



## Study on the Quality of Surface Water in Nandyal

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### ABSTRACT

The aim of study is to determine the quality of surface water Nandyala district. Whether it is for drinking purpose, agriculture purpose and public purpose, which must be tested regularly in order to keep the water in safe and free from environmental risk and protect from health disorders. Physical, chemical and biological interactions are responsible for certain water quality characteristic of a water body. Water can be used for irrigational and industrial purposes without any treatment. In this study the water quality has been carried out by collecting water samples from four sampling sites and analyzed at the laboratory. The most important water quality parameters namely, PH, Dissolved oxygen (DO), Biochemical oxygen demand (BOD), Chemical oxygen demand (COD), Electrical conductivity (EC), Temperature, Turbidity, Chloride, Hardness, Total dissolved solids (TDS), Total solids (TS), Phosphate, Nitrate were analyzed at the laboratory. Parameter values were compared with standard value (WHO and ECR'97) standard for drinking water. The project may get the feasible behaviour of water quality such that it may be good for drinking purpose and also for other uses if quality is not good then it will not be feasible for any other purpose.

**Keywords:** Alkalinity, Dissolved Oxygen, Acidity, Chloride, pH, Total hardness, Nitrates.

### 1. Introduction

Water is the most important necessity for the survival, of all living beings whether humans, animals or plants, all of them need water. Water the second most important element after air for survival. According to the earth is fit for consumption. Surface water refers to all the water bodies present on the earth surface, from small ponds to vast oceans and everything in-between. It includes both freshwater bodies (rivers, ponds, lakes etc.) as well as the saline water bodies (mainly oceans) Rivers, ponds, lakes etc., constitute fresh water, while oceans have saline water. surface water mainly originates from rainfall. It is combination of both surfaces run off and ground water. Water quality is not entirely dependent on human activities, other simmering factors like whether and meteorology floods due to climate change can increase the water pollution as the pollution from farms, residential lawns, overfilled sewage systems, trash, animals waste, nitrogen phosphorous mixes in water ways which increases the risk of contaminations and higher cost of water treatments. There is a notion that water quality is getting severely affected by climate change. Everyone who is affected by the water industry must test water sources. This could be the government organizations trying to regulate the quality of water to protect us from the health risks involved with using chlorinated water or it could be home owners trying to ensure that the water is suitable for consumptions. water testing is carried out to meet the regulatory requirements and adhere to the safety procedure that are needed for pollutions free water. This is a broad concept that involves several procedures to analyze and evaluate the quality of water. water quality tests will give information about the health of the waterway. By testing water over a period of time, the changes in the quality of the water can be seen. The most important water quality parameters namely PH, Dissolved Oxygen (DO), Biochemicals Oxygen demand (BOD), chemicals oxygen demand (COD), Electrical conductivity (EC), Temperature, Turbidity, Chloride, Hardness, Total dissolved solids (TDS), Total solids (TS), phosphate, Nitrates were analyzed at the laboratory. Parameters values were compared with standard values (WHO) standard for drinking water.

### 2. Objectives

To determine the surface quality of water in its natural state in Nandyala.

Whether it is for drinking purpose, agriculture purpose and public purpose, which must be tested regularly in order to keep the water in safe and free from environmental risk and protect from health disorders.

### 3. Study area

- The coordinates of the KC canal are Latitude:15.4777397° and Longitude:78.515344°. This canal interconnects the river Penna and Tungabhadra. This canal is 130 years old major irrigation system which takes off from right flank of Anicut construction across Tungabhadra River near sunkesula village.



- The coordinates of Kundu river are Latitude:15.480622° and Longitude:78.459227° in nandyal. The Kundu river is also known as kunderu. It goes through many changes before merging with the Penna at kamala Puram of Kadapa district. A lot of people in nandyal are dependent on agricultural for their earnings and Kundu river is the main source of irrigation water for this area.



- The coordinates of the cheruvukatta are Latitude:15.49177° and Longitude:78.498425° in nandyal. The water is stored in cheruvukatta and it is further purified by the municipality. Agricultural land having much benefit due to cheruvukatta. The storage capacity is high so, in summer season also benefited by growing crops throughout the year.



- The coordinates of the Rythu Nagar canal are Latitude:15.438557° and Longitude:78.500178° in nandyal. The water that is stored in kanikkalavagu is further purified by the municipal corporation and use that water to the municipality of nandyal and rythunagar. Agricultural land is having much benefited to the rythunagar canal.



