Similarity Indices revealed differences in distribution of different biota due to different ecological conditions of the rivers. The present study also indicated that the water of these rivers might be good for outdoor bathing, industrial and agricultural use, wild life and fisheries but not safe as drinking water without treatment.

15. Gogate, M. N.; Joshi, V. R.; Mulye, V. B.; Sapkale, P. H.; Chogale, N. D. (College of Fisheries, Dr. B. S. Konkan Krishi Vidyapeeth, Shirgaon, Ratnagiri - 415 629, Maharashtra (India)). **Effect of different levels of lactitol on the shelf life of treated frozen surimi prepared from Tuna Fish.** *Aquacult* (2008) (India) v. 9(1) p. 29-36.

The present research work reveals cryoprotective effect of 4, 6, 8, 10 and 12 % lactitol on bleached frozen frigate tuna (*Auxis thazard*) surimi stored at -20°C for 6 months. The results were compared with the control without cryoprotectant with antioxidant in bleached surimi. Among the different levels of lactitol highest expressible water percentage and peroxide value were found in lower levels (4 and 6%) whereas, the decrease in values of protein and SSN were lowest in 8,10,12 % lactitol as compared to the lower levels of lactitol at the end of 5 month storage and control at the end of 3 month of storage. Decreases in the scores of all organoleptic characteristics during storage were noticed in all the samples. However, the extent of decrease was lowest in the 8% lactitol as compared to other levels (5 months) and control (3 months). The study suggests that the frozen treated tuna surimi at 8% lactitol 0.3% polyphosphate and 0.01% BHA can be stored satisfactorily for 4 months in view of its acceptance.

16. Gupta, A. K.; Kumar, Naresh (Environmental Research Laboratory, Department of Zoology, S. S. V (PG) College, Hapur - 245 101. (India)). **Alterations in the population of leucocytes in the blood of a freshwater fish *Clarias batrachus* (Magur) due to intoxication of two anionic synthetic detergents.** *Journal of Nature Conservation* (India) (2008) v. 20(1) p. 145-150.

The effects of two sub-lethal concentrations i.e. 1/4<sup>th</sup> and 1/8<sup>th</sup> fraction of 96 hr LC<sub>50</sub> of Detergent-A and Detergent-B (anionic synthetic detergents) were studied on leucocytic population in a freshwater fish *Clarias batrachus*. Percentage of thrombocytes and small lymphocytes was found increased while large lymphocytes, monocytes, neutrophils, eosinophils and basophils were found decreased at sub-lethal concentrations of both detergents on all exposure periods. However, the changes were more significant in the blood of fishes when exposed to sublethal concentrations of Detergent-B than those of Detergent-A.

17. Gupta, A. K.; Sharma, Nisha (Environmental Research Lab, Department of Zoology, S. S. V. (PG) College, Hapur. (India)). **Combined effect of sugar mill effluents and municipal sewage of planktons of Kali Nadi.** *Journal of Nature Conservation* (India) (2008) v. 20(1) p. 73-80.

18. Combined effect of sugar mill effluents and municipal sewage on Phytoplanktons, Zooplanktons and Physicochemical characteristics of Kali Nadi at Bulandshahr were studied at six sampling stations. The study was made in both the seasons i.e. in winters when sugar mill is functioning, and in summers when sugar mill is not functioning. Seasonal variation has been found and great extent of pollution was noticed during winters. The Phytoplankton reported in river water were Bacillariophyceae, Chlorophyceae, Myxophyceae, Euglinineae whereas Zooplanktons were Protozoans, Rotifera, Ostracoda, Cladocera. Sugar mill effluents were nil in Phytoplanktons and Zooplanktons. Bacillariophyceae, Chlorophyceae, Myxophyceae, Euglinineae among Phytoplanktons were also dominant in municipal sewage effluents but in Zooplanktons, Rotifera and Helminthes were dominant. During winter very few planktons were present in river and in sewage.
19. Jadhav, A. Ujjwala (Department of Life Sciences, University of Mumbai, Kalina, Mumbai- 400 098. (India)). **Observations on the length - weight relationship of *Tilapia mossambica* (*Oreochromis mossambica*) from Nath Sagar dam, Paithan.** Aquacult (2008) (India) v. 9(1) p. 23-27.

Length-weight relationship of the freshwater fish of Nath sagar dam Paithan, Aurangabad *Tilapia mossambica* (*Oreochromis mossambica*) has been worked out. The relationship between length and weight was found to be curvilinear. Differences between the regression coefficients of two sexes were significant. Thus a general length weight relationship not applicable to both sexes has been calculated. Cube law has been found to be not applicable in case of this species as the 'b' value of length and weight relationship is significant.

20. Jadhav, Ujjwala (Department of Life Sciences, University of Mumbai, Santacruz (E), Mumbai - 400 098 (India)). **Correlative changes in the pituitary gland and gonads of *Tilapia mossambica* (*Oreochromis mossambica*) from Koti Tirth Tank, Kolhapur District, Maharashtra.** Aquacult (2008) (India) v. 9(1) p. 45-48.

The present study was undertaken with a view to investigate the correlation between the pituitary gland and gonadal activities in freshwater fish *Tilapia mossambica* (*Oreochromis mossambica*) collected from Koti Tirth Tank, Kolhapur District, Maharashtra. Histological observations revealed that the reproduction behaviour of the fish is under the control of pituitary.

21. Jalaj, R. K. (R. A., Krishi Vigyan Kendra, Rajendra Agricultural University, Pusa, Samastipur – 848 125 (Bihar)); Verma, L. P. (Assistant Professor, Department of Zoology, N. D. University of Agriculture and Technology, Kumarganj, Faizabad – 224 229 (U.P.) (India)). **Temporal variations in water quality of traditional bheries of West Bengal.** Aquacult (2008) (India) v. 9(1) p. 89-93.

The present communication embodies the result of studies made on the temporal variation in some of the physicochemical properties of improved traditional brackish water bheries during October, 2004 to May, 2005. The studies revealed that the bheries are good profitable brackish water aquaculture resources and fluctuations are in the suitable range of culturing the fresh and brackish water fish species. The period between final harvesting and initial stocking is used for the drying, ploughing and

liming of pond besides the repairing of embankment which helps in maintaining the optimum carrying capacity of bheries year after year.

22. Jalaj, R. K. (Research Associate, Krishi Vigyan Kendra, Rajendra Agricultural University, Pusa, Samastipur - 848 125 (Bihar) (India)). Verma, L. P. (Assistant Professor, Department of Zoology, N. D. University of Agriculture and Technology, Kumarganj, Faizabad - 224 229 (U.P.) (India)). **Temporal variations in occurrence of nitrifying, denitrifying and phosphate solubilizing bacteria in the water of traditional bheries of West Bengal.** Journal of Nature Conservation (India) (2008) v. 20(1) p. 103-107.

The result of the study on the seasonal changes in bacterial population of nitrifying, denitrifying and phosphate solubilizing bacteria in selected brackish water bheries in west Bengal is reported. The bacterial population in general increases during the initial phase (March, April, May) of culture and decreased during the latter part of culture period (Oct., Nov., Dec.) in the bheries culture system. Bacteria play a significant role in nutrient dynamics of pond ecosystem hence the population dynamics of bacteria will certainly prove worthiness in better understanding of aquatic ponds ecosystem.

23. Jana, D.; Dasgupta, M. (Bidhan Chandra Krishi Viswavidyalaya, Regional Research Station (NAZ), Gayeshpur – 741 234, Nadia, West Bengal, (India)). **Length-weight relationship and relative condition of the mud eel *Monopterus albus* (Hamilton-Buchanan) from West Bengal.** Journal of Inland Fisheries Society of India (2008) v. 40(1) p. 54-58.

The length-weight relationship of the mud eel *Monopterus albus* from West Bengal was calculated using the methods of least squares, which can be expressed by the equation,  $\text{Log } W = 0.494 + 3.05 \text{ Log } L$ , for sexes combined. A high degree of positive correlation ( $r = 0.9842$ ) was noted between length and weight of *M. albus*. The exponential value of the length-weight relationship ( $b$ ) in this fish followed the cube law (3.05), indicating an isometric pattern of growth. The 'b' value of length-weight relationship varied due to sex, size and season. Kn values at different length groups ranged from 0.798 to 1.179, with an average value of 1.046 and the Kn values varied from 0.8 to 1.99 during different months, with an average value of 1.35 which indicated that the general well-being of this fish was good in this region.

