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WATER QUALITY ANALYSIS OF PONDS IN AND AROUND THIRUNELVELLI, TAMILNADU

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ABSTRACTS

The water temperature ranged from 25℃ to 31℃ at thuthukulikulam and 26℃ to 31℃ at seydunganallurkulam, moolikulam and nochikulam. The surface pH ranged from 7.1 to 8.1 at thuthukulikulam, 7.3 to 8.1 at seydunganallurkulam, 7.6 to 8.1 at moolikulam and 7.6 to 8.2 at nochikulam. Electrical conductivity of the surface water varied from 0.11 mS/cm to 1.23 mS/cm at thuthukulikulam, 0.19 mS/cm to 1.38 mS/cm at seydunganallurkulam, 0.20 mS/cm t0 1.35 mS/cm at moolikulam and 0.30 mS/cm to 2.05 mS/cm at nochikulam. The surface water turbidity ranged from 1.1 NTU to 3.1 NTU at Thuthukulikulam, 1.1 NTU to 3.1 NTU at Seydunganallurkulam, 1.2 NTU to 3.2 NTU at Moolikulam and 1.2 NTU to 3.2 NTU at Nochikulam. The total dissolved solid ranged from 80.4 mg/l to 234.8 mg/l at Thuthukulikulam, 112.3 mg/l to246.5 mg/l at Seydunganallurkulam, 120.5 mg/l to315.4 mg/l at Moolikulam and 120 mg/l to 360.5 mg/l at Nochikulam. The surface water alkalinity ranged from 17.2 mg/l to 76.5 mg/l at Thuthukulikulam, 28.5 mg/l to 138.2 mg/l at Seydunganallurkulam, 38.5 mg/l to 130.8 mg/l at Moolikulam and 24.5 mg/l to 168.1 mg/l at Nochikulam. The total hardness ranged from 42.1 mg/l to 144.82 mg/l at Thuthukulikulam, 55.3 mg/l to 146.2 mg/l at Seydunganallurkulam, 110.5 mg/l to 185.3 mg/l at Moolikulam and 52.5 mg/l to 296.5 mg/l at Nochikulam. The surface water calcium ranged from 11.21 mg/l to 38.8 mg/l at Thuthukulikulam, 12.3 mg/l to 36.5 mg/l at Seydunganallurkulam, 22.4

mg/l to 58.6 mg/l at Moolikulam and 16.5 mg/l to 118.5 mg/l at Nochikulam. Sodium ranged from 5.5 mg/l to 17.5 mg/l at Thuthukulikulam, 5.4 mg/l to 11.2 mg/l at Seydunganallurkulam, 12.5 mg/l to 38.5 mg/l at Moolikulam and 12.5 mg/l to 48.5 mg/l at Nochikulam. Magnesium value ranged from 2.30 mg/l to 16.5 mg/l at Thuthukulikulam, 2.28 mg/l to 12.2 mg/l at Seydunganallurkulam, 4.8 mg/l to 22.4 mg/l at Moolikulam and 4.4 mg/l to 24.5 mg/l at Nochikulam.

KEYWORDS: Turbidity, Electrical conductivity, Hardnaess and Alkalinity.

INTRODUCTION

Various physico-chemical and microbiological parameters in selected sampling ponds (Thuthukulikulam, Seydunganallurkulam, Moolikulam, Nochikulam) in and around Tirunelveli district were analysed, The quality of water is getting vastly deteriorated due to unscientific waste disposal, improper water management and carelessness towards the environmnt; this has led to scarcity of potable water affecting the human health (Dhanalakshmi et al., 2013). The quality of drinking water plays an important role in maintaining health. Safe water is one, which should be free from faecal, chemical contamination (Murugesan et al., 2004).

Pond water quality analyses were performed to understand the suitability for multipurpose usage viz., drinking, domestic, recreational, irrigation, livestock, fisheries and industrial in several studies (Erwin et al., 1994).

Water quality is affected directly or indirectly by physiochemical parameters. Some factors like source of water, type of pollution, seasonal fluctuation etc., such limnological studies are helpful in interaction between the climate, surrounding environmental conditions and biological process in the water(Mushini et al., 2013).

The ponds chosen for the present study are Thuthukulikulam, Seydunganallurkulam, Moolikulam and Nochikulam.

