INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact Factor: 6.078

(Volume 8, Issue 3 - V8I3-1191)
Available online at: https://www.ijariit.com

Seasonal Study of Surface Water in Uddanam Region

V. Luke Paul
lukepaul81@gmail.com
Government Degree College, Tekkali, Andhra Pradesh

ABSTRACT

Chronic kidney disease (CKD) is the most prevailing unknown etiology in the Uddanam region of Srikakulam district. Many studies suggested that water could be one of the factors for the CKD and hence the study was focused on the assessment of surface water for pre-monsoon and post-monsoon seasons for two consecutive years. The water samples have been collected from the selected 13 villages in Uddanam region which are at high risk. All the water samples showed acidic nature (pH < 6.5), greater hardness and high phosphate ions. The water samples were also analyzed for Fe, As, Cd, Pb and Hg. The water can only be suitable for drinking and cooking through proper water treatment methods.

***Keywords*:** *Surface Water, Uddanam, Kidney Disease, Hardness*

1. INTRODUCTION

Uddanam region is the northern sea coast of Srikakulam district, Andhra Pradesh with wide coconut and cashew plantation. A serious health issue mainly chronic kidney disease (CKD)[1,2] with high prominence was prevailing in this region. Several researchers investigated on soil and water samples of this region in course of time but identifying the etiological factors for CKD is still a challenge [3]. As most of the studies revealed that the water[4] could be one of the factors for the CKD and hence the study was focussed on the assessment of surface water for pre-monsoon and post-monsoon seasons for two consecutive years. The water samples have been collected from the selected 13 villages in Uddanam region which are at high risk and analyzed for various parameters such as pH, conductance, total hardness[5], TDS, DO, BOD, sodium, potassium, calcium[6], chloride, phosphate, nitrate, iron, Arsenic, Cadmium, lead[7] and mercuric[8] ions. The place of sample collected and its sample code was given in the table below.

Table-1: Sample collected Place and code

Sample code	Place of the sample collected
SW01	Balliputtuga
SW02	Bejjiputtuga
SW03	Burivanka
SW04	Chandiputtuga
SW05	Jagathi
SW06	Kaviti
SW07	Kojjiria
SW08	Rajapuram
SW09	Vinjagiri
SW10	Nelavanka
SW11	Putiyadala
SW12	Soolvooru
SW13	Jagathikesapuram

2. METHODOLOGY

Water samples were collected at 0-30 cm depth randomly from sampling locations and preserved at room temperature in the laboratory. Water samples were taken into plastic bottles and were analyzed for pH using pH meter, conductance using conductometer, total hardness, TDS, DO, BOD, calcium and chloride ions using standard experimental procedures, sodium and potassium ions using flame photometer, phosphate & nitrate ions using spectrophotometer, iron, Arsenic, Cadmium, lead and mercuric ions using AAS.

3. RESULTS & DISCUSSION

The water samples were analyzed for various parameters and their respective data for the two consecutive years were correlated as shown in the figures below. The samples collected for the pH values are found to be in the range of 6.0-6.8. The standard value given by WHO guidelines for pH is 7.2-8.5. The pH analyzed for the samples is found to be lower in its value, indicating acidic nature to the water samples of the area under study. Electrical conductivity values of the water samples analyzed are found to be in the range of the standard value given by WHO.

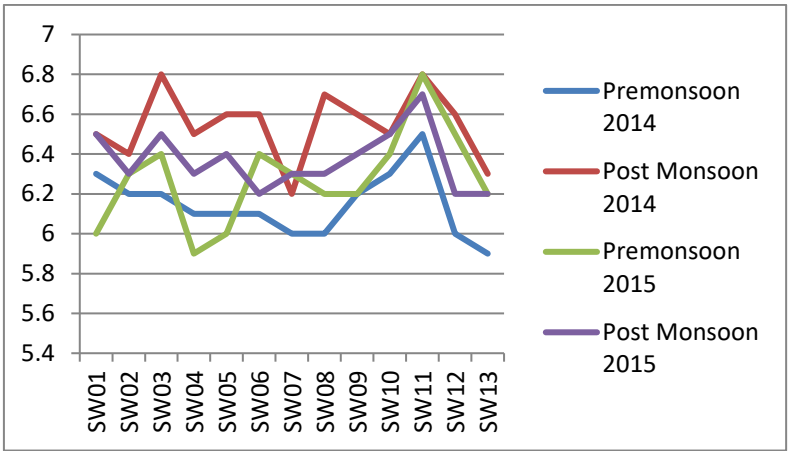

Figure-1: pH values of the samples

The value of total hardness of water in ppm is found to be higher than the standard value. And it is also observed that the concentration level of calcium in the water samples analyzed is found to be very high.

