

Study on Quantity Analysis of Chloride Presence in Gurupura River Estuary Sand

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ABSTRACT: The Circulation and stratification of Sea water or brackish water with fresh water from river in Estuaries causes the formation of layer in and around the sand particles. Due to more density in sea water flows down and fresh water flows upper. The removal of sand rapidly increased in Estuaries and uses for manufacture of concrete in Construction Industry. The sand mining is done in Gurupura river estuary. Without knowledge of chloride content in Estuary sand, the people were extracting and uses for construction purpose directly. This paper seeks to determine the amount of chloride content present in the Gurupura river Estuary sand in various seasons and compared with Indian standard for Natural aggregate to manufacture of concrete. Total ten number of samples were sampled each 1 km intervals from mouth of Arabian Sea. The samples from locations G1, G2, G3 in pre monsoon and G1 and G2 in post monsoon chloride content results shows not suitable for manufacture of concrete as per Indian Standard Table 7 of IS 456.

Keywords: Estuary, Sand mining, Gurupura, Concrete, Sand.

1. INTRODUCTION

The Coastal Karnataka is the place where huge quantity of sand extracting and supply of natural aggregate for construction aggregate within state and nearby states. Estuaries are active mainly in tropical coastline [10]. The river Netravati, Kumaradhara, Palguni, Shabhavi, Pavanje and Payaswini are the originates from Western Ghats and meets Arabian Sea. In present condition sand has important natural resource in India for rapidly increasing construction demand. Sand is not only expensive material but also protecting the environment [5]. The Gurupura River amalgamates with Netravati River and formed Estuary at Ullala near Mangalore at 12°51 north and 74°50 easts [4]. Estuaries are characterized by tidal motion from sea, grade of salinity and density of sea and river water [10, 1]. The plenty of sand removed from the Gurupura Estuary. The most part of the Gurupura river estuary comes under coastal regulation zone (CRZ). According to the CRZ rules, the extraction of sand from estuary is prohibited but the peoples were continuously removing sand from Gurupura Estuary. In concrete there is a limit for use of natural aggregates having soluble salts like chloride. The presence of chloride in concrete causes the corrosion in R.C.C structure [6]. The present study exploits the proper utilization of Estuary sand for manufacture of concrete.

2. STUDY AREA

2.1 Gurupura river

Gurupura River is also called as Pachamagaru or Palguni or Kulur River in Dakshina Kannada originates in Western Ghat and empties into the Arabian river. For present study Gurupura River was selected because of more sand mining activities are at this Estuary. Ten numbers of locations was selected for investigation. From each location by traditional method sand samples are collected and laboratory analysis are done. The locations are marked as G1, G2, G3, G4, G5, G6, G7, G8, G9 and G10. G1 is at estuary point and the rest of the locations are

located at an interval of one km away from the sea respectively. The sampling locations lies details are tabulated below.

Table 1. Sampling Locations

Location	Latitude/Longitude	Location	Latitude/Longitude
G1	12°52.312' N 74°49.622 E	G6	12°54.105' N 74°49.160 E
G2	12°52.701' N 74°49.451 E	G7	12°54.427' N 74°49.960 E
G3	12°53.041' N 74°49.221 E	G8	12°54.805' N 74°49.046 E
G4	12°53.407' N 74°49.178 E	G9	12°55.267' N 74°49.386 E
G5	12°53.782' N 74°49.306 E	G10	12°55.707' N 74°49.622 E

