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Seshaiyana

Quarterly newsletter of ENVIS on
Indian estuaries, mangroves, coral reefs and lagoons

Sponsored by Ministry of Environment and Forests, Government of India

Volume 18 Issue 3 Third quarter, 2010

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Government of India, New Delhi

Instructions to authors

We welcome research and popular articles, notes, news, snippets and cartoons or any scientific information on our core subjects—estuaries, mangroves, coral reefs and lagoons in and around Indian waters.

The articles should not exceed five typed pages in double space.

Figures should be clear for good reproduction.

References should be limited and cited in the text by name and year. *Council of Science Editors Style* may be referred to for listing references at the end.

E-mail your articles, in MS Word 2003 or 2007, to:

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or

send both the hard and soft copies to:

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We invite comments, suggestions and constructive criticism on *Seshaiyana* from the authors and readers.

Editor's Desk

Dear Readers,

In this issue we have included four articles, three from our core areas [2 on corals and 1 on mangroves] and another one on Journal Citation and Impact Factor which have become all the more important for scientists of the present era. Among the biodiversity rich areas, corals and mangrove occupy the prime slots. Global warming has impacted corals to a greater extent than the mangroves. The first article presents the results of monitoring undertaken in two islands of the Andaman group of islands bringing to the fore threshold level of temperature for the corals and the extent of bleaching in these islands. India has rich traditional knowledge about the values of biodiversity notwithstanding mangroves. The second article validates the traditional knowledge available for the medicinal uses of a mangrove species. We all have entered into an era in which publications are made with an eye on impact factor. How this practice began and how it is calculated, the authors of the third article have explained nicely. We cannot but appreciate their national fervour as they have given in the end tips for improving the impact factor of Indian journals. The fourth article reports the occurrence of a new zoanthid genus namely Palythoa from Gulf of Kachchh which may be of interest to the marine census scientists. The threat the reported two species belonging to this genus can pose to the soft corals will be of interest to the ecologists and environmental scientists.

Besides these, latest abstracts of papers published on estuaries, mangroves and lagoons are included for the benefit of the readers. Apart from reading, the readers are requested to contribute to Seshaiyana in the form of articles, notes and reports. Your feed backs will also receive our utmost attention.

Prof. T. Balasubramanian
Prof. S. Ajmal Khan

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Newsletter Subscription

Seshaiyana is available on a subscription fee of Rs. 100/- per year. Subscription covers four issues from the date of receipt of the fee. Interested readers may send Rs. 100/- through M.O. to:

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Disclaimer

Coral Bleaching in and Around Port Blair, Andaman and Nicobar Islands, India

India has rich coral diversity compared to other reefs of the tropical world. Andaman and Nicobar Islands, Gulf of Mannar, Gulf of Kutch and Lakshadweep are the major reef areas in India. Besides the above, patch corals are also occurring in various places. The shallow coral reefs occupy 1.2% of the world's continental shelf area and 0.09% of the total area of the world oceans. The total area of coral reefs in India is estimated as 2.379 sq km, which is less than one percent of all the coral reef areas in the world (DOD and SAC, 1997).

Colour of the coral is due to the presence of zooxanthellae living within the tissues (Buchheim, 1998). Corals lose their colour when they expel the zooxanthellae due to adverse environmental conditions in particular increase in temperature. Loss of colour due to expulsion of zooxanthellae is termed as coral bleaching.

In 1998, there was massive bleaching of corals throughout the world. It was reported that 16% of the world's corals died (Wilkinson, 2004). However, there was no serious impact on corals of Andaman and Nicobar islands.

The above and subsequent bleaching events underscored the importance of continuous monitoring of corals. Therefore at Jolly Buoy and Redskin Island continuous monitoring of physico-chemical parameters was initiated using the Quanta-Hydrolab thanks to the funding support by the Ministry of Earth Sciences, Government of India (Fig.1).

In Jolly Buoy Island, the temperature varied from 27.25 to 31.42°C during March–May 2009 and from 29.02 to 32.33°C during March–May 2010. That way there was a temperature difference of 2.37°C during March and 0.91°C in May.

In Redskin Island the temperature varied from 28.50 to 30.75°C during March-May 2009. However in the year 2010 the temperature during the same period varied from 29.21 to 32.54°C. The difference of 0.71°C was noticed in the month of March and 1.79°C in May between the years.

Over all around 1°C rise in temperature was noticed during the year 2010 in Jolly Buoy and Redskin Islands. Temperature was low by 1°C in Jolly Buoy Island than the Redskin Island in the month of May.

