

A Remote-Sensing Application in Extended Fisheries Reserach

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Abstract

As known that satellite captures most spectral signatures of any certain dimension oriented water-bodies and may useful in fisheries resource management. Satellite imagery can tell the value of Total Dissolved Solids (TDS) which is among important water quality parameters and can be detected digitally. This digital value is a prime aquatic parameter and may be termed as a principal component parameter to determine species existences in most geographic and breeding habitat of aquatic organisms. A scientific study found that Marine aquatic species may breed naturally within the TDS value, below 250 ppm. Never to forget that most aquatic species may breed during the rainy season and rain water has got a TDS value in a range of 5-50 ppm. On the other side a study found that most sweat water inland aquatic species may breed naturally within below the TDS of 150 ppm. This value of TDS measure act to insert osmotic pressure to the individual aquatic species and also to the reproductive cells. Study found that every species has got a very specific tolerance of osmotic pressure and may be uniquely sensitized by individual species. Today computer and electronics like a mere TDS meter digitally can identify such aquatic requirements of species. However satellite imagery in a large extent may identify the habitat distributions and identification of breeding zones of every individual species either in inland or marine environments to keep aquatic species safer.

Keywords: Fisheries Resource Management, Satellite Imagery, Digital TDS Detection, Osmotic Pressures and Fish Breeding Zones, Aquatic Species and Conservation, Computer and Electronics in Fisheries

Introduction

Satellite captures spectral reflectance and then converted to grey values of certain dimension oriented water body, say academically a minimum dimension of 2.4 m x 2.4 m. It is known that in passive remote-sensing clear waters have got higher light penetration in visible wave lengths range, compare to turbid waters. Digital value of spectral signature of water body having a low TDS may become comparatively less. Since long-period most water quality parameters are being assessed by remotely sensed data through regression modelling [1]. Among them TDS measure is also could be possible either online remote sensing and off line field data collection methods. Water bodies of low TDS is important for fisheries existence specially during the season of natural breeding. As time and again it is found that most Indian Major Carps can naturally be breed within and around 100 ppm of TDS. Whereas other hardy species, excepting cold water fishes may bear up to a TDS of 150 ppm, as detected by computer and electronics or even with a mere TDS meter. One may think whether TDS may be the only important parameter in ecological waters for fishes to migrate even other than to search their feed. As communicated that most fishes prefer to swim within certain range water quality parameters, however for natural breeding most inland fishes may need specific osmotic pressure as well Digital computer and electronics may help the detection of fish breeding environments, specifically for most inland species are made

possible [2]. This research communication is presented based on ecological observations. Most inland species may breed naturally within below 150 ppm of TDS or equivalent osmotic pressure. Such osmotic pressure is highly specific to species. As communicated that most important water quality parameter responsible for conductive natural breeding of fishes is osmotic pressure of ecological waters alternatively the total dissolved solids prevailing in natural waters. An analogue to Digital computer, Osmometer or simply digital TDS Meter can identify or measure the records of osmotic pressure or synonymously total dissolved solids that prevailed in natural or cultured waters. A higher osmotic pressure act as hypertonic mediums and auatic breeding cells may die through plasmolysis.

Computer and electronics are being used in fisheries during the recent days. This may be an approach when human observation becomes erroneous. We can find natural breeding sites of many inland fish fishes through such measures. Osmotic pressure is most crucial as identified to perform natural fish breeding. This may be desirous in respect to fisheries sustainability. Principle behind the osmotic pressure is that solvent like water move from lower concentration to higher concentrated solution through a semi permeable membrane. In situation of fish breeding cell membrane acts as this semi permeability. Higher concentrated aquatic medium is simply judged by amount of Total Dissolved Solids (TDS). Most simple device may be TDS meter. Alternatively we can use Osmometer of Analogue computer for identifying such desirous aquatic environments to fishes. As all known, that fish has got an external fertilization or reproductive system. To get the reproduction process being successful in the aquatic environment optimum

specific osmotic pressure may essential for fisheries sustenance,. Such desirous osmotic pressure in digital signature is identified through computers and electronics and may be needful in further research in fish and all aquatic living organisms as a whole. Institute has taken an initiative for sustaining inland fisheries either naturally or through semi-natural means using digital approaches and also through information sharing.

Materials and Method

Inland waters have variable ranged of records measured in TDS, this is ranging from almost 0 to 200 ppm of TDS (Fig.3). Most inland species prefer to breed naturally within below 150 ppm of TDS whereas IMC can breed naturally within the TDS value of 100 ppm. The role of this dissolved solid (TDS) is to act as generating osmotic pressure cellular membrane in all phases of fish lives and particularly during the natural breeding seasons. Most inland aquatic species needs a lower end of osmotic pressure in the aquatic system where the species survive. Low to medium osmotic pressure or low TDS act as a hypotonic or iso-tonic medium to the membranous fishes or eggs (Fig.1). Under the hypertonic medium a reversed osmosis may take place and fishes may live under stress. In such situation of reversed plasmolysis the survival ability of most eggs are almost lost. Study found different species has different tolerance ability of such osmotic pressures.

Yolk density and density of ecological waters should also be healthy and matching so as to reproductive-cells find an optimum environment, In no way cell fluid should come out to the aquatic medium either through biological osmosis process or ionic means. Comparatively in cellular environment egg-cell contains more fluids than a sperm-cell. Fishes have sensory organs and additionally sensitized with aquatic ions for which species has to adapt while maturity stages and also to migrate.

