ISSN: 2347-5129
(ICV-Poland) Impact Value: 5.62
(GIF) Impact Factor: 0.352
IJFAS 2015; 3(2): 343-345

www.fisheriesjournal.com
Received: 09-09-2015
Accepted: 11-10-2015

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Breathing to identify suitability of water quality of inland fish species

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Abstract
Laboratory condition of the fish breathing range are recorded and found that fish breathing is an environmentally controlled. The breathing range of *Channa striatus* may varies from 40 to 52 per minute through their gills and once in a every few minutes through air. A higher breathing rate indicates that the fish is under aquatic environmental stresses. Major purpose of such experimentations is to data capture and data generation in fisheries research which is more academic in nature. It also helps in deriving the logical method of determining aquatic stress environment for every species. Usually, lower the breath value of an individual species may specify the suitability of aquatic environment for such species.

Keywords: Aquatic stress, dispersion of species, Range of water qualities, breathing rate, Inland fisheries

1. Introduction

Suitable water qualities of few inland species are identified along with major catfishes (Das and Bandyopadhyay, 2010) [3] in the lower stretch of river Ganges. This work alternatively is becoming very simple when we consider the breathing rate data of individual species. In a wide geographical area where the dispersion of species is prevailed we may note the breathing rate data. Breathing rate data is certainly a range of numeric. It appears that lower the breathing value the fish may not under aquatic stress condition. With rising such value the aquatic stress may become increased for the particular species and in such cases water qualities may not be suitable for the species. However the traditional process to identify suitable water qualities is done in certain river stretch. This research communication indicates that the laboratory method of measuring fish breathing rate may become ideal and easy. In laboratory condition this experiment can be performed by taking a sample of waters. The traditional method is also mentioned in this research communication. Water quality parameter takes an important role in inland fishery. It has been observed that physicochemical factors affecting fish densities (Sabo *et al*., 1991) [8] and the abundance and species richness of the fishes (Reash and Jimmie, 1990) [7] since physiological and physicochemical factors associated with fish maturation and spawning (Donaldson,1975) [4]. It has been reported that analyses of pond water and mud samples show that nitrifying bacteria (including ammonifying bacteria, nitrite bacteria, nitrobacteria and denitrifying bacteria) are in general closely correlated with various physico-chemical factors (Jun *et al*., 2000) [5]. In case of inland fishery, all the fish species survive under a certain range of physico - chemical parameters. Beyond the ranges of those water quality parameters fishes may survive under stress. Under extreme values of physico-chemical parameters fish species may not survive thus species become endanger. Disturbance, stressful environments, and the ability of fish to cope with physicochemical challenges affect local fish assemblage composition or dynamics (Matthews, 1998) [6] and hence it is important to know the optimum physico-chemical values and their range under which species survive without stress. Number of fish species identified within a entire river stretch is critical and this can be easily observed maintaining a good point database which are used for inland fisheries enhancement (Anon, 1999) [1]. On the other hand, range of physico-chemical parameters and their values can be obtained using any spread sheet or software over the same period of time. Usually the time period of three to four years may be ideal.

2. Materials and Method

Fish breathing rate and range of Channa striatus (Fig. 2) is counted in taking fish sample cage in sampling water. In all possible combination breathing range is counted within the same water. However, in a traditional method, sampling of water quality parameters from sampling centres namely Berhampur, Palta, Dakshineswar and Uluberia over the period of four year (2002 to 2006) are kept in database and analysed. A total of 382 records are available and statistically the range of their values are identified for each forty-nine water quality parameters including microbial loads and pesticides dissolved in river water. Presence of fish species each of four sampling canters are kept in separate point database, these are point database of four sampling centres. The common species of four point databases can be obtained using query command like intersect. Development of database based upon the catch observation of fish species over the four years of study. Twenty common fish species i.e. species available in all the four centre are identified. Database of water quality can be normalized in three different databases like physicochemical parameters, microbial parameters, heavy metals and pesticide parameters and their range and mean values are obtained from the database files during the course of study. It is found that fish identifying optimal breathing data micro scale is more adoptable and easy method. In the past species diversity in relation to stream order and physicochemical condition is observed in the Plum Creek drainage basin (Whiteside and McNatt, 1972) [9], In this research article a twenty inland fish species are identified and these twenty species ideally suited in the range of physicochemical parameters. Microbial loads and tolerable pesticide range are also mentioned. The suitable value for their growth and physiological reactions, however, may be the permissible limit for pesticide for their survival since no mortality of fish species are found during the study. In an earlier studies relationship between physicochemical factors and abundance of fishes in tributary confluences of the lower Channelized Missouri River (Braaten and Guy, 1999) [2] was attempted. It is also observed that maintaining the water quality in a steady, optimum state for fishes is important (Woiwodge, 1996) [10] and when the range of physiochemical parameters become more water bodies may become stressful to some fishes and less number of species ideally suited for the condition in entire stretch. Present paper describes the twenty fish species namely *M. rosenbergii A. aor R. rita, E. vacha, R. corsula, G. guris, W. attu, L. rohita, L. bata, C. catla, C. mrigala, A. coila, C. garua, N. (Chitala) chitala, N. notopterus, T. ilisha, P. paradisius, M. vittatus, P. sapphire, P pama* are available in all the four sampling centres namely Berhampur, Palta, Dakshineswar and Uluberia and their suitable water quality range are identified.