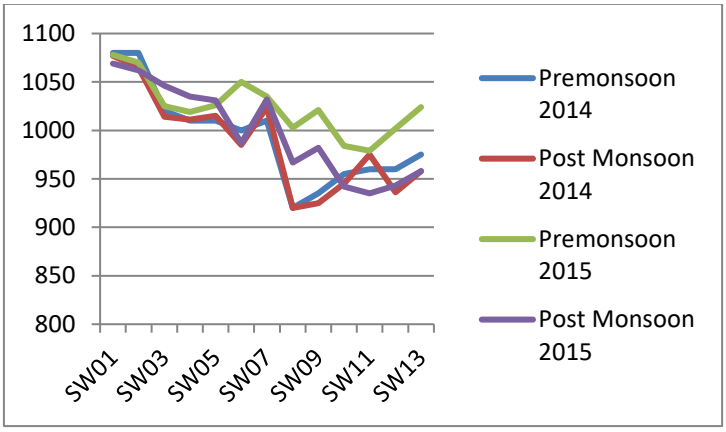

Figure-2: Total Hardness of the samples

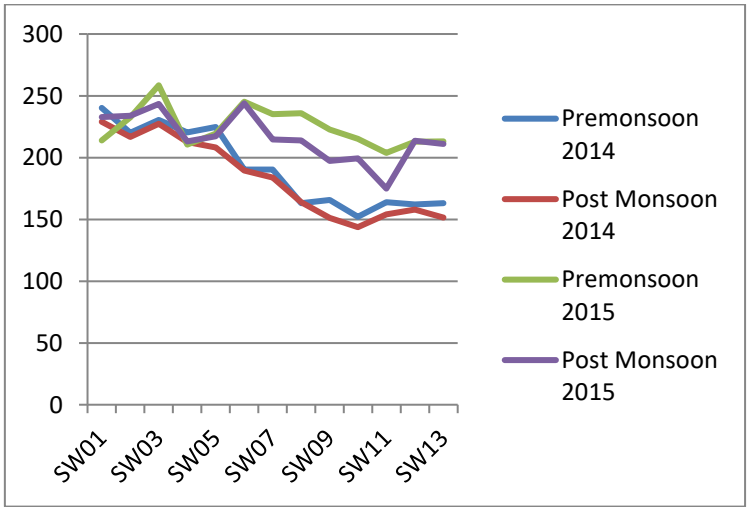

Figure-3: Calcium ion concentration of samples

For all the constituents analyzed, increase in the concentration levels of calcium, sodium, phosphate and chloride was observed.