24. Kaushal, D. K. (ICAR Research Complex for Eastern Region, ICAR Patna, P.O. Bihar Veterinary College, Patna - 800 014, Bihar. (India)). **Benthic macrofauna of Pong reservoir, Himachal Pradesh.** Journal of Inland Fisheries Society of India (2008) v. 40(1) p. 65-68.

Investigation conducted on the macrobenthic fauna of Pong reservoir during 1991-92 to 1994-95 depicted a bimodal pattern of distribution with major peak during winter. Dipterans dominated the benthos in the reservoir constituting 48.2% (1994-95) to 78.5% (1991-92). Molluscan fauna were abundant in intermediate sector compared to lentic and lotic sectors. Nutrient status of soil, morphometric and hydrographic features of the reservoir influence the distribution of benthic macrofauna. The reservoir level had an inverse relation with the density of benthos. It is suggested not to stock fishes like *Cyprinus carpio* and *Puntius* sp. in the reservoir as they may not

get adequate food in the ecosystem.

25. Krishna, P. V. (Department of Zoology and Aquaculture and Centre for Aquaculture Research and Education, Acharya Nagarjuna University, Nagarjuna Nagar - 522 510, Andhra Pradesh, (India)). **Influence of eyestalk ablation on growth and moulting in fresh water prawn *Macrobrachium rosenbergii***. Aquacult (2008) (India) v. 9(1) p. 67-71.

The effect of unilateral eyestalk ablation on *Macrobrachium rosenbergii* juveniles and adults which were classified according to their size was investigated. Males and females prawns were separately tested for the effect of intact and eyestalk ablation and survival, growth and moult frequency in two groups of prawns. For the I group (bigger size) of males and females both ablated and intact prawns average size  $18.4(g) \pm 2.15$ ;  $16.4(g) \pm 1.3$  and for the II group (smaller size) males and females of both ablated and intact prawns average size  $4.35(g) \pm 0.65$ ;  $4.6(g) \pm 0.75$  were selected for the experiment. Ablation had a highly significant effect on growth of female and male of smaller size group, manifested in both increase in size increment per moult and shortening of the moult interval. The survival rate was better in smaller size group and respond quickly for the eyestalk ablation.

26. Krishna, P. V. (Department of Zoology and Aquaculture and Centre for Aquaculture Research and Education, Acharya Nagarjuna University, Nagarjuna Nagar - 522 510, Andhra Pradesh, (India)). **Food spectrum of spotted murrel *Channa punctatus* from Repalle area Guntur District Andhra Pradesh**. Aquacult (2008) (India) v. 9(1) p. 83-88.

A detailed study of the food spectrum and feeding habit of spotted murrel *Channa punctatus* (Bloch) which inhabits ponds, creeks, canals, tanks etc., in Repalle mandal in Guntur district, Andhra Pradesh revealed that these fish are predominantly omnivorous nature and the most abundant and important food fish. The spectrum of different food items in different water bodies depends on many environmental factors and the selection mechanism of fish and the available food items in the environment. The staple food for the juveniles was insects and their larvae, crustaceans and planktonic organisms and miscellaneous matter, and that of adults was fishes including their larvae followed by crustaceans and planktonic forms, miscellaneous matter and animal tissues. The average feeding intensity in both juveniles and adults was studied month wise and the relation between different stages of maturity particularly during spawning period and feeding intensity were also discussed.

27. Krishnamoorthy, R. (Department of Biotechnology, Pavender Bharathidasan College of Arts & Science, Trichy); Syed Mohamed, E. H. (Post Graduate Department of Zoology, Jamal Mohamad College, Tiruchirappali - 20); Subba Rao, T.; Venugopalan, V. P. (Water and Steam Chemistry Division, BARCF, Kalpakkam - 603 102); Shahul Hameed, P. (Environmental Research Centre, J. J. Engineering College, Tiruchirappali - 09. (India)). **Temperature effect on behaviour, oxygen consumption, ammonia excretion and tolerance limit of the post larvae of shrimp *Penaeus indicus***. Journal of Environmental Science & Engineering. (India) (2008) v. 50(1) p. 29- 32.

The present study has been carried out to know the effect of temperature on behaviour, equilibrium loss and tolerance limit of the post larvae of shrimp *Penaeus indicus*. The experimental temperatures were selected based on the thermal tolerance limit. The experiments were conducted at a specific temperature for duration of 48 hr. The thermal tolerance experiments were conducted in two ways: in direct exposure and in gradually increasing temperature. The upper and lower lethal temperatures for the post larvae of shrimp *P. indicus* were 43.5°C and 8°C respectively. During tolerance experiment, no mortality was observed at 33°C and 35°C. But at 38°C with gradual increase in temperature, 30% loss of equilibrium and mortality were recorded in 24.31 hrs and 25.07 hrs, and the remaining 70% were alive. On the contrary, when the post larvae of shrimps were directly exposed to 38°C, almost 80% loss of equilibrium and mortality were recorded in 30.22 hrs and 30.40 hrs, remaining 20% were alive. At 40°C with gradual increase in temperature, 100% loss of equilibrium and mortality were recorded in 25.32 hrs and 25.56 hrs. On the other hand, when the post larvae of shrimps were directly exposed to 40°C, 100% loss of equilibrium was observed in 0.37 hrs and mortality in 1.40 hrs. These behavioral responses include an elevated temperature of 12°C, surfacing, dashing against glass wall, jumping out of the water, etc. In general, the rate of oxygen consumption and ammonia excretion was found to enhance with increasing temperature. In the present study, it was found that gradual increase in temperature favours the shellfish population to escape from the thermal exposure as compared to direct exposure.

28. Kumar, Yudhista A.; Vikramreddy, M. (Department of Ecology and Environmental sciences, Pondicherry University, Pondicherry – 605 014. (India)). **Coliform MPN counts of municipal raw sewage and sewage treatment plant in relation to the water of Buckingham Canal at Kalpakkam (Tamil Nadu, India)**. Journal of Environmental Science & Engineering. (India) (2008) v. 50(1) p. 51-54.

Most Probable Number (MPN) of Total Coliforms (TC) and Faecal Coliforms (FC), and the physicochemical variables - temperature, Dissolved Oxygen (D.O.), Biochemical Oxygen Demand (B.O.D.), Chemical Oxygen Demand (C.O.D.), nitrates, phosphates and chlorides of municipal raw sewage and that of aeration tank and secondary clarifier of the Sewage Treatment Plant (STP), in relation to water at the treated sewage out-fall point, down-stream and up-stream of the Buckingham Canal at Kalpakkam were analyzed. Total Coliform and Faecal Coliform MPN counts were higher, 170 and 70/100 mL respectively in the raw sewage. However, the counts of the former in the aeration tank though remained similar, that of FC decreased to 50/100 mL; both of the counts further decreased to 30 and 44/100 mL respectively, in the secondary clarifier and were 110 and 23 /100 mL, respectively at the treated sewage out-fall point in the canal. Total coliforms MPN was more than 18 times less in the water at the up-stream than that of the treated sewage out-fall point in the canal. Interestingly MPN of the FC in the up-stream water was nil while it was 8/100 mL in the canal's down-stream point. It is concluded that the FC, B.O.D., C.O.D., nitrates, phosphates and chlorides decreased and the D.O. increased in the treated-sewage due to the treatment of raw sewage through the STP.

29. Kumar, T. Sampath (NUALGI Nanobiotech, 651, 11<sup>th</sup> Main Road, 5<sup>th</sup> Block Jayanagar, Bangalore - 560 041 (India)). **Sewage/effluent treatment through diatom algae**. Fishing Chimes (June 2008) (India) v. 28(3) p. 45-46.

A new process to treat sewage/effluent, by using NUALGI, a patented product that aids the growth of diatom algae in the waste water is described. The growing diatom algae absorb nutrients and carbon dioxide from the water and produce oxygen by photosynthesis at micro plant level. The oxygen released during photosynthesis helps aerobic bacteria in breaking down the organic and converting the pollutants into base constituents. The stinking odour matter of anaerobic system is thus eliminated. The diatoms are eaten by zooplanktonic organisms which are in turn consumed by fishes. The ecosystem of the water is maintained as observed by presence of lively and healthy fishes fit for human consumption. Thus all the polluted lakes and rivers can be restored to their original glory using NUALGI.

