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ACCESS TO DRINKING WATER SOURCES, WATER-BORN DISEASE PREVALENCE AND WATER PURIFICATION METHODS ADOPTED BY TRIBES OF VISAKHAPATNAM DISTRICT, ANDHRA PRADESH, INDIA

Dr.Syam Kumar Bariki*, Prof. Byragi Reddy
* Department of Environmental Sciences,Andhra University

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ABSTRACT

Water is a major media for carrying the cause of illness in the world and particularly in rural communities. The objectives of this study were to evaluate access to safe drinking water, water purification techniques and water-borne disease incidence in tribal region of Visakhapatnam District. 100 households were randomly selected with structured interview questions being administered in the four divisions of the District. Approximately 60% of the households got water from unimproved sources such as unprotected dug well, surface water and unprotected springs. The commonly used water purification technologies in the study area included boiling (64%), disinfection using chlorination (4%), cloth filtration (14%) and ceramic filtration (2%), while 16% of the population did not purify the water. Out of the 100 households, 20% households indicated that at least one member of the household had suffered from water-borne diseases in the past year. Viral fever was the most prevalence diseases in the four mandals and high of 43% fevers are observed in the CHC (Community Health Centre) Araku valley the year 2011 and low cases was founded in Dumbriguda PHC, and gradual decrease of viral fever cases was observed in all the PHCs. Whereas many households can easily access improved water sources, access to safe drinking water was still a major challenge. There was inconsistent and inadequate utilization of water purification techniques leading to consumption of contaminated water even after purification had been carried out.

KEYWORDS: purification techniques, safe drinking water, water-borne diseases.

INTRODUCTION

In many developing countries, availability of water has become a critical and urgent problem and it is a matter of great concern to families and communities depending on non-public water supply system. Confirmation with microbial standards is of special interest because of the capacity of water to spread diseases within a large population. The quality of drinking-water is a powerful environmental determinant of health. Drinking-water quality management has been a key pillar of primary prevention for over one-and-a-half centuries and it continues to be the foundation for the prevention and control of waterborne disease. Water is essential for life, but it can also transmit disease in countries in all continents – from the poorest to the wealthiest. The most predominant waterborne disease, diarrhoea, has an estimated annual incidence of 4.6 billion episodes and causes 2.2 million deaths every year. There are several variants of the faecal-oral pathway of water-borne disease (WHO, 1997).

A large proportion of the World's population do not have access to improved or microbiologically safe sources of water for drinking and other essential purposes: It has estimated that 1.1 billion people do not have access to “improved drinking-water sources”. Consumption of unsafe water continues to be one of the major causes of the 2.2 million diarrheal disease deaths occurring annually, mostly in children (WHO/UNICEF, 2000). Current estimates of the number of people using microbiologically unsafe water are probably low. This is because the assumptions about the safety or quality of water based on its source, extent of treatment or consumer handling do not take into consideration in several well-documented problems.

In many regions, water scarcity and water pollution became an issue (Falkenmark, 1990; Arnell, 1999; Bouwer, 2000). Nearly half of the Earth's population does not have enough water to drink; and demand is doubling every 21 years (Vidal, 1995). A large proportion of world population does not have access to safe and clean water. According to the World Health Organization, 1.1 billion people in the world’s population- lack access to safe

drinking water (WHO, 2004). Chlorination is the second most widely-practiced means of treating water at the community level, (UNICEF, 2008). There are however concerns about the taste and odour of chlorinated water with some consumers finding it objectionable. However, some studies show that this is probably exacerbated by a tendency to add more than the recommended dose of chlorine (Gurian et al., 2006).

The United Nations General Assembly declared the period from 2005 to 2015 as the International Decade for Action, "Water for Life": most recently, in July-2011, the UN General Assembly declared safe and clean drinking-water and sanitation a human right essential to the full enjoyment of life and all other human rights (WHO, 2011). Unlike many materials, there is no substitute for water in many of its uses (Sylverster, 2003).

India has the largest tribal population in the world, about 68.34 millions. The state of Andhra Pradesh with 41.99 lakh tribal's, has the largest tribal population in South India. The tribal's all over the country face illiteracy, exploitation and have low standards of living. The Indian constitution has provided two-pronged strategies for tribal development, namely, protection from exploitation and assistance in economic development.

