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Sustainable and Integrated Water Supply Management at North Shivaji Nagar, Sangli

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Abstract: ***Water being important part of life or we can say a most needed element for survival. Over the decades water has been treated wisely, people are getting careless for using water. Now due to changing climate the rainfall has been reducing and due to decreasing water table many regions is facing scarcity of water. Even in our region i.e. Sangli region many areas are under scarcity of water, Low quality of water, in time water supply etc. To overcome such situations there is need to take initial regarding sustainable & integrated water supply. This study and research emphasis on integrating water management and supply system and will help to overcome the scarcity of water during months of year.***
Keywords: Integrating supply system, water management, supply chain.

I. INTRODUCTION

Now due to changing climate the rainfall has been reducing and due to decreasing water table many regions is facing scarcity of water. Even in our region i.e. Sangli region many areas are under scarcity of water, Low quality of water, in time water supply etc. To overcome such situations there is need to take initial regarding sustainable & integrated water supply.

Many projects have been initiated regarding integrated water supply one of the project is Surya Integrated water supply system for Vasai Virar & Mira Bhayender of MMR region. The water is being supplied from Surya Integrated water supply scheme i.e. from Surya dam which is 54 kms away from Vasai-Virar and Mira-Bhayender area. The project has been carried out in order to fulfill the need of water supply to these regions. The investment of 200 Cr. has been made to lay the pipelines from Surya dam till Mira-Bhayender. The pipeline was crossing the railway tracks, bridges, Nallahs, and also the Vasai creek. Over the decades water has been treated wisely, people are getting careless for using water. There are many issues regarding this water supply scheme first even after execution of such a large project of water supply the need of water has not be fulfilling, as mentioned in above the source is 54 kms. away which crosses many small villages and settlement too thus, it provides water to this settlements as well.

Secondly the is risk if of laying of such a huge pipelines, in 2016 the article has been published showcasing about the bursting of this pipe in Virar which resulted in waste of gallons of water and recovering it with cutoff in water supply. After this incident the water were supplied on alternate day. At the same case for Sangli, due to growing population the need of water has been detected. Solutions for providing water supply have been given by Sangli Municipal Corporation by providing Overhead Water tanks. Details are such that – the project has proposed under central government having total 80% of funds, State government with 10% of funds and rest of 10% with current political ruling party. The corporation has carried out the on ground survey of water supply and demand. In 2010 the total population of Sangli city was 294557; the daily demand was 59 lit/ngb. For demand and supply for future need i.e2025**,** population – 420420 with 81lit/ngb. And until it comes will 2040- with 60303population, demand for water supply will be 117 lit/ngb. For this water supply the rate is 135 lit per person per day. Thus, we can tentatively analyze the demand and supply for Sangli city, and how this problem can be resolved with proper water supply Management plan.

Man should make his approach towards water in such a way that they should not use water in a quantitative attitude but the water should be used as qualitative approach.

II. LITERATURE REVIEW

A. Anuradha Mathur,

“Soak “Book the existing water and drainage management of Mumbai city.

June 2009. ISBN: 9788129114801.

The “Soak “explains about the existing water and drainage management of Mumbai city. Author in her book is focusing on changing cycle of water tables and how it is affecting the sources of water in Mumbai city. How the water sources of Mumbai is being converted into drainages. What will be the possibilities to preserve these sources?

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B. Nirmal Kishnani,
"Greening Asia" BCI Asia Construction Information Pte.Ltd.
June 2012. ISBN: 978–981–07–0116–1.
Triggering the majorly focused factor i.e. the environment. The author is more concerned about the changing environment and how it is affecting the lifestyle of people, what will be the possible interventions can be carried out starting from building form to material used. Author also talks about the natural sources and ecosystem which will help in figuring out the solutions for better tomorrow

C. Hassan Tsenbeya Ishaku –(25 2010
Planning for Sustainable Water Supply through Partnership Approach in Wukari Town, Taraba state of Nigeria.
J.Water and Protection, (August2010)2,916-9222.
Revealed that the centralized system management, the location of wukari on a basement rock and the scarcity of sate financial resources are of the greatest obstacles to sustainable water supply. The objective of this paper is to explore the possibility of partnering for sustainable water provision, to identify potential partners and to propose an appropriate partnership framework. System technical problems and lack of adequate financial commitment from the part of the government .water scarcity is due to inadequate knowledge about available water resources at all levels of planning and climatic changes.