'Stations And Feed Structure

S. No	Name of the Pond	Location		Water feed Structure	
		Village and Taluk	Latitude & Longitude	Anicut	Canal
1	Thuthukulikulam	Karungulam Srivaikuntam	8° 38' 51" N 77° 0' 22" E	Marudur	Melakkal
2	Seydunganallurkulam	Seydunganallur Srivaikuntam	8° 39' 46" N 77° 50' 14'' E	Marudur	Melakkal
3	Moolikulam	Sivalaperi Palayamkottai	8° 43' 43'' N 77° 44' 0'' E	Palavoor	Palayam canal
4	Nochikulam	Agasthiarpatti Ambasamudram	8° 42' 32'' N 77° 50' 38'' E	Natural feeding	

MATERIALS AND METHODS

Various physico-chemical and biological parameters of the water sample were analysed following the standard methods of APHA (2005). The pond water sampling programme was well designed by considering the following major factors: four representative samples were collected monthly from each pond. Data of the monthly samples were pooled together according to the seasons (Southwest monsoon (SWM)- July, August and September; Northeast monsoon (NEM)-October, November and December; Post monsoon (PM) - January, February and March; Summer (SUM)-April, May and June). The point of collection of sample was inlet, outlet and two points at the middle of the pond. Water samples were collected in pre-cleaned plastic containers of two liter capacity. The water samples were collected during the morning hours between 08.00 a.m. to 10.00 a.m., 10-15 cm below the water surface.

The physio-chemical and biological parameter analyzed were temperature, electrical conductivity, turbidity, total dissolved solids (TDS), alkalinity, total hardness, calcium, magnesium, sodium, potassium, chloride, dissolved oxygen (DO), biochemical oxygen demand (BOD), phosphate, nitrate, total coliform and faecal coliform. The physical parameters like, temperature, pH, electrical conductivity, total dissolved solids and turbidity measurements were made in the field itself using Deluxe water and soil analysis kit Model 191E, M.S Electronics (India) Pvt. Ltd.

RESULT

Water temperature is an important parameter for aquatic ecosystem by its value of influence on aquatic life directly or indirectly (Neelam and Mankodi, 2013).water temperature is one of the most important factors in aquatic environment (singh and Mathur, 2005).

The water temperature ranged from 25℃ to 31℃ at thuthukulikulam and 26℃ to 31℃ at seydunganallurkulam, moolikulam and nochikulam.in the present study the water temperature was found to be gradually decreasing from august to January and increasing from February to may for the two consecutive years.

Seasonal variation of surface water temperature in sampling ponds during the study period – June2011-July2013.