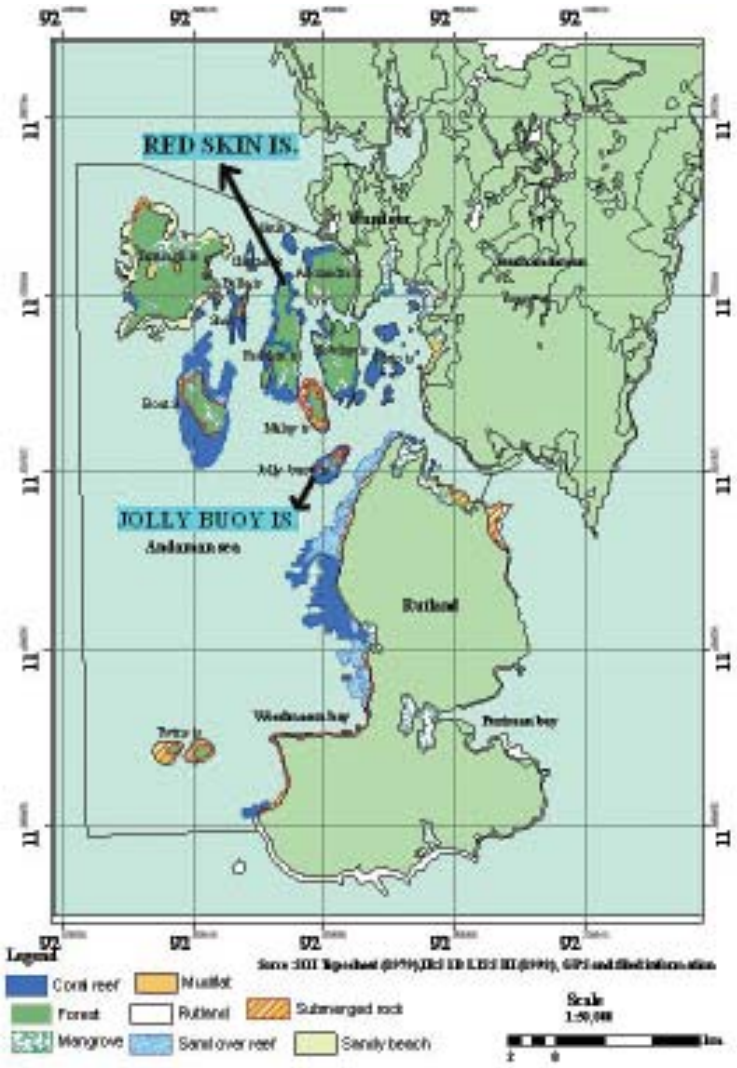

Fig. 1. Study area

Fig. 2a. *Porites* before bleaching

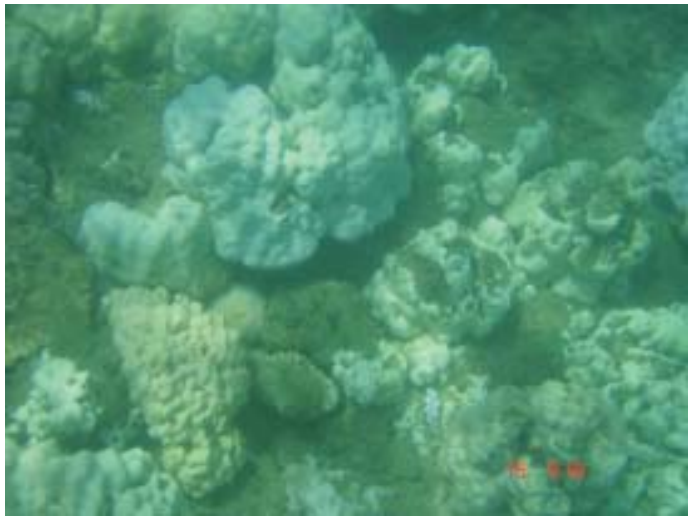

Fig. 2b. *Porites* after bleaching

Fig. 3a. *Acropora* before bleaching

Fig. 3b. *Acropora* after bleaching

The temperature normally rises up to 31.75°C in the study area and then gradually decreases to the normal level at the end of May when the southwest monsoon sets in. Therefore this temperature may be the threshold level of temperature for the corals here. In the year 2010 the threshold level of temperature might have been reached by the end of April itself and it increased further leading to the expulsion of zooxanthellae from the coral tissues, especially among the corals found in the shallow waters. The differences in temperature between the two islands also explained the extent of bleaching in the islands. In the Redskin island which showed higher temperature in May, the extent of bleaching was 80 to 90%. However in Jolly Buoy which showed comparatively lesser temperature, bleaching was to the extent of only 5 to 10%. However, when the temperature increased further at the end of May this part also was devastated fully. Wilkinson (2004) reported that 1°C temperature increment above the threshold limit leads to expulsion the zooxanthellae from the polyps of the coral.

The bleaching phenomenon in these islands was conspicuous up to a depth of 5m. Beyond this depth the percentage of degradation decreased. The most affected coral species during the bleaching event were *Porites*, *Acropora* and *Lobophytum* (Figs. 2–4). However, the fan sponge (*Phyllospongia lamellose*) was not affected in any of these locations. It could be due to the fact that fan sponge can tolerate temperature up to 35°C which is higher than the optimum temperature of sponges (26 to 28°C) as suggested by Massaro (2009).

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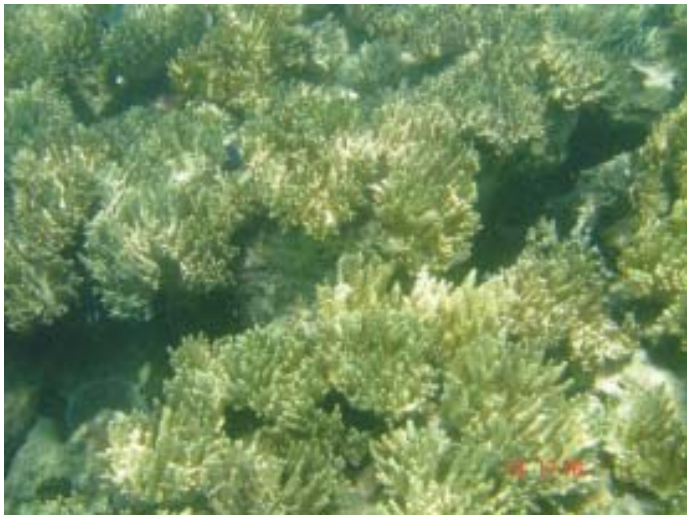

Fig. 4a. *Lobophytum* before bleaching

Fig. 4b. *Lobophytum* after bleaching

Massaro, A., 2009. Selective filtration in the tropical marine sponge *Rhopaloeides odorabile*. In: Impacts of elevated seawater temperature on feeding behavior. ISP Collection, Paper No.774. http://digitalcollections.sit.edu/isp_collection/774.

