



REVIEW OF RESEARCH

ISSN: 2249-894X

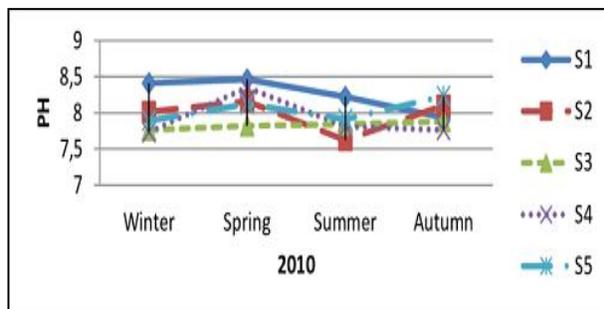
IMPACT FACTOR : 5.2331(UIF)

UGC APPROVED JOURNAL NO. 48514

VOLUME - 7 | ISSUE - 2 | NOVEMBER - 2017



SEASONAL VARIATION IN HYDROGEN ION CONCENTRATION IN BELAPUR ESTUARY, MUMBAI



ABSTRACT:

Mangroves and estuaries

Mangroves protect coastlines by absorbing the force of storms, and provide sufficient nutrients to nurture most of the world's marine life. Many have been lost, largely through conversion to rice paddies and shrimp farms, and with coastal regions set to double their human populations over the next 25 years, coastal ecosystems such as mangroves, estuaries, mud flats and sea grass beds are coming under increasing threat.

KEYWORDS: Estuaries, Sediment, Mangroves

INTRODUCTION :

Mangroves are forests of salt-tolerant trees and shrubs that grow in the shallow tidal waters of estuaries and coastal areas in tropical regions. They require slow currents, no frost and plenty of fine sediment in which to set their roots. Their muddy waters, rich in nutrients from decaying leaves and wood, are home to sponges, worms, crustaceans, molluscs and algae, and provide shelter for marine mammals, snakes and crocodiles. They act as fish nurseries and help feed life further out to sea. Queensland's mangroves, for instance, do much to sustain the Great Barrier Reef, the world's largest coral reef system. Mangroves are also strongly correlated with the presence of shoals of shrimp

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further offshore.

Table 1: Mangroves in India

Area distribution of mangroves in India (thousand ha)		
State/Union territory	Government of India, 1987	Government of India, 1997
West Bengal (Sundarbans)	420	212.3
Andaman and Nicobar Islands	119	96.6
Maharashtra	33	12.4
Gujarat	26	99.1
Andhra Pradesh	20	38.3
Tamil Nadu	15	2.1
Orissa	15	21.1
Karnataka	6	0.3
Goa	20	0.5
Kerala	Sparse	Nil
Total	674	482.7

IMPORTANCE OF MANGROVES FOR MUMBAI

Mumbai is a reclaimed island with powerful wave action along its entire shoreline. The wave action has increased by 14.7 knots in the North Western area and has eroded the 16km long coastline by 500 mts in the past 35 years. Only mangroves can provide a natural control of eroding shoreline and increasing tidal amplitude due to global warming.

Over 100 thousand fisher folks are directly dependent on fisheries resources around Mumbai.

Mangroves provide livelihood for them by breeding and nursing the fish, prawns, mollusks, crabs, etc. Coastal biodiversity including the million migratory birds that visit Mumbai are housed by the mangroves.

Mumbai is one of the most populated city in the world with major space crunch. Only 0.03 acres of open space available per 1000 population. Against 12 acres in London and 4 acres in New York and 6 acres in Singapore.

Study Area

The study area is a small arm of Thane creek locally known as Panvel estuary. It lies to the South east of Mumbai at a distance of around 7 Kms. The length of the creek is 11.5 kms and the maximum width is 0.5km. The tidal influence is seen up to a length of 6.5 kms. The Belapur creek has a beautiful lining of mangroves on both banks which provide tremendous amount of ecological, economical and socioeconomic benefits in this area.

This area has been very productive as it provides high primary production and as well has habitat to fisheries. Now it is under threat for the sand barons who use patches created by destroying mangroves and land filling along the creek to bring sand from other dredging sites for drying. Also lot of activities such as vessels repair is carried out on the land which is carved out of mangroves. *Avicennia Marina*, *Sonneratia* are main species which are found in this area. Waste water coming from Taloja, Mhape and Panvel industrial area is one of important factor as per as mangroves are concern. Even construction of new building in the area is matter of concern because for the construction mangrove are removed. Certainly this area got so much of importance because of proposed project Navi Mumbai international Airport. Any activities within 50 meters of a mangrove is illegal, but the authorities remain silent...nature dies.

