International Journal of Innovative Technology and Exploring Engineering (IJITEE)
ISSN: 2278-3075 (Online), Volume-9 Issue-3, January 2020

Urban Water Quality Scenario by using Geospatial Engineering

M. Satish Kumar, G. Venu Ratna Kumari, Ambati Dattatreya Kumar, P.Srinivasa Rao

Abstract: ***In the world scenario the contamination of water due to the various reasons is one of the major problems in the urban and semi-urban areas which have both positive and negative impact on the existed environment and also on the quality of human life. The developing activities taking place in and around the urban areas covers soil with concrete which leads to reduced soil recharge capacity at one side and the other side releasing of untreated urban sewage in to nearby open water bodies without any concern became most practicing method in most of the urban areas. The new capital region of Andhra Pradesh is selected as study area which is rapidly developing with commercial and residential built-up area. Due to which the pressure on groundwater is increased rapidly with respect to its quality and the quantity to meet the requirement of the living as well as migrating people from all the corners to the newly developing capital region. If the similar situation continues there will be a severe and irreparable damage to the availability of groundwater for the future generation and also there will be a notable reduction in the living standards of urban people. The present study examines groundwater and surface water quality and compared with water quality standards to determine the status of water quality at study area. A total three samples were collected for three times in three consecutive months of study period and analyzed by using standard analytical procedures.Geo spatial technology was adopted to represent the statistical data of water quality in the form of GIS maps for more accuracy to identify the periodical changes in water quality at study area.***

Keywords: Geospatial technology, Groundwater, untreated urban areas,

I. INTRODUCTION

Urban sprawl in India is increasing year by year due to increased and migrated population which shows its significant impact on air, water, soil and other natural resources. By considering it we need handy information in different time frames to promote the sustainable condition over a period of time. Urbanization is quiet revolution in the recent world scenario, where approximately 50% of population in India is living in urban areas and its percentage is increasing gradually year by year due to various reasons, and there is above one million populations at more than 50 cities in India.

Revised Manuscript Received on January 30, 2020.
***** Correspondence Author
Dr. Satish Kumar Moparthi*, Professor of Civil Engineering in Kallam Harandha Reddy Institute of Technology, Guntur, A.P, India
Ms. G.Venu Ratna Kumari, Assistant Professor of Civil Engineering in P.V.P. Siddhartha Engineering College, Vijayawada, A.P, India.
Mr. Ambati Dattatreya Kumar, Assistant Professor of Civil Engineering in V.R Siddhartha Engineering College, Vijayawada, A.P, India.
Mr. P. Srinivasa Rao, Assistant Professor of Civil Engineering in Tirumala Engineering College, Narasaraopet, A.P, India.

there is no doubt that urbanization has a positive impact with respect to increasing economic stability with employment but there will be an un inevitable issues like scarcity of water along with vehicular and industrial pollution which leads severe environmental undesirable consequences in urban areas. The demand of water has been occupying first position in the urban areas due to rapid increment in population and also due to increased developmental activities nearby urban areas. The existing systems are getting damaged to meet the daily demand of water for the public by withdrawing huge amount of groundwater which leads to another set of problems related to groundwater pollution. The main objective of this study is to assess the quality of groundwater as our town and cities are now endangered with severe environmental instability due to unaware of planed sustainable utilization of water available water resources.In this study all the groundwater samples were collected from the bore wells where as the surface water samples were collected from the surface water bodies by covering all the corners of the water bodies. To address the issues related water recourses more effectively, there is a need to update the data periodically on variations of water quality, to incorporate all the related issues with more accuracy and reliability geospatial engineering is very much essential where the spatial and attribute data effectively organized to solve complex environmental issues.