30. Mishra, Dhan Devi.; Bansal, Anjana; Agarwal, P. C. (Department of Zoology, D. S. Degree College, Aligarh - 202 001. U.P. (India)). **Effect of Sporozoan parasite, *Myxobolus* on the body weight of the fresh water fishes in Aligarh region, U.P.** Aquacult (2008) (India) v. 9(1) p. 49-54.

Effect of *Myxobolus* on the growth of infected fishes was studied. Loss of body weight of infected fishes is noticed. Observations indicate that increase weight loss in infected fishes is 3.63 gm in first year, 4.31 gm in second year, 4.66 gm in third year, 5.9 gm in fourth year and 8.0 gm in fifth year weight loss of infected fishes increase with the increase of age.

31. Mishra, Dhan Devi; Kumar, Vinay; Bansal, Anjana (Department of Zoology, D. S. College, Aligarh (U.P.) (India)). **Studies on a new species of *myxobolus* (protozoa: Cinosporodia) from fresh water fish *Channa striatus*, in Shekha lake, Aligarh.** Journal of Nature Conservation (India) (2008) v. 20(1) p. 161-163.

*Myxobolus shekhai n.sp.* is described from kidney *Channa striatus* inhabiting Shekha lake, Aligarh. Fresh spores measure 2.0 µm - 2.5 µm in length and 1.5 µm - 1.7 µm in width. The size of polar capsules is 0.4 µm - 0.6 µm in length and 0.3 µm - 0.4 µm in width. A sporoplasm oval in shape, occupies the posterior half of the spore cavity. Iodinophilous vacuole is present. Polar filaments are not visible in polar capsules.

32. Nagarathna, R.; Benakappa, S. ; Anjanayappa, H. N.; Shivappa, M.U. (Department of Fisheries Resources & Management, Karnataka Veterinary, Animal and Fisheries Science University College of Fisheries, Mangalore 575 002. (India)). **Length-weight relationship and relative condition factor of *Saurida gracilis* (Quoy and Gaimard) from Mangalore Coast.** Environment & Ecology (India) (2008) v. 26(2) p. 640-642.

The parameters of length-weight relationship of *Saurida gracilis* were estimated and corresponding equation was  $W = 0.0223 L^{2.7732}$  for males and  $W = 0.0436 L^{2.7193}$  for females. Analysis of covariance showed that there is no significant difference in length-weight relationship between the two sexes. Hence the pooled equation for male and female was  $W = 0.03295 L^{2.74641}$ . The seasonal variation in the Kn values of mature fish was observed to be related to the sexual cycle and feeding intensity, while the variation in the Kn values in immature fish could not be related either to the sexual cycle or feeding intensity. The Kn values with respect to size indicated that the males were in good condition at 22-24 cm total length and females 28-30 cm total length which may be due to the gonadal maturation.

33. Ojha, Praveen; Mandloi, A. K. (Dept. of Fishery Science College of Veterinary Science and A.H., JNKVV, Jabalpur (M.P.)); Dube, K. K. (Dept of Zoology, Govt. Autonomous Science College, Jabalpur (M.P.) (India)). **Relation of quality fish seed stocking and fish yield in Adhartal pond, Jabalpur (M.P.)**. *Aquacult* (2008) (India) v. 9(1) p. 105-108.

In the present communication, observation made on the basis of the fish production along with the size, stocking rate of the fish seed stocked in Adhartal fresh water fish culture pond. However, the total fish yield from this pond is only 3130 kg in the yr: 2000-2001 with an average yield of 190 kg/ha/annum. After brought this ground under some management through line ie. stocking of reservoir with good quality of advanced size fish seed and with that we produce a total 3725 kg/ha/annum with an average yield of 225 kg/ha/annum in the year 2001-2002.

34. Pal, Subhasis. (Balsi High School (H. S.), Balsi - 722 206, Bankura, West Bengal, (India)). **Evaluation of physico-chemical properties of a pesticide contaminated aquaculture pond**. *Journal of Inland Fisheries Society of India* (2008) v. 40(1) p. 50-53.

Seasonal changes in water quality parameters including pesticide residues of a fish pond due to intentional misuse of endosulfan have been studied to assess the suitability of the pond for pisciculture. The mortality of aquatic organisms due to toxicity of endosulfan was recorded which in turn results into the increase of organic matter. Comparatively high level of nitrate and phosphate concentrations observed were due to the decomposition of these organic matters. High value of free carbon dioxide (CO<sub>2</sub>) in winter coincided with the persistence of endosulfan indicating aquatic pollution. Except total solids, parameters like temperature, dissolved oxygen (DO), biological oxygen demand (BOD) and pH were within desirable limits for fish culture for most part of the study period.

35. Raja, I. A. (Zoology Research Laboratory, Department of Zoology, Shri Shivaji College of Arts, Commerce and Science, Akola - 444 001 (India)); Kulkarni, K. M. (Office of Director, Higher Education, Government of Maharashtra, Pune. (India)). **Tissue biochemical adjustments in the air breathing fresh water fish *Channa punctatus* exposed to environmental hypoxia**. *Environment & Ecology* (India) (2008) v. 26(2) p. 669-672.

We investigated tissue biochemical changes in fish *Channa punctatus* exposed to hypoxia for the period of 1 and 3 hours. Chemical constituents such as glycogen, glucose, lactate, pyruvate, and amino acids were estimated in liver, kidney and white muscle. One hour hypoxia resulted in increase in glycogen and glucose levels in liver and kidney but it decreased in muscles. The lactate level was found to have increased in liver and muscles. However these values returned to near basal levels after three hours of exposure. Similar trend was observed for pyruvate and amino acids concentration in the same tissues. Changed biochemical content of *C. punctatus* during hypoxia suggested that liver gluconeogenesis probably supported by proteolysis. The kidney and liver presented the same biochemical trend suggesting similar metabolic role for both organs. Glucogenolysis followed by glucose fermentation and protein mobilization was observed in the white muscle. The air

breathing behavior of *C. punctatus* works in parallel with metabolism to prevent impairments from hypoxia. Metabolic adjustments are observed when the air taking is avoided.

36. Rajyasree, M.; Sreedhar, S. (Department of Zoology, Vivek Vardhini College of Arts, Commerce and P. G. Studies, Hyderabad-500 095, (India)); Neeraja, P. (S. V. University, Tirupathi, (India)). **Effect of ammonium sulphate on Histopathological aspects of fish, *Oreochromis mossambicus* tissues.** Geobios (India) (2008) v. 35(2-3) p. 211-213.

Acute toxicity of 0.1 g<sup>-1</sup> ammonium sulphate on renal and hepatic tissue of *Oreochromis mossambicus* exposed for 60 days, showed vacuolar degeneration in hepatic tissue, and proliferation of fibroblasts in renal tissue when compared to control.

37. Ram, H. Krishna; Mohan, M. Ramachandra (Department of Zoology, Bangalore University, Bangalore 560 056, (India)). **Nutrient overloading of a few lakes in Bangalore Karnataka, India.** Environment & Ecology (India) (2008) v. 26(IA) p. 300-302.

The study on nutrient overloading of Byramangala, Hebbal and Yelahanka lakes of Bangalore was conducted. The lakes were found to be highly eutrophic. The phosphate content of the lake Byramangala water was found to be in the range of 6.0 to 14.5 mg/liter. Hebbal lake water had 0.2 to 0.9 mg/liter and Yelahanka lake water 0.20 to 0.8 mg/liter of phosphate. The nitrate content of the Byramangala lake water was found to be in the range of 1.3 to 6.9 mg/liter, Hebbal lake water 2.3 to 6.9 mg/liter and Yelahanka lake water 5.3 to 12 mg/liter.

38. Rao, A. Venkateswara (Manager, Technical Services, Neospark Drugs and Chemicals pvt. Ltd, 241, B. L. Bagh, Panjagutta, Hyderabad- 500 082, A.P. (India)). **Vibriosis in shrimps under Aquaculture.** Fishing Chimes (June 2008) (India) v. 27(10&11) p.87-89.