Biggest Environmental problem which is going to occur because of Proposed Navi Mumbai International Airport which is located approximately 2.5 km away from sampling sites



Map of Navi Mumbai estuary

Factor affecting the estuarine ecosystem

Infrastructure development

Because development of business and commercial sectors loads of land has been acquired for construction of buildings from Vashi to Panvel area. Previously this area was under the wetland which has been converted in development land by adding tremendous amount of soil on to it. Sion-Panvel highway, Uran-Belapur railway line and CST-Panvel harbour railway line are some of the examples. Mangrove cover also has been removed for such developmental activities

Waste water Discharge

This mangroves and estuarine area surrounded with major industrial node such as Taloja, Turbhe, Thane – Belapur industrial association which is also one of the main cause of degradation of beautiful and productive ecosystem. All large scale industries has their own Effluent Treatment plant and as well as Common Effluent Treatment facilities for small scale industries, they keep discharging effluent in the

estuary. The effluent coming from those industries contains organic, inorganic waste which will be harmful for mangroves and as well as for aquatic flora and fauna.

Sand dredging

A demand for sand and gravel continues to increase. Excessive in stream sand-and-gravel mining causes the degradation of ecosystem. In stream mining lowers the stream bottom, which may lead to bank erosion.

Navi Mumbai Interantional Airport

Proposed New Navi Mumbai International airport is a new international airport, which is to come up at Kopra-Panvel area, is being built through public-private partnership (PPP).The MoEF has pointed out that more than 30% of the entire proposed land falls under the Coastal Regulatory Zone (CRZ). Ironically , the National Coastal Zone Management Authority (NCZMA) had given its approval to the project. The MoEF's refusal to give environmental clearance could also create problems for Cidco in resettlement of PAPs, sources said. "So far, the PAPs and their elected representatives have been co-operative . But procedural delays could test their patience and also fuel resentment which will create an additional hurdle," Cidco sources said

Literature review

The estuarine ecosystem filters the nutrient, organic and metals which in turns improve the quality of water as indicated by Sharp el al, (1998)

The physio chemical parameter such as pH, Conductivity, TDS and Chloride varies in three regions sea, estuary and till the water mixed with fresh water which has been shown in Bhitarkanika mangrove, Orrisa., Chuhan, *et al*, (2008)

The sediments content sufficient amount of phosphate which improves the productivity of an ecosystem. The rates of exchange and the exchange capacity of the sediments are large enough to be significant to maintain phosphate level in aquatic ecosystem.

In untouched sediments the biological exchange is minor, but in suspended sediments the biological exchange is always found to be more. Pomeroy L. R. *etal* (1965)

Mangroves are ecologically important coastal wetland. It perform major environmental role in sheltering coastline and estuary by storm protection, shore stabilization and control of coastal soil erosion and flooding, Sathirathaiet *al*.(2001)

Brick kiln industries are present around the study area can leads to several, socioeconomic and environmental problems. The gases like carbon monoxide, sulphur dioxide, nitrogen dioxide, some amount of hydrocarbon and fine dust particle get realised from the process depending upon material used. The inhalation of these gases can cause cardiovascular, respiratory diseases. The incomplete combustion of coal and other material can increase the intensity of hearth disease. Joshi S. K *etal*, (2008)

Objectives

- To study the distribution of water and soil pH in the estuary
- To study of effect of pH on sedimentation pattern, circulation of nutrient

Material and methodology

Water and soil samples has been collected from different sampling location in pre monsoon and post monsoon season and following physical, chemical characteristics has been studied

Sampling: Soil and water samples have been collected by random sampling method at 7 sampling location. One sample has been collected at the mouth of the creek which will be considered as control.

Sampling location

Total 14 water and 7 soil samples has been collected from estuary. Sample 1 is near to the mouth of the estuary which is demonstrated characteristic of sea. Rest of the sample has been collected from sides of estuary like illustrated in diagram sample 2A, 2B, 3A and so on. Tidal effluence has been seen till sample 6.