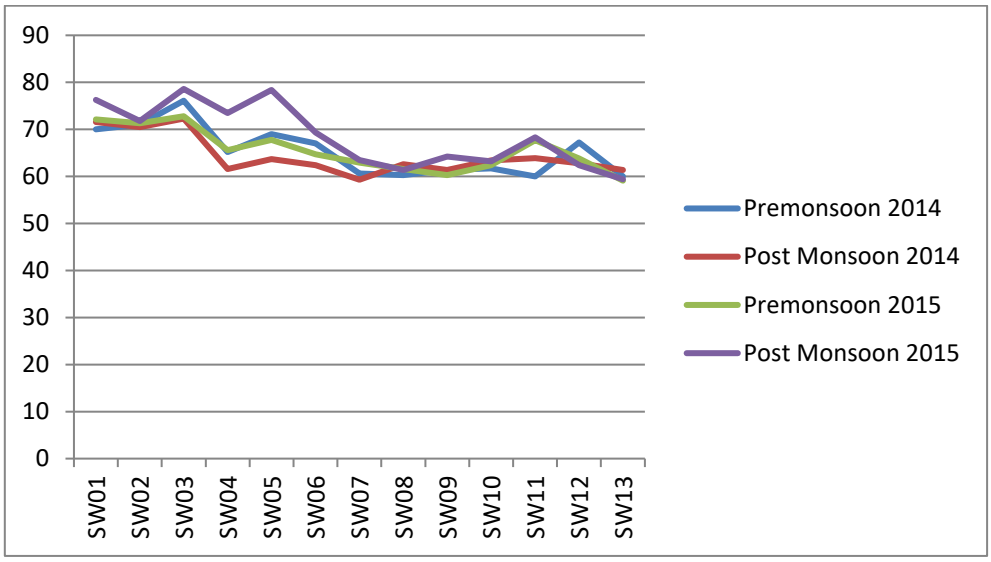

Figure-4: Sodium ion concentration of samples

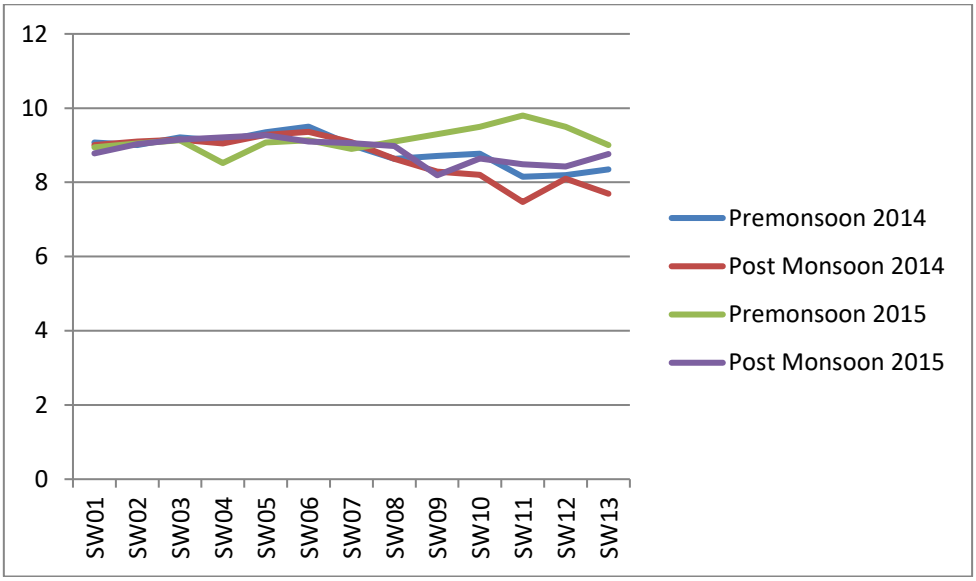

Figure-5: Phosphate ion concentration of samples

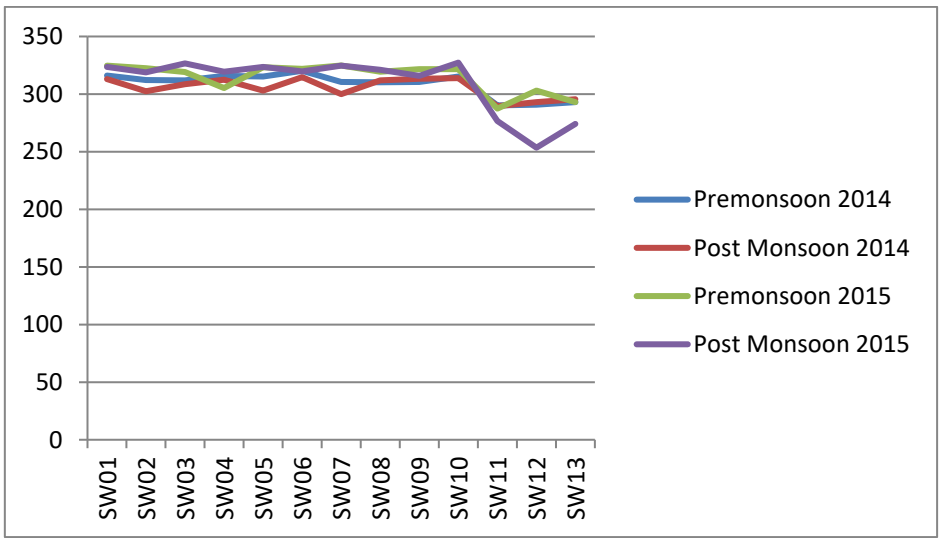

Figure-6: Chloride ion concentration of samples

It is observed that there is a correlation between the observed values of various parameters. All the water samples collected at various villages affected with chronic kidney diseases showed deviations from standard values in the parameters studied such as total hardness, Calcium, Sodium, Phosphate and Chloride ions concentrations. Moreover it is observed that most of the samples have high total hardness and phosphate ion concentration. There is relative decline in the parameters of post monsoon season. AAS study has revealed the following data for the metal ions concentrations such as Fe, As, Cd, Pb and Hg.