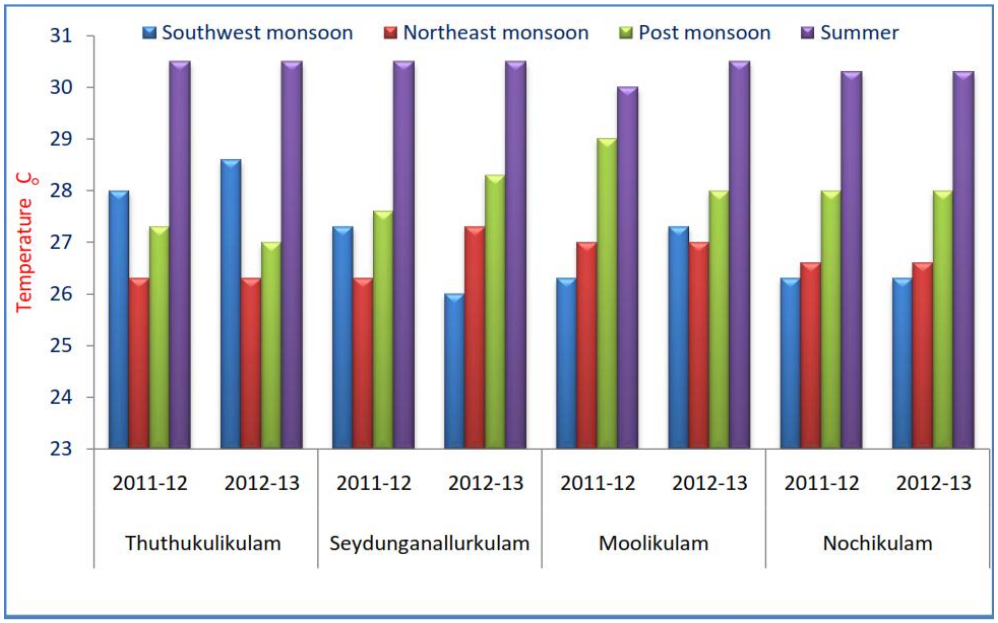

Figure 1. Temperature

The surface pH ranged from 7.1 to 8.1 at thuthukulikulam, 7.3 to 8.1 at seydunganallurkulam, 7.6 to 8.1 at moolikulam and 7.6 to 8.2 at nochikulam during the study period. In the present study water in all ponds are slightly alkaline in nature.

Seasonal variation of pH in sampling ponds during the study period -June 2011 to July 2013.

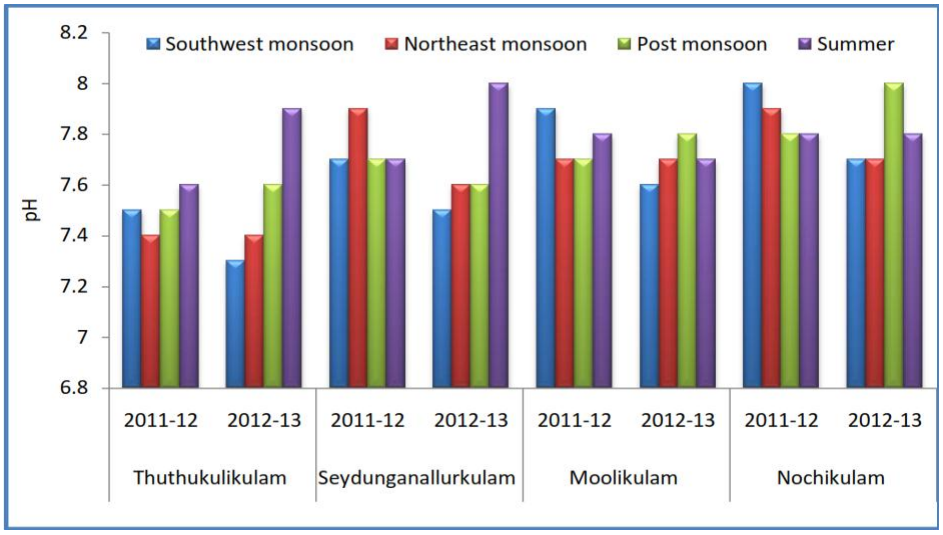

Figure 2.pH

During the present study electrical conductivity of the surface water varied from 0.11 mS/cm to 1.23 mS/cm at thuthukulikulam, 0.19 mS/cm to 1.38 mS/cm at seydunganallurkulam, 0.20 mS/cm t0 1.35 mS/cm at moolikulam and 0.30 mS/cm to 2.05 mS/cm at nochikulam. The conductivity value increased with increase in total dissolved solids and water temperature(Entz, 1973).

Seasonal variation of electrical conductivity in sampling ponds during the study period - June 2011 to July 2013.