Vibriosis is a common problem world-wide, particularly in India. *V. harveyi* continues to cause chronic mortalities of upto 30% among *P. monodon* larvae, post larvae and adults under stressful conditions. A highly pathogenic strain of *Vibrio* sp. is also emerging and continues to cause mortalities among cultured shrimps (Le Groumellec et al., 1996). Problems caused by secondary vibriosis are common but are considered minor compared to viral epidemics.

39. Rayaz, Khalid (Department of Geography, Govt. Post Graduate College, Rajouri (J&K) - 185 212. (India)). **Ecology and economy of fish resources in Rajouri District, J&K (India).** Journal of Nature Conservation (India) (2008) v. 20(1) p. 19-28.

Fishery industry plays significant role in the socio-economics development of any region. This industry has brought remarkable achievements in the hilly district Rajouri of Jammu & Kashmir State. Present communication is an attempt to identify and classify the rich diversity of fishes living both in cold and warm water bodies. Paper further goes to assess the spatio-temporal variations in production of fishes in

the area under investigation. The study established the fact that district as whole hosts more than 24 species of fishes and records an average production of 2108.8 quintals fishes per year in the area.

40. Rayaz, Khalid.; Aeyaz, Saleem; Bhatia, Sonu; Afzal, Jawaid (Govt Post Graduate College, Rajouri- 185 212. (India)). **Aquatic ecosystem and fish potential of Bhaderwah Valley (J&K)**. Aquacult (2008) (India) v. 9(1) p. 55-62.

Water is the precious gift of nature to mankind. But expeditious rate of increasing anthropogenic activities has left an indelible mark of destruction of vital aquatic ecosystem throughout the world. The growing food demands have accelerated the pace of over grazing, forest cutting, agricultural development and usage of certain chemicals that has deteriorate the natural aquatic ecosystem. Present communication is an attempt to assess the nature of aquatic ecosystem in Bhaderwah valley of Jammu and Kashmir. The study established the fact that overwhelming rate of destruction in water quality renders the region to host only 20 species of fishes accounting to the production of 890.19 quintals with the lending value of Rs. 35.60 lakhs. Besides, increasing anthropogenic activities have becomes an important constraint in the development of fish resources in the area.

41. Roy, A. K.; Martha, S. R. (Bioinformatics Center, Central Institute of Freshwater Aquaculture, Kausalyaganga, Bhubaneswar - 751 002 (India)). **Association between genes and codons of *Cyprinus carpio*: A multivariate statistical approach**. Journal of Inland Fisheries Society of India (2008) v. 40(1) p. 32-38.

A total of 13 gene sequences of *Cyprinus carpio* available in the Genbank are made to undergo a detailed Correspondence Analysis (CoA). After the Relative Synonymous Codon Usage (RSCU) values are extracted using Codon Usage software, CoA using the statistical package SPSS (14.0) is carried out which reveals that all genes except two located far away from the origin in the plot generated, follow a common trend. These genes prefer TGT, AAG, CGT and gene 13 is associated with codons GGC, TIA, TAG while all other genes viz. 1,2,3,4, 5, 6, 7, 8, 9, 10 and 12 prefer GCG, CGG, TGC, TAC, ATA, TCG, GGA, GTC, CAG, CTC, CTG, CTI, ATC, CAC, TGA, ATG, AAT, ACC, GAA, TIC, AAC, GCA, GAC, ACT, GTA etc over other codons for synthesizing their respective proteins and hence they are associated with codons that are GC ending.

42. Roy, Tuhin Narayan (Department of Agricultural Economics, Uttar Bango Krishi Viswavidyalaya, Pundibari - 736 161 (India)). **Investment towards eco-friendly agricultural allied activities (fishery and livestock) for augmenting farm income and sustainable livelihood in North Bengal region of West Bengal**. Environment & Ecology (India) (2008) v. 26(2A) p. 654-658.

On the basis of the analysis of primary data collected from the North Bengal district of West Bengal during 2006, it reveals that fishery and livestock have capacities to address economic, social and environmental aspects in a positive manner and are also capable to face economic conflict and synergy effect for sustainable development for resource poor small and marginal farmers with their existing farm resources and technologies. Net returns over investment coupled with results of other economic parameters arc also higher compared to main field crops (productivities and prices

being stagnant) with low yield variations. These may be tried to adopt as alternative economic activities in the event of new agricultural policy (NAP) if rational investment and scientific management are done properly. Lending institutions may come forward to support higher level of investment needed for these two activities compared to food crops. Rational investment as means of farm diversification will add more to net farm income, which in turn will upgrade the quality of life also with pollution free environment. Government intervention coupled with support from SAU, civil organizations, NGO, bank and private sectors will help for sustainable adoption with the broad frame work of micro (farm income) and macro (rural employment) economics aspects. Hence, this effort may add some impetus and renewal dimension to the agrarian economy for the development of rural people in North Bengal district of West Bengal.

43. Sahu, Minakshi; Mukhopadhyay, P. K. (Central Institute of Freshwater Aquaculture, Bhubaneswar – 751 002 (India)). **Biochemical Assessment of nutritional status in fish metabolic effects of feeding through enzyme assays.** Fishing Chimes (June 2008) (India) v. 28(3) p. 24-26.

Growth optimisation in fish and its quality at harvest are intimately linked to the supply of right quality and quantity of required nutrients through diet. A precise knowledge of qualitative and quantitative dietary requirements of cultured fish is thus essential in maximising yield and also to counteract a number of anticipated disease infestations caused by nutritional deficiencies. In tune with the nature of rapid transition from extensive to semi-intensive feed-based aquaculture, better understanding on the metabolic utilisation of nutrients is also recognised as fundamental for both economic and ecological reasons. Despite the importance of sound nutrition in influencing growth and product quality, the nutritional requirements of a variety of culturable finfish and shellfish still remain poorly understood except probably to a great extent for fishes like trout, channel catfish, tilapia, common carp and Indian major carps. Most of these nutrient requirement studies were carried out by the authors using weight gain (growth related performance) and feed utilisation as the responses to graded levels of nutrient intake from purified diets of known composition.

44. Sarangi, N.; Das, B. K.; Mohapatra, B. C.; Patnaik, P.; Ghosh, S.; Swain, D. K.; Mallick, A. (Central Institute of Freshwater Aquaculture, Kausalyaganga, Bhubaneswar - 751 002 (India)). **Carp seed production under extreme temperatures: An experience at Tanar village, Orissa, India.** Fishing Chimes (June 2008) (India) v. 28(3) p. 42-44.

From the study it can be inferred that water temperature plays a very significant role in successful fish breeding programmes in captivity. In all the trials, air temperature and water temperature in both breeding pool and hatching pool were not congenial, which resulted in less of fertilisation success and also less of hatching success. Though fish seed production in the remote village of Tanar had not been hundred percent successful, nevertheless, spawn production by manipulating water temperature under extreme conditions in the farmers pond is definitely a feather in the cap of CIFA. But the delayed monsoon and high temperature had been a matter of concern.

45. Saravanan, S. (Graduate Scholar); Sahu, N. P.; Sukham, Sunil (Senior Scientists, Fish Nutrition and Biochemistry Division, Central Institute of Fisheries Education, Seven Bungalows, Fisheries University Road, Mumbai. (India)). **Innovative feeds for aquahatcheries.** Fishing Chimes (June 2008) (India) v. 27(12) p. 22-24.

Availability of quality fish seed for supply to fish farmers is largely dependent on the effective functioning of hatcheries, as they are the main source of post-larvae, for raising them into seed of stockable size. For the production of quality of post larvae, hatcheries need viable and nutritive food inputs. In this contribution, the authors have put together quite a few known innovative feeds for use at aquahatcheries, explaining various aspects of their application.

46. Sardar, Parimal; Kumar, R.; Datta, S.; Sinha, A.; Das, R. C.; Patra, P. K. (Central Institute of Fisheries Education (Deemed University), Kolkata Center. Indian Council of Agricultural Research, Salt Lake City, Kolkata 700 091 (India)). **Assessment of production potential and nutritional status of Indian major carps and giant freshwater prawn under polyculture system in relation to feeds and feeding methods.** Environment & Ecology (India) (2008) v. 26(2) p. 632-636.

