

Utilization and Consumption Pattern of Water in Urban Areas: A Study in Sambalpur City of Odisha

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Submitted by
Swati Hota
Roll No- (412HS1001)

**Under the Supervision of
Dr. Nihar Ranjan Mishra**



Department of Humanities and Social Sciences,
National institute of Technology, Rourkela

May, 2014

Dr. Nihar Ranjan Mishra

Department of Humanities and Social Sciences Date:

National Institute of Technology Rourkela

Rourkela – 769008

Odisha, India.

CERTIFICATE

This is to certify that the project entitled, “Utilization and Consumption Pattern of Water in Urban Areas: A Study in Sambalpur City of Odisha” submitted by “Swati Hota” in partial fulfillments for the requirements for the award of Masters of Arts in Development Studies at National Institute of Technology, Rourkela (Deemed University) is an authentic work carried out by her under my supervision and guidance.

To the best of my knowledge, the matter embodied in the report has not been submitted to any other University/ Institute for the award of any Degree or Diploma.

Dr. Nihar Ranjan Mishra
(Research Supervisor)

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CONTENTS

	Page No.
Certificate	ii
Acknowledgement	iii
Contents	iv
Lists of Table	v
List of Figure	vi
Abstract	1
Chapter-I	2-10
Introduction	3
Review of Literature	5
Statement of the Problem	8
Objective of the Study	9
Methodology	9
Chapter-II	11-16
Area Profile	12
Chapter-III	17-30
Analysis and Findings	18
Chapter- IV	31-34
Conclusion	32
References	35-37
Appendix	38-46

List of Tables

	Page No.
Table No. 2.1. Educational Status in percentage in both Slum and Non-Slum Areas of Sambalpur Towns	13
Table No. 2.2. Distribution of hamlets on the basis of Geographical Location	15
Table No. 2.3. Distribution of Households on the basis of Area and caste	15
Table No. 3.1. Statement on Water Supply and Demand Status	20
Table No. 3.2. Total Water Demand and Supply	21
Table No. 3.3. Daily Water Consumption of the Households	25
Table No. 3.4. Distribution of households on the basis of satisfaction towards the quality of Water	26
Table No. 3.5. Distribution of households on the basis of satisfaction towards the quantity of Water	26
Table No. 3.6. Distribution of Households on the basis of Problems Facings in Water Supply	27
Table No. 3.7. Households Satisfaction towards the regularity of water Supply	29
Table No. 3.8. Percentage of household Paying Water Bill	30
Table No. 3.9. Percentage of complain registered and solved by the higher authority	30

List of Figures

		Page No.
Figure No. 2.1.	Local Map of Sambalpur	12
Figure No. 2.2.	Educational Status of Slum Area	14
Figure No. 2.3.	Educational Status of Non-slum Area	14
Figure No. 3.1.	Source of Drinking Water in Non-slum Area	19
Figure No. 3.2.	Source of Drinking Water in Slum Area	19
Figure No. 3.3.	Over All Sanitation Condition of Non-slum Area	22
Figure No. 3.4.	Over All Sanitation Condition of Slum Area	22
Figure No. 3.5.	Gender wise Water consumption in non slum area	23
Figure No. 3.6.	Gender wise Water consumption in Slum areas	23
Figure No.3.7.	Age wise Water consumption in Slum area	24
Figure No. 3.8.	Age wise water consumption in non slum area	24

Abstract:

The study was designed to understand the proper utilization and consumption pattern of water in urban areas. In past few years, ground water level in India is going down. The population has been increased exponentially, leading to improper use of water. Unfortunately, with diminishing resources of water, the human behaviour towards water conservation is not changing. During present study efforts have been made to assess the different income group consumer's behaviour with respect to the decreasing water supply. It has been observed that due to unawareness, people are using more water than it is needed. The finding shows that the higher income group people in urban area are using more water than lower income group people. The water totally depends on the size of the family. This needs to be addressed immediately by changing public perception towards water use through media and by organizing public awareness programs. It is hoped that the results of the study would benefit the urban development authorities in optimizing the existing water resources through proper distribution system viz-a-viz society.

Chapter-I

Introduction

INTRODUCTION

Water is one of the five essentials which compose Nature. Others are earth (soil), space (sky), air and fire. Human Geographers, especially the determinists, believe that these elements of nature also determine the social nature of human beings. The possibility tend to believe that with the help of science and technology man can control nature and make use of or create these elements for its survival and sustenance. In our day to day life we depend on these five elements of nature to assorted extents. In the early days of human civilization these resources (except fire) were in great quantity and there were very few users. As time passed, population increased and the progressive population went for recognized legislations, agricultural modernization, and industrial urbanization thereby increasing competition among people and Nations to possess and utilize these resources for consumption, comfort and commoditization. (Joy et al., 2006).

The scenario of water resources in the earth reveals that though the resources are abundant in quantity, the amount of availability is very less. The total volume of hydrosphere of the earth is distributed in the oceans (97.2 %); in glaciers, ice caps and ice sheets (1.8%), ground water (0.9%), fresh water in lakes, inland seas and rivers (0.02%) and atmospheric water vapor (0.001%) (Baboo B, 2009). Ground water and fresh water are useful or potentially useful to humans as water resources. These imply that availability of water for human beings and the flora and fauna is limited. However, most of it is contained in sea and ocean and saline and cannot be put to human use unless treated properly. Desalination process is very luxurious and third world countries would find it difficult. Water, available for human use is a scarce commodity and we cannot survive without it. Hence human beings must sensibly utilize this sweet water. Besides consumption by humans and other living organism for health and sustenance water has several uses in and as irrigation, industry, pollution control, chemical solvent, fire extinguisher, recreation etc. Water is considered a purifier of persons and place in most religions in terms of ritual washing/ablution, immersion, ritual bath of the living and the dead etc. Sometimes people talk of the sacred or holy rivers like the Ganges and the Cauvery in India may be because of its multiple use and description in religious scriptures. Water plays an important role in the world economy as it functions as a solvent for a variety of chemical substances and facilitates industrial cooling and transportation. Approximately 70% of freshwater is consumed for agriculture, 20% for industry and 10% for domestic use (Baboo B, 2009).

Water is a precious natural resource and one of the most essential requirements of all living being. Regions with the highest growth rate are not having access to water both in terms of quality and quantity. Indian cities receive intermittent water supply. From the dawn of human history, water has been an essential requirement for the survival of humans and ecosystems (Biswas, 2006). The colorless, odorless, and tasteless liquid known as water is indispensable for all sorts of growth development of human kind, animals and plants. As water is a key resource and we can never produce more water, water running deserves priority in the development and preservation of any area (Jethoo and Poonia, 2011). India has been always lucky in having plentiful fresh water reserves, but the increasing population and overexploitation of surface and ground water over the past few decades has resulted in water scarcity in many regions of the country. In years to come, water, the need of life, is possibly to pose greatest challenge on account of its increased demand with population rise, economic development, and shrinking supplies due to over exploitation and pollution. In India, with development, the demand of water is increasing both in urban and rural areas. This may create increased tension and dispute between these areas for sharing and command of water resources (Shaban A, 2008).

The water utilization and consumption pattern is different in urban and rural areas. The water utilization in urban areas is more than the rural areas. In rural area people depend on pool, tube well, bore well etc but people live in urban areas fully depend on the municipality supply water. It is certain that societies are going to have to confront, among other things, demographic transitions, geographical shift of population, technological advancement, growing globalization, degradation of the environment and emergence of water scarcities. Water, the need of life, is likely to pose the greatest challenge on account of an increased demand with population rise and economic development, and shrinking supplies due to over-exploitation and pollution. A majority of households in major cities in India depend on the municipal water supply for their daily needs. The 54th round NSSO data show that 70.1 per cent of the households in urban India depend on tap water (municipal supply), 21.4 per cent on tube wells, 6.7 per cent on wells/open wells, and the rest on other sources (Bajpai and Bhandari 2001).

As most of the household in urban areas are depending on tap water, it is a major challenge for the Government to provide safe water to all households for their household consumption. Due to increasing awareness about health and sanitation, growing population and

requirements for industries there is increased demand for water. Water is both an economic good as well as a social good. Unscrupulous people have also been using water sources as dumping ground as a result of which there is increasing pollution. This may be the biggest simple misuse of water to the extent that a pollutant limits other uses of water. It becomes a waste of the resource, regardless of benefit to the polluter. Pollutants also affect the aquatic life. Clean, fresh drinking water is essential to human and other life. Access to safe drinking water has improved steadily and substantially over the last few decades in almost every part of the world keeping in line with the Millennium development Goal. However, some observers have estimated that by 2025 more than half of the world population will be facing water based vulnerability that is water crisis.