#### 4. Results

The results obtained through various test conducted on surface water are presented in Table. From the table, it is clearly observed that the comparison between drinking water and river water with the standard range as per IS 10500:2012

Table 4.1: Different parameters before and after treatments of Kundu river

| S.NO | Parameters   | Drinking water values   | River water values   | Drinking Standards                | Agricultural standards             |
|------|--|---|--|-----------------------------------|------------------------------------|
| 1    | pH   | 6.56  | 7.78   | 6.5-8.5                           | 6.5-8.4                            |
| 2    | Alkalinity   | 150 mg/l  | 270 mg/l   | < 200 mg/l                        | > 200 mg/l                         |
| 3    | Acidity  | 20 mg/l   | 10 mg/l  | 0 mg/l                            | >50 mg/l                           |
| 4    | Electrical conductivity                                  | 84.86@33.1C   | 490.9 s @31.9 c  | < 800 s                           | < 800 s                            |
| 5    | Total dissolved solid                                    | 47.42PPM@34.9 C   | 269.3 ppm@31.4 c   | <500 PPM                          | < 2000 PPM                         |
| 6    | Chloride Concentration                                   | 2.99 mg/l   | 44.98 mg/l   | < 250 mg/l                        | < 150 mg/l                         |
| 7    | Dissolved Oxygen   | 2.2 mg/l  | 3.5 mg/l   | 6.5–8.5 mg/l                      | >8 mg/l                            |
| 8    | Nitrates   | 6.06 mg/l   | 1.221 mg/l   | <45 mg/l                          | 50-150 mg/l                        |
| 9    | Total Hardness<br>Calcium Hardness<br>Magnesium hardness | Absent  | 170 mg/l<br>150 mg/l<br>20 mg/l                                    | <300 mg/l<br>< 75mg/l<br>< 30mg/l | >300 mg/l<br>< 400mg/l<br>< 60mg/l |
| 10   | Alum Jar<br>1 ml<br>3 ml<br>5 ml                         | pH, Alkalinity<br>6.57 ,22 mg/l<br>6.22,17 mg/l<br>5.52,11 mg/l | pH, Alkalinity<br>7.27, 240 mg/l<br>7.13,220 mg/l<br>6.92,220 mg/l | 6.5-8.5, <<br>200mg/l             | 6.5-8.4,<br>>200mg/l               |

Table 4.2: Different parameters before and after treatments of Athmakuru cheruvu katta

| S.NO | Parameters   | Drinking water values   | River water values   | Drinking Standards                  | Agricultural standards               |
|------|--|---|--|-------------------------------------|--------------------------------------|
| 1    | pH   | 6.56  | 7.83   | 6.5-8.5                             | 6.5-8.4                              |
| 2    | Alkalinity   | 150 mg/l  | 265 mg/l   | < 200mg/l                           | > 200mg/l                            |
| 3    | Acidity  | 20 mg/l   | 10 mg/l  | 0 mg/l                              | >50 mg/l                             |
| 4    | Electrical conductivity                                  | 84.86@33.1C   | 585.8 s @31.9 c  | <800 s                              | < 800 s                              |
| 5    | Total dissolved solid                                    | 47.42 PPM @34.9 C   | 322.5 ppm@31.4 c   | <500 PPM                            | < 2000 PPM                           |
| 6    | Chloride Concentration                                   | 2.99 mg/l   | 89.92mg/l  | < 250 mg/l                          | < 150 mg/l                           |
| 7    | Dissolved Oxygen   | 2.2 mg/l  | 4.23 mg/l  | 6.5–8.5 mg/l                        | >8 mg/l                              |
| 8    | Nitrates   | 6.06 mg/l   | 1.289 mg/l   | <45 mg/l                            | 50-150 mg/l                          |
| 9    | Total Hardness<br>Calcium Hardness<br>Magnesium hardness | Absent  | 160 mg/l<br>134 mg/l<br>26 mg/l                                      | <300 mg/l<br>< 75 mg/l<br>< 30 mg/l | >300 mg/l<br>< 400 mg/l<br>< 60 mg/l |
| 10   | Alum Jar<br>1 ml<br>3 ml<br>5 ml                         | pH, Alkalinity<br>6.57, 22 mg/l<br>6.22, 17 mg/l<br>5.52, 11 mg/l | pH, Alkalinity<br>7.32, 255 mg/l<br>7.12, 210 mg/l<br>6.94, 190 mg/l | 6.5-8.5 < 200 mg/l                  | 6.5-8.4, >200 mg/l                   |