D. Robert A. Young,
Determining the Economic Value of Water Book of Water Economics and Policy, Volume 1, (March 2015)1580001 pp. 77-82
It is a concept and methods for Water from the lens of Economic aspect. The main aspects of the book show the study of policy making, landownership and how it The main aspects of the book show the study of policy making, landownership and how it affects the water Management. Part 1 of defines and explaining the nuances of the many possible valuation techniques that can be used for water.Part two focuses on the application of the various techniques for valuing water in irrigated crop production, industry, municipal uses, and public goods (recreation, water quality, and the like).

E. D. Stephenson,
Water Supply Management ,
Book of Publisher Iwa Publishing, (30 Apr 2015) ISBN: 13 9781843390800.
Book talks about the proper Management of water and it's Demand.
It gives broad idea about supply of sufficient clean drinking water is often taken for granted, but it requires a considerable technical and financial effort to ensure reliable and economic water supply. Chapters of the book are devoted to water demands, management of reservoirs and conjunctive use of alternative sources. Asset management and loss control are also considered. Water supply management is of concern to developed urban environments as well as developing communities.

F. N.F Gray ,
Water Technology,
An Introduction for Environmental Scientists and Engineers Book (30 Apr 2015) ISBN: 978-1-85617-705-4.
It talks about the different technologies used in water Management. The topic covers the key concepts of water science and technology by explaining the fundamentals of water quality and regulation, policy and management, hydrobiology, water treatment and drinking water supply. It deals with water quality assessment, management and treatment Includes a new chapter on sustainability within water technology.

G. Matt Inman, Donna Brennan,
Integrated resource planning for the integrated water supply scheme for expert panel examining Kimberley water supply options.
Water for A Healthy Country National Research Flagship
(November 20105)1,896-9854.
Review what would be required to meet the State Water Strategy recommendation that Integrated Resource Planning be used in Western Australia. Briefly examine case studies from other jurisdictions to see what could be learned from them. Propose a framework and model which could be used to evaluate the options in the "Security through Diversity" policy (including Kimberley water supplies).

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III. METHODOLY

1) PART –I

Ground Theory Approach

- Methods of Enquiry

Participant Unstructured interview
Photo sorting survey
Participant Observation
Behavior Mapping
Audio Recording and Frame Analysis

- Samples
- Random samples
- Translating raw data into a meaningful theme
- Emerging theory /key questions
- Survey Design

Behavior mapping survey
Multiple Photos sorting Method
Graphical representation of the coding process

2) PART – II

Questionnaire Survey

a) Bill reading with concerning various contexts

Building Context, Gender, Current and Previous bill readings.
Survey in selected study areas in North Shivaji Nagar Sangli City.
Stratified Sampling.
Document Preferences, Perception, Constraints and Aspiration.

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b) Pre-Design Questions

- Project Descriptions – Sustainable And Integrated Water Supply Management at North Shivaji Nagar, Sangli City.
- Project Location – North Shivaji Nagar, Sangli City.
- Desired Schedule

✓ How many ECR's in the zone?
✓ How the increasing demand of water supply will mitigate the need?
✓ Whether the system is streamlined or not?
✓ Do leakages of pipelines disturb the supply of water?
✓ Does the Malfunctioning of newly laid pipeline affect the distribution?

IV. INSTITUTIONAL CONTEXT OF SANGLI CITY WATER SUPPLY

Sujal Nirmal Abhiyan – Sangli city, Water Supply Pattern (SMKMCwsd)
Population – 2001 – 4,36,631
2040 – 10,46,952

Table 1 – Total Water Supply Connection – 2008

Connections	Sangli- Kupwad city	Miraj City	Total
Domestic	32714	13424	46138
Commercial	961	219	1180
Charity	432	99	531
Total	34107	13742	47849

Table 2 – Total Water Supply Connection – 2018

Connections	Sangli- Kupwad city	Miraj City	Total
Domestic	50454	22189	72643
Commercial	1989	1088	3077
Charity	77	54	131
Total	52520	23331	78591

Table 3 – Total Water Supply Connection of North Shivaji Nagar, Sangli – 2019

Connections	Total
Domestic	1258
Commercial	68
Charity	11
Total	1337

Sangli Miraj And Kupwad Municipal Corporation
Water Works Department
Demand & Supply

Sangli-Miraj-Kupwad is divided in to nine zones as I mentioned above. Miraj and Kupwad further divided into four. Therefore departments are divided separately for consumer convenience.