Review of Literature:

The colorless, odorless, and tasteless liquid known as water is indispensable for all sorts of growth development of human kind, animals and plants. As water is a key resource and we can never produce more water, water running deserves priority in the development and preservation of any area (Jethoo et al, 2011). A standard for water was identified thirty years ago. In 1977, the United Nations determined the concept of a water used standard to meet people's basic need for water. *"all people, whatever their stage of development and their social and economic conditions, have the right to have access to drinking water in quantities and of a quality equal to their basic needs"* (United Nations 1977). There has always been a large disparity in the access to water supply and sanitation of people in different levels of consumption expenditure in urban areas. A large majority of poor people do not get the lowest quantity of water for their daily use but the progressivity in the pricing of water in most of the states and cities and as a result a large portion of this subsidized facility is used by the higher income population. The result in wastage and non-priority use of water (Kundu, 1991).

Disparities for an access to drinking water persisted in rural and urban areas. In the urban areas absence of progressive pricing, a very large proportion of subsidized water was using by the higher income groups. The distribution pattern was more impartial in rural areas in comparison to urban areas. At the organization level pricing be able to be used to reducing inefficiencies in water usage and would help reallocating it to other priority uses. In the rural areas, where most of the households have low incomes to pay for water need to be given high

priority in terms of accessibility to clean and safe drinking water (Reddy & M S Rathore, 1993). Residential water is used for household purposes, such as drinking, food preparation, bathing, washing clothes, flushing toilets, and watering lawns and gardens. According to the guidelines for Drinking Water Quality, WHO defines residential water as being “water used for all usual domestic purposes including consumption, bathing and food preparation” (WHO, 1993). Standards for residential water use vary with climatic conditions, life style, culture, technology and economy. There is no fixed data to estimate the amount of water needed to maintain acceptable of minimum living standard (Zhang, 1999). According to the WHO about 1.8 million people die in drinking polluted drinking water and from diarrhea diseases annually worldwide. The declining trend in the use and provision of basic amenities needs immediate attention at the policy level. The main reason for this decline is the low efficiency in managing resources like drinking water, where distribution and transmission losses are high. Policy-making should also focus on demand-side aspects like increasing water use efficiency, recycling and promotion of water saving technologies (V Ratna Reddy, 2001).

Water is an urgent necessity for the survival of the biosphere. Excessive water is equally harmful. River dam construction is a major mechanism for flood control which also has various other utilities. However, large dam construction has several disadvantages as well. The study of Hirakud Dam in Orissa informs us that the controlling Nature has its own hazards and power and politics play important role in developmental initiatives which justifies the old saying ‘one man’s food is another man’s poison’. At a higher level of abstraction the centre periphery theory seems to be more befitting to this situation (Baboo, B, 2001). The poor and marginalized people living in rural and peri-urban settlements are most in need for improved and safe drinking water, appropriate forms of sanitation and access to water for other domestic purposes (Crow, 2001). Water use feedback systems can stimulate feelings of accountability from consumers for their behavior. Feedback analysis can also support governments in finding high and low users and system leakages (Infraguide, 2003).

Access to water is a prerequisite for health and livelihood, which is MDG target, was formulated in terms of sustainable access to affordable drinking water supply. The availability of improved and quality water supply and sanitation infrastructures are widely recognized as an essential component of human rights, social and economic development (ADF, 2005). The

condition of clean water, sanitation and removal of storm water to all the residents of the large urban centers of developing countries will be one of the major challenges of the 21st century, the magnitude and the complexity of which no earlier generation has had to face (Biswas, 2006). A majority of households consume water below the particular standard and people show satisfaction with available supply. Because they have limited their aspiration and requirements of water in relation to available supply from the municipalities or water authorities. The availability and method of use of water varies across the socio-economic classes within the cities. Only about 18 per cent of the total households in the metro cities get 24 hours of municipal water supply. So, the households in a majority of the cities depend on groundwater and other sources of water, like private vendors who supply water through tankers and drums. These sources, in turn, result in depletion of groundwater (S Abdul, Sharma R N, 2007).

An understanding of relationships between human activity and Natural systems is needed to integrate and forecast urban water demand (Hill and Polsky, 2007; House-Peters, 2010). The water use in the household is highly linked with the income of different groups. Most water consumption is observed in high income group people and middle income group people in India. Only High income group people and Middle income group people are responsible for large water consumption (Jethoo and Poonia, 2011). The world facing four major problem relating to water were identified. These were the provision of safe drinking water, water requirements for further agricultural, hydroelectric and industrial developments, sustainability of water development projects and development of water resources (Biswas, 2012). Many municipalities throughout Canada are experiencing the consequences of inefficient and wasteful water use. Studies focused on water consumption have shown that the Canadian average per capita water use is one of the highest in the world (EC, 2010). Water metering has been accepted as a step towards more conscientious resource use (Infraguide, 2003; BCWWA, 2012). Efforts encouraging municipal water use reduction hold many benefits for a community, as high freshwater withdrawals can lead to environmental degradation and social difficulties in the short and long-term. Consequences include the decreased security of access to safe potable water supplies for future generations (BCWWA, 2012).

One- third of rural and small town residents rely on private wells for their drinking water. Rural residents connected to a municipal water system have a higher per capita use of water than

urban residents. Water use appears to have a stronger association with economic incentives than with location characteristics. Households in areas with a higher proportion of water meters use less water than households in areas with a lower proportion of water metering. Rural households are less likely to treat their water than urban households. Location characteristics are significant factors in determining perception of water quality as measured by the choice of treating tap water for domestic consumption. Water source does not seem to affect water quality perception (Hardie D, Alasia A, 2009). In the midst of the new economic policy new priorities were rising in agriculture, industry and urbanization that will bring changes in both water accessibility and use. Water has always been a common property resource, which if now privatized or even considered as an economic good will give rise to new kinds of tensions. It is fact that because of extremely low rates, people perceive water as being a free resource. A water rate has been raised by the state governments both in urban areas and the canal irrigated areas. These rates were raised sharply after a certain minimum level of supply in urban areas so as to discourage lavish consumption and wastage. Encourage the cultivation of sustainable crops in different agro-climatic zones. Disparities were bound to widen between water-rich and water-poor regions. Rural and urban areas: cash crop and food crop cultivation areas; large cities and small towns and of course, between the rich and poor (P Sheela and C Ramachandraiah, 1999).

Statement of the Problem:

The literature reviewed above reflects that there is no much study on water utilization and consumption pattern. Though, few scholars have done some study on water but they are mostly confining to the demand and supply of water in urban areas. Significantly, very less study has conducted on consumption and utilization pattern of water resources and particularly in urban areas of Odisha. The rapid increase in the population, depleting water resources and improved consumer needs are going to create a difficult situation in urban areas. It creates problem in agricultural sector. Market-oriented development with new needs in sectors like the entertainment industry, the building Industry, new technologies with increasing water needs, improved supply in shopping malls, etc have brought a serious challenge in the case of water distribution in urban areas. The supply of water in the urban areas is going to be a serious challenge in the future. Therefore, an urgent need is felt to develop an inclusive water policy for urban areas which satisfactorily addresses the growing needs of citizens and various sectors.

Keeping all these issues in mind the present study made an attempt to explore the problem of water resources in Sambalpur town and also the consumption and utilization pattern of water resources of various households in the study areas.

Objective of the Study:

- To explore the issues or problems relating to the water resources in study area.
- Try to understand the utilization and consumption pattern of different household in the study area.

Methodology:

Study Universe:

The present study is based on the intensive field work carried out in Sambalpur town of Odisha during December, 2013. However, the study was confined to ten hamlets such are Laxmi Narayan Lane, Dhanupali, Budharaja, Ainthapali, J M colony, Durgapali, Thelkopara, Tahanlapara, Kalibari, Sahoopara of Sambalpur town.

Rational behind selecting the Study Areas:

Though there are few towns in Odisha, Sambalpur town was selected for the study with some specific reasons. In comparison to other towns in Odisha the scarcity of water is quite sever. The growth of industries in the periphery of the town has brought a great challenge in meeting the water needs of households. Specifically the poor households are facing lots of problem due to lack of voice. To understand the dynamics of these issues Sambalpur town is being selected.

Sampling Procedure and Sample Size:

For the selection of respondents three stages of sampling were followed. In the first stage some hamlets constituting low income group households and some hamlets constituting high income group households were identified. In the second stage five hamlets from each income group was selected. In the third stage using the circular random sampling method ten households from each hamlets were selected.

Source of Data:

Both quantitative and qualitative data was collected from primary and secondary sources. Primary data was collected from all the ten hamlets. For collecting primary data participant observation, case study and interview methods were used. For gathering quantitative data household survey were conducted using the pre-tested schedules. Besides this to verify the supply, demand and billing system, respected water authority and Municipality Officer were also interviewed. Audio-Video accessories were used during the collection of primary data. The secondary data were collected from official records, policy documents, published reports of similar projects, journals, books and related literature.