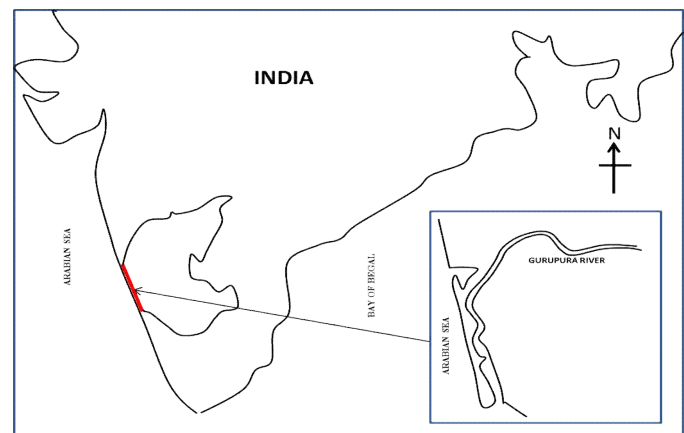


Figure1: Map shows study area

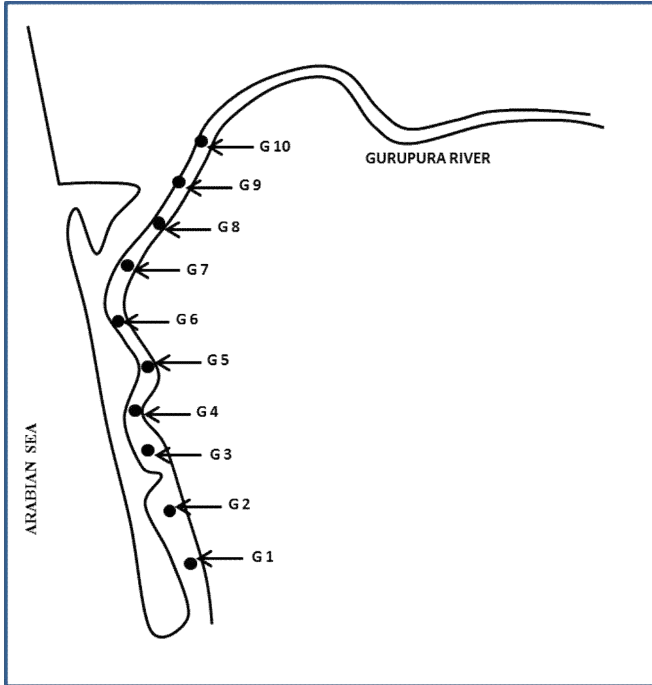


Figure2: Sampled locations



Figure4: Collected samples in Plastic bags

3. MATERIALS AND METHODOLOGY

The sand samples are collected from bed of Gurupura River Estuary by traditional method using Boat (Nada Doni). From each location sample collected and stored in plastic bags. The sample was collected in different seasons namely Pre monsoon, Monsoon and Post monsoon respectively. The laboratory analysis was carried out for collected sample i.e Salinity test by various methods.



Figure3: collection of sample by Boat traditionally

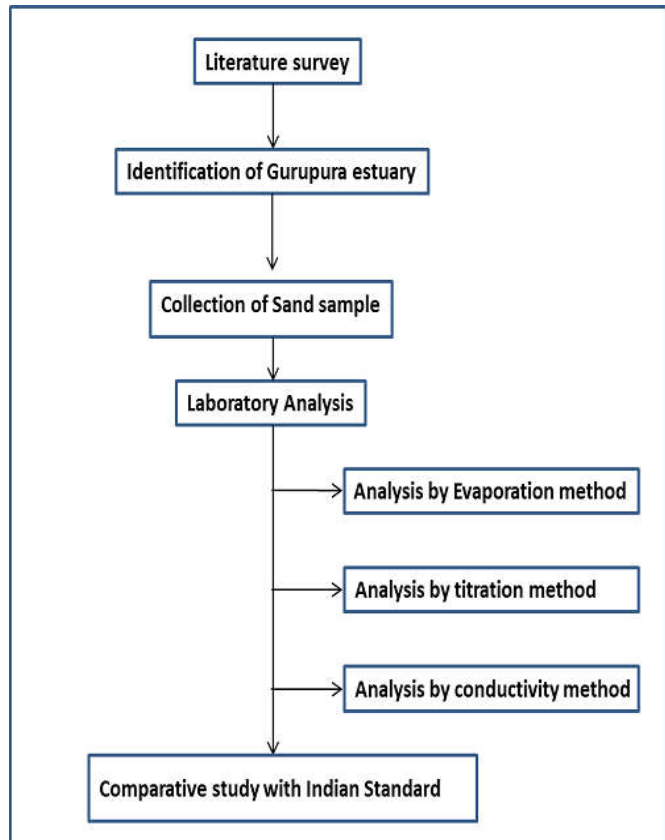


Figure5: Flow chart shows methodology

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4. RESULTS AND DISCUSSION

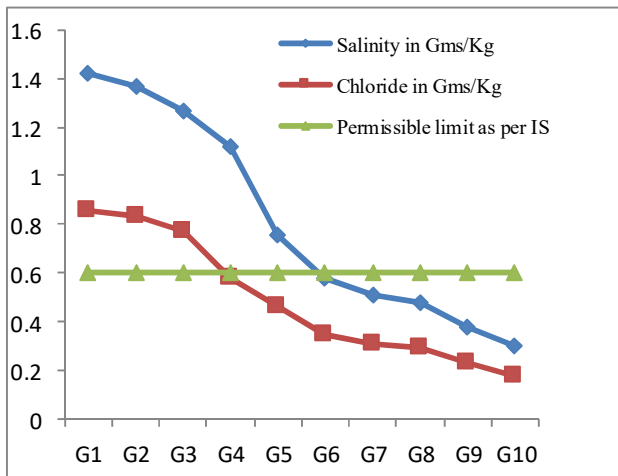
The collected samples were examined as per Standard. The analysis carried by Evaporation, Titration and Electrical Conductivity method respectively.

