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Present Investigation on the study of microbial activity of Nirmal lake waters at Vasai,Maharashtra,India

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ABSTRACT

Nirmallake is about 50 kms from Mumbai situated in Nirmal village near Vasai town,Thane district Maharashtra at 19 23' 29"N and 72 46' 57" E .It comprises of two ponds namely Vimal and Malai that are separated by a tar road for public use .The lake water is utilized for variety of purposes including ritual ceremonies ,domestic and agricultural purpose. Water is vital for all living organisms this valued resource is increasingly being threatened as human population grow and demand more water of good quality for all domestic purposes, economic activity. The current investigations are carried out to determine microbes present in water to establish and notify the quality for varied purpose our present study is carried out to examine and assess the quality and microbial activity of water.

Key words: Lake, microbes, domestic, microbial, activity

I.INTRODUCTION

Water as one of the basic substances of life is called upon to serve many beneficial uses that require a high degree of purity to provide a suitable habitat for life or other uses primarily including drinking which may depend on the most basic physico- chemical properties. Beneficial uses of water supply, industry supply, agricultural stock and wild life propagation of aquatic life, aesthetic enjoyment, depression and assimilation of wastes. Hence water should be free from even material that will settle to form objectionable deposits, floating debris, scum and other comparable matter, substances that produce objectionable colour, odour, taste or turbidity which are toxic or which produce undesirable physiological responses in human beings, fish, other animal life and plants. Dwiwedi and AK Dwiwedi., (2010). Safe drinking water is a human birth right as clean air however much of the world's population does not have access to safe drinking water.

II.MATERIAL AND METHOD

Water samples are collected quarterly from Vimal and Malai Lake each.Sample collection is usually completed during morning hours between 8.00 to 10.00 am. Necessary precautions are taken while collecting the samples clean plastic containers of 2 litres capacity are used for the collection and storage of water samples from two

sites of Vimal and Malai lake containers are filled under the surface of water without entrapping any air bubble samples are kept in refrigerator and temperature is maintained at 4^{o}C.

Microbial activity in lake water is determined by microbial culture study, identification and its classification microbial activity is also studied by using membrane filter technique and multiple tube dilution technique which is based on principal that the biochemical reactions are used to detect various microorganisms. Quantitative analysis of phyto plankton is done by putting one drop of fixed sample on glass slide and studied under microscope results obtained are recorded as nature of organism /ml ,species are identified under microscope and classification is done.

1.1. Zooplankton analysis:

Samples were collected from each site. Thirty litres water was taken from surface water at each sampling site by filtering through a zooplankton net of 55 mu mesh diameter. Collected samples were kept in plastic bottles with some lake water to which 4 percent formalin was added as a preservative .Samples were studied under the compound microscope and species level when possible many publications and taxonomic references were used for zooplankton identification.

III.RESULTS AND DISCUSSIONS

In the present investigation the microorganism isolated are Enterobacteriaceae, Pseudomonas, Klebsiella ,E.Coli ,Salmonella ,Shigella.Microbes are tiny organisms which cannot be seen with a naked eye they are abundant on earth and are present everywhere in air, soil, rock and water. Some live in searing heat while others thrive in freezing cold .Some microbes need oxygen to live while others do not need oxygen .Microbes include bacteriaarchaea, viruses, protozoa, helminths and protists. Bacteria like organisms called Microbes are natural and vital members of all aquatic communities and are the foundation of lake and stream ecology without them the natural water would not be possible. Certain microbes when present in excess cause a threat to human health.

3.1. E.Coli:

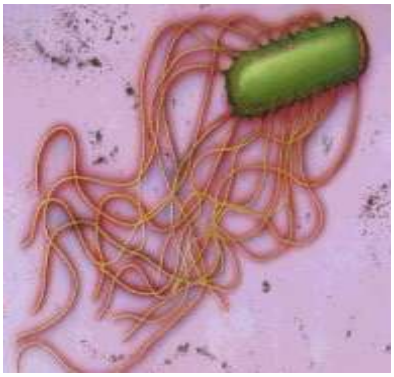
E.Coli is expelled into the environment with the faecal matter the bacterium grows massively in fresh faecal matter under aerobic conditions for 3 days but its number decline slowly afterwards .Sources: contaminated food, raw milk, juices, raw fruits, raw vegetable, swimming in contaminated water not washing hands after touching animals and faeces of infected people.