Data Analysis:

Both qualitative and quantitative data collected were analyzed in the backdrop of the project objectives. Quantitative data will be tabulated and statistically analyzed using SPSS software using multiple indicators. Qualitative data shall be interpreted based on the information collected from the field setting using content analysis.

Significance of the Study:

The central focus of the study is to highlight the issues or problem relating to the water resources and to understand the utilization and consumption pattern of water in different households in the study area. The understanding of utilization and consumption pattern of water resources will help in developing a better policy frame. This study will help us in developing better framework for proper utilization of water resources.

Chapter-II

Area Profile

Odisha depends largely upon monsoon for its water resources. Southwest monsoon triggers rainfall in the state. About 78% of total annual rainfall occurs during the period from June to September and the balance 22% in the remaining period. In addition to seasonal availability, the rainfall in the state also shows spatial disparity. This resulted in causing droughts in some parts of the state and floods in some others. The state is endowed with an extensive network of rivers and streams. 75% of the average annual flow can be utilized. Due to increasing demands for water for various uses leads to shortage of water in many district of Odisha. Sambalpur is one of them.

Sambalpur the western town of Odisha located around 320 km from the state capital, derived its name from the presiding goddess Samlei, whose stone image was discovered by Balaram Dev, the first chowhan kings of Sambalpur. The town located along side the river Mahanadi and spread over an area of 33.7 Sq Km. The town is famous for its Sambalpur textiles. Hirakud dam, the longest earthen dam in the world and the largest artificial lake of Asia is situated near Sambalpur. The population of the town for the census year 2001 was 1, 53,643 and the current population as of 2011 is estimated to be 1, 83,147 with the slum population of 74,131 (40%). The total number of households as of 2011 is 41411 in which 26595 are slum households. The town divided into 29 administrative wards is spread over 33.66 Sqkm slopping west to east and has a total road network of 503 km. Due to its importance of trading, there are good number of floating population in the town.

Figure No: 2.1.: Location map of Sambalpur City.



(Source: Google Map)

Nearly 40% of the total population of the town lives in slum. There are around 105 slums situated in the town of Sambalpur. Out of which 88 are authorized and 17 are unauthorized slums. If we look at the total population size it is found that while around 74,131 people are living in authorized slum areas around 26,595 are in non slum areas (City Sanitation Plan, Draft Sambalpur Municipality, 2011). The slums are facing difficulties due to deficiency in various infrastructure facilities like roads, water supply, drainage, street lighting, solid waste management etc. Municipality is taking up a number of slum improvement and poverty alleviation programs with assistance from State Government and Central Government.

Lots of efforts are being taken to raise the literacy rate of the city. The literacy rate of the Sambalpur town is shown in the table below.

Table No. 2.1.: Educational Status in percentage in both Slum and Non-Slum Areas of Sambalpur Towns

Category	Non-slum	Slum
Average Literacy Rate	79.09	62
Male Literacy Rate	86.16	51
Female Literacy Rate	71.47	40

Education plays important roles in our day to day life. If the people are educated than it leads to the better understanding of the water problem. Because educated or the literate people are more conscious about the conservation of water. The data reveals that generally in non-slum area people are more educated than people who are living in slum areas. They are giving more importance to education. Education is the only way to bring changes in the society. More than 85% of people in non-slum areas are graduate. Around 55% people have passed matriculation and 40% have Professional qualification. The scenario is totally different in slum area. Around 45% households are illiterate. Around 30% people have passed primary education. There was very less number of graduate and Professional qualifications in slum area.

Figure No.2.2: Educational Status of Non-slum Area

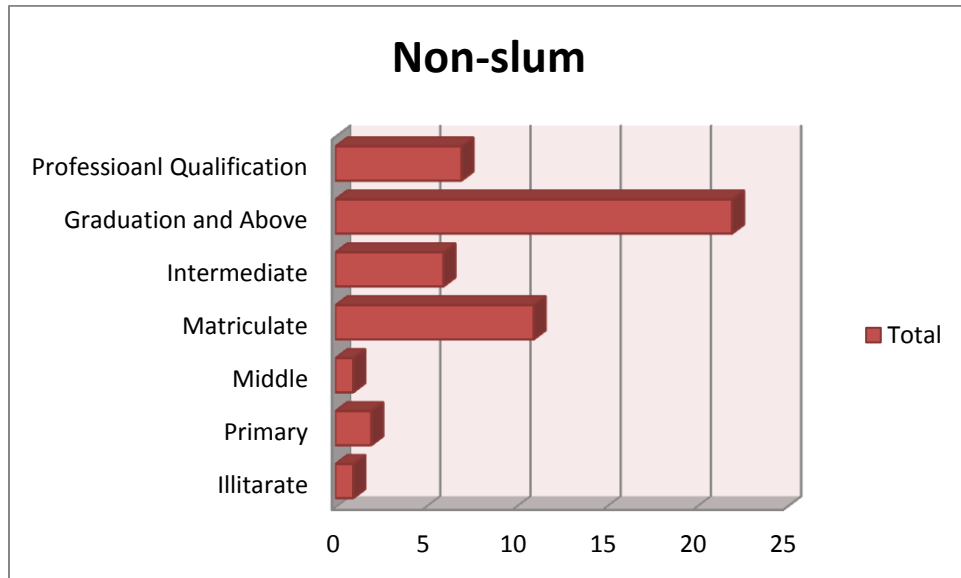
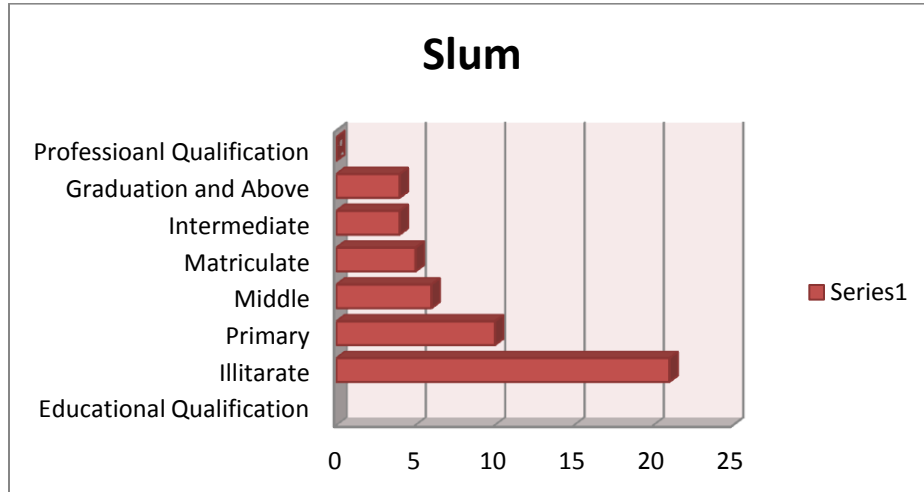


Figure No. 2.3: Educational Status of Slum Area



Demographic details of the Study Areas:

The study was carried out in ten hamlets in Sambalpur town of Odisha. We had taken Budharaja, Ainthapali, J.M. Colony, L.N. lane, Dhanupali, Durgapali, Tahanlapara, Sahupara, Thelkopara, Kalibadi areas of Sambalpur town.

Table No. 2.2: Distribution of hamlets on the basis of Geographical Location

Areas	Hamlets
Non-Slum Areas	1. Budharaja 2. Ainthapali 3. J.M. Colony 4. L.N. Lane 5. Dhanupali
Slum Areas	1. Durgapali 2. Tahanlapara 3. Sahupara 4. Thelkopara 5. Klaibadi

The data collected from field shows that fifty sample households were taken from each area. While around 84% of households in non-slum areas belong to general community only 10% households are belong to general communities in slum areas. Slum areas are mostly dominated by OBC (50%) and SC (34%) communities. The tribal population is concentrate only to slum areas.

Table No: 2.3: Distribution of Households on the basis of Area and caste

Caste	Non-slum Area	Slum Area
GC	42	5
SC	4	17
ST	0	3
OBC	4	25
Total	50	50

There are many things which lead to wastage of water. People are not aware about the wastage of water. Both the literate and illiterate people are responsible for the problem. Communication plays an important role between Municipality and people of the town. The poor piping system is observed and unequal distribution of water leads to conflict among various stakeholders. One of the most important things is Municipality provides more water for industrial uses rather than agricultural uses. Since 2009, there is no water problem in Sambalpur town. But the utilization and consumption pattern of water is not properly used by the people. Among the ten hamlets, the people of Kalibadi and Durgapur area face more problems regarding the supply of water. Among the ten hamlets I have taken five of general household and five are from slum household. The areas of Budharaja, Ainthapali, J.M. Colony, L.N. Lane, and Dhanupali consist of APL holder people. And, Durgapali, Tahanlapara, Sahupara, Thelkopara, Kalibadi consist of BPL holder people. People were showing their BPL cards during the field study. It is more famous among the slum people.