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Antimicrobial Activity of *Acanthus ilicifolius* L. Collected from Mangrove Forest of Karwar Coast

Acanthus ilicifolius (Family Acanthaceae) is a valuable medicinal plant widely distributed from tropical Africa and Asia through Malaya to Polynesia (Xie *et al.*, 2005). *The* extracts of this plant have been used in various folk medicines as remedy for rheumatism, neuralgia, wounds sustained due to poisonous arrow, coughs, asthma and bacterial infections with subsequent scientific validation of this traditional knowledge (Mastaller, 1997).These created an interest to study the possible antimicrobial activity of different parts of this plant, which has not been reported. The phytochemical literature reveal the presence of 2-benzoxazolinone, lignan glucosides, benzoxazinoide glucosides, flavone glycosides and phenylethanoid glycosides in this plant (Kanchanapoom *et al.*, 2001). In the present study preliminary investigations on antibacterial and antifungal activity of n-hexane, chloroform and methanol extracts of leaves and roots of *A. ilicifolius* have been carried out.

A. ilicifolius was collected from mangrove forest of Karwar in the west coast of India (lat. 14° 47' N, long. 74° 01' E) during December 2009 and identified by a mangrove expert (Fig. 1).

The shade dried parts of the whole plant (leaf and root) were coarsely powdered (50–200 g) and used for extraction in n-hexane, chloroform and methanol for 48 hours in soxhlet apparatus. After evaporation of the solvent under reduced pressure, the respective extracts were obtained. As methanolic extract is reported to show better activity (Chatterjee, 2007), it was successively partitioned with ethyl acetate and acetone.

Fig. 1. *Acanthus ilicifolius* with flower

The *in vitro* antibacterial and antifungal studies using n-hexane, chloroform and methanol extracts of the leaves and roots were carried out by the Agar disc diffusion method (Barry, 1976). All the extracts were separately dissolved in dimethylsulfoxide (DMSO) to get 10 mg/ml solution. Ampicillin (1 mg/ml) and clotrimazole (1 mg/ml) were used as standard antibacterial and antifungal agents respectively. The antibacterial activity was evaluated employing 24 h cultures of *Bacillus subtilis*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Proteus vulgaris* using Muller Hinton Agar medium. Antifungal activity was carried out against 24 h cultures of *Candida albicans*, *Aspergillus fumigatus* and *A. niger* using Sabouraud dextrose agar medium. Accurately 0.2 ml of the test and standard solutions were transferred to cups aseptically and labeled accordingly. The plates inoculated with microorganisms were then maintained at room temperature for 2 h to allow the diffusion of the solutions into the medium. The petri dishes used for antibacterial screening were incubated at 37±1° for 24 h, while those used for antifungal activity were incubated at 28±1°c for 48 h. The diameter of zone of inhibition surrounding each of the well was recorded.

Table 1. Antimicrobial activity of *Acanthus ilicifolius*

Test organisms	Zone of inhibition in mm					
	n-Hexane extract*		Methanol extract*		Methanol extract*	
	Leaves	Roots	Leaves	Roots	Leaves	Roots
Bacillus subtilis	21	18	17	15	20	15
Staphylococcus aureus	20	17	12	14	22	10
Pseudomonas aeruginosa	20	16	12	12	18	10
Proteus vulgaris	22	16	14	15	18	14
Candida albicans	20	19	16	12	24	20
Aspergillus fumigatus	22	17	17	12	22	18
A. niger	22	20	15	14	22	18

*10mg/ml

The n-hexane, chloroform and methanol extracts from the leaves and roots exhibited strong to moderate activity against the test microorganisms (Table 1). The n-hexane and chloroform extracts of leaves exhibited strong inhibitory action against *B. subtilis*, *S. aureus*, *C. albicans*, *A. fumigatus* and *A. niger* and moderate inhibitory action against *Pseudomonas aeruginosa* and *Proteus vulgaris*. The rest of the extracts showed moderate activity.

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Journal Citation and Impact Factor

A citation index is an index of citations between publications, allowing the user to easily establish which later documents cite which earlier documents. The first citation indices were legal citations. In 1960 first citation index for papers published in academic journals was initiated. Later Social Sciences Citation Index also came into being. Now the citation index is automated.

History

The legal profession has been provided with an invaluable research tool known as Shepard's Citation published by Shepard's Citation Inc., Colorado Springs, Colorado since 1878. This citation index is published for court cases in the 48 states as well as for cases in federal courts. Gross and Gross (1927) conducted a classic study of citation patterns in the 1920s. Others, including Estelle Brodman with her studies in the 1940s of physiology journals and subsequent reviews followed this lead (Brodman, 1944). During 1960's Eugene Garfield developed the Institute for Scientific Information (ISI) and it developed the experimental *Genetics Citation Index* project which led to the publication of *Science Citation Index* with the help of Irving H. Sher in 1961. Then ISI became Thomson Scientific & Health Care in 1992 and finally "Thomson Reuters Corporation – ISI Web of Knowledge". In the '60s ISI invented the "impact factor" for journals. By using the journals statistical data, ISI compiled all the data and developed the Science Citation Index® (SCI®). Then, Thomson Reuters began to publish Journal Citation Reports® (JCR®) in 1975 as part of the SCI and the Social Sciences Citation Index® (SSCI®).

Journal citation reports

Journal Citation Reports offer a systematic and objective means to critically evaluate the world's leading journals, with quantifiable, statistical information based on citation data. By compiling articles' cited references, *JCR Web* measures the exposure of research papers and impact of the journal with category levels, and shows the relationship between citing and cited journals. There have been many innovative applications of journal impact factors. The most common involves market research for publishers and others. But, primarily, *JCR* provides librarians and researchers with a tool for the management of library journal collections (http://thomsonreuters.com).

Journal criteria

Journal selection criterion in ISI is an important process which includes timeliness of publication, adherence to international editorial conventions, English language and bibliographic information (including English article titles, key words, abstracts and cited references). Thomson Reuters also examines the journal's editorial content, the international diversity of its authors and editors. Citation Analysis using Thomson Reuters data is applied to determine the journal's citation history and/or the citation history of its authors and editors.