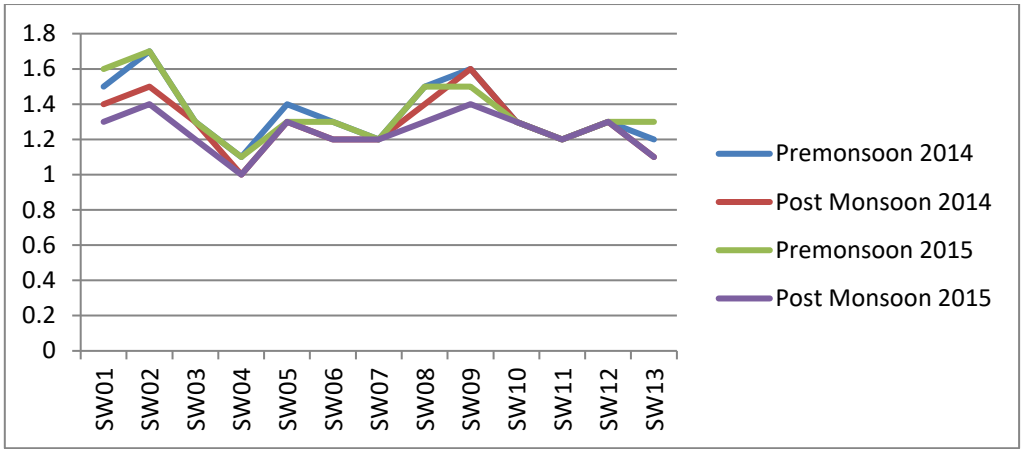

Figure-7: Ferric ion Concentration levels

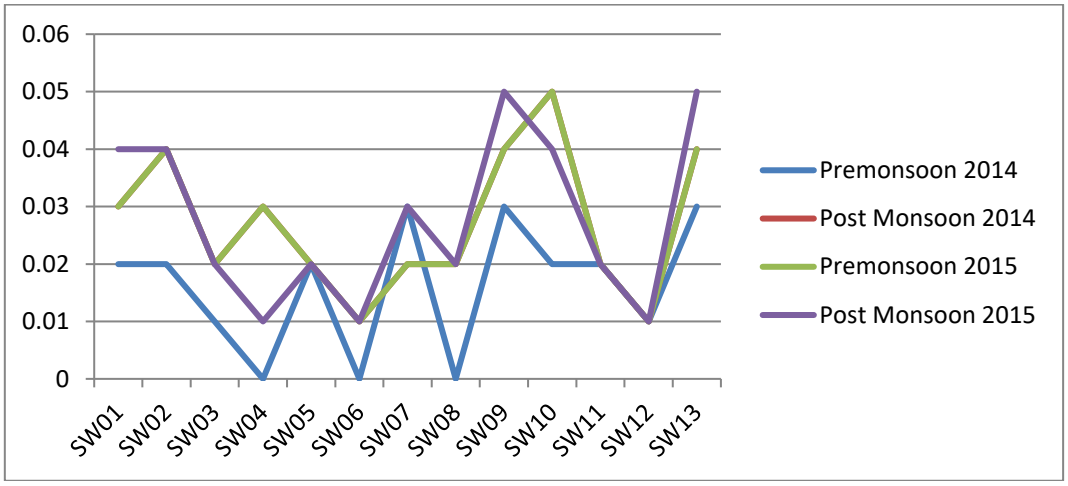

Figure-8: As ion concentration levels

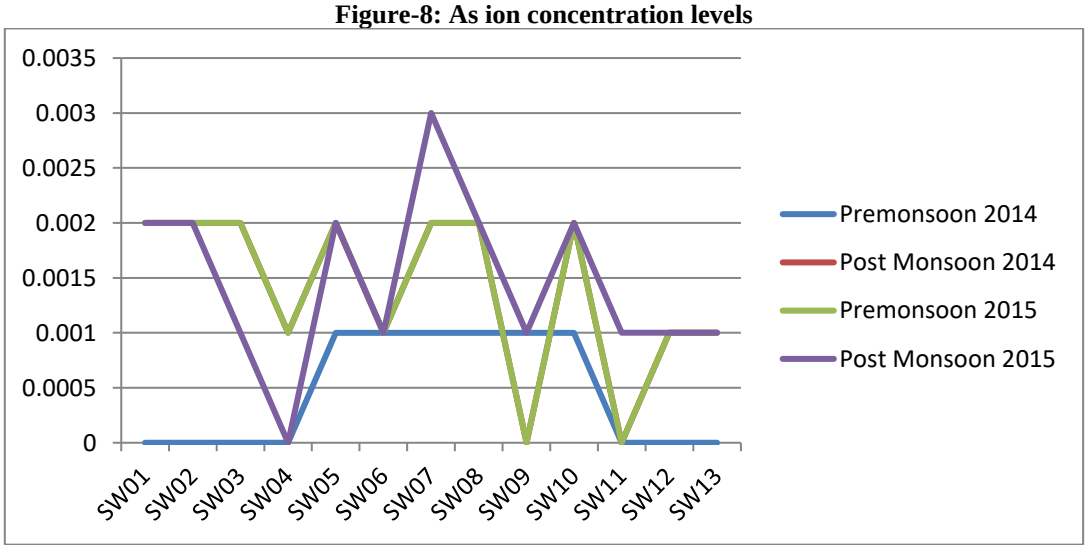

Figure-9: Cd ion concentration levels

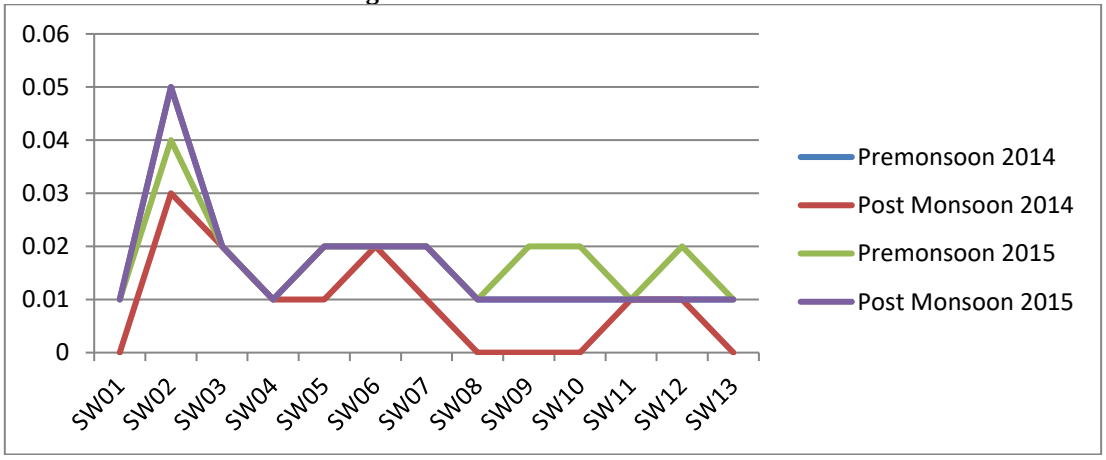

Figure-10: Pb ion concentration levels

The AAS analysis reports clearly indicate that the metal ion concentrations of As, Cd, Pb & Hg in the surface water samples collected from various regions are found to be within the range of Standards given by WHO. But there is high concentration of Ferric ions in all the samples. This shows high impact on the health of the humans.