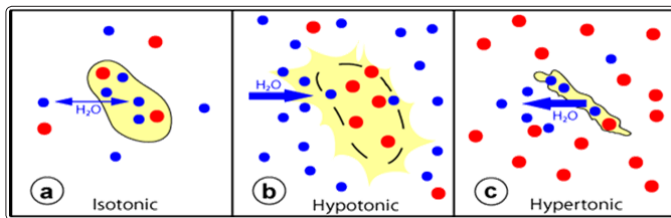


Figure 1: Experiment with cells, as like reproductive cells in different aquatic-mediums with having variable total dissolved solids (TDS)

In natural fisheries, fruitful natural hatching as said may dependant to TDS of ecological waters. Among the common (Fig.2) distributions shown above this might have Cubic, Quadratic and S distributions may be significant with an example species on a presumed data of *A testudineus* An experience at cold water fisheries is also may be added with that in high altitudes fishes may start natural breeding after the melting of ice is over. Fishes of Dal Lake may breed during the month of March when the osmotic pressure or TDS value of melted water become minimum (Fig.3). Whereas under plain condition most species breed naturally on set of monsoon at optimum TDS.

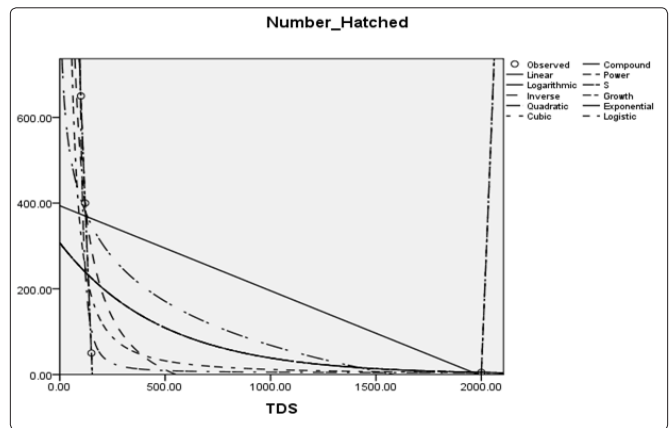


Figure 2: Successful hatching and TDS in *A testudineus*

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Results and Discussion

As mentioned above this research study is based on primarily on Beel fisheries of Nadia District of West Bengal with waters of minimum osmotic pressure. This is linked with the natural fisheries at the lower stretches of the River Ganges. Obtaining specific data was the prime objective of this research communication which is achievable with a TDS meter. A long term time series data is also analysed and presented.

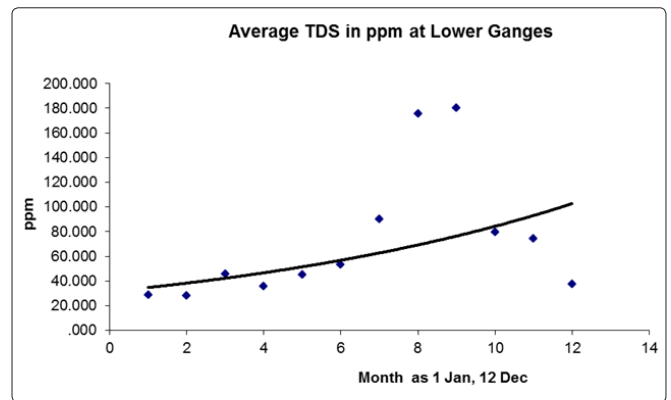


Figure 3: TDS trend annually at the lower stretch of River Ganges

Conclusion

It may happen scientifically that obtaining multiple breeding in a single year in inland fishes may possible once biological process is known and records of digital instrument is such that this may be achievable. Once a well maintained digital value prevail in inland aquatic system, a multiple breeding may become possible,

in species of inland fisheries, species like *A mola*, *Puntius spp*, *Tilapia mossambica*, *Labeo bata*, *Ompok pabda*, *Glossogobius giuris* and *Macrobrachium rosenbergii*. Being digital is a decision making process in fisheries as well Analogue signatures may be changing in nature and accordingly fish may migrate based on the specific osmotic pressures suitable to breed [3].

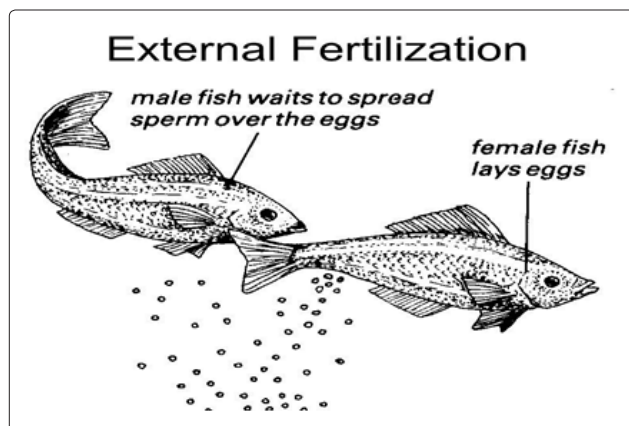


Fig 2. External-fertilisation of fish may be based on specific osmotic pressure of ecological waters as well and this alternatively measured in ppm as detected by computer & electronics viz. TDS meter, Osmometer, Analogue computer or a imagery of a remote sensing satellite.

May however, it is found that Satellite data is complex to be modelled accurately by using regression-based methods. Therefore, study attempts to develop an artificial intelligence modelling method for mapping concentrations of both optical and non-optical SWQPs [4, 5]. Present Recorded digital value is to remind a scientific associated with inland fisheries and also for academic reasons. This digital

detection process or approaches towards fisheries research may be vital in most situations as manual method may remain biased or erroneous. As found that this specific digital values is not only an important criteria for natural breeding of many fish species but for their adaptive migrations, as well. This communication is to support fisheries executives, extension personnel, managers, researchers or even to the academicians when sustainability is desired.

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