A survey was conducted in carp and prawn based polyculture farms in and around Kolkata, West Bengal, India to assess the production potential and nutritional status of carps and prawn in existing culture and feeding systems. A questionnaire was prepared. Feeds, feeding methods, production and profitability data were obtained from farm owner after interviewing based on questionnaire. The results demonstrated that poor over all productivity was observed in the ponds where fish and prawn were solely maintained on natural food without supplementation of artificial feed. This observation indicated that natural food alone was not able to provide nutrients especially protein of optimum quantity for maximum growth of fish and prawn. It was also true for carps and prawn, which was provided only traditional mixture of rice bran and GNC without fertilization of pond indicating supplementary artificial feed alone was unable to provide optimum nutrition to carps and prawn to induce optimum growth. Proximate composition indicated that this feed contained 27.30% protein, which was lower than the optimum requirement of carps and freshwater prawn. When the ponds were provided manures and fertilizers and mixture of rice bran and GNC at different ratio of previous mixture was used as artificial feed, though the protein percentage (21.42%) of this artificial feed was lower than the previous mixture, better growth performance was observed in this case might be owing the fulfillment of deficient nutrients from natural food, which also indicated that culture system where natural food is available, protein percentage of artificial feed might be reduced from optimum requirement to reduce feed cost to make the aquaculture operation profitable. Best growth and production performance of carps and prawn obtained due to use of commercial pellets followed by feeding of fish meal along with traditional mixture indicating feed formulation with more number of ingredients combinations and inclusion of high quality ingredients might give proper balance of nutrients of feed and less nutrient loss due to leaching in pelleted feed leading to optimum performance and more production of carps and prawn under polyculture system.

47. Sasmal, S.; Chari, M. S. (Department of Fisheries, Indira Gandhi Agricultural University, Raipur, Chhattisgarh – 492 006. (India)); Bhunia, D. S. (Vidyasagar University, West Midnapur, West Bengal – 721 102. (India)). **Impact of duck**

**droppings on plankton production in a village pond of Chhattisgarh.** Fishing Chimes (June 2008) (India) v. 27(12) p. 16-18.

Integrated fish farming is recognized widely as an economically beneficial form of fish production. This is so because, fish farming when integrated with the farming of land based animals like cattle, poultry, ducks etc., there will be a substantial saving in the cost of feed. The authors lent field based depth to the plankton production in a village fish pond of Chhattisgarh. They say that the duck excreta has upgraded the nutrient level in the ecosystem of the experimental fish pond into a productive range, imparting good growth and survival, indicate of the fish crop output raising efficacy as part of Integrated fish farming.

48. Sen, Pooja.; Tiwari, Kunwer Ji; Shukla, Sanjive (P. G. Department of Zoology, B. S. N. V. PG College, Lucknow - 226 001 (U.P.) India); Shukla, Richa (Department of Zoology, Navyug Knaya P. G. College, Lucknow); Sharma, U. D. (Prawn Research Centre, Department of Zoology, University of Lucknow, Lucknow - 226 007 (U.P.) (India)). **Effects of Cadmium on ventilation and oxygen consumption of fresh water prawn *Macrobrachium dayanum* (Crustacea-Decapoda).** Aquacult (2008) (India) v. 9(1) p. 95-100.

Fresh water prawn, *Macrobrachium dayanum* were subjected to acute concentration, 0.15 mg/l (96 h LC<sub>50</sub> of cadmium chloride to evaluate its effects on scaphognathite oscillations and oxygen consumption rate. Scaphognathite oscillations were found first increased then decreased after 96 h than control where as oxygen consumption showed continuous decreasing trend through out the experiment than control ones. Possible interaction of cadmium in relation to respiration of these economically important crustaceans has been discussed.

49. Sethuramalingam, T. A.; Ahila, K. Alankara; Rajakumari, K. (Center for Aquafeed and Nutrition (CAFeN), Department of Advanced Zoology & Biotechnology, St. Xavier's College (Autonomous), Palayamkottai - 627 002 (India)). **Dietary Influence of *Saccharomyces cerevisiae* and *Lactobacillus sporogenes* on Gut Adhesion Level, Transit Time and Nutrient Digestibility of *Cyprinus carpio* (Linnaeus) Fingerlings.** Environment & Ecology (India) (2008) v. 26(1A) p. 397-402.

*Cyprinus carpio* fingerlings (420 ± 067 mg) were fed with three types of formulated diets (carbohydrate, protein and fat rich) containing different concentrations of *Saccharomyces cerevisiae* (LL = 9.3 x 10<sup>6</sup>; LH = 3.1 x 10<sup>9</sup>; HL = 62 x 10<sup>7</sup> and HH = 3.1 x 10<sup>6</sup>) and *Lactobacillus sporogenes* (38 x 10<sup>9</sup>; 76 x 10<sup>8</sup>; 182 x 10<sup>6</sup> and 285 x 10<sup>4</sup>) for a period of 41 days to assess the gut adhesion levels of cells, transit time of feed and nutrient digestibility. Higher concentrations of lactic acid bacteria in fat rich diets failed to influence the fish for digestion. Higher concentrations of yeast (HH = 31 x 10<sup>6</sup>) incorporated carbohydrate rich diets induced the bioavailability of nutrients and improved the digestive capacity of the fish by decreasing the transit time in the digestive tract. Enhancement of nutrient bioavailability was evidenced by higher adhesion level of *S. cerevisiae* and *L. sporogenes* in the gut. The presence of higher population of yeast in the gut tissue (FL) than in the gut contents (FR) indicated higher level of adhesion and improvement of microbial balance of gut flora in the fish. The digestibility coefficients (DC) of the protein and carbohydrate rich diets were improved in fish which had higher cell adhesion levels. The same trend was also

recorded in the gut tissue of fish fed with *L. sporogenes* contained the carbohydrate and protein rich diets was also noticed. In both the sets of experiments the medium water contained low amount of probiont level. Thus addition of *S. cerevisiae* and *L. sporogenes* were highly effective in improving the bioavailability of the nutrients, fastened the transit time and influenced the digestive capacity of the fish.

50. Sethuramalingam, T. A; Rajan, D.; Sudhakaran, M.; Ananth, Y.; Rajakumari, K. (Center for Aquafeed and Nutrition (CAFeN), Department of Advanced Zoology & Biotechnology St. Xavier's College (Autonomous), Palayamkottai 627 002, (India)). **Length-weight relationship and fecundity analysis of fresh water barb *Puntius filamentosus* (Valenciennes) from river Thamiraparani.** Environment & Ecology (India) (2008) v. 26(IA) p. 414-421.

The length weight relationship and the condition factor of *Puntius filamentosus* collected from river Thamiraparani basin were determined. The logarithmic form of total length to body weight of the fish was  $\log W = 0.4534 + 2.984 \log L$  which showed the dependence of weight (W) on the total length (L). The coefficient of correlation (r) was found to be 0.88056 which indicated the relationship between the length and body weight of the fish was highly significant. The range and mean value of the condition factor (k) were 0.51 to 2.9 and 1.59 respectively. The fecundity study revealed that there was a significant relationship between total length and total weight of the fish to the fecundity rate. The regression equation of fecundity versus total length and total weight of the fish were as follows:  $\log f = 1.4648 + 2.8082 \log BW$  and  $\log f = 0.5717 + 3.90593 \log BL$ . The correlation coefficient (r) were found to be 0.77842 and 0.91483 respectively which indicated a positive linear relationship but the relationship among the fecundity, gonad length and gonad weight were not significant ( $r = 0.69818$  and  $0.66713$ ). An average fecundity of 980 eggs were recorded with a highest fecundity of 1,120 eggs. The GSI showed a slight decrease as the length and weight of the fish increased but, the HSI showed the positive increase but not highly significant with either body length or body weight.

51. Sharma, Ramesh C.; Chauhan, Punam; Bahuguna, Manju (Department of Environmental Sciences, H. N. B. Garhwal University, Post Box No. 67, Srinagar-Garhwal – 246 174, Uttarakhand (India)). **Impact of Tehri dam on aquatic macroinvertebrate diversity of Bhagirathi, Uttarakhand (India).** Journal of Environmental Science & Engineering. (India) (2008) v. 50(1) p. 41- 50.