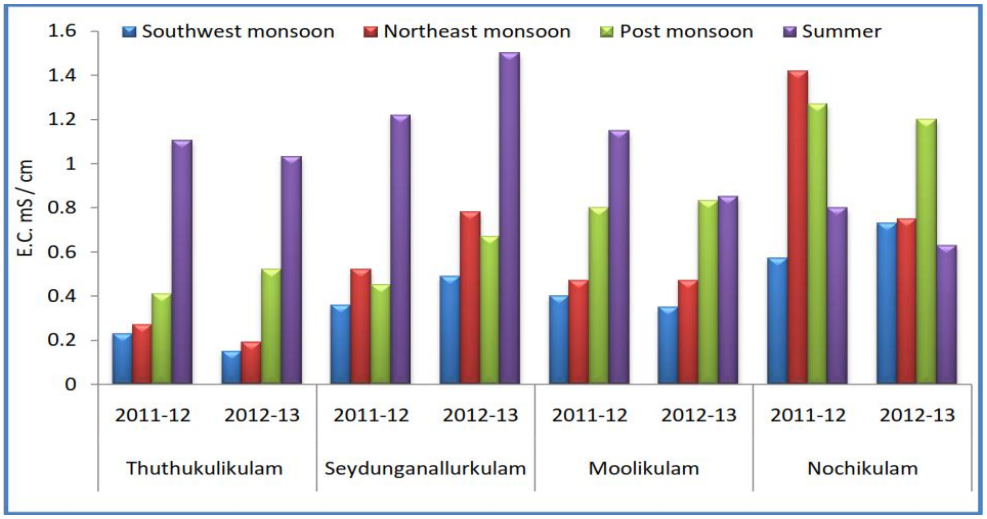

Figure 3. Electrical Conductivity

The surface water turbidity ranged from 1.1 NTU to 3.1 NTU at Thuthukulikulam, 1.1 NTU to 3.1 NTU at Seydunganallurkulam, 1.2 NTU to 3.2 NTU at Moolikulam and 1.2 NTU to 3.2 NTU at Nochikulam during the study period. High turbidity shows presence of large amount of suspended solids.

Seasonal variation of turbidity in sampling ponds during the study period - June 2011 to July 2013.

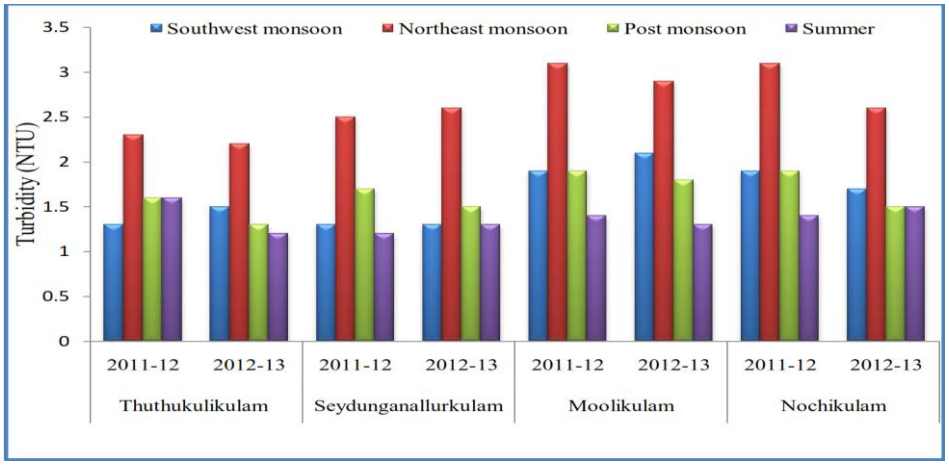

Figure 4.Turbidity

The total dissolved solid ranged from 80.4 mg/l to 234.8 mg/l at Thuthukulikulam, 112.3 mg/l to 246.5 mg/l at Seydunganallurkulam, 120.5 mg/l to 315.4 mg/l at Moolikulam and 120 mg/l to 360.5 mg/l at Nochikulam during the study period. The excess amount of total dissolved solids in water disturb ecological balance and cause suffocation of aquatic fauna (Phushpam et al., 2013).

Seasonal variation of Total dissolved solids in sampling ponds during the study period - June 2011 to July 2013.

