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GLOBAL WARMING AND ITS IMPACT ON COLACHEL ESTUARY, KANYAKUMARI DISTRICT, TAMIL NADU.

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ABSTRACT

The outcome of global warming in the form tsunami brought drastic changes in our ecosystems. With a view to understand the ill effects of global warming, an attempt was made to focus attention on the shift in diversity of phytoplanktons in the Colachel estuary.

Keywords: Estuary, fluctuations, retting, stress, Tamilnadu.

1. INTRODUCTION

On 26th December 2004, tectonic disturbances happened in the java,Sumatra islands with an intensity of a round 9.3 in the Richter scales extend to the southern Indian Ocean basin. The changes caused by the tsunami along the Tamilnadu coast was discussed by Jayakumar *et al*. (2005).This has brought vast changes in our aquatic ecosystem and resulted in large scale depletion of flora and fauna.

An estuary is a partly enclosed coastal body of water which is opened to the open sea and within which sea water is measurably diluted with fresh water derived from land drainage (Pitchard, 1967). These ecosystems with an unstable environments spread to an expanse of about two million hectares in India (Kurian, 1975). Being influenced by river flow and tidal water currents they have wide fluctuations in hydro dynamic and biological characteristics (Balusamy, 1988). Estuary serves as a potential breeding site for many of the important species of fin fishes and shell fishes (Achuthankutty *et al*., 1981) and prawn (Jayabalan *et al*., 1980). The occurrence of recent tsunami waves have created an extensive dredging in estuaries affected local tidal currents regimes which influence the movement and distribution of sediments and turbidity plums resulting in stress, remobilization of metals and minerals impacted microalgae.

Some fishes were being an extensive dredging in estuaries affected local tidal currents regimes which influence the movement and distribution of sediments and turbidity plums resulting in stress, remobilization of metals and minerals impacted microalgae. Some fishes were being forced out of their habitats. The hindrance to the fish habitats caused a disruption of the local food chain resulting in reduced fish catch.

2. MATERIALS AND METHODS

2.1. Study area

The Colachel estuary is situated in Kanyakumari at the south of Tamil Nadu.it is a minor estuary. It originates from the Vellimalai hills about 25km north west of Nagercoil and transverses 22 km before it joins the Arabian sea at Colachel and forms the estuary when it crosses the rice paddies it receives the agricultural run-off which contains the fertilizers and pesticide effluents along these retting fields are found along the estuaries.

2.2. Methodology

Phytoplankton samples were collected using no.3 plankton net (bolting silk mesh size 48 µm) during early hours of the day and transferred to 1 liter polythene bottle with a few drops of 5% formalin as preservative. The phytoplankton were allowed to settle to the bottom for 24 hours and identified using standard monographs of Desikachary (1959) and Santhanam *et al*., 1987 and compared with the pre tsunami reports.

The fishery resources of water bodies are greatly influenced by the availability of primary producers, the phytoplankton with a view to find out the impact of tsunami on fish production; survey physical observation and personal enquiry were conducted. The resource depletion was enlisted.

3. RESULTS AND DISCUSSION

The estuary chosen for the present study is used for various purposes for domestic and agricultural purposes; people rely mainly on estuarine water sudden perturbation like tsunami can alter the state and contents of water both

qualitatively and quantitatively. Diversity of phytoplankton acts as an index to assess the fertility of water mass as they are efficient primary producers and constitute a major food source for higher trophic level. The phytoplankton observed from colachel estuary ranged from primitive Cyanophyceae to Bacillariophyceae (Vasantha, 2004). In the present study 36 species were observed i.e 4 genera of Chlorophyceae, 5 genera of Cyanophyceae, 5 members of Dinophyceae, 3 members of Euglenophyceae,19 genera Bacillariophyceae (Table 1). 17 algal species were found decreased in the post tsunami period and all other genera were found increased.

Table 1. Phytoplankton identified in the water samples collected in the selected estuary during post and pre-Tsunamic periods.