Impact factor

The impact factor for a journal is calculated based on two main criteria. One is that the journal should obey the selection criteria of Thomson Reuters Journal Selection Process and included in SCI for minimum of one year. The second is that the journal should be cited for another two more years. That way only when a journal is included in the SCI for 2-3 years period, it may get the impact factor.

A journal's impact factor is based on two elements: the numerator, which is the number of cites in the current year to any items published in the journal in the previous 2 years; and the denominator, the number of substantive articles (source items) published in the same 2 years.

Calculation for journal impact factor

A = cites in 2003 to articles published in 2002 and 2001
B = number of articles published in 2002 and 2001
C = A/B = impact factor (2003)

Selection of journals

A quality research article will be published in a quality journal which consists of ISSN (International Standard Serial Number), included in SCI (ISI), included in Journal Citation Report (Impact) and a unique identifying number (DOI or PMID).

The ISSN is an eight-digit number which identifies periodical publications as such, including electronic serials. The ISSN is a numeric code which is used as an identifier: it has no significance in itself and does not contain in itself any information referring to the origin or contents of the publication.

The Thomson Reuter's group analyses the Journal's basic criteria (explained above) and then includes that journal in their list. The recently published Science citation index expanded™ 2010 consists of more than 6000 journals (http://science.Thomsonreuters .com/mjl/publist_sciex.pdf).

Unique identifying number like DOI (digital object identifier) is an Internet based global naming and resolution system that provides for the precise identification, retrieval, and trading of digital items in the form of articles, books, images, bibliographies, supporting data, videos, charts, tables, audio, and other electronic files. The DOI has two components, a prefix and a suffix. The prefix is a DOI resolver server identifier (10) and a unique identifier assigned to the specific journal (eg: 1038) and the suffix is an arbitrary number provided by the publisher for each individual article (eg: 12345). For example: DOI 10.1038/12345 connects to http://dx.doi.org/10.1038/12345.

Indian scenario

Some of the funding agencies in India look for SCI paper with impact factor at the time of consideration for the award of fellowship or sanctioning projects. Therefore currently, impact factor, H-indices (Immediate index of the journal) and other similar criteria seem to have become the only yardstick, albeit unjustifiably, to measure the quality of one's scientific contributions. This bias has forced scientists in India, especially the younger generation, to believe that publication of their results in the so-called international journals alone can help them to get a good job or recognition (Lakhotia, 2010).

During 2004–08, out of 126,000 research papers published from India in journals indexed by Thomson Reuters, 5634 are from agricultural sciences and 10,190 from plant and animal sciences (Jonathan *et al*., 2009). Shukla and Singh (2009) reported that in the Thomson Reuters study, no institution from the southern hemisphere is featured in the list of the world's 20 best agricultural institutions based on institution-wise citations per paper. This could be because most of the journals are print-only and not online. During 2008, some of our Indian journals were included with Springerlink group. Since then they are available to the research community. Now most of the Indian NISCAIR journals are having open access (OA). OA is free, immediate and a permanent online access to research articles for the scientists in any corner of the world to know about information available and to improve upon the existing research findings. Therefore free and online articles will bring more citations to authors and create impact of the research (Lawrence, 2001). The Indian Institute of Science's repository ePrints@IISc is the oldest one started in April 2004 and till date, it is the most active and most populated OAR (open access repository) ranking at 72 under institutional repositories category in the world (http://repositories.webometrics.info). This means that OAR in India is in its infancy, and quite a lot needs to be done to bring any of our OARs into the top 20 world rankings (Gutam *et al*., 2010).

Among the many researchers who try to publish their papers in foreign journals having high impact factor, some succeed and others get their manuscripts rejected with good comments. Then they send their papers for publication in Indian journals. Instead, what we must do is, submitting good quality papers to the Indian journals and cite our recently published papers in Indian journals in the manuscript to improve the impact factor of our journals. Moreover research journals published in India are internationally competitive. The Indian scientists in the first place must believe that their science is good and will attract readership no matter where it is published (Lakhotia, 2010).

According to Garfield (2005), "Impact Factor is not a perfect tool to measure the quality of articles. But there is no other better alternative. Therefore this has the advantage of already being in existence and is, therefore, a good technique for evaluation. Experience has shown that in each specialty the best journals are those in which it is most difficult to have an article accepted, and these are the journals that have a high impact factor. That way the use of impact factor as a measure of quality continues to be widespread".

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Abstracts of Recent Publications

Estuaries

076. Arjunan Babu, Kaila Kesavan, Duraisamy Annadurai and Santhanam Rajagopal, 2010. **Abundance and diversity of by-catch molluscs from Cuddalore coast**. *Marine Biodiversity Records*, 1–5.

Address: Centre of Advanced Study in Marine Biology, Annamalai University, Parangipettai 608 502, India

Abstract: The marine biodiversity of the south-east coast of India is rich and varied. This article deals with the availability of molluscs from the trash fish from the Cuddalore coast, Tamilnadu, south-east coast of India, viz., Mudasalodai (11°29′N 79°46′ E) and Cuddalore (11°42′N 79°46′ E) landing centres. A survey has been done to estimate the composition of molluscs from October 2007 to September 2008. About 250 trawlers from Cuddalore and 200 trawlers from Mudasalodai were engaged in fishing activity every day up to a depth of 30–80 m. A total of 59 species belonging to 35 genera from 25 families were recorded at Station 1 and 57 species belonging to 32 genera from 24 families were identified at Station 2. The most diverse families were Muricidae, Conidae, Arcidae and Veneridae at both stations. The Shannon diversity index of gastropods varied from 2.27 to 4.71 and bivalves varied from 1.82 to 2.52, the species richness of gastropods varied from 2.75 to 6.27 and bivalves varied from 1.42 to 1.75. The species evenness in the gastropods was between 0.58 and 0.90 & 0.57 and 0.74 in gastropods and bivalves respectively. Seasonal contribution of gastropods was maximum during pre-monsoon and minimum during summer at both the stations. At Station 1 bivalves attained the maximum during pre-monsoon and minimum was recorded during monsoon. Seasonal contribution of bivalves at Station 2 was high during post-monsoon and minimum during summer.