Aquatic macroinvertebrate diversity in the Bhagirathi river was monitored for the period of twelve months (September, 2004 to August, 2005) for assessing the impact of Asia's highest dam, Tehri Dam. Comparative data on diversity of macroinvertebrates revealed that the number of taxa in the downstream stretch, especially close to the dam was significantly reduced. The velocity of water current, hydromedian depth, turbidity, dissolved oxygen and the bottom substrates of the river were found drastically influenced due to the construction activities of the dam. Macroinvertebrate diversity (Shannon-Wiener Index) was altered from 3.44 to 1.98. The members of ephemeroptera and trichoptera were drastically influenced in comparison to other macroinvertebrates.

52. Sharma, U. D.; Khan, M. A.; Lodhi, H. S.; Tiwari, K. D. (Prawn Research Centre, Department of Zoology, University of Lucknow, Lucknow- 226 007 (U.P.), India); Shukla, S. (P. G. Department of Zoology, B. S. N. V. PG College, Lucknow- 226 001 (U.P.) (India)). **Acute toxicity and behavioural anomalies in freshwater prawn, *Macrobrachium dayanum* (Crustacea- Decapoda) exposed to chromium.** Aquacult (2008) (India) v. 9(1) p. 1-6.

Fresh water prawn, *Macrobrachium dayanum* were subjected to Static bioassay test to evaluate the LC<sub>50</sub> values of Potassium dichromate (K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>) The LC<sub>50</sub> values for 24, 48, 72 and 96 h exposure were 2.74, 2.62, 2.58 and 2.49 mg/l respectively. The chief behavioural alterations observed after chromium exposure were hyperactivity, erratic swimming, rapid surfacing, aggressiveness, loss of balance and profused mucous secretion on gills, carapace and abdominal segments. Blackening of certain body parts like gills, carapace and abdominal appendages of 25% test animals was observed. Behavioural anomalies were found dose and duration dependent.

53. Shinde, A. N.; Mulye, V. B.; Chogale, N. D.; Bhatkar, V. R.; Bondre, R. D.; Mohite, A. S. (College of Fisheries, Shirgaon, Ratnagiri, Maharashtra - 415 629 (India)). **Effect of different probiotics on growth of *Macrobrachium rosenbergii* (De-Man) post larvae.** Aquacult (2008) (India) v. 9(1) p. 7-12.

*Macrobrachium rosenbergii* post larvae with an average length of 16.5 ± 0.4 mm and an average weight of 27.0 ± 1.16 mg were fed for 30 days with experimental diets viz A, B, C, D and E which incorporated five probiotics P-1, P-2, P-3, P-4 and P-5 respectively. Post-larvae were fed twice a day @ 10% of the body weight for 30 days. In treatment D wherein the probiotics P-3 was used the various growth parameters indicated best growth among all other treatments. Survival rate was same for treatment B, D and E while treatment C shows survival rate nearly same. Viability test were conducted for testing the viability of probiotics both as pure probiotics and incorporated in diets. Based on the statistical analysis probiotic P-3 was found better growth of *M. rosenbergii* post larvae.

54. Shukla, Vineeta; Dhankhar, Monika (Department of Biosciences, M. D. University, Rohtak – 124 001, India); Abusaria, Sharda (Lecturer in Zoology, A. I. J. H. M. College, Rohtak, (India)). **Bioaccumulation of heavy metals in tissues of fish, *Cyprinus carpio*.** Geobios (India) (2008) v. 35(1) p. 191-195.

Present communication deals with the bioaccumulation of heavy metals in *Cyprinus carpio* exposed to sub-lethal concentration of effluents of a bicycle manufacturing industry. Levels of metals were estimated in gill, liver, kidney, blood and muscles. Chromium and nickel were significantly higher than control fish and progressively increased in different tissues except liver in which increase was maximum after 15 days. Thereafter, the pattern was reversed after 30 days of exposure.

55. Singh, Devendra Kumar (Department of Zoology, L. S. College, Muzaffarpur 842 001, India); Singh, Indrajit (Postgraduate Department of Zoology, B. R. A. Bihar University, Muzaffarpur 842 001, India)). **Interrelationship of certain physico-chemical parameters with plankton community of Motipur Ox-Bow Lake (Muzaffarpur, Bihar).** Environment & Ecology (India) (2008) v. 26(2A) p. 800-803.

The paper deals with interrelationship of certain parameters and plankton community of Motipur ox-bow lake (Muzaffarpur, Bihar) which were carried out during 2006. A positive correlation between temperature and planktonic population was not established and showed inverse relationship. Correlation between free CO<sub>2</sub> and plankton production was not conclusive and was found to be the result of addition of free CO<sub>2</sub> by different sources and its utilization during photosynthesis. Plankton and free CO<sub>2</sub> were interrelated differently depending upon the different groups of phytoplankton and zooplankton. In the present studies no relationship could be established between pH and zooplankton and phytoplankton. Similarly no distinct relationship was found between total alkalinity and phytoplankton. Phosphate and chloride did not show any distinct relationship with plankton production. Cyanophyceae among phytoplankton were found to be adapted for low oxygen concentration. Low concentration of O<sub>2</sub> was found to be related with high plankton production. It may be concluded that the plankton community depended greatly on different physico-chemical parameters. No single factor was responsible for the fluctuation in the abundance of plankton and different ecological parameters jointly might be influencing the plankton production.

56. Singh, H. R. (Department of Fishery Hydrography, College of Fisheries, G. B. Pant University of Agriculture and Technology, Pantnagar - 263 145, (India)); Srivastava, Rajshree (Department of Zoology, University of Allahabad, Allahabad - 211 002, (India)). **Scale structure and age and growth of *Puntius sophore* (Ham.) from the Ganga river system at Allahabad for economic harvesting.** Journal of Inland Fisheries Society of India (2008) v. 40(1) p. 16-22.

Age and growth of a minor carp *Puntius sophore* (Ham.) from the Ganga river system have been studied using its scales. The cycloid scales reveal the presence of a distinct larval mark under the SEM. The breaking and widening of circuli in the scales were considered as 'growth rings' or 'annulii'. A linear relationship between total fish length and lateral scale radius was observed. The larval mark, located very near the focus, appears during the first year of life. The life span of this fish was observed to be 4 years. The fish should be harvested only after the completion of second year of life when it has attained 62 mm total length.

57. Singh, K. A. K.; Singh, J. (Department of Chemistry); Yadav, P. K.; Singh, R. K.; Singh, R. P. (Department of Agricultural Chemistry & Soil Science, Udoi Pratap Autonomous College, Varanasi 221 002 (India)). **Physico-chemical characteristics of water sediments of river Tons.**

Environment & Ecology (India) (2008) v. 26(IA) p. 256-260. A laboratory experiment was carried out with collection of water sediment samples from river tons and analysis for physico-chemical properties. Sediments were collected from different sites along the river and important physico-chemical properties viz. texture, pH, organic carbon, nitrogen, phosphorus, potassium and calcium status were determined. These parameters are reported with respect to site, month and season. Results revealed that the textural class varied from site to site and month to month but there was no definite trend. The site wise variation shows that the pH value was maximum at site S<sub>2</sub> and minimum at site S<sub>1</sub>. Organic carbon content was found maximum at site

S<sub>4</sub> and minimum at site S<sub>6</sub>. Nitrogen content was found to be maximum at site S<sub>4</sub> and minimum at site S<sub>1</sub>. Highest phosphorus status has been found at site S<sub>3</sub> and minimum at site S<sub>5</sub>. In case of potassium maximum content was found maximum at site S<sub>4</sub> and minimum was found at site S<sub>1</sub>. Maximum calcium content was recorded at the site S<sub>4</sub> and minimum at site S<sub>1</sub>.

58. Singh, Raj Mohan (Lecturer, Department of Civil Engineering, Motilal Nehru National Institute of Technology (MNNIT), Allahabad – 211 004, (India)). **Fuzzy rule based estimation of agricultural diffuse pollution concentration in streams.** Journal of Environmental Science & Engineering. (India) (2008) v. 50(2) p. 147-152.

