VI. Summary
VI. SUMMARY

Bacteriological parameters such as total bacterial count, total and fecal coliform count, presumptive and fecal streptococcal count and *Salmonella* were studied in riverine, estuarine and sea sites corresponding to two rivers Nethravathi and Sharavathi. FC : FS ratio was calculated to know the source of fecal pollution.

Bacterial counts were higher in sediment samples compared to water samples from riverine and estuarine sites of both the rivers Nethravathi and Sharavathi and their adjacent sea sites.

TCC and FCC were high in samples from riverine and estuarine region (highest recorded values being $1.1 \times 10^5$ and $2.4 \times 10^4$ MPN/100ml) but low in sea site samples (0 MPN/100ml). FCC and ECC were almost absent in all samples collected from sea sites adjacent to both the rivers.

PSC and FSC were high in estuarine and sea site samples (highest recorded level being $1.1 \times 10^7$ MPN/100ml for both) compared to riverine region ($1.1 \times 10^6$ and $1.1 \times 10^5$ MPN/100ml). FSC was lower than PSC in different aquatic habitats of both the rivers. TPC(PCA) was high in samples from riverine ($1.0 \times 10^8$ cfu/ml) and estuarine region ($1.4 \times 10^6$ cfu/ml) where as TPC(ZMA) was high in samples from sea site ($1.4 \times 10^8$ cfu/ml) and estuarine site ($7.2 \times 10^7$ cfu/ml).

All bacterial counts were found high in surface water samples from riverine region of Nethravathi when compared to surface water samples form Sharavathi.

TCC was high in surface water samples from estuarine region of River Nethravathi ($1.1 \times 10^4$ MPN/100ml) and sediment samples from estuarine region of River Sharavathi ($1.1 \times 10^5$ MPN/100g). PSC was found to be high in surface water samples from estuarine region of River
Sharavathi (1.1X10^6 MPN/100ml). FSC was comparatively high in bottom water samples from Sharavathi (1.5X10^6 MPN/100ml).

TCC and FCC were found to be high in sediment (highest level being 4.0X10^4 and 1.1X10^4 MPN/100g) and surface water samples (4.6X10^4 and 1.1X10^4 MPN/100ml) collected from sea sites adjacent to River Nethravathi. PSC and FSC were high in sediment (highest recorded value being 1.1X10^7 and 4.6X10^6 MPN/100g) from sea sites adjacent to River Sharavathi. TPC(PCA) found to be high in sediment (9.1X10^5 cfu/g) and surface water samples (7.5X10^4 cfu/ml) from sea sites adjacent to River Nethravathi but high in the case of bottom water samples (1.5X10^5 cfu/ml) from sea sites adjacent to River Sharavathi. TPC(ZMA) was high in sediment samples (1.4X10^8 cfu/g) from sea sites adjacent to River Sharavathi.

Effect of nutrient, salinity and monsoon on bacterial growth is evident from the data obtained from bacteriological analysis of samples from different aquatic habitats of both the rivers.

The differences in the types and abundance of various bacterial groups in different aquatic habitats of rivers Nethravathi and Sharavathi indicate that these aquatic systems are highly biodiversed.

ANOVA statistical analysis proves that there was a significance difference found between rivers, stations, seasons and depths with respect to various bacteriological parameters analyzed for surface and bottom water and sediment samples collected from different aquatic habitats of rivers Nethravathi and Sharavathi. But there was no significant difference found between high and low tide with respect of various bacteriological parameters analyzed for the same samples.
Correlation studies indicate that there was a positive as well as negative correlation between water discharge and bacteriological parameters and also with in the bacteriological parameters analyzed for samples collected from various aquatic habitats of rivers Nethravathi and Sharavathi.

FC : FS ratio indicates that in most of samples from riverine, estuarine and sea sites corresponding to both the rivers, there was a contamination by fecal matter from human as well as animals (domestic and wild) during all seasons.

Incidence of *Salmonella* in various aquatic habitats of Rivers Nethravathi and Sharavathi was quite low. The over all incidence was 0.5% where only 4 out of 780 samples yielded typical *Salmonella* isolates. Out of the four isolates obtained, three were from estuarine site and one from riverine site. All the four isolates, which were biochemically confirmed, were also positive by PCR targeting *hns* gene coding for DNA binding protein.

The differences in the various bacterial groups in water and sediment samples collected from different sampling sites along riverine, estuarine region of Rivers Nethravathi and Sharavathi and their adjacent sea sites indicate that these aquatic ecosystems are highly biodiversed. The variations in different bacterial groups in Sharavathi river cannot be attributed solely to the presence of dam across this river but it may be one of physical parameter influencing these bacterial populations. It is fact that flora and fauna of aquatic habitats were disturbed within few kilometers away from dam and also with in the dam environment. Further, the impact may be reduced towards the estuary and coastal waters. The nature has its own way to overcome these influences due to dam and with in the course of time, the disturbed ecosystem will return to its original form. Since our sampling sites were 25 kms away from dam, we can conclude that other than the presence of dam, there are various physico-chemical, biological and
climatic factors might have been involved in these changes occurring in bacterial types and their abundance in these aquatic habitats. So in this regard, further investigation is needed.