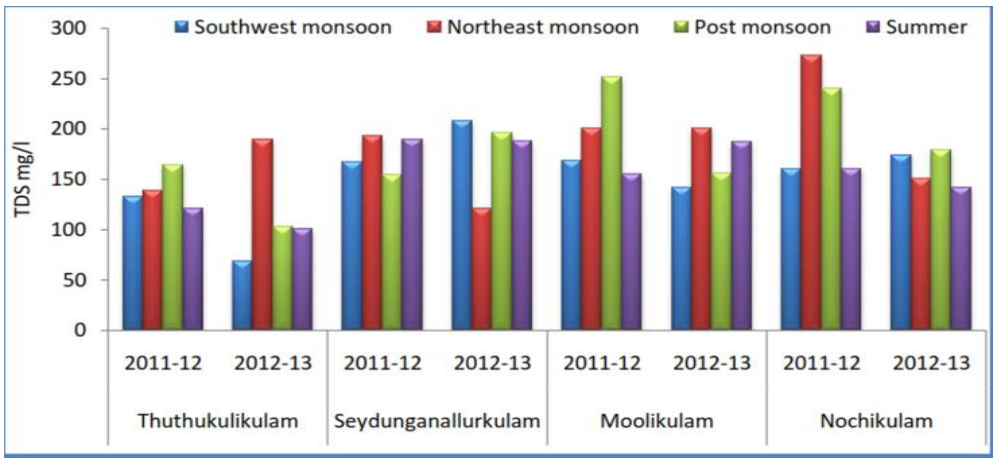

Figure 5.Total Dissolved Solids

The surface water alkalinity ranged from 17.2 mg/l to 76.5 mg/l at Thuthukulikulam, 28.5 mg/l to 138.2 mg/l at Seydunganallurkulam, 38.5 mg/l to 130.8 mg/l at Moolikulam and 24.5 mg/l to 168.1 mg/l at Nochikulam during the study period. Accordingb to Kaur et al., (1996) high alkalinity values indicated the eutrophic nature of water body.

Seasonal variation of total alkalinity in sampling ponds during the study period - June 2011 to July 2013.

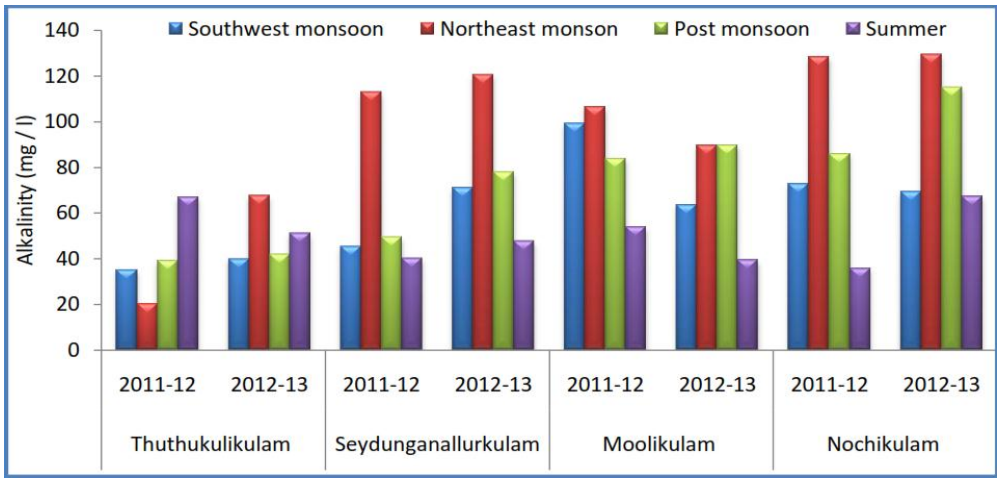

Figure 6.Alkalinity

The total hardness ranged from 42.1 mg/l to 144.82 mg/l at Thuthukulikulam, 55.3 mg/l to 146.2 mg/l at Seydunganallurkulam, 110.5 mg/l to 185.3 mg/l at Moolikulam and 52.5 mg/l to 296.5 mg/l at Nochikulam during the study period.

Seasonal variation of total hardness in sampling ponds during the study period - June 2011 to July 2013.

