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Impact of Rice Mills on Ground Water Quality at Koovappady, Ernakulam

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ABSTRACT

Water is more precious and essential requirement for all life process. In present study, the impact of leachate percolation on groundwater quality was estimated from rice mills of Koovappady during the period of August 2013 to April 2014. To find out the extent of pollution, various water quality parameters were studied. It has been founded that location I was more polluted and are not in the acceptable limit in accordance with WHO standards. This may be due to the leaching of waste water from the rice mills. So the water becomes polluted and it is adversely affect the human life.

KEY WORDS

Ground water, Rice mills, Koovapady, Human life

INTRODUCTION

Water is the most essential component of life. It is a unique liquid in the sense that without it life is impossible. Water is the most abundant compound on Earth's surface, covering about 70 percent of the planet. In nature, it exists in liquid, solid and gaseous states. More than 99% of Earth's water in its natural state is not available or is unsuitable for human use. Thus, the amount of water which is available for all people, plants (including agriculture) and animals on the earth is much less than 1% of the total amount. The quality of ground water may depend on geology of particular area and depth of water column. The main problem is the availability of water in the right place at the right time and in the right form(Ahluwalia & Malhotra[3]). Water pollution is the degradation of the quality of water that makes it unsafe or harmful to human beings, animals and aquatic life. A water pollutant as a physical, chemical or biological factor causing aesthetic or detrimental effects on aquatic life

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and on those who consume the water. The unique properties of water which make it universal solvent and a renewable resource also make it a substance which by virtue of these properties has got a much greater tendency to get polluted.

MATERIALS AND METHODS

The Koovapady panchayath is located in Kunnathunadu thaluk , Ernakulam District, Kerala, India. It is located at 10.15º N latitude and 76.45º E longitude. For the study two locations/stations were selected.

Location I:- is a thickly populated area. Four wells were selected for the study and numbered as I, II, III, IV with a distance of 50m. There was rice mill present near the site I. There is no proper waste management system in the rice mill and the waste water inlet of rice mill is to the canal and open land.

Location 2:- is also a thickly populated area and it located. Four wells were selected for the study and numbered as I, II, III, IV with a distance of 62m.This location considered to control and which was at 750 meter away from site I

The study was conducted from August 2013 to April 2014. Water of two sampling stations was monitored monthly. Standard APHA[4] water analysis procedures were used to analyze the water quality parameters. Identification of water borne diseases, a questionnaire was prepared. About 30 houses were selected in location I and location II randomly.

RESULT AND DISCUSSION

Water samples from all the two locations were analysed and their levels were compared with WHO[12] specified standards. The behaviour of the parameters at each location is given below.

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Table1: Different physico-chemical parameters of 8 open wells.

Parameters	Average value of water samples of wells							
	Location I				Location II			
	Well I	Well II	Well III	Well IV	Well I	Well II	Well III	Well IV
Colour	Blackish colour & oily	Blackish colour & oily	Blackish colour & oily	Blackish colour	Colourless	colourless	Colourless	colourless
Odour	Foul smell	Foul smell	Foul smell	Foul smell	odourless	odourless	Odourless	odourless
Taste	Sour taste	Sour taste	Sour taste	Sour taste	tasteless	tasteless	Tasteless	tasteless
Atm.Tem (^{0}C)	32.13	31.95	31.75	31.47	31.11	31.4	31.72	31.61
Water tem. (^{0}C)	28.66	28.54	28.57	28.38	28.06	28.08	28.31	28.41
pH	6.42	6.35	6.01	5.3	8.26	8.28	8.36	8.36
Alkalinity (mg/L)	37.77	39	37.55	36.88	24	24.11	25.33	28.33
Hardness (ppm)	59.33	59.33	57.55	57.55	38.44	38.66	39.33	39.55
DO (mg/L)	2.44	2.45	2.49	2.51	6.12	6.01	5.71	5.86
BOD (mg/L)	386	368	330	322	98	102	112	128
Chlorinity (mg/L)	0.0361	0.0361	0.035	0.0327	0.027	0.031	0.0494	0.0333
Salinity (ppt)	0.0695	0.0695	0.0675	0.0634	0.0542	0.0603	0.0624	0.0644

Physical parameters like odour, taste and colour showed seasonal fluctuations. It showed that in location II, all the physical parameters were agreeable to WHO standard, but in location I, water samples were blackish colour, oily, foul smell and sour in taste. Temperature at the all time showed that Air temperature was higher than the water temperature. Jindal and Kumar[7] the higher temperature during the summer mainly due to higher rate of decomposition of organic matter. Bath and Kaur[5] temperature has a negative correlation with oxygen. Kasuhiti[8], in summer season, DO decreased due to increasing water

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temperature. Chemical parameters also showed slight variations. In the case of pH, location II had pH within drinking water quality range but in location II it was slightly acidic. Abbasi[1] reported that pH varied between 0.8 and 8.6 lower pH are injurious to many fresh water animals, and have diverse biological effects including changes in the abundance,biomass and diversity of invertebrates, plants and amphibians.