Whereas access to 'improved' water sources has increased rapidly in the last decade, little has been done to find out whether this increase in access to 'improved' water sources has led to an increase in access to safe drinking water. The tribal population mostly drink water without treatment under unhygienic conditions; the impact of the developmental activities on drinking water sources has not been explored. This research was therefore carried out with the objective of accessing to safe drinking water, water purification techniques and water-borne disease prevalence in Tribal areas of Visakhapatnam district, Andhra Pradesh India.

Water is essential for life, but it can also transmit disease in countries in all continents – from the poorest to the wealthiest. The most predominant waterborne disease, diarrhoea, has an estimated annual incidence of 4.6 billion episodes and causes 2.2 million deaths every year. There are several variants of the faecal-oral pathway of water-borne disease (WHO, 1997). The use of contaminated waters for drinking and bathing is one of the principal pathways for infection by diseases that kill millions and sicken more than a billion people each year. About 2.5 billion people (more than one in three) do not have access to adequate sanitation services. Together, these shortcomings spawn waterborne diseases that kill on average more than 6 million children each year (about 20,000 children a day) (TWAS, 2002).

Aims and objectives

- To evaluate the available water resources and water purification method adopted by tribal community.
- To evaluate the water born water-borne disease prevalence in Visakhapatnam agency.

MATERIALS AND METHODS

Out of eleven tribal Mandals of Visakhapatnam district four mandals, 49 villages were selected for the present study randomly. The selected mandals are Araku Valley, Hukumpeta, Dumbariguda, Ananthagiri. The tribal mandals have several villages out of which 18 villages choosen for study in Araku Valley mandal, 10 villages in Hukumpeta mandal, 12 villages in Ananthgiri Mandal and 09 villages in Dumbariguda mandal.

The individual mostly responsible for management of drinking water in the household, in most cases the mother, was identified and interviewed. Where this was not possible, the next most responsible person was interviewed or questioned. Water sources, purification methods and health data were identified through a questionnaire with structured questions administered with the help local leader. Questions asked touched on distance to water sources, time taken to collect water, methods of water purification, sources of water and water-borne disease incidence. The Data of Water born diseases were collected from concerned PHC (Primary Health Centres).

People's dependence on water:

Plenty of water resources available in the form of rivers springs and streams in this area. Some villages were provided with open wells, bore wells and Kundi's (spring water storage device). Natural springs (Ooota) are the only source available for drinking water as well as utility purpose in some remote villages.

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STUDY AREA

The Visakhapatnam district is towards north eastern part of Andhra Pradesh on the coast of Bay of Bengal. Topographically the western part of the district is studded with hill tracts of Eastern Ghats. And there are about 22 different tribal communities. Representative tribal populations chosen for the present study are surrounded by green forests and the average temperatures range 10-35ºC in different seasons. The area of the study was distributed in four mandals of Visakhapatnam district (Dumbriguda, Ananthagiri, Araku valley, and Hukumpeta mandals) which is mostly inhabited by tribal population. The hill in the tribal area is with dense forest, is popular with tribal products and coffee plantation. The coffee of this area is fair in trade and of good quality with a unique place in the global coffee market. The area is endemic and epidemic disease prone due to its vast geography with remote habitations pose a great challenge for ensuring good health.