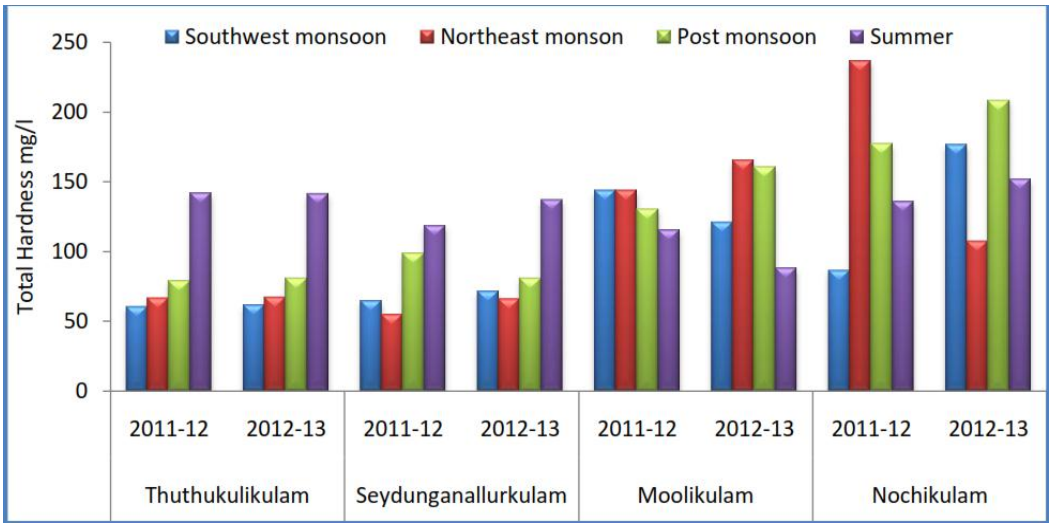

Figure 7. Total Hardness.

The surface water calcium ranged from 11.21 mg/l to 38.8 mg/l at Thuthukulikulam, 12.3 mg/l to 36.5 mg/l at Seydunganallurkulam, 22.4 mg/l to 58.6 mg/l at Moolikulam and 16.5 mg/l to 118.5 mg/l at Nochikulam during the study period.

Seasonal variation of calcium in sampling ponds during the study period-June 2011 to July 2013.

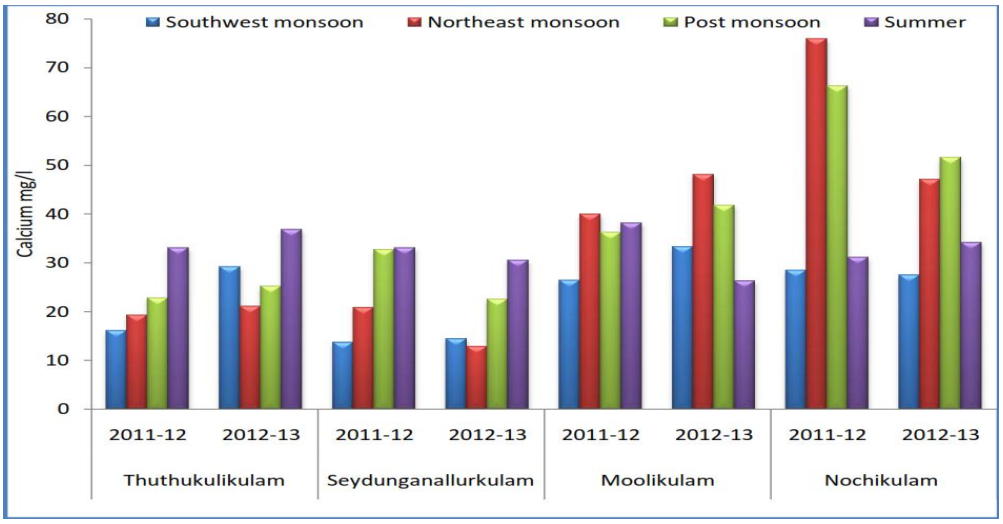

Figure 8.Calcium

Sodium ranged from 5.5 mg/l to 17.5 mg/l at Thuthukulikulam, 5.4 mg/l to 11.2 mg/l at Seydunganallurkulam, 12.5 mg/l to 38.5 mg/l at Moolikulam and 12.5 mg/l to 48.5 mg/l at Nochikulam during the study period. This observation is in conformity with the findings of barot and patel (2014).

Seasonal variation of sodium in sampling ponds during the study period -June 2011 to July 2013.