4.1 Evaporation method

The salinity presence in Gurupura estuary sand was determined by using Evaporating dish and other apparatus. The total quantity of salinity obtained in different seasons.

Table 2. Results shows the Salinity in Pre monsoon season

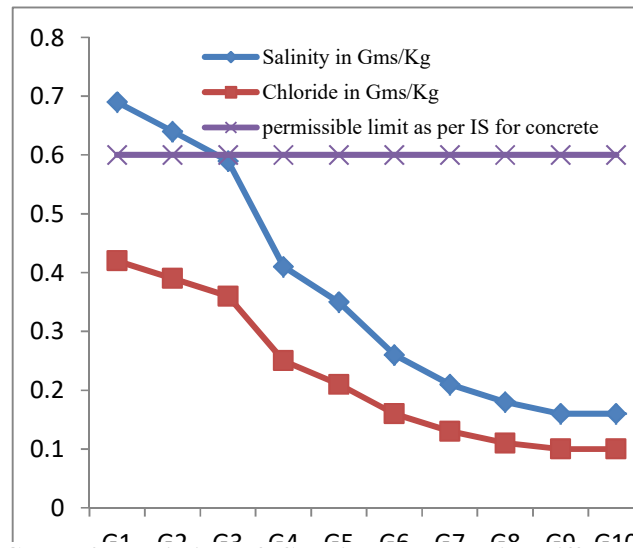
Location	Salinity (gms/kg)	Chloride content (gms/kg)
G1	1.42	0.86
G2	1.37	0.83
G3	1.27	0.77
G4	1.12	0.58
G5	0.76	0.46
G6	0.58	0.35
G7	0.51	0.31
G8	0.48	0.29
G9	0.38	0.23
G10	0.30	0.18



Graph 1: Variation of Chloride content with different Locations in Pre monsoon season

Table 3. Results shows the Salinity in Monsoon season

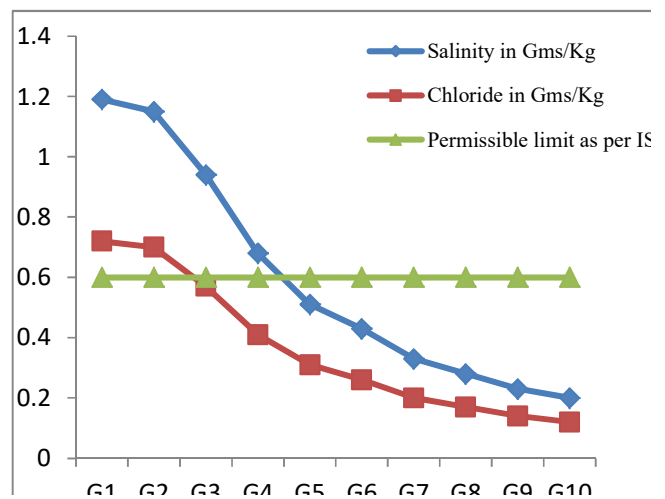
Location	Salinity (gms/kg)	Chloride content (gms/kg)
G1	0.69	0.42
G2	0.64	0.39
G3	0.59	0.36
G4	0.41	0.25
G5	0.35	0.21
G6	0.26	0.16
G7	0.21	0.13
G8	0.18	0.11
G9	0.16	0.1
G10	0.16	0.1



Graph 2: Variation of Chloride content with different Locations in monsoon season

Table 4. Results shows the Salinity in Post Monsoon season

Location	Salinity (gms/kg)	Chloride content (gms/kg)
G1	1.19	0.72
G2	1.15	0.70
G3	0.94	0.57
G4	0.68	0.41
G5	0.51	0.31
G6	0.43	0.26
G7	0.33	0.20
G8	0.28	0.17
G9	0.23	0.14
G10	0.20	0.12



Graph 3: Variation of Chloride content with different Locations in Post monsoon season

In evaporation method the locations G1, G2 and G3 shows the more chloride content or salinity in Pre monsoon In monsoon

Date of Publication: 30 May 2018 | Volume 6, Issue 2 | Pages: 11-15

no locations shows more chloride in estuary sand. Post monsoon the location G1 and G2 shows the higher value of chloride.

