

**Monthly Programme Report**  
**The Cochin College BMC**

Institution Name: **The Cochin College**

BMC Code: **ERM/2022/29**

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Programme Title: **Effect of Water Hyacinth infestation on the Physicochemical parameters of canal water in Karumalloor, Aluva, Kerala, India**

|  |                                      |                                 |
|--|--------------------------------------|---------------------------------|
| Program Category: <b>Studies/Research Projects</b> | Activity Type: <b>Action Program</b> | No. of participants: <b>20</b>  |
| Planned Date: <b>23-01-2024</b>                    | Renewed date: <b>-</b>               | Program Date: <b>31-03-2024</b> |
| Budgeted Amount: <b>Rs 300/-</b>                   | Total expenditure: <b>Rs 300/-</b>   | Balance: <b>Rs 0/-</b>          |

**Brief Report**

Water hyacinth infested canal in Karumalloor, Aluva was the sampling location. Sampling was done before and after the removal of water hyacinth during January and February 2024. Samples were collected 1-2 week after the removal of water hyacinth, this was done to determine the difference in physico-chemical and microbial parameters of the water sample due to water hyacinth infestation. Sampling was done at 3 points (close to canal wall, 100 meters away from the wall and from the center of the canal) in selected location. All the parameters, except microbial, listed below were analyzed for water samples from the 3 points and the mean/average of the three points were used to compare the effect of water hyacinth removal.

## **METHODOLOGY**

Sampling Location: Water hyacinth infested canal in Karumalloor, Aluva was the sampling location. Sampling was done before and after the removal of water hyacinth during January and February 2024. Samples were collected 1-2 week after the removal of water hyacinth, this was done to determine the difference in physico-chemical and microbial parameters of the water sample due to water hyacinth infestation. Sampling was done at 3 points (close to canal wall, 100 meters away from the wall and from the center of the canal) in selected location. All the parameters, except microbial, listed below were analyzed for water samples from the 3 points and the mean/average of the three points were used to compare the effect of water hyacinth removal.

Figure1 – Map showing the sampling location

### **1. ESTIMATION OF DISSOLVED OXYGEN**

Winkler's method is used for the estimation of dissolved oxygen

#### **PRINCIPLE**

In Winkler's method oxygen released from water is used to liberate iodine from potassium iodide and this iodine liberated in turn is estimated using standard Sodium thiosulphate ( $\text{Na}_2\text{S}_2\text{O}_3$ ). When manganese sulphate ( $\text{MnSO}_4$ ) is added to a sample of water followed by strong alkaline potassium iodide. Manganese hydroxide [ $\text{Mn}(\text{OH})_2$ ] will be formed. This combines with dissolved oxygen in water. This on acidification with conc. Sulphuric acid in the presence of alkaline potassium iodide, release iodine equivalent to the amount of oxygen dissolved in the sample water. The amount of iodine liberated is estimated by titrating the sample solution against 0.01N Sodium thiosulphate.

#### **PROCEDURE**

##### **a) Fixation of water samples**

Water was taken in a BOD bottle of 250 ml immersed into the pond with minimum disturbance, taking care to avoid the formation of air bubble in it. Close the bottle with the

stopper while under water. Now remove the stopper of the water and add 2 ml of manganese sulphate solution followed by 2 ml of alkaline iodide solution into the water sample collected. Add the reagent in such a way that the tip of the pipette touches the bottom and gradually pull them upward. Close the bottle tightly with the stopper and avoid the formation of any air bubble inside. Shake the sample very well, in order to complete the formation of precipitate inside the bottle. Leave the sample undisturbed for some time so that the precipitate settles down completely.

##### **b) Titration of water sample**

Add 2 ml of conc. Sulphuric acid carefully to the precipitate and close the bottle with the stopper. Mix the content very well to dissolve the precipitate completely to form a brown coloured solution. From this pipette out 20 ml into a clean conical flask and titrate the same against 0.01N sodium thiosulphate solution from the burette and stop titration when the solution in the beaker turns pale yellow. Now add 1 ml of freshly prepared starch solution as indicator. The solutions become blue in colour. Note down the burette reading and repeat the titration for concordant value.

### **2. LIGHT AND DARK BOTTLE EXPERIMENT**

The rate of photosynthesis or primary productivity is estimated using light and dark bottle experiment. For this two measuring cylinder of 250ml is filled with water without minimum disturbance, taking care to avoid the formation of air bubbles in it. Close the bottle with the stopper while under the water. Cover one of the bottles completely with black paper or painted completely to exclude the bottle from sunlight. And the other bottle is left as it. Now tie both the bottles and immerse the bottles into the water to some depth. Keep this arrangement undisturbed for 24 hours. After 24 hours the bottle is taken out of the water and Winkler's method is done for estimating the dissolved oxygen, so that the rate of photosynthesis can be determined.

### **3. ESTIMATION OF DISSOLVED CARBON DIOXIDE** Dissolved carbon dioxide in the water sample is estimated using the following method **PRINCIPLE**

Carbon dioxide dissolved in water to form carbonic acid, which subsequently dissociates into  $\text{H}^+$  and  $\text{HCO}_3^-$ . If water contains a high amount of  $\text{CO}_2$  it becomes acidic. An acid can be titrated against a standard alkali using phenolphthalein as indicator to



## Expenditure Statement

| Item                     | Expenditure | Remarks       |
|--------------------------|-------------|---------------|
| TA                       | Rs 300      |               |
| <b>Budgeted Amount</b>   |             | <b>Rs 300</b> |
| <b>Total Expenditure</b> |             | <b>Rs 300</b> |
| <b>Balance Amount</b>    |             | <b>Rs 0</b>   |

# Photographs



## Results

| Parameters** | Before Water Hyacinth Removal | After Water Hyacinth Removal                  |  |
|--------------|-------------------------------|---|--|
| 1            | pH                            | 6.7   | 7.4                                    |
| 2            | Total Alkalinity              | 14 ppm in terms of calcium carbonate          | 16.6 ppm in terms of calcium carbonate |
| 3            | Transparent                   | Murky and opaque - hence transparency is zero | Transparent till the bottom            |
| 4            | Phosphate                     | Absent  | Absent                                 |
| 5            | Chloride                      | Absent  | 43.3 mg/l                              |
| 6            | Fluoride                      | Absent  | 1mg/l                                  |
| 7            | Residual chlorine             | Absent  | Absent                                 |
| 8            | Iron                          | 0   | 4.3 mg/l                               |
| 9            | Calcium hardness              | 20 ppm in terms of calcium carbonate          | 12 ppm in terms of calcium carbonate   |
| 10           | Sulphate                      | 4 ppm   | 2 ppm                                  |

\*\* all these parameters were analyzed using standard Nice Water Testing Kits

| Parameters                 | Before Water Hyacinth Removal | After Water Hyacinth Removal |
|----------------------------|-------------------------------|------------------------------|
| Dissolved Oxygen (DO)      | Not detected** 10.5mg/L       |                              |
| Dissolved Carbon dioxide   | 5.5mg/L 1mg/L                 |                              |
| Net Primary productivity   | Not detected** 3.6 mg.C/12hrs |                              |
| Gross Primary productivity | Not detected** 4.4 mg.C/12hrs |                              |

## TPC results

|     | Before Water Hyacinth Removal | After Water Hyacinth Removal |
|-----|-------------------------------|------------------------------|
| TPC | 5.5 x 10 <sup>6</sup> CFU/ml  | 4.9 x 10 <sup>6</sup> CFU/ml |