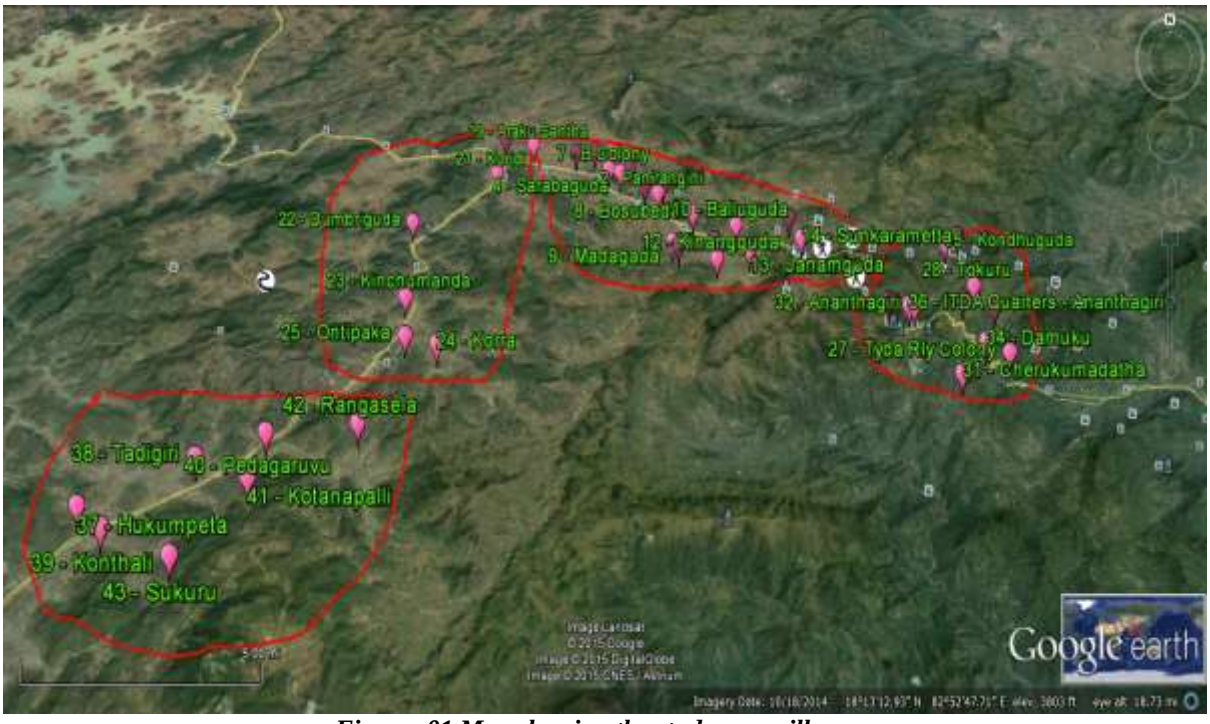

Figure :01 Map showing the study area villages.

Geographical Location;

The study area lies between 17º-34' 11" and 18º-32' 57" northern latitude and 18º-51' 49" and 83º-16' 9" in eastern longitude. It is bounded on the north partly by Orissa state and partly by Vizianagaram district, on south by East Godavari district, on west by Orissa state and east by Bay of Bengal. It is famous for the scenic beauty and is a major touristic destination. The area of the valley is roughly 36 km², and the altitude is between 600 and 900 meters above sea level.

RESULTS

Drinking Water Sources

Many of the households sampled in the four mandals (Araku, Ananthagiri, Hukumpeta and Dumbriguda) got their drinking water from various sources (spring, piped water, dug well, tanks and borehole). Approximately 60% of the households got water from unimproved sources such as unprotected dug well, surface water and unprotected springs (Figure 1). However, 31 households reported that their major water source was seasonal while the other 69 households reported that their major water source was permanent.

A majority of these water sources were within 1 km or less from the households. Out of the 100 households, 79 got their drinking water from within 500 m distance while 8 households walked for more than 1 km to access their main source of drinking water (Figure 2). Some 43 households spent less than half an hour daily to collect their drinking water, 53 spent about 1 hour while another 4 households spent more than 1hour to collect water daily.