Keywords: molluscs, biodiversity, conservation, taxonomy, Cuddalore.

077. Martin, G.D.[1,2], K.R. Muraleedharan[1], J.G. Vijay[1], G. Rejomon[1], N.V. Madhu[1], A. Shivaprasad[1], C.K. Haridevi[1], M. Nair[1], K.K. Balachandran[1], C. Revichandran[1], K.V. Jayalakshmy[1] and N. Chandramohanakumar[2], 2010. **Formation of anoxia and denitrification in the bottom waters of a tropical estuary, southwest coast of India**. *Biogeosciences Discuss*, 7: 1751–1782.

Address: [1]National Institute of Oceanography, Regional Centre, Kochi 682 018, India
[2]Dept. of Chemical Oceanography, Cochin University of Science and Technology, Kochi 682 016, India.

≤ **Abstract:** Hydrographic characteristics of the southwest coast of India and its adjoining Cochin backwaters (CBW) were studied during the summer monsoon period. Anomalous formation of anoxia and denitrification were observed in the bottom layers of CBW, which have not been previously reported elsewhere in any tropical estuarine systems. The prevalent upwelling in the Arabian Sea (AS) brought cool, high saline, oxygen deficient and nutrient-rich waters towards the coastal zone and bottom layers of CBW during the high tide. High freshwater discharge in the surface layers brought high amount of nutrients and makes the CBW system highly productive. Intrusion of AS waters seems to be stronger towards the upstream end (~15 km), than had been previously reported, as a consequence of the lowering of river discharges and deepening of channels in the estuary. Time series measurements in the lower reaches of CBW indicated a low mixing zone with increased stratification, 3 h after the high tide (highest high tide) and high variation in vertical mixing during the spring and neap phases. The upwelled waters (O2 ≤ 40 μM) intruded into the estuary was found to lose more oxygen during the neap phase (suboxic O2 ≤ 4 μM) than spring phase (hypoxic O2 ≤ 10 μM). Increased stratification coupled with low ventilation and presence of high organic matter have resulted in an anoxic condition (O2 = 0), 2–6 km away from barmouth of the estuary and leads to the formation of hydrogen sulphide. The reduction of nitrate and formation of nitrite 20 within the oxygen deficient waters indicated strong denitrification intensity in the estuary. The expansion of oxygen deficient zone, denitrification and formation of hydrogen sulphide may lead to a destruction of biodiversity and an increase of green house gas emissions from this region.

078. Sannadurgappa, D., 2010. **Water quality and human influence on coastal ecosystem of South India**. BALWOIS 2010 - Ohrid, Republic of Macedonia - 25, 29.

Address: Centre for Sustainable Technologies, Indian Institute of Science, Bangalore, India.

Abstract: The problem confronting coastal resource managers in the west coast of India is analogous to the question of whether economic policy makers in India should be focusing on restoring the fundamentals of capitalism. Pragmatic monitoring and prediction capabilities must also be built to provide further confidence that human impacts are being minimized. There is a need to develop a framework to integrate biodiversity effect methods with risk assessment methodology. Such integration will improve the basis for risk-based assessment of coastal health. To protect estuary and coastal ecosystems and the health of communities effectively, management infrastructure requires the tools and resources necessary to detect damage to estuary and coastal ecosystems and their components, identify causative agents, impose remedial action, and demonstrate that measures have been effective. In contrast, bottom-up restoration strategies not only simplify planning, but they recognize that basal ecological mechanisms are what define coastal ecosystems. Populations of the majority of fish species showed drastic reduction over the past five decades in west coast of India. We conducted an intensive study of Aghanashini estuary for water quality and fish diversity in west coast of India. Coastal ecosystems are impacted by many stressors and are continually subjected to threats from multiple stresses imposed mostly by human activities predominantly as a result of increased

population growth in India. The most significant categories of threats derive from water pollution from numerous sources including thermal effluents, heavy metals, oil, sewage, pesticides, pulp mills, habitat loss and degradation: overexploitation: eutrophication and misguided human perceptions. Wide array of prohibited fishing methods are rampant by using of insecticides as poisons, destruction and modification of habitats, dynamiting, using chemical and herbal poisons. Due to deteriorated water quality from anthropogenic activities fish diversity has drastically reduced. In complex coastal ecosystems, strategies for restoration can become equally complicated. Our tendency to want to predict and establish performance targets for the charismatic megafauna which populate the higher trophic levels of an ecosystem may reduce our ability to actually implement restoration plans.

Keywords: Human influence, water quality, fish diversity, southern India.

079. Swami, B.S. and M. Udhayakumar, 2010. **Seasonal influence on settlement, distribution and diversity of fouling organisms of Mumbai harbor**. Indian Journal of Marine Sciences, 39(1): 57–67.

Address: Marine Biotechnology Department, Naval Materials Research Laboratory, DRDO, Anandnagar P.O. Ambernath (E) 421 506, Maharashtra, India (*e-mail*: swamibs29@yahoo.co.in).

Abstract: Biofouling at two sites was examined with regard to species abundance (density) and its composition. Sixty species were recorded during the investigation period (2000–2001). These species mainly belong to phylum annelid (11 species), bryozoa (22 species), cirripedes (4 species), mollusca (5 species), coelenterate (6 species), tunicate (10 species) and porifera (2 species). Thirty five species have been recorded from tidal basin which is influenced by organic pollutants released through sewage water. Among the sixty species recorded, 16 were new records for the region. There is significant variation in density from month to month at Near-shore waters and at tidal basin. Species settled in pre-monsoon were significantly higher than species settled in monsoon and post monsoon. Settlement pattern varies with seasons at Near-shore waters and at Tidal basin.