3.2. Klebsiella:

Belongs to enterobacteriaceae family and are found everywhere in nature Species are routinely found in the human nose, mouth and gastro intestinal tract as normal flora however they can also behave as opportunistic human pathogens. It leads to a wide range of disease like pneumonia, urinary tract infections, meningitis ,diarrhea and soft tissue infection.

3.3. Salmonella:

Salmonella infection is a common bacterial disease that affects the intestinal tract. Salmonella bacteria typically live in animal and human intestine and are shed through faeces humans become infected most frequently through contaminated water or food Sources: Meat, organic fertilizers, water, drinking contaminated water
Symptoms: Cramps, bloody stools, diarrhoea, cold and chill, fever, headache, joint pain ,dehydration



3.4. Shigella:

It belongs to enterobacteriacea family and cause acute gastroenteritis. The bacteria can spread from an infected person to contaminate water or food or directly to another person.
Sources contaminated food or water, contact with an infected person, raw vegetables contaminated in the field.
Symptoms: sudden abdominal cramping, fever, diarrhoea that may be bloody or contains mucus, nausea and vomiting

In the present study, the bacterial population is higher during the summer seasons;the analysis of variance shows the significant difference between the different seasons. A number of studies have shown that Bacterioplankton growth is positively correlated with temperature, particularly at relatively low temperature (< 10oc -15oc) (Tibbles,1997.,Simon and Winsch,1998) .Above these temperatures, bacterial growth is less strongly correlated and presumably in the seasonally warmer upper part of the water column. In present study, a maximum count occur during summer season and minimum in rain may be the lower part of the water column, temperatures can directly control bacterial growth. Like temperature, p H also plays a role in determining the ability of bacteria to grow or thrive in particular environments. Most commonly, bacteria grow optimally within a narrow p H range (Venkateshwaralu,1969).In present study p H value range from (7.24to 8.5) and such condition is suitable for the growth of microorganisms. High bacteria count is are attributed to contamination by domestic sewage (Kowsalya et al.,2010).Significant increase in organic and bacterial load after rain storm from point sources have been linked to increase risk of infectious disease transmission (Kistemannet al,2002)

The maximum quantity in summer season may be due to low water level,high organic matter, low bacterial and optimum growth supporting nutrient favour for higher bacterial count .Land washing organic matter and animal manure added by runoff rain.In the present study, the value of bacterial population drops down during the rainy season which is due to dilution caused by the rain water through flood and increased in post monsoon and summer season may be due to low water level, optimal temperature and high microbial nutrients.

All the study sites recorded high number of coliforms which were significantly high in the wet season.The high total coliform loads recorded is mostly attributed to organic deposits predominantly from human and animal

3.5. Phyto planktons:

Phyto planktons are the autotrophic components of the plankton community and a key part of oceans, seas and freshwater basin ecosystem the name comes from the Greek word phy to meaning plant and plankton meaning wanderer .Most phytoplankton are too small to be individually seen with the unaided eye however when present in high number some varieties may be noticeable as colored patches on the water surface due to the presence of chlorophyll within their cells and accessory pigments in some species .Phytoplankton is photosynthesizing microscopic organisms that inhabit the upper sunlit layer of almost all oceans and bodies of fresh water. They are agents for primary production, the creation of organic compounds from carbon dioxide dissolved in the water, a process that sustains the aquatic food web.

In the present investigation 21 genera are isolated and the cell density is 10.084*106cells/L

Storastrum	Chlorophyta
Thalassiosira	bacillariophyceae
Cylindrotheca	Fugii
Scenedesmus	Chlorophyta
Spirulina	Cyanobacteria
spirogyra	chlorophyta
Crucigenia	Clorophyta
Dictyosphaerium	Chlorophyta
Crucigeniella	Chlorophyta
strombomonas	chlorophyta
anabena	Cyanobacteria
Aulacosiera	bacilarriophyceae
phacus	euglenophyceae
Kirchneriella	Chlorophyta
Euglena	Eukaryotes
Tetrastrum	Chlorophyta
Closterium	chlorophyta
Peridinium	Dinoflagellate
Synedra	fragillariaceae
oocystis	chlorophyta

3.6. Greenalgae:

Green algae are the most diverse group of algae growing in a variety of habitats the green algae is paraphyletic group because it excludes the plantae. Like the plants, the green algae contain two forms of chlorophyll, which they use to capture light energy to fuel the manufacture of sugars, but unlike plants they are primarily aquatic.

Because they are aquatic and manufacture their own food, most green algae occur in fresh water usually attached to submerged rocks and wood or as scum on stagnant water.