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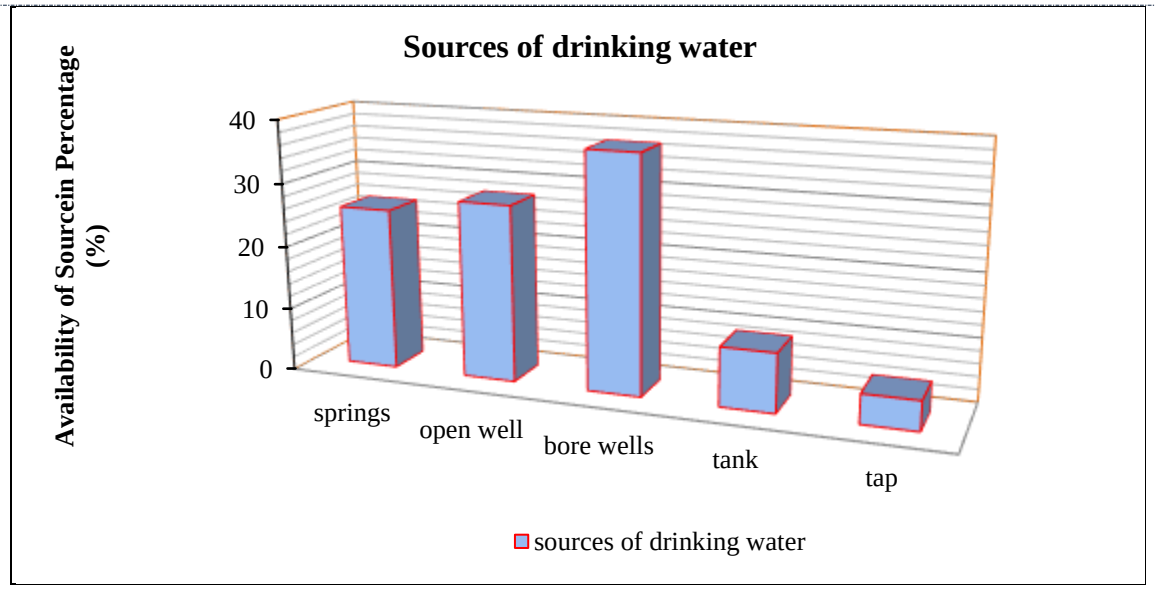

Figure 02: Sources of Drinking Water in the study area.

Water Purification Methods by tribes

The commonly used water purification technologies in the study area included boiling (64%), disinfection using chlorination (4%), cloth filtration (14%) and ceramic filtration (2%), while 16% of the population did not purify the water (Figure 3). Some of the households could not remember when they last purified their water using their preferred method. The most preferred method of water purification was boiling (64%) which indicates mostly in every household, that they preferred boiling.

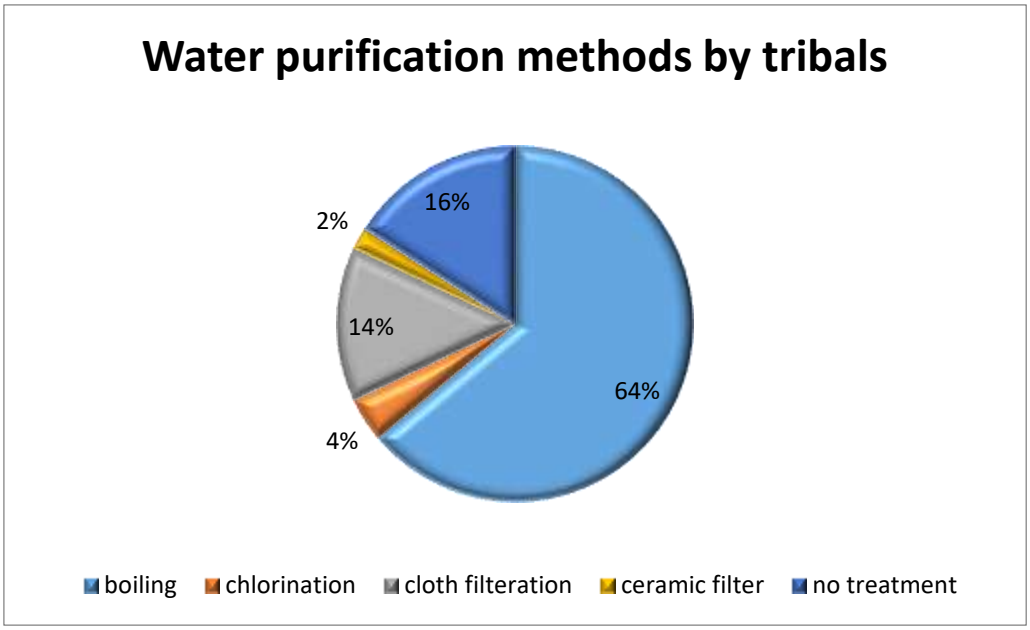

Figure 03: Water purification method by Tribes.

Most commonly prevalence water born diseases.

Typhoid and malaria are the most commonly reported water-borne diseases in the study area. Viral fevers were the first-most widely reported disease at 45%, while 15% of the malaria was reported that there had been both malaria and typhoid in the household in the past year. (Figure)

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Table. 01: Differently most commonly Prevalence diseases data pertaining to the study area have been collected for the year 2011-2012 to 2013 from the office of the PHC(Primary health centres) of different mandals , Visakhapatnam,(district) which is furnished in table – and fig.