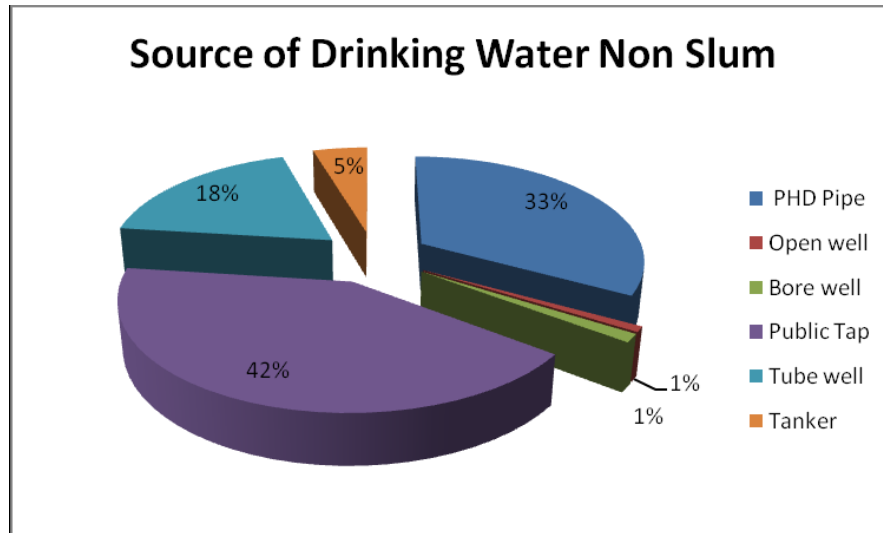
Chapter-III

Analysis and Findings

I

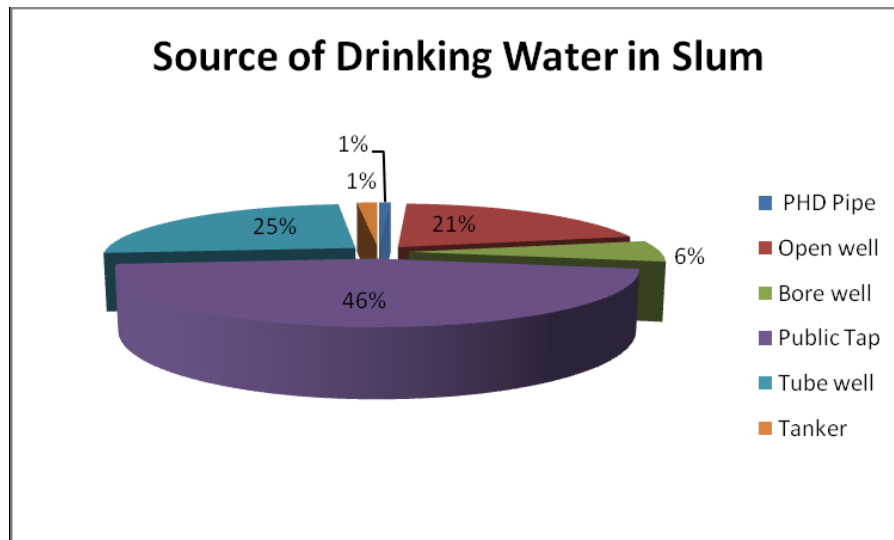
During field work it was observed that households living in different parts of the town are facing lots of problem in getting safe drinking water and water for other domestic consumption. There are many thing which leads to wastage of water. People are not aware about the wastage of water. Both the literate and illiterate people are responsible for the problem. Communication plays an important role between Municipality and people of the town. Due to lack of communication between Municipality and households most of the households are not able to conserve the water resources for their consumption. Irrespective of geographical location households from different areas had shown their grievances towards the irregularity in timing of water supply during field work. The poor piping system and unequal distribution of water have dragged various stakeholders into the land of conflict. One of the most important thing is Municipality provide more water for the industrial uses rather than agricultural uses. Wastage and theft of water and illegal connections and high system loss were observed during field work. It is observed from the primary survey that as high as 40-50 % of both non slum and slum households depend on public stand post. While 2013 Urban Water Policy claims to provide 100% households with piped water connection, the reality differs. The data collected from the field reveals that while around 33% of households in non slum areas are having piped water connection only 1% in slum areas is having piped water connection (Figure No.3.1 & 3.2). It shows that all most all the slum areas households are deprived from safe piped water. The question raised here whether the poverty, administrative incapability or administrative constrains are major constrain in making those vulnerable more deprived. Though in every election they get a big promise from all parties but thereafter they are being neglected because of lack of voice and wealth. During field work people from both slum and non-slum areas show their grievances regarding availability of water and the problem they are facing during summer. They are spending much of their valuable times in fetching safe drinking water. While in slum areas the women are spending around 3-4 hours per day for collecting the water from public taps, women in non slum areas are spending 2 hours per day during midsummer.

Figure No.3.1: Source of Drinking Water in Non-slum Area



(Source: City Sanitation Plan of Sambalpur)

Figure No.3.2: Source of Drinking Water in Slum Area



(Source: City Sanitation Plan of Sambalpur)

The idea of all individuals must get at least 70 liters Per Capita per Day (LPCD) progressively increased to 135 LPCD in Odisha state urban water policy 2013. Urban poor shall receive all the facilities available to other residents, at an affordable cost. However, the data collected from municipal office reveals that the present administrative system has failed in supplying around 70 litres water per individual in a day. It is providing around 218 liter water to

a household. Sambalpur town is consisting of 195812 populations (Census Towns of Odisha, 2013). The main source of water supply of the town is the Hirakud Reservoir and Ayodhya Sorabar of river Mahanadi. The number of productive well is six in the town. The Municipality is facilitated with piped water for every household. In every ward, Municipality has covered with piped water facilities. The town has many water facilities like piped water, well, tube well, bore well etc. But most of the people are using piped water for their livelihood. The total number of wards, which is fully covered with piped water are 25, partly covered is 4. So, the total number of covered with piped water are 29 (Table No. 3.1). In the town people depend on piped water rather than any other water sources.

Table No 3.1: Statement on Water Supply and Demand Status

District	Population	Source of Water Supply	Total No. of wards covered with piped Water
Sambalpur	195812	1. Hirakud Reservoir 2. Ayodhya Sorabar of River Mahanadi	Fully Covered- 25 Partly- 04 Total- 29

(Source: Water supply status in 103 ULBS+2, census towns of Odisha.)

Everywhere the demand for water is increasing. Due to population growth, industrializations, degradation of ground water, the level of water is decreasing day by day. The same case found in Sambalpur town. Though, Sambalpur is situated in the bank of river Mahanadi, the water availability is decreasing day by day. The main source of water supply is discussed in (Table No.3.2). The rate of demand in liter per capita per day (LPCD) is 135 liter in a day. The total quantity in Million liters per day (MLD) is 26.43 liter. The rate of supply in liter per capita per day (LPCD) is 218 liters in a day. The total daily supply in Million liters per day (MLD) of ground water source is 0.59 percent. The total supply in Million liters per day (MLD) of surface water is 42.00 percent. So, the total daily supply in Million liters per day (MLD) is

42.59 percent. Sambalpur town has having 618 total number of functional hand pump and tube wells. Around 11365 households in town have service connection. Especially in slum areas people mainly depend on stand posts. Municipality provides stand posts in every ward of the town. The total number of stand posts available in Sambalpur town is 965. All most all the households in town depend on stand posts as per the availability of water.