II. II OBJECTIVE

To assess the quality of groundwater in the part of capital region of Andhra Pradesh with GIS maps for groundwater quality

III. III METHODOLOGY

III.I Acquisition of Satellite data:

1. The satellite data of PAN (Panchromatic) and LISS-III (Linear Image Self Scanner) are enhanced and geometrically corrected,
2. The two satellite data of both PAN and LISS were merged by adopting Cubic Convolution re-sampling technique and principal component method then map composition satellite imagery is printed in FCC with 1:50,000 scale

III.II Creation of data base:

1. By using visual image interpretation technique base map, village maps and settlement maps were prepared.
2. By using Arc view and Arc info software the maps were scanned and digitized.
3. Field observations were used to check the corrections and then final maps were prepared.

III.III Water quality analysis:

1. Water quality analysis was conducted by adopting standard analytical procedures.

2. The basic parameters of water quality like P^H, Alkalinity, Hardness, Total solids, and Total Dissolved solids (TDS) were analyzed to find out the suitability of water.

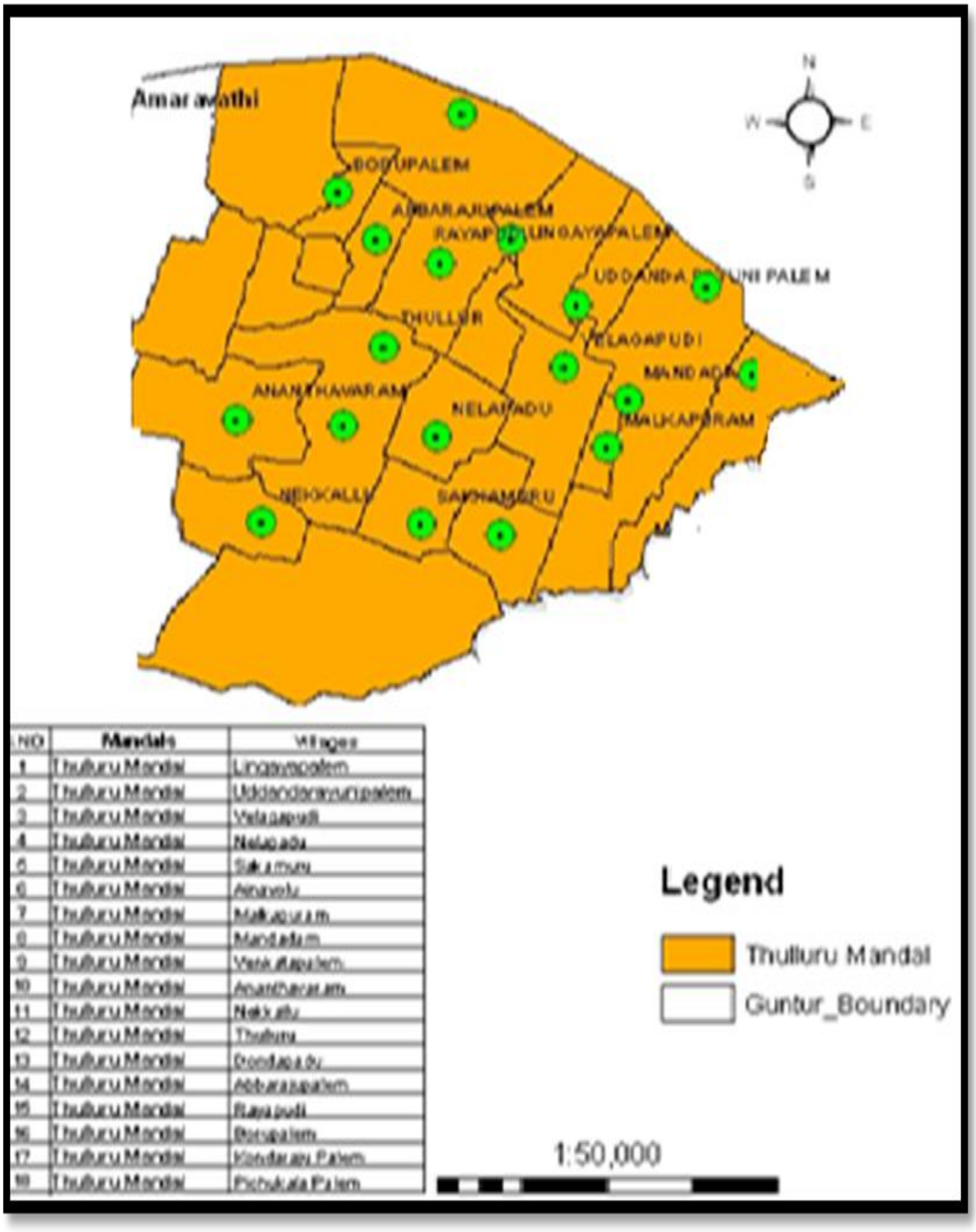

Figure1:Location Map

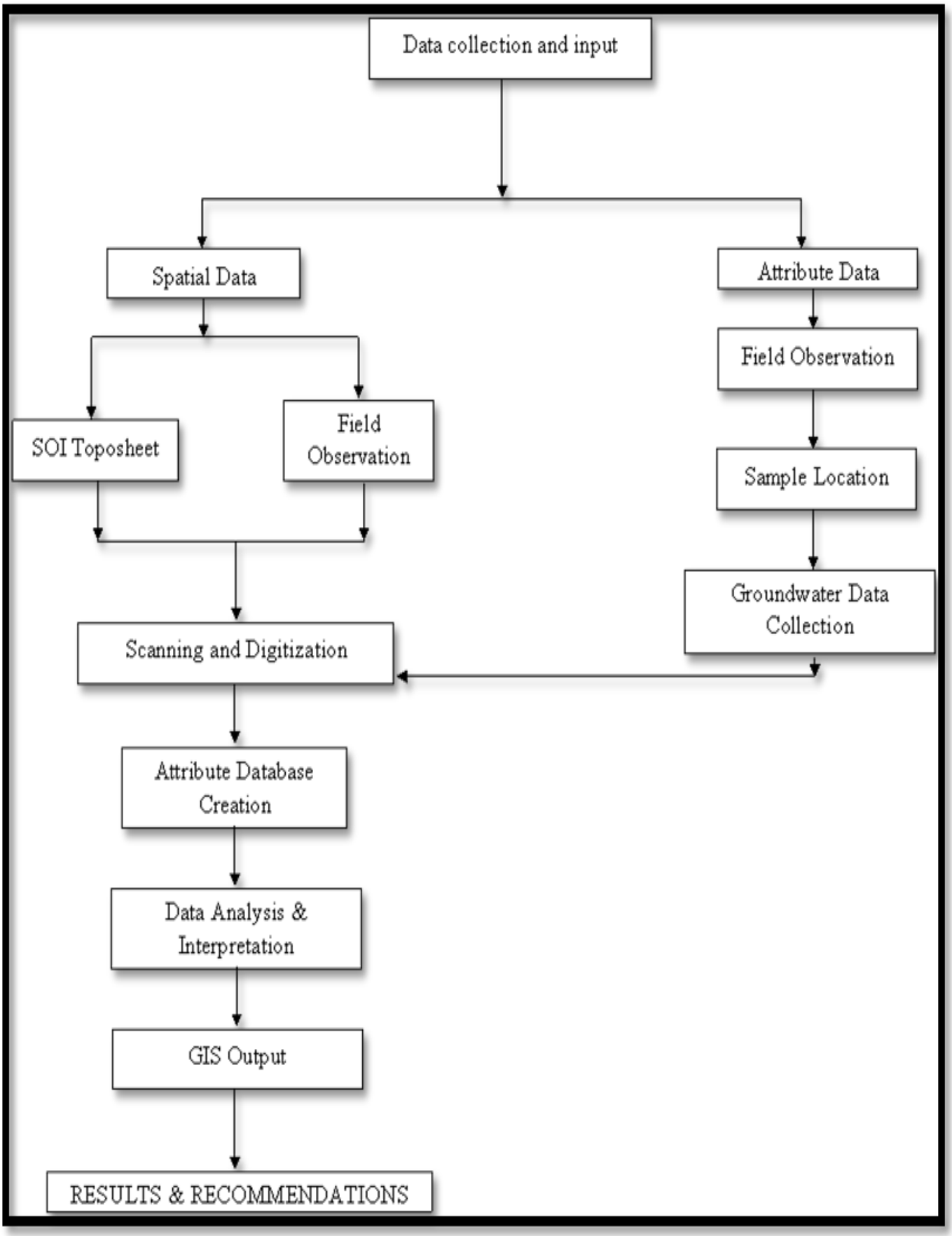

Figure 2: Step by step procedure of methodology

Table- I: Groundwater quality during the study period

VILLAGE NAME	pH	ALKALINITY	HARDNESS	TOTAL SOLIDS	TOTAL DISSOLVED SOLIDS
THULLURU	7.52	224	284	386	372
LINGAYAPALEM	7.49	241	276	374	364
UR PALEM	7.54	238	274	372	365
VELAGAPUDI	7.55	229	279	371	366
SAKAMURU	7.62	235	266	375	354
NELAPADU	7.44	236	274	37	366
MALKAPURAM	7.34	224	272	389	365
MANDADAM	7.78	248	271	375	364
VENKATAPALEM	7.45	244	289	374	36
ANANTAVARAM	7.68	234	268	375	369
NEKKALLU	7.55	245	266	375	362
DONDAPADU	7.46	221	265	351	348
AR PALEM	7.66	232	271	371	366
RAYAPUDI	7.44	236	272	372	362
BORUPALEM	7.55	233	274	384	368
KONDARAJUPALEM	7.62	238	278	376	35
PICHUKULA PALEM	7.83	236	286	379	361