Keywords: Biofouling, seasonal variation, density, species composition, pollution, biodiversity.

Mangroves

080. Abhrajyoti Ghosh, Nirmalya Dey, Amit Bera, Amit Tiwari, K.B. Sathyaniranjan, Kalyan Chakrabarti and Dhrubajyoti Chattopadhyay*, 2010. **Culture independent molecular analysis of bacterial communities in the mangrove sediment of Sundarban, India**. *Saline Systems*, 6:1.

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Abstract: Sundarban is the world's largest coastal sediment comprising of mangrove forest which covers about one million hectares in the south-eastern parts of India and southern parts of Bangladesh. The microbial diversity in this sediment is largely unknown till date. In the present study an attempt has been made to understand the microbial diversity in this sediment using a cultivation-independent molecular approach. Two 16 S rRNA gene libraries were constructed and partial sequencing of the selected clones was carried out to identify bacterial strains present in the sediment. Phylogenetic analysis of partially sequenced 16 S rRNA gene sequences revealed the diversity of bacterial strains in the Sundarban sediment. At least 8 different bacterial phyla were detected. The major divisions of detected bacterial phyla were Proteobacteria (alpha, beta, gamma, and delta), Flexibacteria (CFB group), Actinobacteria, Acidobacteria, Chloroflexi, Firmicutes, Planctomycetes and Gammatimonadates. The gamma-proteobacteria were found to be the most abundant bacterial group in Sundarban sediment. Many clones showed similarity with previously reported bacterial lineages recovered from various marine sediments. The present study indicates a probable hydrocarbon and oil contamination in this sediment. In the present study, a number of clones were identified that have shown similarity with bacterial clones or isolates responsible for the maintenance of the S-cycle in the saline environment.

081. Prince C. Mmom and Samuel B. Arokoyu, 2010**. Mangrove forest depletion, biodiversity loss and traditional resources management practices in the Niger Delta, Nigeria.** *Research Journal of Applied Sciences, Engineering and Technology*, 2(1): 28–34.

Address: Department of Geography and Environmental Management, University of Port Harcourt. P.M.B 5323, Choba-Port Harcourt, Nigeria.

Abstract: The mangrove forest of the Niger Delta is of high economic value to the local people as well as National Development generally. The mangrove forest is rich in both aquatic and terrestrial biodiversity as such a major source of rural life sustenance in the region as well as plays a vital role in ecosystems stabilization. However, unfortunately, the mangrove forest in recent times has been subjected to the effects of a growing population, economic and social pressures manifested in the form of rapid urbanization, agricultural land expansion and industrialization. Thus, there is a steady deforestation of the mangrove forest and loss of biodiversity in the region. The mangrove forest is not under any known form of protection and or laws and strategies of biological resource conservation in Nigeria. And even in areas where they seem to exist, they have alienated the knowledge systems and practices of the local people. This paper therefore aims at examining the rate of exploitation of these mangrove resources and the traditional resource management practices of the people, as a strategy for mangrove forest resource conservation in the Niger Delta, Nigeria. Thus, using a simple random sampling technique (use of table of random digits), ten (10) communities from two states of the Niger Delta (Delta & Rivers States) were selected as samples for the study. Also, using mainly primary data generated on the field through the use of structured questionnaire and analysed in percentages, the

authors found out as follows: That rural livelihood in the area depends on the exploitation of the mangrove resources as such there is over exploitation and rapid loss of these resources; that the mangrove forest is not in any known form of protection; that the local people have an efficient way of protecting and conserving their resources which could be exploited to enhance mangrove resource conservation in the region. Thus, the paper recommends that policy makers and planners should enlighten the local people on the dangers of over exploitation and encourage them to strengthen these traditional resource management practices.

Keywords: Traditional resource management, biological resources, biodiversity, mangrove forest, conservation, deforestation, Niger Delta.

082. Sanjay K. Singh[1], Pankaj Verma[2], Nagappa Ramaiah[1], A. Chandrashekar Anil[1], Yogesh S. Shouche[2], 2010. **Phylogenetic diversity of archaeal 16S rRNA and ammonia monooxygenase genes from tropical estuarine sediments on the central west coast of India**. *Research in Microbiology*, 161(3): 177–186.

Address: [1]National Institute of Oceanography, Dona Paula, Goa, India 403 004.

[2]National Centre for Cell Sciences, Ganeshkhind, Pune, India 411 007.

Abstract: Phylogenetic diversity analyses of archaeal 16S rRNA and ammonia monooxygenase subunit *A* (A*amoA*) genes were carried out from the sediment samples of Mandovi and Zuari estuaries in the central west coast of India. The 16S rRNA gene libraries revealed quite high diversity of archaea in these sediments compared to previous reports from tropical and temperate estuarine sediments. Uncultured members of Crenarchaeota accounted for ~78% of 433 archaeal 16S rRNA gene clones from both the estuaries. We detected archaeal 16S and *amoA* genes related organisms capable of ammonia oxidation. Among Crenarchaeota, Marine Group I (MGI) was the most predominant. Clones matching with the uncultured methanobacteria were predominant among the ribogroups of Euryarchaeota. Our results indicate that archaeal diversity in tropical estuarine sediments is influenced by the mangrove vegetation bordering the lower stretches of both the estuaries. Higher diversity may be related to elevated land drainages during monsoon particularly in Mandovi estuary sediments. Also, diversity of A*amoA* sequences was higher in Mandovi sediments than those from Zuari and other tropical and/or temperate estuaries studied previously.

Keywords: Tropical estuaries, sediment, phylogeny, archaea, marine group I, DGGE, 16S rRNA, OTU, *amoA*, ammonia oxidation.

Lagoons

083. Debasish Mahapatro*[1], R.C. Panigrahy[2], Sudarsan Panda[1] and Rajani K. Mishra[1], 2009. **Influence of monsoon on macrobenthic assemblage in outer channel area of Chilika lagoon, East coast of India**. *Journal of Wetlands Ecology*, 3: 56–67.