Table No.3.2: Total Water Demand and Supply

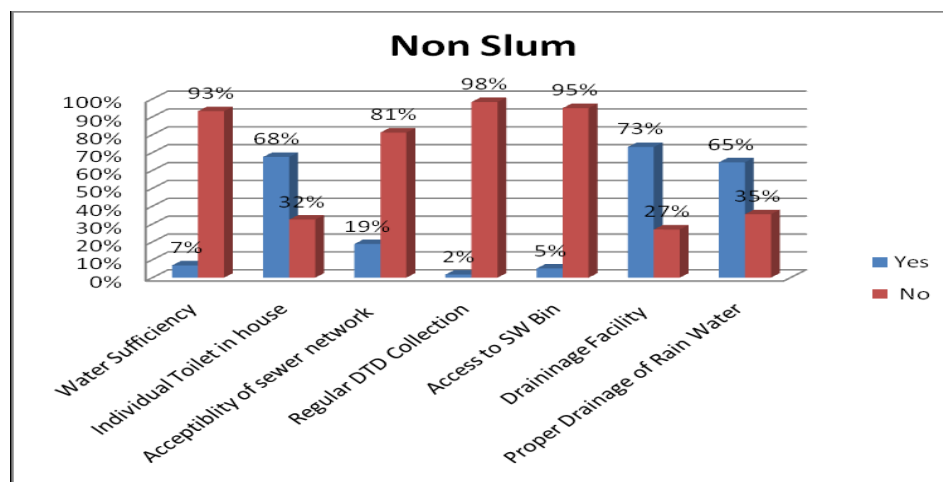
Rate of Demand in LPCD	Rate of Supply in LPCD	Total no. of Functional HP &TWs	Total no. of Stand Posts
135 litres	218 litres	618	965

According to City Sanitation Plan, Draft Sambalpur Municipality the water supply coverage is about 48% where there are 11386 direct piped water supply connections. The physical coverage is also quite low. As against 503 km road length the water network is available in about 150 km only. Majority population depends upon around 950 public taps, 530 hand pumps, open well & tanker supply. Basic services are available for urban poor. Sambalpur has total 105 numbers of slums out of which 88 are authorized and 17 are unauthorized slums. Out of 74,131 households in the town around 26,595 households are located in slum areas. Nearly 40% of the total population of the town comprises of the slums. The slums are facing difficulties due to deficiency in various infrastructure facilities like roads, water supply, drainage, street lighting, solid waste management etc. Municipality is talking up a number of slum improvement and poverty alleviation programs with assistance from state Government and Central Government. It can be seen that the own source revenues are very low and the town depends almost on grant devolutions from the state government. Also the expenditure on salaries is very high. The text collection efficiency varies in a range of 35%-45% leading to increased arrears. Also a decreasing trend in collection is observed which is alarming and mostly attributed to shortage of manpower.

From the data of City Sanitation plan it is observed that the slum areas are deprived of the basic requirement. There is a huge scope for improvement in the services levels. 93% of non slum and 95% of slum residents complain about the sufficiency of water. Irrespective of areas all

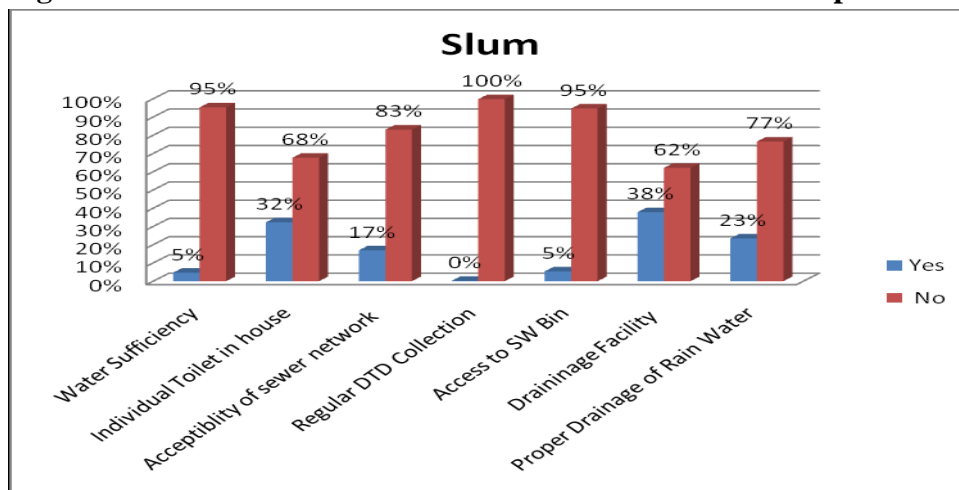
most all households from both slum and non slum areas claim that water services are not regular. Around 95% households from both slum and non slum areas claim that it is not so easy to access the Municipal bins to file complain. Figure bellow shows that around 62% households in slum areas and around 27% households in non slum areas showed their displeasure regarding drainage facilities (Figure No. 3.4&3.3).

Figure No. 3.3: Sanitation Condition of Non-slum Area in Sambalpur Town



(Source: City Sanitation Plan of Sambalpur)

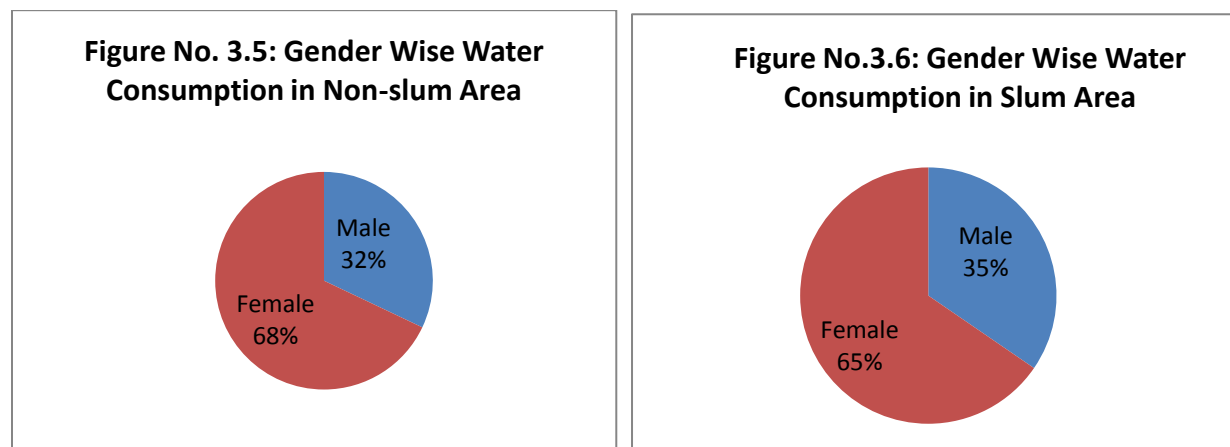
Figure No.3.4: Sanitation Condition of Slum Area in Sambalpur Town



(Source: city Sanitation Plan of Sambalpur)

II

Water plays a major role in meeting the day to day needs of the common people in the earth. Based on gender, age, season and other factors the demand and consumption pattern varies. Gender plays an important role in every society. The data collected reflects that consumption pattern of water varies according to the needs of different gender. In general we all know that women are using more water in every household. Highest number of liter used by women is for the household activities. Here data reflect that around 68% percent of water used by women in non slum areas in daily household activities, where as it is around 65% in case of slum areas (Figure No.3.5 & 3.6). Women are requiring more water because they are involved in performing maximum number of domestic works. The women in slum areas use more water for the domestic purpose. Most of the women in slum areas are home maker; they usually stay in home and do domestic works. So, they are using more water for the domestic purposes. So, in every household women are using more water than men.



In the case of age, it was found that irrespective of economic position and location living adults from both slum and non-slum areas consume more water in comparison to other age groups. Children in both the areas consume less water in comparison to other age groups that is around 18% (Figure No. 3.7 & 3.8). From the previous observation it was found that consumption and utilization pattern of water totally different in slum and non-slum areas.

Figure No: 3.7: Age Wise Water Consumption in slum Area

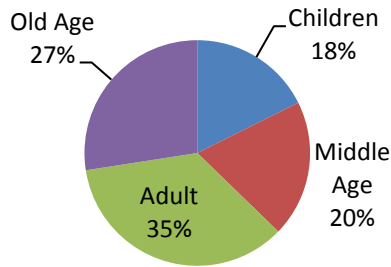
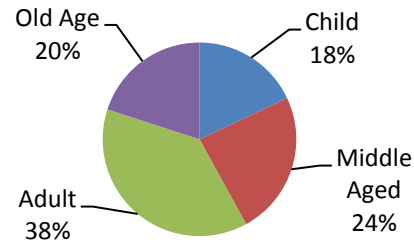


Figure No: 3.8: Age Wise Water Consumption in Non-slum Area



During field study it was observed that the use of water in daily basis is different from each household. The consumption of water is fully depending on the family size. If the family size is big than the consumption of water is also more. If the family size is small than the consumption of water is less. The data collected from field reflects that the consumption of water varies from non slum to slum areas. The data collected from field shows that the high income group people are using more water rather than lower income group people. Though the people of higher income are more concern about water but their life style are differ from lower income group people. The slum area's people are less concern about the preservation of water because they are not aware about water relating problems. They are mostly happy with the water supply. Because their life style are not much sophisticated than general households. In every household water plays an important role for the domestic uses. While around 55 liters of water is being consumed for domestic uses by households in non slum area, in slum areas it is about 40 liters. Mainly the high income group people have garden in their home. They used to consume water for gardening. But in slum areas or the lower income group people do not have garden in their home. So, they do not consume more water for their households. Basically people do not consume more water for gardening. The analysis shows that while around 30 liters of water is being consumed by households in non slum areas for daily gardening purpose, it is about zero liters in slum areas. In high income group people are using water for the washing car, pet animal bathing etc. On an average each household in non slum areas consume around 190 liters water, whereas it is around 125 liters consumed by each household in slum areas (Table No. 3.3). However, the demand for water varies from season to season. The data from field shows that the demand for water increased around 20 % during summer.