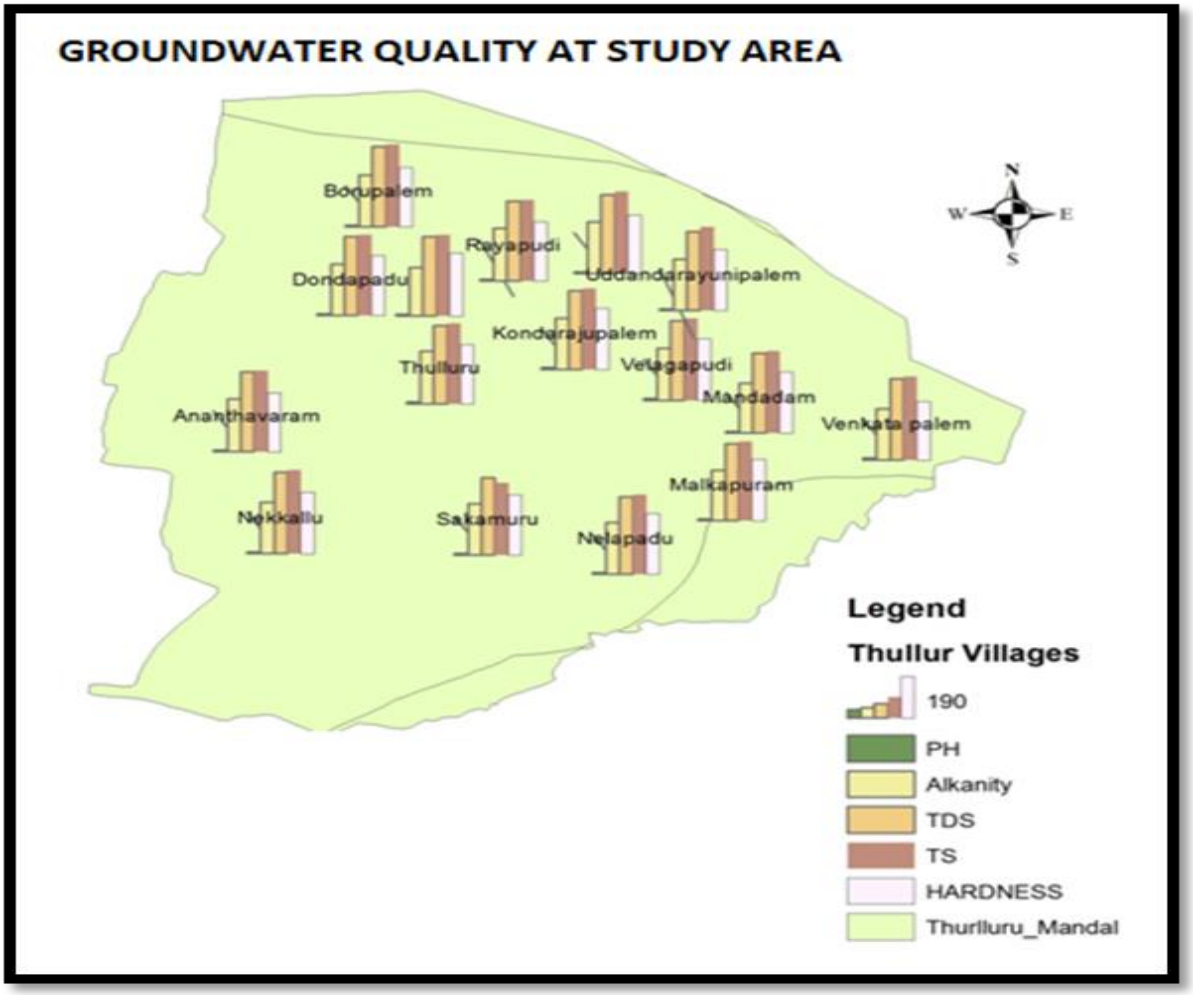

Figure 3: GIS Map for groundwater quality analysis at study area

Table- 2: Surface water quality during the study period

VILLAGE NAME	pH	ALKALINITY	HARDNESS	TOTAL SOLIDS	TOTAL DISSOLVED SOLIDS
THULLURU	7.25	234	274	374	365
LINGAYAPALEM	7.55	235	272	375	364
UR PALEM	7.55	236	276	376	366
VELAGAPUDI	7.44	232	27	372	362
SAKAMURU	7.76	226	282	371	354
NELAPADU	7.55	244	274	364	362
MALKAPURAM	7.22	238	278	378	361
MANDADAM	7.11	241	282	389	376
VENKATAPALEM	7.45	235	276	362	352
ANANTAVARAM	7.62	236	274	375	363
NEKKALLU	7.66	224	271	374	354
DONDAPADU	7.54	248	262	372	368
AR PALEM	7.68	224	274	384	379
RAYAPUDI	7.74	226	266	366	354
BORUPALEM	7.31	238	278	374	365
KONDARAJUPALEM	7.75	239	282	368	356
PICHUKULA PALEM	7.34	242	284	382	364