Address: [1]Chilika Development Authority, C-11/BJB Nagar, Bhubaneswar.

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Abstract: Abundance of macrobenthos in the outer channel area of Chilika lagoon in the east coast of India was studied during monsoon season of 2007 & 2008. In total 27 species of macrobenthic organisms were collected during the study period. Crustacea emerged the most dominant group representing 9 species followed by polychaetes with 8 species while 5 species belonged to bivalvia and 3 species to gastropoda. The others group in the study area included nematodes and echiurids. The mean density of macrobenthos was 378 organisms m^{-2} and 392 organism m^{-2} respectively in 2007 & 2008. The biomass recorded was 0.525 gm^{-2} and 0.575 gm^{-2} respectively. Mean values of Margalef's richness index were 2.7 in 2007 and 3.0 in 2008, while Shannon's H' values were 1.7 in 2008 and 1.8 in 2007. The evenness J was calculated as 0.76 in 2008 and 0.94 in 2007. The result of the study shows that hydrographical parameters like temperature (°C), pH and salinity (psu) parameters had modest relationship with population density and biomass. The preference of macrobenthic organism to any specific parameter couldn't be established clearly and this would be due to the presence of more opportunistic filters feeders than the deposit feeders. The opening of a new outlet connecting the sea showed good influence on species richness and population density.

Keywords: Chilika lagoon, macrobenthos, population density, biomass, diversity indices.

084. Latha, C. and V. Salom Gnana Thanga*, 2010. **Macroinvertebrate diversity of Veli and Kadinamkulam lakes, South Kerala, India**. *Journal of Environmental Biology*, 31: 543–547.

Address: Department of Environmental Sciences, University of Kerala, Kariavattom, Thiruvananthapuram 695 581, India.

Abstract: The diversity and distribution pattern of benthic macroinvertebrates in two backwaters viz., Veli and Kadinamkulam of Kerala were assessed using diversity indices. The samples were collected once in three months for a period of two years from six sampling sites (K1, K2, K3, V1, V2 and V3) and community variations were analyzed. Overall, 24 families were identified represented by mollusca, annelida and arthropoda (crustaceans and insects). Among this, dominant taxon was Mytilidae of molluscan family and site-wise dominance was maximum in sites V1 and V2. Richness and abundance were highest in site V2 and lowest in site K2. Diversity index ranged from 0.27 (K2) to 2.33 (V1). The diversity and distribution patterns of certain species were clearly related to water quality as evident from the present study.

Keywords: Benthic macroinvertebrates, diversity, species richness.

(continued from back cover)

On the Saurashtra coast, it is found at Dwarka, Veraval, Mangrol and Bural-Chank reef. The first three locations are rocky shores but the last one is an off shore reef within the Marine National Park. In intertidal regions of Dwarka near sunset point and lighthouse (lat. 22° 14′35" N and long. 68° 57′17" E) large colonies of *Palythoa* are found growing on rocks and in shallow water pools. The growth rate of the colonies is very high. Within a short span of 3 months the expanse of a few colonies was observed to have doubled. On Bural-Chank Reef a small colony was observed in the month of April-2008 and it was in the initial stage of colony development. As there is little natural control it could rapidly spread over to other areas in the reef. Keeping in mind its aggressive growth and its ability of overgrow on natural coral community, there is an immediate need to study its distribution vis-à-vis other corals in other sites on Bural-Chank reef as well as other reefs of the Marine National Park.

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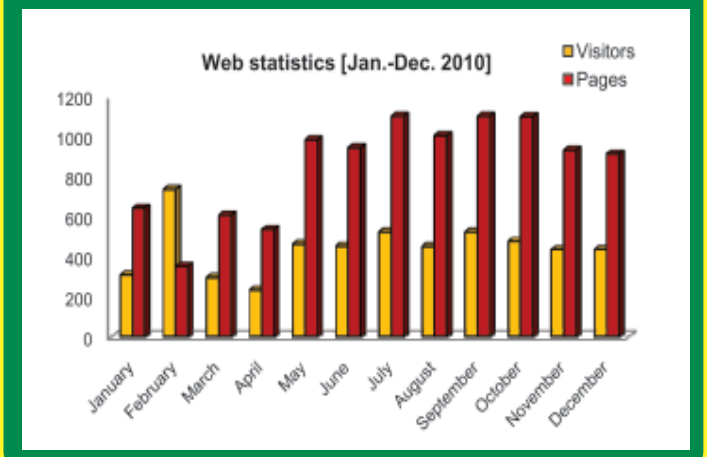

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New Record of a Zoanthid Genus *Palythoa* from the Gulf of Kachchh, Gujarat

The genus *Palythoa* belongs to the Family Sphenopidae, Order Zoantharia, Class Anthozoa of Phylum Cnidaria. It has a yellowish brown coloured colony generally found as encrusting mats on rocks, dead reefs, shells and even on live coral colonies. The fleshy polyps are of 5-10 mm in diameter and about 1 cm in thickness (Haywick and Mueller, 1997). The fleshy polyps have short, stout and rounded tentacles in two rings. The outer surface of the colony is covered with large and rounded calyces surrounded by a low and rounded ridge or lip.

Except one old report ("Report to the Government of Baroda on the Marine Zoology of Okhamandal in Kattiawar" by James Hornell, Vol. I, 1909), no information on the occurrence of *Palythoa* from Indian waters is available. The species reported was *Palythoa tuberculosa*. However, here also only the photograph was given and not the description of genus or species. Therefore this genus is being described now for the first time in India.

The retired Deputy Commissioner of Fisheries of Gujarat State was approached for confirming the identity of the genus. He vouched safe that this is the first description of this genus from the above area and India.