Table No 3.3: Daily Water Consumption of the Households

Purpose	Amount of Consumption (in litre)	
	Non-Slum	Slum
Drinking	25	20
Bathing	65	40
Domestic	55	40
Gardening	30	00
others	15	25
Total	190	125

The households in non-slum areas are more concern about the uses of water because they are more concern about the water. Here, literacy plays a very important role. Because literate people are more concern for the conservation of water. They are aware about the consequences of shortage of water. But at the end water uses are mainly depend on the family sizes. If a family consist of more member than the water uses also more but the family is small than the water uses also less.

The quality of water is very good in the town. From the research it is observed that maximum number of people happy with the quality of water in both the areas. The sample we collected shows that around 95.3 percent of people in Sambalpur town happy with the supply of water in non slum areas. Due to the direct pipe connection they get sufficient water every day. Sometime the people of Dhanupali area are getting brown water from their taps. Mainly in rainy season people use to get brown water from their taps. The sample collected shows that around 84 percent of households living in slum areas of the Sambalpur town are happy with the quality of water supplied. Around 95 % households living in non slum areas have shown their satisfaction towards the quality of water (Table No. 3.4). People of Durgapali, Kalibadi and Tahanlapara people are facing quality of water problem. Because they do not have any other facilities than road side stand posts. According to the (Table No 3.1) 965 stand posts provided by Municipality or the water Authority of Sambalpur town. People directly depend upon the public stand post of the slum areas. The water pressure is not up to the mark in many hamlets. People demand for the improvement in pressure of water.

Table No. 3.4: Distribution of households on the basis of satisfaction towards the quality of Water

Location of households	Level of satisfaction	
	Yes	No
Slum	42	8
Non-Slum	48	2

During field survey it was observed that different households have given different response on the basis of their residential location towards the quantity of water they received on daily basis. Around 74 percent of the households living in non slum areas have shown their happiness with the quantity of the water. People are getting two hours of water in a day. Water has been supply for twice in a day. Around 63 percent of the people in slum area are happy with the quantity of the water. As all of them have not received piped water connection, maximum number of them showed unsatisfaction with the quantity of the water (37%) (Table No: 3.5). Because they are fully depend on public stand posts, well, tube or bore well etc. It takes more time to go and take water from different places. Mainly women are doing this work for their household. It is not possible for women to get water from other places every time. In the slum areas people are lagging behind the use of direct water connection because they do not have their land prove or the house's proves.

Table No. 3.5: Distribution of households on the basis of satisfaction towards the quantity of Water

Location of households	Level of satisfaction	
	Yes	No
Slum	37	13
Non-Slum	30	20

In each and every part of India people are facing water problem in different seasons. The present study reflects that majority of the households facing water shortage in summer season. But people of Sambalpur are also facing problem in rainy season. Usually in rainy season people are getting brown water from their taps. People were claimed that they give complain to higher

authority for the betterment of the water but Higher authority didn't take any initiative to solve the water problems. Around 42 percent of people of general household facing problem in different season. In summer they are facing serious water problems. Due to water storage tanks people in non slum areas face comparatively less problem than slum areas. During the time of scarcity of water people are mainly depend on nearby water bodies, neighbors, use stored tank water or buying water from outside. During scarcity Municipality has also provides water tank for the households. Around 80 percent households of slum areas are facing water problem in summer (Table No: 3.6). Mainly in Durgapali people are depend on river because they don't have Municipality direct water connections in their households. Durgapali is situated around ten kilometers far away from the Sambalpur town. So, the Municipality has shown its' inability to provide water facilities to that area. So, the households in this area are fully depending on the public stand posts, river, tube wells etc. Normally in summer season rivers are dried up and people are facing problem. In rainy season, the water of the rivers is getting brown. So, people are enabling to use that water for their domestic uses or any other uses. During the field study it was observed that in slum areas people are facing more problems in different seasons. Both the households are facing problems but it is adjustable in non slum areas.

Table No 3.6: Distribution of Households on the basis of Problems Facings in Water Supply

Location of households	Problems faced	
	Yes	No
Slum	40	10
Non-Slum	21	19

During field survey it was observed that the regularity of water supply is differing in different areas. The people of Budharaja area do not face any water problem in any season. Water is plenty available in that area. The water supplying tanks are available nearby the Budharaja. Around 100 percent people of Budharaja area has enjoy the fullest of water supply. Same situation in Ainthapali area, it is also near to the water supplying tanks of town. People of this area do not face any water problem in different seasons. So, the people of Ainthapali area are free from the problem of water supply. Somehow the people of J.M. Colony are facing water problem because in the colony it was found that there are many break downs of water pipes. So,

most of the people are not able to use the Municipality piped water facilities. But the percentage shows that 99.3 percent of people are happy with the supply of water. Around 99.7 percent people of L.N. Lane are happy with the supply of water. The people of L.N. Lane area are sometime facing water problem because of the breakdown of the pipes, road construction etc. Around 99.8 percent people of Dhanupali area are happy with the regularity in supply of water. Maximum numbers of people in Dhanupali area are having their own well or tube well. The major water problem is being faced by the Durgapali area people. The people of Durgapali are not getting direct Municipality piped water connections. Due to information gap between people and Municipality, ultimately people are the real sufferer. Around 38 percent people of Durgapali are happy with the regularity in supply of water. Rests are not happy with the supply. Around 46 percent people of Tahanlapara are happy with the supply of water. Maximum numbers of people are not happy with the supply of water. The same problem arises in every slum area which was observed through the field work. Around 41 percent people of Sahupara are happy with the supply of water or the regularity of the supply of water. During the field work it was observed that the people of Sahupara were much more worried about the political constants. Due to the political causes they are not getting water or the direct piped connections. They don't have the land proves paper. That's why they are lagging behind the supply of water. Around 53 percent people of Thelkopara are happy with the supply of water. More than fifty percent of people of the area are happy with the supply of water. Thelkopara is situated nearby the main water tank of Sambalpur town. The main source of water supply in the town is Modipara water tank. So, in this case the people of Thelkopara are luckier than any other slum people. Around 39 percent people of Kalibadi area are happy with the regularity of water supply. Similarly Durgapali, Kalibadi people are also facing problem in every season. People of Kalibadi are fully depend on the public stand posts, rivers, well, tube wells etc (Table No: 3.7). They don't have any other option to get water. They are directly or indirectly depend on the other water sources. These problems are arising day by day because people are not aware of the public distribution systems. Information gaps between the Municipality/ Water Authority and people. People are not giving water bill in time in general household. In slum areas people are not willing to give water bill. Municipality has formulated two different rules for general households and slum households. The above poverty line people should pay 170 rupees in every month and the below poverty line people should pay 30 rupees in every month as water bill. Both the households has not pay water bill in

every month. Water availability is different in different households. Households of non-slum areas are more satisfied with the use of water. Due to some political and administrative constraints households of slum area are not satisfied with the regularity of the water.

Table No 3.7: Households Satisfaction towards the regularity of water supply

Sl. No	Types of Household	Areas	Percentage
1	Non slum	Budharaja	100%
2	Non slum	Ainthapali	100%
3	Non slum	J.M. Colony	99.3%
4	Non slum	L.N. Lane	99.7%
5	Non slum	Dhanupali	99.8%
6	Slum	Durgapali	38%
7	Slum	Tahanlapara	46%
8	Slum	Sahupara	41%
9	Slum	Thelkopara	53%
10	Slum	Kalibadi	39%

Data collected from field shows that 80.2 percent households from non-slum areas are paying water bill in every month (Table No: 3.8). People don't aware of the water bill. They are not willing to pay anything for the Water department. Though, most of the households claimed that they are paying water bill in a regular basis, but the data collected from Municipality department shows that most of them are irregular and even not paying their bill. The literate people are aware about the water bill, because of their carelessness they are not paying anything to the department. In slum areas around 12.7 percent people are paying water bill. They are little bit concern about the water and the billing system. They said that the billing system should be improved by Sambalpur Municipality. People should pay water bill in time. From the above table it shows that, maximum number of people are not paying water bill. The water problem arises due to the improper billing system. Though municipality has failed in providing piped water connection to all the households in slum areas, they are charging around 30 rupees from each household every month. This creates a grievance in the mind of public for which most of them are not paying water bill in time.