Sampling details

Sample Number	Name of the place	Altitude	Description
1.	Mouth of the creek	19° 00'00.83" N 73° 01'46.99"E	Starting of the estuary used for fishing and shipping activities
2.	UranBelepur Railway bridge Sample A Sample B	19°00'13.58" N 73° 01'57.66"E 19° 00'08.72" N 73° 02'00.17"E	Sand dredging, fishing and shipping activities on the both bank
3.	DiwaleVillage Sample A Sample B	19° 00'26.44" N 73° 02'26.90"E 19° 00'19.31" N 73° 02'33.07"E	Sample A fishing and shipping and on Sample B dense growth of mangroves
4.	RetiBander Sample A Sample B	19° 01'01.21" N 73° 02'41.07"E 19° 00'53.97" N 73° 02'56.04"E	Sample A Sand mining and transportation sample B mangrove
5.	3 stream together Sample A Sample B Sample C	19° 00'17.56" N 73° 03'21.45"E 19° 00'10.69" N 73° 03'26.43"E 19° 01'06.17" N 73° 03'32.60"E	Stream divided into 3arms one goes and meet to Ghadi river in Panvel mangrove growth both the side of bank
6.	Kharghar Station Sample A Sample B	19° 01'21.61" N 73° 03'58.68"E 19° 01'16.90" N 73° 04'03.66"E	Sample A Near to the Kharghar station and sample B has growth of mangroves
7.	SionPanvel highway bridge Sample A Sample B	19° 01'37.95" N 73° 04'25.07"E 19° 01'33.38" N 73° 04'28.83"E	Bricks kiln on A side and mangroves on B side of estuary

The water and soil samples has been collected

1. pH. U.S.EPA150.1
2. Temperature APHA2550B
3. Conductivity, APHA-2510B

Sediment sampling: Soil samples are collected from same seven point for pH

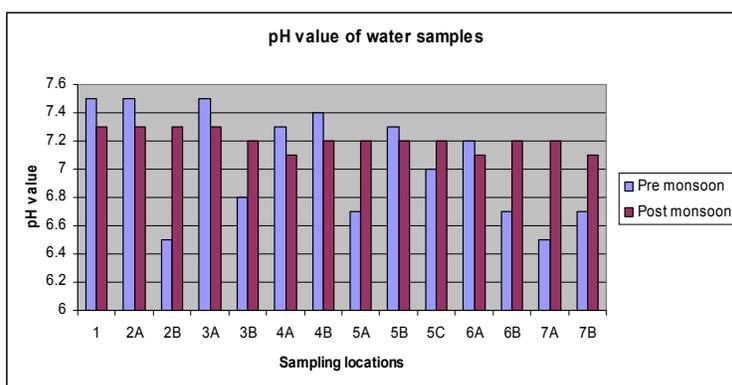
pH:

The pH of water is measured with the help of a pH meter, using a glass combination electrode saturated with KCl.

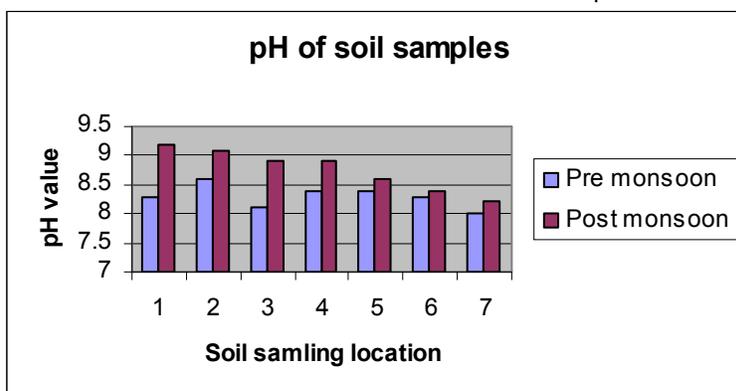
Physical and Chemical parameter of pre monsoon samples

Results and Discussion

No	Sample details	Side	pH	Temp ° c	Cond mho/cm.
1.	Mouth of the estuary		7.5	30	64.5
2.	UranBelapur Railway bridge	A	7.5	30	64.9
		B	6.5	31	65.6
3.	DiwaleVillage	A	7.5	30	65.1
		B	6.8	30	65.6
4	RetiBander	A	7.3	35	65.1
		B	7.4	32	64.7
5	3 stream together	A	6.7	30	65.1
		B	7.3	30	65.2
		C	7.0	31	65.0
6	Kharghar Station side	A	7.2	29	65.5
		B	6.7	28	63.1
7	Near SionPanvel railway bridge	A	6.5	30	62.7
		B	6.7	31	62.0



1. The pH values of the samples are towards higher side at the mouth of the estuary and decrease toward freshwater in both pre and post monsoon samples.
2. The pH value has been considerably decreased in sample 2B and 7A in pre monsoon samples.
3. The pH value is fluctuating in pre monsoon samples whereas constant in post monsoon samples 7.1-7.3.
4. The average of the bank A is 7.08 and bank B is 6.98. It does not illustrate any one particular pattern of pH from mouth to inside and as well as bank to bank in all water samples



1. The pH value found to be varies from sample 1 to 7 in pre monsoon and post monsoon samples
2. The pH values are more in post monsoon samples as compared to pre monsoon
3. The highest value is observed at sample 2 and sample 1 of pre and post monsoon sample respectively and minimum values are obtained at sample 7 in both pre and post monsoon sample

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