Table 4.3: Different parameters before and after treatments of KC canal

| S.NO | Parameters   | Drinking water values  | River water values   | Drinking Standards                | Agricultural standards             |
|------|--|--|--|-----------------------------------|------------------------------------|
| 1    | pH   | 6.56   | 7.265  | 6.5-8.5                           | 6.5-8.4                            |
| 2    | Alkalinity   | 150 mg/l   | 265 mg/l   | <200 mg/l                         | > 200 mg/l                         |
| 3    | Acidity  | 20 mg/l  | 10 mg/l  | 0 mg/l                            | > 50 mg/l                          |
| 4    | Electrical conductivity                                  | 84.86@33.1C  | 508.5 s @28.4 c  | < 800 s                           | < 800 s                            |
| 5    | Total dissolved solid                                    | 47.42 PPM@34.9 C   | 264.5ppm@28.5 c  | <500 PPM                          | < 2000 PPM                         |
| 6    | Chloride Concentration                                   | 2.99 mg/l  | 79.95mg/l  | < 250 mg/l                        | < 150 mg/l                         |
| 7    | Dissolved Oxygen   | 2.2 mg/l   | 3.103 mg/l   | 6.5-8.5 mg/l                      | > 8 mg/l                           |
| 8    | Nitrates   | 6.06 mg/l  | 8.36 mg/l  | < 45 mg/l                         | 50-150 mg/l                        |
| 9    | Total Hardness<br>Calcium Hardness<br>Magnesium hardness | Absent   | 113 mg/l<br>100 mg/l<br>13 mg/l                                      | < 300mg/l<br>< 75mg/l<br>< 30mg/l | > 300mg/l<br>< 400mg/l<br>< 60mg/l |
| 10   | Alum Jar<br>1 ml<br>3 ml<br>5 ml                         | pH, Alkalinity<br>6.57, 225 mg/l<br>6.22, 240 mg/l<br>5.52, 220 mg/l | pH, Alkalinity<br>7.73, 255 mg/l<br>7.37, 240 mg/l<br>6.90, 220 mg/l | 6.5-8.5, <<br>200mg/l             | 6.5-8.4, ><br>200mg/l              |

Table 4.4: Different parameters before and after treatments of Rythu nagar canal

| S.NO | Parameters   | Drinking water values  | River water values   | Drinking Standards                | Agricultural standards             |
|------|--|--|--|-----------------------------------|------------------------------------|
| 1    | pH   | 6.56   | 7.9  | 6.5-8.5                           | 6.5-8.4                            |
| 2    | Alkalinity   | 150 mg/l   | 295 mg/l   | < 200 mg/l                        | > 200 mg/l                         |
| 3    | Acidity  | 20 mg/l  | 30 mg/l  | 0 mg/l                            | > 50 mg/l                          |
| 4    | Electrical conductivity                                  | 84.86@33.1C  | 581.5 s @28.4 c  | < 800 s                           | < 800 s                            |
| 5    | Total dissolved solid                                    | 47.42 PPM@34.9 C   | 319.25ppm@28.5 c   | <500 PPM                          | <2000 PPM                          |
| 6    | Chloride Concentration                                   | 2.99 mg/l  | 84.975mg/l   | < 250mg/l                         | < 150 mg/l                         |
| 7    | Dissolved Oxygen   | 2.2 mg/l   | 3.7 mg/l   | 6.5-8.5 mg/l                      | >8 mg/l                            |
| 8    | Nitrates   | 6.06 mg/l  | 7.78 mg/l  | < 45mg/l                          | 50-150 mg/l                        |
| 9    | Total Hardness<br>Calcium Hardness<br>Magnesium hardness | Absent   | 139 mg/l<br>115 mg/l<br>24 mg/l                                      | < 300mg/l<br>< 75mg/l<br>< 30mg/l | > 300mg/l<br>< 400mg/l<br>< 60mg/l |
| 10   | Alum Jar<br>1 ml<br>3 ml<br>5 ml                         | pH, Alkalinity<br>6.57, 225 mg/l<br>6.22, 240 mg/l<br>5.52, 220 mg/l | pH, Alkalinity<br>7.98, 300 mg/l<br>7.33, 290 mg/l<br>6.51, 270 mg/l | 6.5-8.5, <<br>200mg/l             | 6.5-8.4, ><br>200mg/l              |

## 5. Conclusion

After conducting the tests on different locations, we noticed that:

- Compared to all the locations of PH values is more in Raithu nagar canal (7.9) and less in KC canal (7.265)
- All the parameters like PH, TDS, Total hardness are in within the limits in all locations.
- Dissolved oxygen is not within the limits in all locations.

- The Total hardness is more in Kundu river (170 mg/l) and less in KC canal (113 mg/l).
- Nitrates value is more in KC canal (8.36 mg/l) and less in Kundu river (1.221 mg/l).

The dissolved oxygen content is not within the limits as per Indian standard (IS:10500-2012) the standard value of dissolved oxygen is 6.5-8.5 mg/l for drinking purpose and greater than 8.5 mg/l for agricultural purpose, but for our all locations it is less than standard value so we need to be increase dissolved oxygen by using supplementing wind and wave action.

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