Table No 3.8: Percentage of household Paying Water Bill

Sl. No	Types of Household	Percentage
1	Non Slum	80.2%
2	Slum	12.7%

The analysis over water utilization and consumption pattern reveals that around 38.8 percent households residing in non slum areas complained to the higher authority relating to the water problem. People living in non slum areas mainly complained for the pressure of water. They didn't get the appropriate pressure, which they want for their households. People also claimed for the betterment of billing system and maintenance etc. However, municipality has failed in solving the problems of most of the households. Though 38.8 percentages of households in non slum areas field complain, only 36. 2 percentage of the complain registered was solved by the municipality. The interesting thing observed in the field that though around 64.2% households in slum areas have filed their complain regarding water problem, only 16 % of those problems are being addressed by the higher authority (Table No.3.9). This reflects the apathetic attitude of higher officials towards the slum people. The study reveals that information gap between Municipality and people are cause for the high degree of negligence. During field work fault was observed in both the sides. People are not filing the complaint in proper time to make Municipality to take initiation in right time.

Table No 3.9: Percentage of complain registered and solved by the higher authority

Sl. No	Types of Households	Percentage of Household Complained	Percentages of Complain solved
1	Non Slum	38.8	36.2
2	Slum	64.2	16

Chapter-IV

Conclusion

Scarcity of water in the cities has come up as a major problem in the last few years. The State as well as other Non-governmental Organizations have been constantly worried about the future of water crisis in India. Taking some sociological methodologies into account the present study was carried out in both slum and non slum areas of Sambalpur town. From each area around 50 households were taken for final study. The study was carried out during December. It was confined to only ten hamlets of the town. In comparison with the other towns of Odisha the scarcity of water in Sambalpur is quite severe. The growth of industries in the margin of the town has brought great challenges in providing adequate water. The analysis of the study reveals so many aspects which are being discuss bellow.

The present study has shown that the use of water in the household is highly associated with the income level of different groups. The maximum consumption of water is pragmatically higher in upper level income group and middle level income group. Solitary higher income groups and middle income group incumbents are responsible for large consumption of water for domestic use like kitchen garden and car washing etc. Changes in lifestyle are responsible for the increase in consumption of water. The use of water has also gone higher due to climate change, in view of the fact that rising temperatures lead to increase in consumption of water for drinking, bathing and use of equipments such as coolers.

A few domestic water saving procedures can be adopted to make a difference. Technical measures like changes in water supply, improving maintenance, putting some water saving device in place, etc can improve the present situation. Broadcasting information, education, and higher tariff for water may change the consumption pattern of the households. Effective repayment may also support the cause. The town has sufficient water but there is dissimilarity in distribution and urban poor are the victim of the system. The treatment is low due to insufficient distribution network. There is large wastage and theft of water due to lack of metering and proper observation. The main matter of concern is illegal connections, suction from distribution line, system leakages and improper maintenance of the accessible infrastructure. Ground water is getting infected due to improper sewage collection and lack of treatment. Open defecation is common practice in the ponds leading to unhealthy and unhygienic conditions. Quality of water bodies in the city is degrading rapidly and the ponds are heavily silted. The deprivation of piped water has developed an agony in the minds of slum dewellers.

Limitation of the Study:

There was a strict prohibition of using electronic gadgets like camera, tape recorder etc, which would have helped in collecting more information. The respondent's self reports might have been biased due to social desirability factors. Due to academic constraints and long official procedure to get appointment, the researcher failed to carry out the field work for long time. In the slum areas it was very difficult to collect data people were less co-operative. Basically they don't want to give the information regarding any minimum things. The social crisis did not allow much time to interact with the household members.

Scope of the Study:

The basic understanding about the utilization and consumption pattern of water in urban areas helped us in developing an idea for further study. A future study can be carried out in relating to a particular area. Even Government policy and provision should be studied for an intensive study.

Recommendation of the Study:

- Water requirement for the domestic, commercial and industrial sectors should be planned by the town planning department. The potential growth factors for the city/town in terms of residential and industrial aspects should be assessed and appropriate population density/water requirement factors should be estimate. The population growth should also be taken into consideration over the projected period and the overall water demand should be estimated. The probable growth aspects of the real estate sector in the area should be taken into consideration and permissions must be given only according to the master plan for real estate developments. Water requirements for irrigation development in the area must be regularly updated.
- Satisfactory treatment and supply of water will be the key to public satisfaction. The supply of quality water by respective sectors such as domestic, industrial, agricultural, etc will lead to socio-economic development in the area. This will result in migration of population to the area leading to growth of several opportunities in the area for a prospective and healthy life. However, population migration without adequate water supply for specific uses will result in conflict related to water availability, water-related illness, depletion of surface and ground water sources, eco system degradation, imbalance in hydrologic cycle, social and political instability and, slowed economic growth.

- The water conservation measures suggested for adaption are rain water harvesting, creation of low reservoirs such as check dams for storing the water, prevention of losses through seepage and leaks, improving usage efficiency of water in irrigation through better practices such as drip irrigation/ sprinkler irrigation, crop rotation and, recycling and reuse of treated wastewater. This step aims for adoption of waste minimization techniques in minimizing the waste generation both from the domestic and industrial sources. The natural resources are converted into an effective product/ service through an appropriate technology. An integrated and controlled approach in the Technology, Management, and Waste emissions increases the efficiency of Natural Resource conversion.
- Public should be involved during various stages of water resources planning such as planning, financing, design consideration, operation and maintenance. Committees dealing with political, technical, and social aspects of water resources planning at village/mandal/panchayat levels should be constituted (Shrivastava et al., 2003).
- The last, but not the least, a strategies is to be developed to enhance co-ordination among various agencies such as Industrial Development Corporation, State Finance Corporation, Irrigation Department, Panchayat Raj Department, Ground Water Department, and some other non-governmental agencies. They are the key players in implementing the Government's policies and directives. The interaction, co-operation and co-ordination should be maintained among them. Then only the equilibrium will be maintained and that is the need of the hour. This square should not get distorted to become a rectangle or trapezium if sustainable development is to be achieved in the country.

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Appendix

Questionnaire

Name of the Respondent:

Sex:

Caste:

Age:

BPL/APL:

SECTION 1: GENERAL

1.1. Geographic Information

State	District	Block	Ward No.	Area:
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Area: 1-From local, 2-Wester Odisha, 3-Other part of Odisha, 4-Other states

1.2. Household composition (Include members who stay permanently)

Sl. No.	Name (Start with head of House Hold)	Relation with HH	Sex (Male-1/Female-2)	Age*	Marital Status	Educational Qualification	Main Occupation	Subsidiary Occupation	Current Annual Income (Rs)
1									
2									
3									
4									
5									
6									
7									
8									

* Enter the completed age (for less than one year age = 00, 98 years and above =98) or

Date of birth after verifying records

Codes used:

Relationship with HoH (Column 3): Self-HoHH-1/Spouse-2/Father-3/Mother-4/Father-in-law-5/Mother-in-law-6/Uncle-7/Aunt-8/Brother/Brother-in-law-9/Sister/Sister-in-law-10/Son/Son-in-law-11/Daughter/Daughter-in-law-12/Nephew-13/Niece-14/Own grandchildren-15/Sibling's grandchildren-16/Cousin (brother)-17/Cousin (sister)-18/Live-in domestic help-19/Others (specify)-20

Marital Status (Column 6): Married (1), Unmarried (2), Divorcee (3), Widow/Widower (4), Separated/Deserted (5)

Educational Qualification (Column 7): Illiterate (1); Literate (2); Primary (3); Middle (4); Matriculate (5); Intermediate (6); Graduate and above (7); Professional qualification (Specify)(8); other (Specify)(9)

Usual Activity (Column 8): Worker (1); Unemployed (2); House wife (3); Student (4); Old/Retired (5); School age children not going to school (6); Non-school age children (< 6 years) (7); Handicapped (8); Others (Specify) (9)

Occupation (Column 9 & 10): Cultivation-1/Dairy-2/Fishery-3/Goatery & other animal rearing-4//Daily Wages-Agricultural Labourer-5/Skilled Wage Labourer-6/Semi or Unskilled Wage Labourer-7/Service-Private Sector-8/Service-Government-9/Trade/Business-from fixed premises-10/Owner of SSI/Cottage Industry-11/Other Self-employed-12/Professionals-13/Household Industry-14/Artisan-15/Vendor(Cycle/Pheri wala)-16/Others (Specify)-17

Type of Worker (Column 11): Main worker-1/Marginal worker-2 (Main worker>180 days engagement/year; Marginal worker<180 days engagement/year)

1.3. Housing and other amenities before and after Watershed

Housing and other amenities		Code
House type	1-Pucca/ 2-Semi-Pucca/ 3-Kutcha/ 4-Hut/ 5-Temporary	
Ownership of house	1-Own 2. Rent 3. Govt Quarter 4. Relative	
Sanitation	1-yes, 2-no	
Kitchen room	1-Separate/2-Attached	
Cow shed	1-Separate/2-Attached	
Main Cooking fuel	1- Wood, 2-charcoal,3-kerosine, 4-Cow dung, 5-Gas	
Main source Drinking water	1-Tube well, 2- open well, 3-stream, 4-pond 5- Tab water	
Ownership of water	1-Municipality 2-Own 3-Private 4-public	
Cow shed	1-yes, 2-no	