S.No	Name of the health care unit	Year	Viral fever	Malaria	Diarrhoea	Typhoid fever	Dysentery	Cholera
1	PHC Madagada	2011	635	252	107	180	295	28
		2012	744	130	118	105	204	16
		2013	577	88	98	120	180	14
2	PHC Dumbriguda	2011	60	195	137	30	274	05
		2012	42	147	31	141	320	09
		2013	28	39	14	165	221	06
3	PHC Ananthagiri	2011	890	280	155	165	165	19
		2012	775	145	104	100	132	12
		2013	590	120	99	99	102	09
4	PHC Hukumpeta	2011	900	189	140	196	146	18
		2012	610	160	119	170	118	20
		2013	560	144	89	112	96	22
5	CHC Araku valley	2011	1370	1022	299	399	420	32
		2012	990	788	118	410	369	19
		2013	650	699	96	296	256	26

DISCUSSION

Households percentage had access improved water sources including protected bore wells was 79% and majority of people depend on bore wells and open wells while least percentage of people depend on tap water sources. In remote habitations people mainly depend on natural springs, which are the only sources for drinking, this may be due to the unavailability of good supply of Municipal water. However many households identified that the water resources as unreliable which indicating that the water resources was seasonal. Especially during the dry summer season, the people use water from other sources, only 1% of household had access to piped drinking water, which may be due the economical constraints and unavailability of proper road for transport of bore well machines to the remote areas. In fact many of the dwelling places lived more than half kilometre away from the water resources, this can be to the reason the District is in a high altitude region with moderate rainfall.

The most commonly used method of water purification was boiling which mostly relies on non-renewable sources of energy such as charcoal and firewood. These materials were not always available and as a result households fail to purify their water, exposing themselves to water-borne diseases. Only four percentages of households consider chlorination to be the most suitable method of water purification.16% of households who do not go for any treatment of water ,this may be due to the reason of unaware of water born diseases and its consequences. The Panchyat personal considered to the fact that chlorination is a much faster, cheaper and convenient alternative, although its unavailability in this rural district hassled to minimal use.

The poor results from boiling could be due to the fact that there is no residual disinfectant in boiled water, longer period of water storage increasing the likelihood of recontamination or inadequate boiling. The major challenge in boiling was lack of consistency with 14 households who claimed to use the method not able to declare when the method was last used. Only 2% of Households go for costlier method like ceramic filtration method on the basic of their financial capacity and awareness, depending upon the needed the poor tribes go for cloth filtration method. The better results obtained from households using chlorination can be explained by the presence of residual disinfectant (Rufener et al., 2008)

Viral fever was the most prevalence diseases in the four mandals and high of 43% fevers are observed in the CHC (Community Health Centre) Araku valley the year 2011 and low cases was founded in Dumbriguda PHC, and gradual decrease of viral fever cases was observed in all the PHCs. It is generally accepted that ware and excreta –related pathogens can be spread by person contact (Cirncross et al.,1991) Contact with contaminated soil and surfaces, food and flies(Emerson et al.,2004; Emerson et al.,1999). The next 20% and 13% Observed diseases is

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Malaria and typhoid fever in all the Primary health centres while least of 1% of cholera was observed in all the PHCs areas.13% of dysentery was noted. A common finding of acceptability studies is that uptake and use is much less among poor and uneducated people who are risk of disease (Clasen.T 2008).