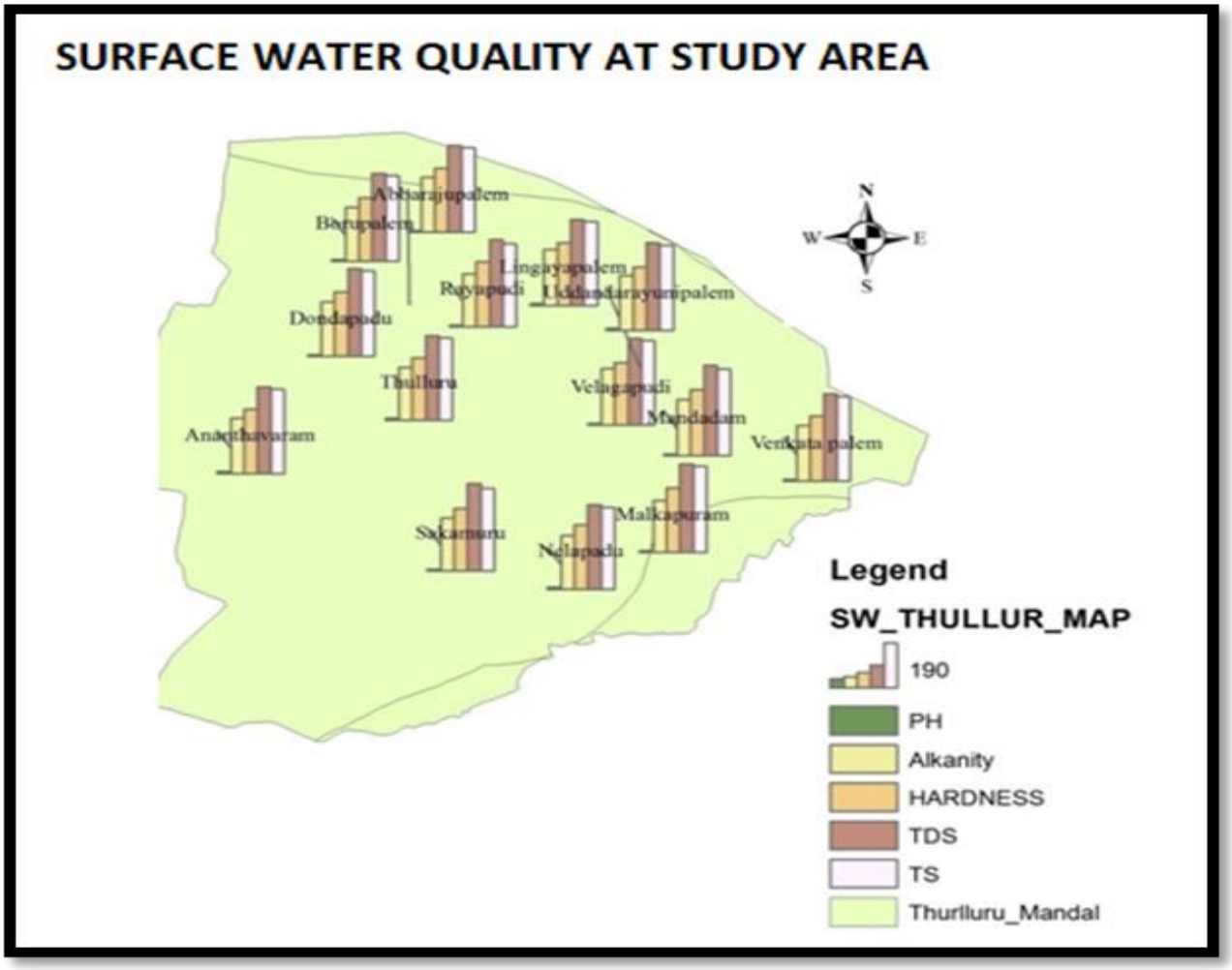

Figure 4: GIS Map for surface water quality analysis at study area

IV. RESULTS AND DISCUSSIONS

1. The properties of ground water quality at thulluru mandal consisting of eighteen villages in core capital region were analysed. As it is well known that there will be fluctuations in water quality and tend to change with respect to living standards of the local people as well as due to the climatic conditions.
2. In the present study the groundwater quality in the study area is safe and good for human consumption with minimum treatment
3. In the present study the surface water quality in the study area is within the acceptable limit can be used for daily activities to meet the water demand other than consumption with basic treatment
4. GIS helps in data capture and processing and it serves as powerful computational tool that facilitate multi map integrations.
5. Geographical Information System is an advanced tool for the representation of water quality with high accuracy and easy to communicate with the help of maps.
6. The spatial distribution maps of pH, TDS, Total solids, Alkalinity and Chlorides indicates that all the parameters are within the permissible limit.
7. With the help of GIS mapping we are able to show the pattern of changes in groundwater prospects for future reference
8. Finally it is concluded that using GIS technology has great potential in effective monitoring and management of natural resources.