3.6. Diatoms:

Diatoms are single celled organisms but can be found lumped together diatoms are photosynthetic, meaning they need light to make their food, and they also have elaborate, transparent shells made out of a chemical compound called silica .They come in different shapes and sizes .Diatoms are important contributors to the primary production in aquatic ecosystems, sitting at the bottom of the food chain. They are eukaryotic algae, commonly unicellular.

Phytoplankton live in water column some fresh water phytoplankton are toxic and many species contribute to the taste and odour of water. In the present investigation Spirogyra was the most abundant among chlorophyceae Population of chlorophyceae gradually rised from February onwards and touched peak level in May and June .Shinde et al (2012) have noticed maximum number of chlorophyceae in summer and minimum in monsoon Bacillariophyceae diatoms was minimum during rainy season and maximum in summer season.Shinde et al (2012) recorded similar observation maximum genera of bacillariophyceae during summer and minimum during monsoon. Cyanophyceae (blue green algae) was maximum during summer while lowest density in rainy season.According to Thirugananamorty and Selvaraju (2009) reported maximum density of cyanophyceae members occurred from April to June and density has gradually decreased during winter and rainy season. Shinde et al (2012) recorded maximum member of cyanophyceae in summer and minimum during monsoon. Groups such as blue green algae varied with the nutrient availability in the fresh water lakes. During summer,the phytoplankton count increased in lake water chiefly blue green algae such as micro cystics blooms suddenly occurred in the lake water .The increase in phytoplankton density started from spring to late summer .During summer, highest sun intensity occurred in fresh water lakes, led to thermal stratification .During summer, blue green assemblages were prevalent in the lake water during monsoon normal rainfall induced uniform temperature ranges. Phytoplankton decreased with less sunshine hours and non-uniform intensity of sunlight. During winters temperature variations played important role in phytoplankton distribution phytoplankton distribution majorly forced by factors such as seasonal fluctuations in lake water ,period of sunshine, wind patterns,depth of lake,temperature, pH, turbidity,dissolved oxygen nutrients like chloride, phosphate, organic

carbon ultimately influenced the occurrence of phytoplankton in fresh water lake. The blooms of phyto plankton grazed by zooplankton reduces the count of phytoplankton in fresh water lakes .Green algae is favorable for fish culture in the lake water (Pradhan et al., 2008)

3.7. Zooplankton:

Zooplankton are microscopic animal components of aquatic system which move at the mercy of water movements.Protozoans, rotifers, cladocerans and copepods constitute the major groups of zooplanktons. Zooplankton constitute the important link between primary producers (mostly phytoplankton)and higher consumers mostly fishes in aquatic food webs.They occupy in intermediate position in the food web and mediate the transfer of energy from lower to higher trophic level (Water,1997).Zooplankton density and composition exhibit a monthly variation.In the present study the concenteration of zooplankton was recorded in the month of May and minimum in January. Zooplankton exhibited higher density in summer season.Similarly in summer maximum zooplankton population is reported by George (1970)and Adoni (1985)Joseph B.et al (2011). The composition and abundance of each zooplankton group varied from time to time and season.Zooplankton consisted species of protozoa,rotifers and copepod.

3.8. Rotifers:

They are named so for their distinct moth called corona .It is used for both locomotion and filter feeding It serves as a food source for larger organisms including other zooplankton most do not swim and must simply drift along with the water as many plankton do they are very efficient reproducers and can multiply asexually in good conditions they eat bacteria, detritus, other rotifers, algae and protozoa.

3.9. Daphnia :

Also knownas the water flea is able to move in the water in a very unique jerky manner by moving their appendages in a paddling motion.

Daphnia and several other zooplanktons perform what is known as a diurnal migration this is a daily routine of migrating between the darker, deeper waters of the lake during the day and more food dense surface water during the night.

Zooplankton is vital component of fresh water food webs the smallest zooplankton is eaten by the larger zooplankton which in turn are eaten by small fish aquatic insects and so on. Herbivorous zooplankton grazes on phytoplankton or algae and helps maintain natural balance of algae.

IV.CONCLUSION

In order to prevent water pollution,human and animal excreta should be prevented from mixing with its source ,construction of pit toilets and proper sewage treatment can offer some solution to problem .Mass awareness is strongly needed regarding pollution every individual should take initiative regarding maintenance of the quality of water as it is basic need of life. Therefore serious steps should be taken to remove water pollutionfrom lake.

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