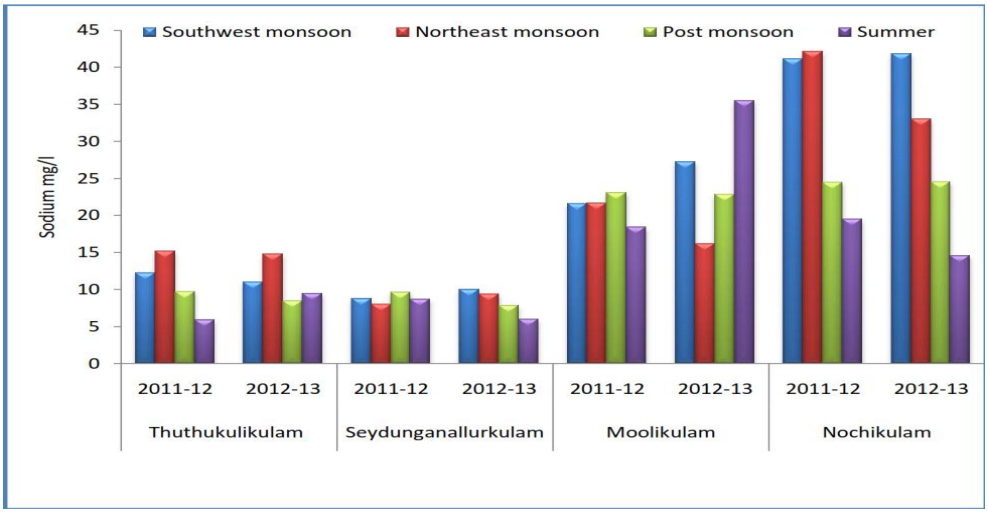

Figure 9.Sodium

Magnesium value ranged from 2.30 mg/l to 16.5 mg/l at Thuthukulikulam, 2.28 mg/l to 12.2 mg/l at Seydunganallurkulam, 4.8 mg/l to 22.4 mg/l at Moolikulam and 4.4 mg/l to 24.5 mg/l at Nochikulam during the study period.

Seasonal variation of magnesium in sampling ponds during the study period June 2011 to July 2013.

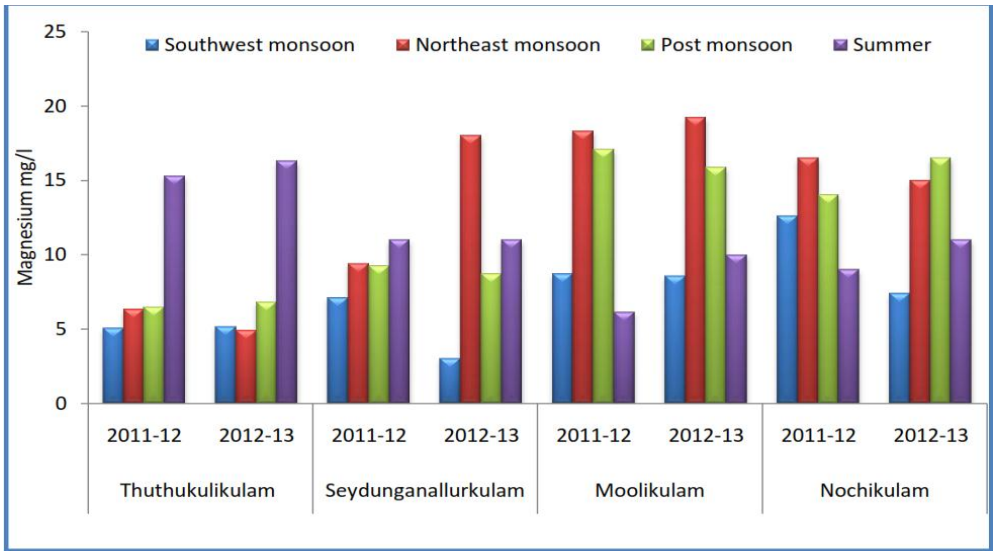

Figure 10. Magnesium.

The fluctuation in Magnesium may be due to the excess level of rain fall and other seawage entry into the river. This observation is in conformity with the findings of Adak et al., (2001) and Kumar (2003).

DISCUSSION

The quality of water is getting vastly deteriorated due to unscientific waste disposal, improper water management and carelessness towards the environment; this has led to scarcity of potable water affecting the human health (Dhanalakshmi et al., 2013).

The quality of drinking water plays an important role in maintaining health. Safe water is one, which should be free from faecal, chemical contamination (Murugesan et al., 2004).

Pond water quality analyses were performed to understand the suitability for multipurpose usage viz., drinking, domestic, recreational, irrigation, livestock, fisheries and industrial in several studies (Erwin et al., 1994; Staicer et al., 1994; Papastergiadou et al., 2007).

CONCLUSION

The results clearly indicate that all the pond waters were quite unfit for drinking. since they exceeded the water quality standards. Atleast from now we should take steps to stop pollution and preserve the water resources for our future generation.

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