Along with departments the water supply system and ESR's are divided accordingly to fulfill the need of current population. According to census 2011 report population of Sangli city was 300179. Thus the changing demand and increasing population made interruption in continuous water supply to customers.

Following table shows the demand and supply of water supply for current population of Sangli city.

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Table 4

PARTICULARS	Year								
	2011			2025			2040		
	SANGLI	KUPWAD	MIRAJ	SANGLI	KUPWAD	MIRAJ	SANGLI	KUPWAD	MIRAJ
POPULATION	300179	66410	181817	419708	104284	226236	606143	159360	281449
Total(1) Sangli - Kupwad	366589			523992			765503		
Total(2) Sangli - Kupwad-Miraj	548406			750228			1046952		
Lpcd rate	135	135	135	135	135	135	135	135	135
	All Demand in MLD			All Demand in MLD			All Demand in MLD		
Net Demand (at consumer end)	40.53	8.97	24.55	56.67	14.08	30.55	81.83	21.52	38
PW demand of outlet of WTP	54.04	11.96	32.74	66.68	16.57	35.95	96.28	25.32	44.71
RW demand at headwork	58.06	12.58	35.18	70.16	17.44	37.83	101.29	26.65	47.05
Total (1)	70.91			87.66			127.94		
Total (2)	106.09			125.43			174.99		

Table 4. shows the comparative demand and supply of water for Sangli city and Kupwad and Miraj. It shows the data according to report of census 2011 and for future demand. It shows how the population changes yearly thus the demand increases.
But on its contrary, the demand for water supply is not getting fulfilled. This study thus will focus on the reasons for interruption of supply. The data shows details of Sangli city, Project is focused on a part area of Sangli city i.e North Shivaji Nagar, and thus following table will show the details of particular area.

Table 5. DEMAND & SUPPLY – NORTH SHIVAJI NAGAR SANGLI

PARTICULARS	Year		
	2011	2025	2040
	NORT SHIVAJI NAGAR	NORT SHIVAJI NAGAR	NORT SHIVAJI NAGAR
POPULATION	6315	8782	10995
Lpcd rate	135	135	135
	All Demand in MLD	All Demand in MLD	All Demand in MLD
Net Demand (at consumer end)	0.85	1.18	1.48
PW demand of outlet of WTP	1.13	1.56	1.96
RW demand at headwork	1.2155	1.68	2.11
Total (1)	3.19	4.42	5.55

Table 5 shows the details of population, amount of water required, and amount of water provided etc. It can be seen that the amount of water required for current population is not enough as required amount more than the provided. I cannot reach the desired need thus, it is necessary to carry out proper research and find out the solution.

V. RESULTS

1) There are 9 zones in the city; North Shivaji Nagar comes under one of the nine zones.
2) It has been seen that there is no water supply for 24 X 7.
3) Even after having an ESR within the area it has been shut down due to technical issues. Thus, North Shivaji Nagar gets water from Maal Bangla ESR the main distribution network of the city.
4) According to standards the need of water per person per day is 135 lit. but as we know there is no continuous water supply the need doesn't gets fulfilled.
5) Findings has been based on survey done for past nine months, but the actual water used per day by the consumers was 182790 lit. But the actual water supply by Water Works Department was 106456 lit.
6) Need of water supply per day is 182790 lit but it does not fulfill the requirement, and the deficiency of actual water required and supplied water is 76333 lit.
7) Due to old pipeline network, water leakage has become eminent, and the maintenance work for the same does not carry out periodically thus, waste of water results in shortage of supply.

VI. CONCLUSION

According to findings following are the conclusions-

1) Existing water supply department does not have discipline towards the work, thus the network is not maintained properly.
2) Water is a natural resources, thus is should be preserved and maintained to overcome the scarcity of water.
3) Many water meters are not maintained thus, the amount of water used by the consumer is not preserved by the department.
4) Pipeline networks need to be maintained periodically to identify the leakages, as smallest of leakage can waste liters of water within small period.
5) Cast Iron pipes are used for main distribution of water to areas, thus maintenance of such pipes does not carried out resulting in rusting of water.
6) The amount of water required is lesser than the amount of water supplied by the corporation, people has to rely on borewells, wells etc.
7) North Shivaji Nagar area has an ESR which can provide enough water but even after having an ESR, the area provided with water from Maal Bangala ESR as the existing ESR has been shut down due to Structural Problems.
8) In many cases consumer does not have awareness, if any pipeline has leakage and water is wasting they ignore the same and does not take any effort to inform the officials of corporation to fix the problem. Awareness about such things should be developed within the people.
9) Many problems occurred related to the water meters. They are the –

a) Meter quality could be maintained
b) Installation of meters done by customers
c) Customers manipulate the reading

Many people create the bogus connections in order to divert water from neighbor's connection it leads to shortage of water to honest consumer.