3. Results and Discussion

In traditional ways authors identified fish species which are most suitable in the entire river stretch of Berhampur to Uluberia are mentioned in this communication. Requirement of physico-chemical and physiological parameters of those species in terms of ranges are measured. Range of water quality parameters are concluded as suitable since river is open water system, range in certain river stretch might be the ideal breathing range, if not suitable for those fish species, they will migrate to upstream or downstream to find their more suitable physicochemical condition. Another aspect of this communication is development of fish species database in certain river stretch like Berhampur to Uluberia. Database on water qualities of the river Ganga in the entire stretch helps to find out the seasons and extreme of those parameters. The practical importance of the communication may be to set up culture based capture fisheries development programme like hatchery in the adjoining areas for the mentioned species or possible conservations.

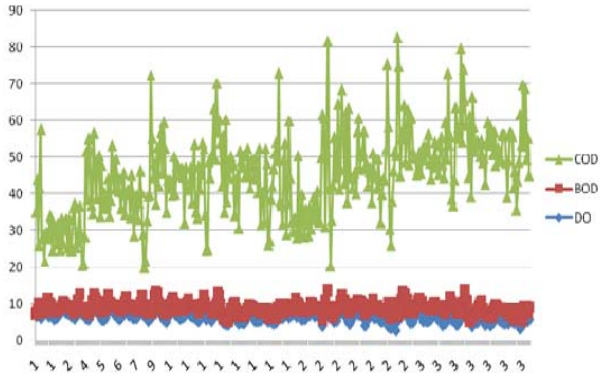

Fig 1: Dispersed data of DO, BOD and COD of Lower stretch of River Ganes

Fig 2: Image of *Channa straitus*

It is assumed that every species may need environmental comfort that indicates the breathing rate is minimum. Related all environmental and ecological parameters whereas primarily oxygen source is dissolved Oxygen (DO) Biological Oxygen Demand (BOD) and chemical oxygen demand (COD) are also relevant in figure (Fig 1).

5. Conclusion

The experiment performed under laboratory condition is to measure fish breathing range which are recorded and found that fish breathing is an environmentally controlled. In ideal cases breathing range of *Channa straitus* varies from 40 to 52 per minutes through their gills and once in a every few minutes through air. A higher breathing rate indicates that fish is under aquatic environmental stresses. Major purpose of such experimentations is to data capture and data generation in fisheries research which is more academic in nature. It also helps in deriving the logical method of determining aquatic stress environment, if any, species wise. It is confirmed that lower the breath value of a species individual may be the suitable of aquatic environment for such species.

6. Acknowledgements

The authors are grateful to The Director and the Ex-Director of Central Inland Fisheries Research Institute (ICAR), Barrackpore, Kolkata-700 120 to accomplish this research manuscript.

7. References

1. Anon. Global characterization of inland fishery enhancements and associated environmental impacts. F A O Fisheries Circulars, FIRI/C945(945), 1999, 1-89.
2. Braaten PJ, Guy CS. Relations between Physicochemical Factors and Abundance of Fishes in Tributary Confluences of the Lower Channelized Missouri River. American Fisheries Society. Transactions 1999; 128(6):1213-1221.
3. Das Debabrata, Bandyopadhyay. Ecological requirements of major catfishes in lower stretch of the river Ganges. Fishing Chimes 2010; 30(1):159-161.
4. Donaldson EM. Physiological and physicochemical factors associated with maturation and spawning. Food and Agriculture Organization of the United Nations. European Inland Fisheries Advisory Commission. Technical Papers 1975; 25:53-71.
5. Jun X, Xiuzheng F, Tongbing Y. Physico-chemical factors and bacteria in fish ponds. Naga: Iclarm Quarterly 2000; 23(4):16-20.
6. Matthews WJ. Disturbance, Harsh Environments, and Physicochemical Tolerance. [IN: Patterns in Freshwater Fish Ecology; Kluwer academic publishers; P.O. Box 17, 3300 AA Dordrecht, Netherlands], 1998, 318-379.
7. Reash Rob J, Jimmie Pigg. Physicochemical factors affecting the abundance and species richness of fishes in the Cimarron River. Oklahoma Academy of Science. Proceedings 1990; 70:23-28.
8. Sabo Matthew J, William Kelso E, Frederick Bryan C, Allen Rutherford D. Physicochemical factors affecting larval fish densities Mississippi river floodplain ponds, Louisiana (USA). Regulated Rivers: Research and Management 1991; 6(2):109-116.
9. Whiteside BG, McNatt, RM. Fish species diversity in relation to stream order and physicochemical conditions in the Plum Creek Drainage Basin. American Midland Naturalist 1972; 88(1):90-101.
10. Woiwode JG. Recent advances in predictive recirculating aquaculture technology. The Role of Aquaculture in World Fisheries 1996; 6:214-218.
11. https://www.google.co.in/search?q=Channa+fish+images&hl=enIN&gbv=2&prmd=ivns&tbm=isch&tbo=u&source=univ&sa=X&ved=0CBUQsARqFQoTCJ39ueXmqsgCFQMbjgodaFYPXg.