1. What is the major source of household water supply?
 1. Indoor tap water 2. Shared tap 3. Well 4. Other: Specify _____
2. What are the major water using appliances in your apartment?
 1. Shower 2. Flushing toilet 3. Hand basin 4. Bath tub 5. Washing machine 6. Water heater
3. What is the major source of household drinking water?
 1. Piped water 2. Well water 3. Bottle water 4. Other: Specify _____
4. Does your household use water for?
 1. Drinking 2. Cooking 3. Laundering 4. Bathing 5. Toilet flushing 6. Flower watering 7. Car washing 8. Other: Specify _____
5. While brushing your teeth, do you
 1. Let water run 2. Use a glass of water 3. Either, it depends
6. While taking a shower, do you..
 1. Let the water run all the time 2. When I am shampooing/soaping. I turn it off 3. Both, It depends
7. In a typical week, what is the frequency does household go laundry?
 1. Everyday 2. Once three days 3. Once a week 4. Others: Specify _____
8. How many loads of laundry do you usually do?
 1. One load 2. Two loads 3. Three loads 4. Other: Specify _____
9. Do you use bottle water?
 1. Not at home 2. A few bottles a week 3. We use only bottled water for drinking
10. Where does your waste water go?
 1. Central sewerage system 2. Roadside drain 3. Nearby water body 4. Do not Know 5. Other:
11. What kind of sewage system do you have?
 1. Local 2. Central 3. Polluted water is driven into the nature (ground etc)
12. What kind of toilet do you use?
 1. Economical WC 2. 1-system WC 3. DC (dry closet)

13. Does your toilet tank leak?

1. Yes **2.** No **3.** Do not know

14. Does your family drink tap water directly?

1. Yes **2.** No **3.** If yes, please ask for the amount _____liters

15. How many taps are there in the household?

1. One **2.** Two **3.** Three **4.** Four **5.** Five and more **6.**Other: Specify_____

16. Do your taps leak?

1. Yes **2.** No **3.** Do not know

17. State the water consumption detail (Daily)

Purpose	Amount (liter)
Drinking	
Bathing	
Other domestic	
Gardening	
Other	

18. How much drinking water does your household consume each day? _____Liters

19. Are you happy with the supply of water?

1. Yes **2.** No

20. If No, why?

21. Are you getting water in time?

1. Yes **2.** No

22. If your family does not use tap water for drinking, how much do you pay for drinking water each month? _____Yuan/Month

23. Do your taps usually have brown water running out?

1. Yes **2.** No **3.** Do not know

24. How would you rate the current public water service in this city?

	Excellent	Very Good	Good	Poor	Very Bad
Purity					

Color					
Taste					
Pressure					

25. Do you receive prompt maintenance whenever it is needed?

1. Yes 2. No 3. Other: Specify_____

26. What's your monthly water bill?

1. We don't pay anything 2. Under 10 3. 10-50 4. 50-100 5. Above 100

27. How often is the water meter read?

1. Once a month 2. Twice a month 3. Others. Specify _____

28. How much of water bill do you pay each month? _____

29. Do you know how much do you pay for each cubic meter of water?

1. Yes 2. No 3. Other: Specify_____

30. What do you think about the current water rate?

1. Too high 2. Normal 3. Too low 4. Do not know

31. Are there any water-saving measures practiced in the household?

1. Yes 2. No 3. Other: Specify_____

32. What is the water-saving measure are used?

1. Using kitchen water for flower watering 2. For toilet flushing 3. For moping floor 4. Water-saving Tap 5. Water-saving shower head 6. Toilet dam 7. Other: Specify_____

33. How would you rate the existing water supply service?

1. Very Good 2. Good 3. Fair 4. Poor 5. Do not know

Frequency

1. Many times a day 2. Once a day 3. Twice a day 4. Three times a day 5. Once a week 6. Once more than a week 7. Others

Duration

1. Less than 10 min 2. 20 to 30 min 3. 30 to 40 min 4. 40 to 60 min 5. Others

34. Compared with other utility payments such as the electricity fee, what do you think about the current water tariff?

1. Too high **2.** Normal **3.** Too low **4.** Do not know

35. Which of the following aspects of your water supply need improvement?

1. Quality **2.** Pressure **3.** Rate **4.** Reliability **5.** Billing system **6.** Service quality **7.** Maintenance **8.** Other

36. Which one of the above aspects do you think should be improved right away?

37. If the water company encourages families to use less water by providing water rebates, Say 20%, would you be willing to use less water?

1. Yes **2.** No **3.** Other: Specify _____

38. If the water company further improves its service, for example by providing better quality water that you could drink directly from the tap, would you be willing to pay more for your water?

1. Yes **2.** No **3.** Do not know

39. What is the maximum price are you willing to pay for each cubic meter of water?

40. If you are willing to pay more for water, where should the Water Company invest the extra revenue?

1. Improve reliability **2.** Improve quality **3.** Improve pressure **4.** Prevent water pollution **5.** Improve Management **6.** Other: Specify _____

41. Do you know that this region is short of water?

1. Yes **2.** No **3.** Other: Specify _____

42. Have you ever noticed any public information program on water conservation?

1. Yes **2.** No **3.** Other: Specify _____

43. If the government offered subsidies to households to improve the existing water system, would you be willing to participate in the program?

1. Yes **2.** No **3.** Other: Specify _____

44. If you are willing to take part in a program, where the government paid 50 percent of the overall cost what is the maximum expense would you be willing to assume?

1. Less than 100 yuans **2.** 101 - 200 yuans **3.** 201 - 300 yuans **4.** 301 – 400 yuans **5.** 401 - 500 yans **6.**

More than 500 yuans **7.** Other: Specify_____

45. Do you experience water shortages?

1. No, never **2.** Rarely **3.** Almost every year **4.** There are constant problems

46. How would you evaluate the quality of your drinking water?

1. Very good **2.** Satisfactory **3.** We use a water filter **4.** Very bad

47. Do you collect rain water for your household?

1. No **2.** Sometimes **3.** Often (for watering the garden, washing the car etc)

48. What's your family's attitude towards saving water?

1. We often talk about it **2.** Mostly parents mention it from time to time **3.** We don't think about it

49. How much of the Earth's water is drinking?

1. 50% **2.** 70% **3.** 90%

50. What is the largest source of fresh water?

1. Surface water (river, lakes) **2.** Glaciers **3.** Resources of ground waters

51. Where do we find the biggest water consumption?

1. Agriculture, industry and private households **2.** Industry **3.** Agriculture

52. Are you facing problems, if the water use in construction areas

1. Yes **2.** No **3.** Sometime **4.** Never

53. What are the other recourses using when water is not coming sufficiently?

54. Quality of water

1. Good **2.** Very good **3.** Bad **4.** Very bad **5.** Other

55. Quantity of water

1. Sufficient **2.** Insufficient

56. Regularity of water

57. Regularity in water supply

1. Good **2.** Very good **3.** Bad **4.** Very bad

58. What are the alternative things done by Municipality, if the water is not coming sufficiently?

59. Are you getting sufficient water?

1. Yes 2. No

60. Are you happy with the quality of water?

1. Yes

2. No

61. Are you happy with the Quantity of water?

1. Yes 2. No

62. Are you facing problem in different season?

1. Yes 2. No

63. In which season you are facing more problems?

1. Summer 2. Rainy 3. Winter

64. Have you ever complain to higher authority?

1. Yes 2. No

65. Are they taking any initiative to address you problem?

1. Yes 2. No

66. Are you want to solve your problem?

1. Yes 2. No

67. Are you happy with you problem?

1. Yes 2. No

68. Do you have water meter in your home?

1. Yes 2. No

69. When water meter is established in your home?

70. What is the situation before establishment of water meter?

71. What is the situation after establishment of water meter?

72. Are you happy with the establishment of water meter?

73. Daily water consumption of the household

	10-20 liter	20-30 liter	30-40 liter	40-50 liter	50-60 liter
Male					
Female					
Child					
Young People					
Old People					

74. What purpose you are consuming more water?

75. How many liters of water is available of water in your tank?

76. What are the storage facilities do you have?

1. Tank 2. Ground store 3. Pot 4.others

77. Which is your first preference in summer season?

Drinking	
Bathing	
Cooking	
Washing	
Gardening	

78. How many liters of water you are consuming during scarcity?

1. 10-20 liters
2. 20-30 liters
3. 30-40 liters
4. Above 40 liters

79. How do you cope/compromise during the scarcity of water?

80. Do you have any other sources while collecting water?

- 1. Yes 2. No**

81. How much time do you spend in collecting from other sources?

- 1. 1-2hrs 2. 2-3 hrs 3. 3-4 hrs 4. 4-5hrs 5. Above 5 hrs**