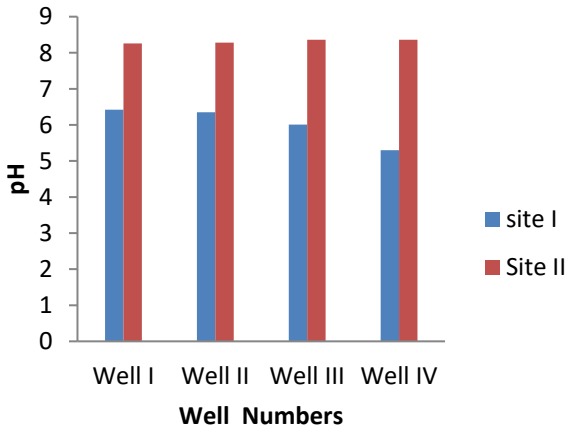

Fig. 1 - Seasonal variation of pH

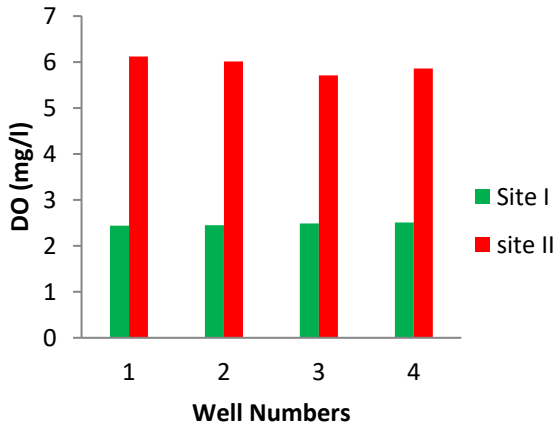

Fig. 2 -Variation of DO in two study location

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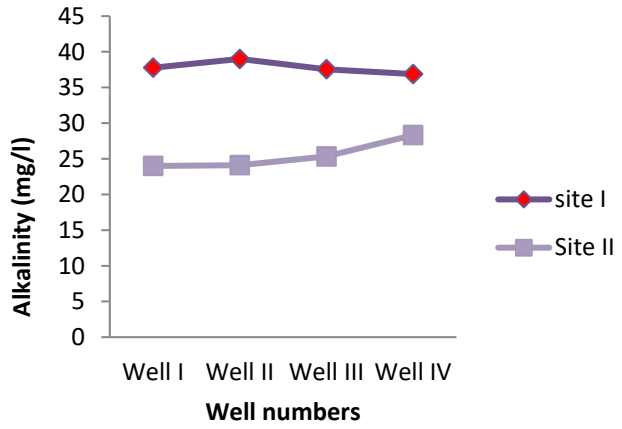

Fig.3- Monthly variation of Alkalinity

Alkalinity value in all the wells were within the permissible level and showed variations in location I and II. Panday and Soni[10] observed high values of alkalinity along with low DO. Neera[9] observed lowest DO with high alkalinity. DO showed great variation in wells of location I and II. DO was minimum in April and maximum in December. The higher the DO better the water quality. Only in location II had DO with in the drinking water quality range (5<DO mg/l). BOD in location I & II was beyond the permissible limit. Hooda and Kaur[6] the water ranges between 0 to 60ppm become soft water and above 60ppm were moderately hard. Based on the hardness value, water samples in location II become soft water and location I is moderately hard water.

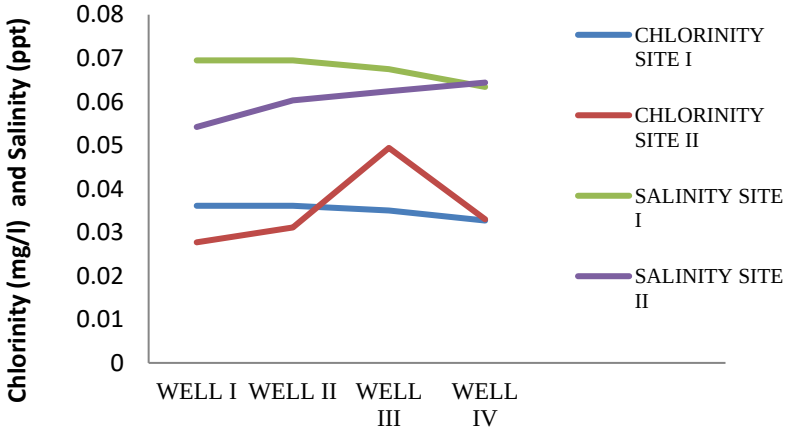

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Fig. 4 - Seasonal variation of Chorinity & Salinity

Chlorinity and salinity showed slight variations in both locations. The minimum chlorinity and salinity in December and maximum in the month of April. High salinity may be due to low amount of rainfall and high atmosphere temperature. DO recorded higher values in the surface water and decreased with increase of depth. The low value of DO in bottom water may be due to the higher salinity. Only slight variations were seen at both sites.

Survey was conducted among 30 houses in location I and II resulted that the individual do not suffering from any other serious health problem in location II, but in location I individual show some health diseases like asthma bronchitis, cardio vascular diseases, skin diseases and other gastro intestinal problems. This might be due to pollution from the rice mill. There is no proper waste management system in the rice mill and the waste water inlet of rice mill is to the canal and open land. So the well water near to the rice mill cannot be used for the drinking purpose.

CONCLUSION

The present study was to compare the water quality parameter of 8 open wells in the Koovappady resulted, location I was more polluted than location II. This leads to scarcity of drinking water and spreading the water borne diseases. This may be due to the leaching of waste and presence of dust particles on air and water. So the water becomes polluted and it is adversely affect the human life. We have the responsibility to adopt respective safety measures for maintaining acceptable water quality and the conservation of water bodies for future. A continuous monitoring station for ground water and leachate quality must be established and adopt proper waste management in rice mills.

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