Outflow from the agricultural fields carries diffuse pollutants like nutrients, pesticides, herbicides etc. and transports the pollutants into the nearby streams. It is a matter of serious concern for water managers and environmental researchers. The application of chemicals in the agricultural fields, and transport of these chemicals into streams are uncertain that cause complexity in reliable stream quality predictions. The chemical characteristics of applied chemical, percentage of area under the chemical application etc. are some of the main inputs that cause pollution concentration as output in streams. Each of these inputs and outputs may contain measurement errors. Fuzzy rule based model based on fuzzy sets suits to address uncertainties in inputs by incorporating overlapping membership functions for each of inputs even for limited data availability situations. In this study, the property of fuzzy sets to address the uncertainty in input-output relationship is utilized to obtain the estimate of concentrations of a herbicide, atrazine, in a stream. The data of White river basin, a part of the Mississippi river system, is used for developing the fuzzy rule based models. The performance of the developed methodology is found encouraging.

59. Sonawane, Yuvraj D. (Department of Botany, M. S. G. College, Malegaon-camp, Dist. Nashik - 423 105, (India)); Saler, R. S. (P. G. Department of Botany, K. T. H. M. College, Nashik (India)). **Physico-chemical characteristics of water reservoir near Malegaon, Maharashtra.** Geobios (India) (2008) v. 35(1) p. 25-28.

The investigation on the physico-chemical characteristics of the Belgaonpade Dabhadi reservoir, carried out from November 2006 to October 2007 show that the water is suitable for human use.

60. Sonawane, Yuvraj D. (Department of Botany, M. S. G. College, Malegaon Camp, Dist. Nashik – 423 105, (India)); Saler, R. S. (P. G. Department of Botany, K. T. H. M. College, Nashik (India)). **Hydrobiological study of a village pond near Malegaon, Maharashtra.** Geobios (India) (2008) v. 35(1) p. 157-160.

The investigations on the physico-chemical characteristics and algae of the Sayane village pond carried out from November 2006 to October 2007 show the presence of species of *Oscillatoria*, *Scenedesmus*, *Closterium*, *Synedra*, *Fragilaria*, *Navicula*, *Spirulina* and *Cymbella* which indicated that water is polluted and unfit for drinking.

61. Sultan, Salim (Deputy Director, Fisheries Directorate, 7, Faizabad Road, Lucknow (U.P.) (India)). **Integrated fish farming in Uttar Pradesh: Field study.** Fishing Chimes (June 2008) (India) v. 27(10&11) p. 82-84.

Variation in aggregate input and output levels, a key difference between productivity stages is seen to lie in the adoption models. Filter feeding fish (catla, rohu & mrigal) dominate in less developed areas, while “feeding fish”, grass carp and omnivorous carps dominate in high pond productivity zones. It is pertinent to mention that while work on integrated fish farming has focused on biological concerns, there is also the need for related socio-economic studies. Some relevant aspects are also socio-economic structure of farming, family income analysis evaluation of joint costs and input substitution, economic efficiency study, land tenure or user right, credit and marketing and development policy analysis as vertical integration in fish framing will be influenced by the state of technical development with the species concerned. The scarcity of sites and the capital intensity of the methods used. Farming, processing and distribution will tend to ne integrated where the market is sophisticated with concentrations of retail buying power.

62. Tiwari, Kunwer Ji; Lodhi, Harnam Singh; Tripathi, Rashmi; Sharma, U. D. (Prawn Research Center, Department of Zoology, University of Lucknow, Lucknow – 226 007, India); Shukla, Sanjive (PG Department of Zoology, B. S. N. V. PG College, Lucknow 226 001 (India)). **Effects of Lead on Heart Beat Rate of Freshwater Prawn, *Macrobrachium dayanum* (Crustacea-Decapoda).** Environment & Ecology (India) (2008) v. 26(2A) p. 807-810.

The present work incorporates the effect of lead nitrate on heartbeat-rate of freshwater prawn, *Macrobrachium dayanum*. The animals were subjected to acute (116.46 mg/liter; 96 h LC<sub>50</sub> and sub-acute (29.12 mg/liter; 25% of 96 h LC<sub>50</sub> exposures. Over all significant increase in heart beat rate was recorded after both the exposures throughout the experiments. Potential of heart beat rate as bio-marker was discussed.



# AUTHOR INDEX

Every Author's name appearing in the original article are listed alphabetically. Reference is given in the serial number of the entries.

Names of Authors	Serial No.
<b>A</b>	
Abhilash, R.	1
Abusaria, Sharda	53
Aeyaz, Saleem	39
Afzal, Jawaid	39
Agarwal, P. C.	29
Ahila, K. Alankara	48
Akhtar, Md. Shahbaz	2
Alam, Md. Noor	3
Ananth, Y.	49
Anjanayappa, H. N.	4,31
Annappaswamy, T. S.	5
Arunkumar, L.	6
<b>B</b>	
Bahuguna, Manju	50
Bansal, Anjana	29,30
Barua, Basabi	13
Benakappa, S.	4,31
Bhatia, Sonu	39
Bhatkar, V. R.	52
Bhunia, D. S.	46
Binu, K. S.	7
Biswas, B. K.	8
Bondre, R. D.	52
Bora, Indira Baruah	9
Borah, Bibha Chetia	9

<b>C</b>	-----	
Chakrabarti, Padmanabha	-----	10
Chakraborty, S. K.	-----	14
Chari, M. S	-----	46
Chauhan, Punam	-----	50
Chogale, N. D.	-----	15,52
Chowdhury, Srimoyee Hazra	-----	10
<b>D</b>	-----	
Das, B. K.	-----	43
Das, R. C.	-----	45
Dasgupta, M.	-----	22
Dash, Biswajit	-----	11
Datta, S.	-----	45
Demin, Zhang	-----	11
Dhankhar, Monika	-----	53
Dube, K. K.	-----	32
<b>G</b>	-----	
Gautam, R. K.	-----	12
Ghosh, Nandita	-----	13
Ghosh, S.	-----	43
Giri, S.	-----	14
Gogate, M. N.	-----	15
Gupta, A. K.	-----	16,17
<b>I</b>	-----	
Irshad, Shaikh	-----	12
<b>J</b>	-----	
Jadhav, A. Ujjwala	-----	18,19
Jalaj, R. K.	-----	20,21
Jana, D.	-----	22
Joshi, V. R.	-----	15
<b>K</b>	-----	
Kaushal, D. K.	-----	23
Khan, M. A.	-----	51

Krishana Bhat, C. H	-----	4
Krishna, P. V.	-----	24,25
Krishnamoorthy, R.	-----	26
Kulkarni, K. M	-----	34
Kumar, Yudhistra A.	-----	27
Kumar, Naresh	-----	16
Kumar, R.	-----	45
Kumar, Shivendra	-----	2
Kumar, T. Sampath	-----	28
Kumar, Vinay	-----	30
<b>L</b>	-----	
Lodhi, H. S.	-----	51,61
<b>M</b>	-----	
Mallick, A.	-----	43
Mandloi, A. K	-----	32
Martha, S. R.	-----	40
Mishra, Dhan Devi	-----	29,30
Mohan, M. Ramachandra	-----	36
Mohapatra, B. C.	-----	43
Mohite, A. S.	-----	52
Mukhopadhyay, P. K.	-----	42
Mulye, V. B.	-----	15,52
<b>N</b>	-----	
Nagarathna, R.	-----	31
Nagesh, T. S.	-----	5
Neeraja, P.	-----	35
<b>O</b>	-----	
Ojha, Praveen	-----	32
<b>P</b>	-----	
Pal, Subhasis	-----	33
Patnaik, P.	-----	43
Patra, P. K.	-----	45
Pradhan, P.	-----	14

Prakasam, V. R.	-----	1,7
<b>R</b>	-----	
Raja, I. A.	-----	34
Rajakumari, K.	-----	48,49
Rajan, D.	-----	49
Rajyasree, M.	-----	35
Ram, H. Krishna	-----	36
Rao, A. Venkateswara	-----	37
Rayaz, Khalid	-----	38,39
Reddy, H. R. V.	-----	5
Roy, A. K.	-----	40
Roy, Tuhin Narayan	-----	41
<b>S</b>	-----	
Sahu, Minakshi	-----	42
Sahu, N. P.	-----	42
Saler, R. S.	-----	58,59
Sapkale, P. H.	-----	15
Saravanan, S.	-----	2,44
Sardar, Parimal	-----	45
Sasmal, S.	-----	46
Sen, Pooja	-----	47
Sethuramalingam, T. A.	-----	48,49
Shah, Sunil	-----	12
Shahul, Hameed P.	-----	26
Sharma, Ramesh C.	-----	50
Sharma, Nisha	-----	17
Sharma, U. D.	-----	47,51,61
Shinde, A. N.	-----	52
Shivappa, M. U.	-----	4,31
Shivaprakash, S. M.	-----	3
Shukla, Richa	-----	47
Shukla, S.	-----	51
Shukla, Sanjive	-----	47,61