4.2 Titration method

The Chemical analysis was conducted to know the quantity of chloride in Gurupura Estuary sand washed water. The results were tabulated as below.

Table 5. Results shows the Chloride in Pre monsoon season

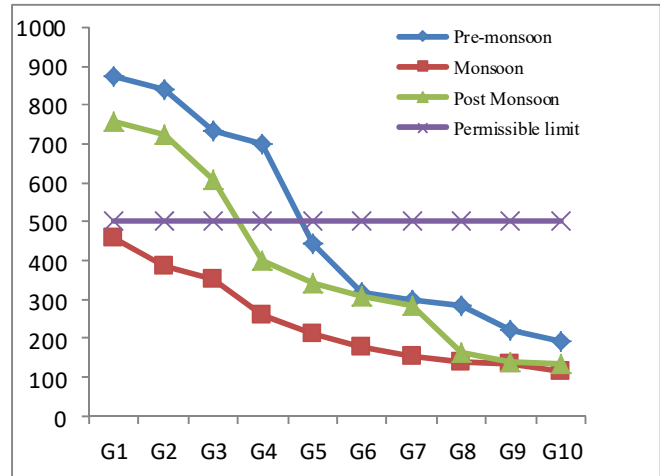
Location	Chloride in mg/L
G1	874
G2	841
G3	735
G4	700
G5	446
G6	320
G7	300
G8	284
G9	220
G10	194

Table 6. Results shows Chloride content in monsoon season

Location	Chloride in mg/L
G1	456
G2	384
G3	352
G4	260
G5	210
G6	180
G7	154
G8	140
G9	134
G10	116

Table 7. Results shows Chloride content in Post monsoon season

Location	Chloride in mg/L
G1	760
G2	724
G3	610
G4	400
G5	342
G6	310
G7	286
G8	165
G9	140
G10	134



Graph 4: Variation of Chloride content with Locations in different seasons

4. Electrical conductivity method

The electrical conductivity of sand washed water is directly influenced by the Total dissolved solids. The salinity increases the ability of a solution to conduct an electrical current. The highest value in Electrical conductivity is the higher value in salinity in estuary sand washed water. The Electrical conductivity measured in $\mu\text{S/cm}$.

Table 8. Results shows EC in Pre monsoon season samples

Location	Electrical Conductivity $\mu\text{S/cm}$
G1	2.12
G2	2.04
G3	1.89
G4	1.75
G5	1.13
G6	0.86
G7	0.76
G8	0.71
G9	0.57
G10	0.42

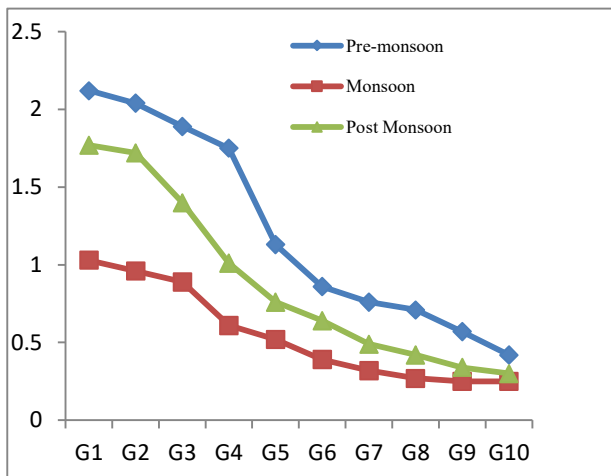
Table 9. Results shows EC in monsoon season samples

Location	Electrical Conductivity $\mu\text{S/cm}$
G1	1.03
G2	0.96
G3	0.89
G4	0.61
G5	0.52
G6	0.39
G7	0.32
G8	0.27
G9	0.25
G10	0.25

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Table 10. Results shows EC in Post monsoon season samples

Location	Electrical Conductivity $\mu\text{S/cm}$
G1	1.77
G2	1.72
G3	1.40
G4	1.01
G5	0.76
G6	0.64
G7	0.49
G8	0.42
G9	0.34
G10	0.30

**Graph 5: Variation of Electrical Conductivity with Locations in different seasons**

5. CONCLUSION

The concrete mix design has been done for M20 grade concrete and calculated the quantity of fine aggregates or sand required for a meter cube of concrete. It has been observed that by laboratory analysis of the sample from G1, G2, and G3 in Pre monsoon and G1, G2 is in Post monsoon season having more chloride content. It is not suitable for manufacture of Concrete. It concluded that before use of Gurupura Estuary sand concrete care should be taken.

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