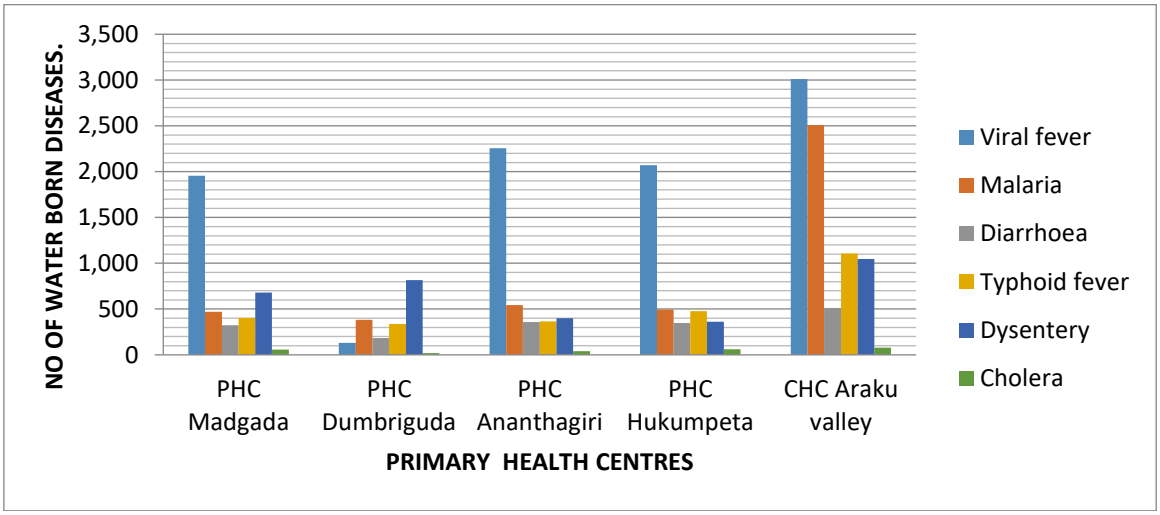

Figure 04: Number of prevalence Diseases in 2011, 2012 and 2013.

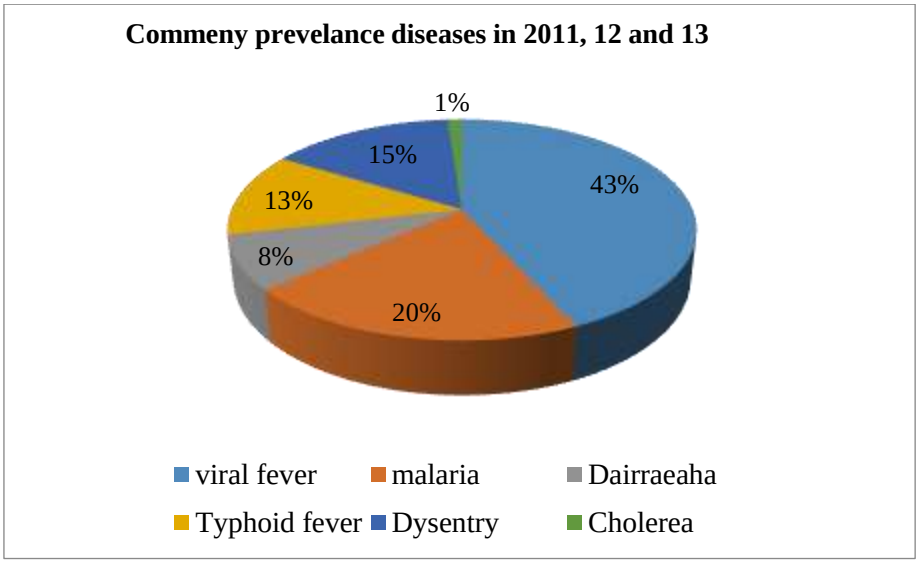

Figure 05 : Percentage of Commonly prevalence Diseases in 2011, 2012 and 2013

CONCLUSION

In the Tribal areas of Visakhapatnam District People do not have access for safe drinking water and whereas many households could easily access improved water sources, access to safe drinking water is still a major challenge. There was inconsistent and inadequate utilization of water purification techniques leading to consumption of contaminated water even after purification had been carried out. There's need to promote more economically and environmentally viable water purification methods, sensitize households about hygiene and sanitation practices aimed at reducing drinking water re contamination which will ultimately help in increasing access to safe drinking water and reduce the high incidence of water-borne diseases in the district. Awareness programmes should be conducted in the areas regarding the utilization and method of hygienic, sanitation of drinking water sources. The study has to be further extended to promote the simple filtration method like bio sand filters, to conserve the health status of tribal community.

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Figures:07, Spring sources in Hukumpeta Mandal.

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Figures:08 Unprotected open well in Ananthagiri Mandal.

Figures:09 Tube bore Well in Araku Valley Mandal

Figures:10 Spring Sources in Dumbriguda Mandal.