Shukla, Vineeta	-----	53
Singh, J.	-----	55
Singh, Devendra Kumar	-----	54
Singh, H. R.	-----	55
Singh, Indrajit	-----	54
Singh, K. A. K.	-----	56
Singh, Nirbhay	-----	12
Singh, R. K.	-----	56
Singh, R. P.	-----	56
Singh, Raj Mohan	-----	57
Sinha, A.	-----	45
Somashekara, S. R.	-----	3
Sonawane, Yuvraj D.	-----	58,59
Sreedhar, S.	-----	35
Srivastava, Rajshree	-----	55
Subba Rao, T.	-----	26
Sudhakaran, M.	-----	49
Sugunan, V. V.	-----	8
Sukham, Sunil	-----	44
Sultan, Salim	-----	60
Swain, D. K.	-----	43
Syed Mohamed, E. H.	-----	23
<b>T</b>	-----	
Tiwari, K. D.	-----	51
Tiwari, Kunwer Ji	-----	47,61
Tripathi, Rashmi	-----	61
<b>V</b>	-----	
Venugopalan, V. P.	-----	26
Verma, L. P.	-----	20,21
Vikramareddy, M.	-----	27
<b>Y</b>	-----	
Yadav, P. K.	-----	56

---

# **SUBJECT INDEX**

Subject headings with their sub-headings are listed alphabetically. Reference is given to the serial number of the entry.

<b>1.</b>	<b>AQUACULTURE SYSTEMS</b>		
	<i>a. Hatcheries</i>	-	43,44
<b>2.</b>	<b>AQUACULTURE SYSTEM PREPARATION &amp; MANAGEMENT</b>	-	32
<b>3.</b>	<b>ANATOMY</b>		
	<i>a. Fishes</i>	-	10
<b>4.</b>	<b>ASSOCIATED FAUNA</b>	-	50
<b>5.</b>	<b>BENTHOS</b>	-	23,50
<b>6.</b>	<b>BIOCHEMISTRY</b>	-	34,42
<b>7.</b>	<b>BIODIVERSITY</b>	-	8
<b>8.</b>	<b>BIOLOGY OF AQUATIC ANIMALS</b>		
	<i>a. Decapoda Crustacean biology</i>	-	24,26
	<i>b. Fish biology</i>	-	18,22,31,49
	<i>b1. Breeding &amp; development</i>	-	5,9,19
	<i>b2. Food &amp; feeding habit</i>	-	4,25
<b>9.</b>	<b>CULTURE OF AQUATIC ANIMALS</b>		
	<i>a. Freshwater aquaculture</i>	-	45
<b>10.</b>	<b>CYTOLOGY/GENETICS</b>	-	40
<b>11.</b>	<b>ECOLOGY</b>		
	<i>a. Rivers</i>	-	14
	<i>b. Ponds</i>	-	13,54
	<i>c. Tanks</i>	-	59
<b>12.</b>	<b>FISHERIES MANAGEMENT</b>	-	39
<b>13.</b>	<b>FISHERY ECONOMICS</b>	-	4,60
<b>14.</b>	<b>FISHERY STATISTICS</b>	-	38

15.	<b>INTEGRATED AQUACULTURE</b>		
	<i>a. Duck rearing-cum fish culture</i>	-	46
16.	<b>MICROBIOLOGY</b>	-	11,21,27,37
17.	<b>MORPHOLOGY</b>		
	<i>a. Fishes</i>	-	55
18.	<b>NUTRITION</b>	-	2,44,45,48,52
19.	<b>PARASITOLOGY</b>	-	30
20.	<b>PLANKTON</b>	-	46
	<i>a. Zooplankton</i>		
	<i>b. Phytoplankton</i>	-	
21.	<b>POST-HARVEST TECHNOLOGY</b> <b>(Handling, storage, processing, preservation</b> <b>inspection, quality control &amp; transport etc.)</b>	-	16
22.	<b>SOIL CHEMISTRY</b>	-	56
23.	<b>SYSTEMATICS</b>		
	<i>a. Fishes</i>	-	6
24.	<b>TOXICOLOGY</b>	-	1,12,16,35,47,51,53,61
25.	<b>WATER CHEMISTRY</b>	-	3,7,20,36
26.	<b>WATER POLLUTION</b>	-	17,27,28,33,57,58



# TAXONOMIC INDEX

Taxonomic terms of the fishes, frogs, prawns and crabs occurring in the title, also in the body of the paper are included. The names of other groups appear as per their taxonomic status in the animal kingdom. Name of the authorities omitted.

Species Name	Serial No.
<i>Auxis thazard</i>	15
<i>Bangana chindwinicus</i>	6
<i>Channa punctatus</i>	25,34
<i>Channa striatus</i>	30
<i>Clarias batrachus</i>	16
<i>Closterium</i>	59
<i>Colisa labiosus</i>	8
<i>Cymbella</i>	59
<i>Cyprinus carpio</i>	10,23,40,48,53
<i>Fragilaria</i>	59
<i>Gagata sexualis</i>	8
<i>Hemibagrus microphthalmus</i>	8
<i>Lactobacillus sporogenes</i>	48
<i>Lepidocephalichthys annandalei</i>	8
<i>Liza macrolepis</i>	4
<i>Macrobrachium dayanum</i>	47,51,61
<i>Macrobrachium rosenbergii</i>	24,52
<i>Monopterusuchia</i>	9,22
<i>Myxobolus</i>	29,30
<i>Myxobolus shekhai</i>	30
<i>Nangra assamensis</i>	8
<i>Navicula</i>	59
<i>Nemacheilus pavonaceus</i>	8
<i>Oreochromis mossambicus</i>	1,35
<i>Oscillatoria</i>	59
<i>Pangio pangia</i>	8

<i>Penaeus indicus</i>	-----	26
<i>Penaeus monodon</i>	-----	37
<i>Pillaia khajuriae</i>	-----	8
<i>Puntius filamentosus</i>	-----	49
<i>Puntius fraseri</i>	-----	8
<i>Puntius sophore</i>	-----	55
<i>Puntius sp.</i>	-----	23
<i>Rama rama</i>	-----	8
<i>Saccharomyces cerevisiae</i>	-----	48
<i>Saurida gracilis</i>	-----	31
<i>Scenedesmus</i>	-----	59
<i>Sillago sihama</i>	-----	5
<i>Spirulina</i>	-----	59
<i>Synedra</i>	-----	59
<i>Tilapia mossambica</i>	-----	18,19
<i>Vibrio harveyi</i>	-----	37

---

\*\*\*\*\*

# SERIAL INDEX

Serials are abbreviated according to FAO's world list of periodicals for Aquatic Science and Fisheries, Reference is given to the serial number of the entry.

Name of the Journal	Serial No.
Aquacult	
9(1), 2008	----- 6,15,18,19,20,24,25,29,32,39, 47,51,52
Environment & Ecology	
26 (1A),2008	----- 36,48,49,56
26 (2), 2008	----- 3,4, 31,34,45
26 (2A), 2008	----- 13,41,54,61
Fishing Chimes	
27 (10&11), 2008	----- 60
27(12), 2008	----- 44,46,
28(3), 2008	----- 2,11,28,42,43
Geobios	
35(1), 2008	----- 1,7,35,53,58,59
35(2-3), 2008	----- 35
Journal of Environmental Science & Engineering	
50(1), 2008	----- 57
50(2), 2008	----- 26,27,50
Journal of Inland Fisheries Society of India	
40(1), 2008	----- 5,8,9,10,14,22,23,33,40,55
Journal of Nature Conservation	
20(1), 2008	----- 16,17,21,30,38