V. CONCLUSIONS

1. There should be a careful monitoring on water resources with respect to their quality and quantity at study area
2. Periodical water quality assessments must be done to identify the status of water quality at study area
3. GIS maps must be encouraged to identify the periodical changes in water quality with high accuracy

REFERENCES

1. Chemical Analysis of Water and Soil, Third Edition, by Dr. KVSG Murali Krishna.
2. Interpretation and correlative study of water simulation in surface water bodies, M.Satish Kumar M. V Raju. S.Ramesh Babu and M.SivaJagadeesh Kumar in International Journal of Civil Engineering and Technology, Volume No: 8. Issue No: 05, 2017, pp 1206 – 1211, ISSN: 0976-6316.
3. Procedure for soil analysis by L.P van Reeuwijk sixth edition with ISBN 90-6672-044-1
4. Comprehensive index of groundwater prospects by using standard protocols – A model study, M.Satish Kumar M.V Raju and Hepsiba palivela in International Journal of Civil Engineering and Technology, Volume No: 8. Issue No: 05, 2017 pp 521 – 526. ISSN: 0976-6316.
5. M.Anji Reddy, 2006, a Text book of Remote sensing and Geographical Information Systems, Third Edition from BS Publicatios
6. Mapping and modelling of groundwater pattern using geo spatial technology, M.Satish Kumar, M.V Raju, G.VenuRatnakumari and S.Rameshbabuin International Journal of Civil Engineering and Technology, Volume No: 9, Issue No: 09, 2017, pp 110 – 115, ISSN: 0976-6316.
7. Y. Anjaneyulu, Introduction to Environmental Science, Edition, B.S Publications, Hyderabad, 2004.
8. A Synaptical representation of potentiality of groundwater by using geospatial technology, G.VenuRatnakumari, M.Satish Kumar, M.V Raju., and Hepsiba palivela in International Journal of Civil Engineering and Technology, Volume No: 9. Issue No: 1, January 2018, pp 748 – 754, ISSN: 0976-6316.
9. Remote Sensing and GIS, (2nd edition) By Basudeb Bhatta Oxford Higher Education.
10. Interpretation and correlative study of water simulation in surface water bodies,M.Satish Kumar, M. V Raju. S.Rameshbabu and M.SivaJagadeeshkumar published in International Journal of Civil Engineering and Technology , Volume No: 8. Issue No: 05, May 2017, pp 1206 – 1211, ISSN: 0976-6316.
11. Evaluation of groundwater pattern in block cotton soils using geospatial technology – A Model study,M.SatishKumar,M.V Raju. and G.VenuRatnakumari in International Journal of Civil Engineering and Technology ,Volume No: 8. Issue No: 05, May 2017, pp 851 – 855 ISSN: 0976-6316.
12. DilipG.Durbude, Vadarajan, N., and Purandara, B.K., Mapping of ground water quality parameters in GIS Environment. Proceedings of international conference on Hydrology and water shed management (vol.1), 2002.

AUTHORS PROFILE

Dr. Satish Kumar Moparthi is the professor of Civil Engineering in Kallam Harandha Reddy Institute of Technology, Guntur, A.P, India He has more than 35 International journals in the field of Civil Engineering. He got sanctioned grant from Science and Engineering Research Board, Department of Science and Technology, Government of India.

Ms. G.Venu Ratna Kumari is the Assistant Professor of Civil Engineering in P.V.P. Siddhartha Engineering College, Vijayawada, A.P, India. She has 8 Years of teaching experience along with 2 years of Industrial experience in the field of Civil Engineering

Mr. Ambati Dattatreya Kumar is the Assistant Professor of Civil Engineering in V.R Siddhartha Engineering College, Vijayawada, A.P, India. He has 10 Years of Teaching experience along with 15 years of Industrial experience in the field of Civil Engineering

Mr. P. Srinivasa Rao is the Assistant Professor of Civil Engineering in Tirumala Engineering College, Narasaraopet, A.P, India. He has 6 Years of teaching experience.