Class	Name of the phytoplankton	Species composition	
		Pre-tsunami	Post tsunami
Chlorophyceae	*Chlorella marina*	+++	+
	Closterium sp	++	++++
	Spirogyra sp *	+++	++++++
	Volvox sp	+++++	++
Cyanophycea	*Oedogonium sp**	+++	+++++++
	*Oscillatoria sp**	+++++	++++++++
	Nostoc sp	++	+++++
	Anabaena sp	+++++++	+++
	*Gloeocapsa sp**	+++	+++++++
Dinophyceae	*Ceratium furca**	++	++++++++
	Peridinium conicum	++++++	++
	P .granii	++	+++
	Noctiluca sp.	++++++++	++
	*Gymnodinium sp.**	+	+++++
Euglenophyceae	*Euglena acus**	++++++++	+++
	Phacus longicauda	+++	+++++
	*Lepocinclis ovam**	++	+++++++
Bacillariophyceae	*Asterionella sp* *	+	++++
	Diatoma sp	+++	++
	Fragilaria sp *	+	+++++
	Melosira sulcata	++++++	+++
	Navicula granulate	+++	++
	Pleurosigma normenii	++++++	++
	*Gyrosigma balticum**	++	+++++
	Rhizosolenia robusta	+	++++
	Bacillaria paradoxa	++++	++
	*Coscinodiscus centralis**	+	+++++
	Ditylum brightwelli	++++++	+++++
	Eucampia zoodiacus	++++++	++
	Synedra ulna	++	++++
	*Schroederella delicatula**	++	+++++
	*Tricerattium favus**	+	+++++
	*Hemidiscus hardmannianus**	++	+++++
	*Rhizosolenia setigera**	+	+++++
	*R .alata**	+++	++++++
	R .cylindricus	+++	+++++

Source: primary data * = increase in number

The temperature and plankton production are positively correlated .The microbial community exhibited marked variation in their dominance and diversity and these changes are due to different effects of changing physical, chemical and biological factors on individual species (Legendre and Legendre, 1978). Diatoms and in flagellates were the predominant forms throughout the year a reported earlier in many of the Indian estuaries.(Sivakumar, 1982, Ashokan, 1987, Ramesh *et al.*,1992, Tiwari and Nair, 1993 ,Katti *et al*, 2002). In response to alterations in weather and seasonal oscillations in hydrography microalgal diversity may vary (Walting *et al*., 1979, Karentz and Smayda, 1984). Their growth, abundance and dispersal are determined by environmental parameters such as transparency, temperature, salinity, nutrients in particular nitrates, phosphates and silicates (Satpathy, 1996) light penetration (Jegatheesan, 1986 and Vasantha, 2004) salinity (Neelakantan, 1988) and circulation patterns (Smayda, 1978). During the pre-tsunami period microalgae supported diverse communities of small benthic invertebrates such as polychaetes and amphipods, isocapods, decapods, oligochaetes, foraminifera, ostracods and mollusks (Vasantha, 2004) which form part of the local fish production cycle.

Table 2. Depletion in fish catch after Tsunami in Colachel estuary.

Common name	English name
Mullukendai	White carp
Naichaalay	Herring oil sardine
Kuthippu kare	Big jawed jumper
Kalral	Lobsters
Velameen	Snapper
Oolavaalai	Ribbon fish
Chunnampoovaalai	Cutlass fish

The fish catch in Arabian Sea near Colahel estuary has been affected severely in the post tsunami period. Discharge of industrial wastes in several forms such as solid, liquid and gases to the environment causes several problems and it ultimately results in global climatic change. Coir retting, a process of decomposition of coconut husk by the action of bacteria is a common practice in nearby this estuary. During this process the retting liquor is discharged directly into the estuarine water and it causes an adverse change in the resident communities of the habitat composition.

The tsunami that hit the shores of Tamilnadu on 26th December, 2004 was a catastrophe. It not only killed thousands of people but also changed the coast line of Tamilnadu in several areas. After the tsunami, the realization has set in that the destruction of the coastal mangrove forest and other natural vegetation was the main reason for the havoc caused. This has spurred many measures to protect the coast lines with natural barriers and prevent such occurrences in the future.

The results of the study indicate that if there is no increase in thermal tolerance capacity, depletion would become an annual or bi annual event for almost all fishes. The tsunami episodes have definite impact on fish habitats, plankton diversity and reduced local and regional fishery production. Hence there is a need to keep the people aware about global warming and to have a better understanding of this estuary for optimum utilization of water and biological resources.

The global temperature will continue to increase and in order to minimize the effects all individuals, governments and NGOs have come forward to take control measures. Emerging economics such as India which is rich in biodiversity due to immense variety of climate conditions coupled with ecological habitats should take steps against greenhouse gas emission. The benefits we are getting from the innumerable natural resources should be passed to the grand children of their children also. Man is the beneficiary and biodiversity is the benefactor. In the absence of benefactor the beneficiary cannot exist. Man should not forget this basic fact.

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