4. CONCLUSION

The surface water samples collected from the Uddanam area are analyzed for pH, Conductance, total hardness, DO, BOD, TDS, calcium ion, nitrate ion, phosphate ion, chloride ion, sodium ion, potassium ion, Ferric ion, Arsenic ion, Cadmium ion, Lead ion and Mercuric ion concentrations. The reports clearly indicate that the water samples showed deviations from the standard values in the parameters such as pH, total hardness, Calcium, Sodium, Phosphate and Chloride ions concentrations. Moreover it is observed that the most of the water samples have high total hardness and phosphate ion concentration and the pH values indicate high acidity. High phosphate concentration levels stimulate eutrophication which brings in ecological imbalance. High hardness in water and high calcium levels impairs kidney functions. It may be suggested that the water is suitable for drinking if the water is treated such that the values lie within the permissible range.

5. ACKNOWLEDGEMENT

I am very much grateful to the University Grants Commission for funding under Minor Research Project. It is an immense pleasure to work in the prestigious organization Government Degree College, Tekkali.

6. REFERENCES

[1] Ramesh KV, Sasibhushan B, Gouru Naidu K, Mohan Kumar S. The renal failure in Uddanam Region of Srikakulam district, Andhra Pradesh: areas identified for further investigations. *IUP J Chem Eng*. 2011;3:68–71.

[2] Rajapurkar MM, John GT, Kirpalani AL, Abraham G, Agarwal SK, Almeida AF, et al. What do we know about chronic kidney disease in India: first report of the Indian CKD registry. *BMC Nephrol*. 2012. March 6;13(1):10. 10.1186/1471-2369-13-10.

[3] http://www.searo.who.int/srilanka/documents/report_international_expert_consultation_on_ckdu.pdf [cited 2017 Aug12]

[4] H.M.S.Wasana et.al. Drinking water quality and chronic kidney disease of unknown etiology: synergic effects of fluoride, cadmium and hardness of water. *Environ. Geochem. Health*, 2015 March

[5] Rohana Chandrajith , C B Dissanayake, Thivanka Ariyarathna, H M J M K Herath, J P Padmasiri Dose-dependent Na and Ca in fluoride-rich drinking water--another major cause of chronic renal failure in tropical arid regions. *Sci Total Environ.* 2011 Jan 15; 409 (4):671-5.

[6] Chandra B.D., Rohana Chandrajith, Groundwater fluoride as a geochemical marker in the etiology of chronic kidney disease of unknown origin in Sri Lanka. *Ceylon Journal of Science*, June 2017, 46(2):3.

[7] Sunil B.W. The role of ions, heavy metals, fluoride, and agrochemicals: Critical evaluation of potential aetiological factors of chronic kidney disease of multifactorial origin (CKDmfo/CKDu) and recommendations for its eradication. *Environmental Geochemistry and Health*, June 2016, 38(3).

[8] Sommar J.N.Svensson, M.K.Bjor, et.al., End stage renal disease and low level exposure to lead, cadmium and mercury, a population-based, prospective nested case referent study in Sweden. *Environ. Health*, 2013, 12(9).

[9] ith, R., Dissanayake, C. B., Ariyarathna, T., Herath, H. M. J. M. K., & Padmasiri, J. P. (2011a). Dose-dependent Na and Ca in fluoride-rich drinking water -Another major cause of chronic renal failure in tropical arid regions. Science of the Total Environment, 409(4), 671–675.

[10] Chandrajith, R., Nanayakkara, S., Itai, K., Aturaliya, T. N., Dissanayake, C. B., Abeysekera, T., et al. (2011b). Chronic kidney diseases of uncertain etiology (CKDue) in Sri Lanka: Geographic distribution and environmental imply cations. Environmental Geochemistry and Health, 33(3), 267–278.

[11] Chandrajith, R., Dissanayake, C. B., Ariyarathna, T., Herath, H. M. J. M. K., & Padmasiri, J. P. (2011a). Dose-dependent Na and Ca in fluoride-rich drinking water -Another major cause of chronic renal failure in tropical arid regions. Science of the Total Environment, 409(4), 671–675.

[12] Chandrajith, R., Nanayakkara, S., Itai, K., Aturaliya, T. N., Dissanayake, C. B., Abeysekera, T., et al. (2011b). Chronic kidney diseases of uncertain etiology (CKDue) in Sri Lanka: Geographic distribution and environmental implications. Environmental Geochemistry and Health, 33(3), 267–278.