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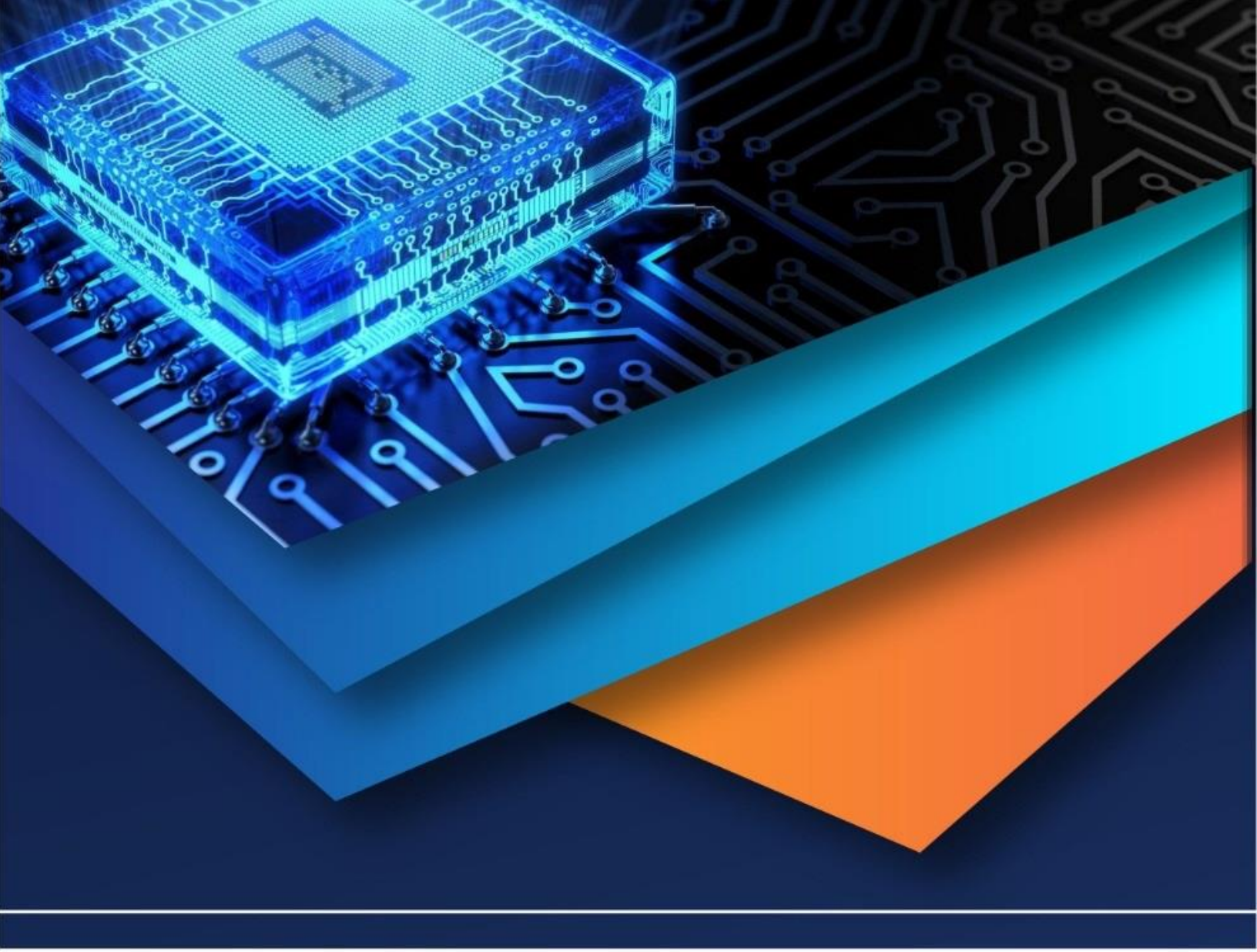

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