Dr. James Davis Reimer, Assistant Professor in the University of Ryukyus, Japan an expert on zoanthids was contacted for his comments. He identified the species as *Palythoa tuberculosa* and *P. mutuki* (Figs. 1 and 2).

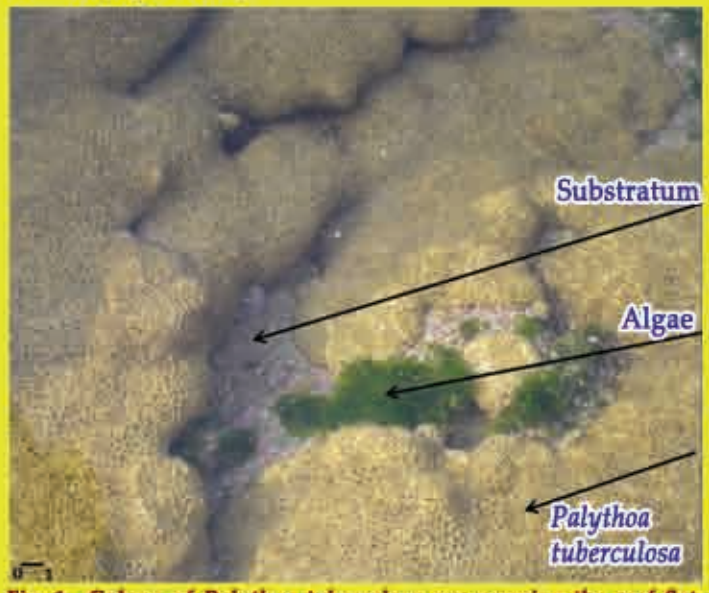

Fig. 1. Colony of *Palythoa tuberculosa* overgrowing the reef flat region of Dwarka

Species belonging to this genus inhabit shallow reef areas having bright light. They prefer moderate to strong currents and are therefore found in reef crest and reef fronts. This genus is fairly tolerant to high turbidity, high nitrate and phosphates levels besides poor water quality conditions, which allow them to grow well in canals, harbors and intertidal areas with high sediment load. Members of this genus have the habit of overgrowing on neighboring invertebrates besides the scleractinian corals (Suchanek and Green, 1981). Their overgrowth leads to slow death of native colony due to release of an allelochemical (neurotoxin) called as 'Palytoxin'. This toxin is being intensively studied in medicine as it is considered as the most potent non-protein marine toxin known (Mueller and Haywick, 1995).

This toxin is used by the organisms to protect themselves from predators and to acquire space on the reefs (Suchanek and Green, 1981). *Palythoa* contains zooxanthellae (*Symbiodinium* sp.) in its epidermal tissue. Therefore its distribution is strongly light-dependent (Mueller and Haywick, 1995). *Palythoa* is sensitive to increase in temperature as it is generally the first one to show temperature induced bleaching, and so can act as an early indicator of bleaching among corals (Kemp *et al*., 2006). Being very common in zones of high sediment deposition (Haywick and Mueller, 1997), this genus has been identified as sediment assimilator as it stores fine sediments in its mesogleal tissue (Muller and Haywick, 1995). Purpose of sediment assimilation is for tissue strengthening. It makes *Palythoa* more rigid and therefore more resistant to waves and currents at reef crest. *Palythoa* has two kinds of mechanism to acquire its nutrition one with the help of zooxanthellae and the other through capture of live prey with the help of tentacles (Amada, 1970). Nervous system is of primitive nerve net type. Reproduction can be asexual or sexual. *Palythoa* has high reproductive rate and is very aggressive in nature. Growth rate of *Palythoa* varies according to the defense mechanism of competent species. Asexual reproduction by colony fission happens year round. Sexual reproduction is believed to occur between April and May (Acosta *et al*., 2005). It is hermaphroditic in nature and broadcast the spawn.

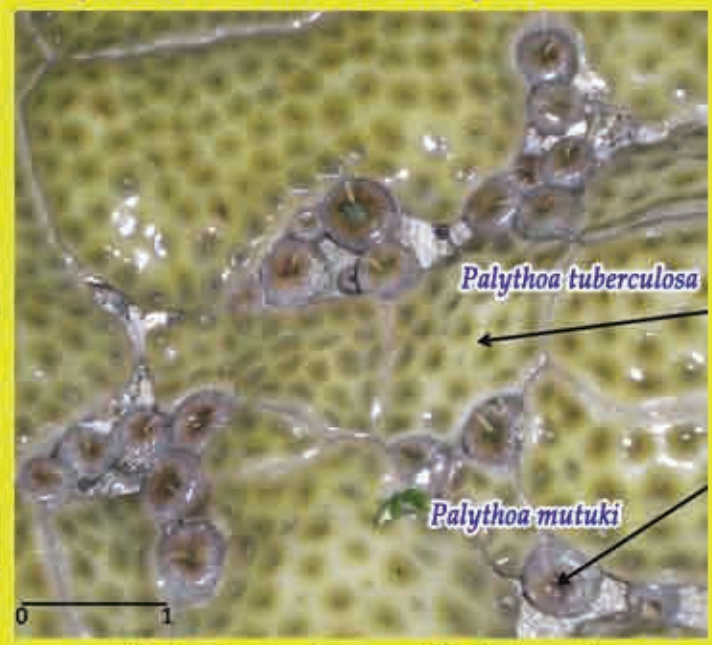

Fig. 2. Close up of colony with both the species

Gulf of Kachchh is one of the four major coral reef regions of India. *Palythoa* is a new addition from the Gulf of Kachchh reefs. It has its distribution in Florida, Caribbean Sea and Western Indian Ocean reefs. But it has not been recorded in Gulf of Kachchh before. It is very often misunderstood as soft coral in view of its mat like appearance. At many places especially in aquarium shops it is being sold as a good starter coral in view of its rapid growth and adaptability to harsh conditions in the aquarium tanks.

(continued on inner back cover)