



Research Paper

Structuring village level as base guideline & achieving Self-sustainability

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ABSTRACT: In India, complete dependency on Government bodies for the fulfillment of any of the need is creating huge pressure on government systems. Government issues guidelines based on nation's catering to various social, economic & environmental problems. Every year, surplus money is allotted in the budget for policy implementation. At village level, Ministry of Rural Development, India & other organizations are consistently working for the rural problems has a power to decide on various aspects at village level. But the main beneficiaries are still secluded from the basic needs contextual basis will help both beneficiaries & implementing systems. This could be done by adopting a proper methodology as a base guideline for any of the basic need or development works. This paper tries to structure out the water as a whole & analyzing the present system with the help of an experimental analysis of a village by random selection & its achievements towards sustainable solutions.

KEYWORDS: Government guidelines, measures, sustainability, water management

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I. INTRODUCTION

The saying, "India lives in its villages" is relevant even today. Mahatama Gandhi as a visionary of India had a very clear perception of its villages & made a definite claim that "India lives in her seven & half lakhs of villages". He held this conviction by saying that "If village perishes, India will perish too" [1]. Whenever one imagines development of villages, very firstly the scene of clean and green environment with all smiling faces is portrayed in mind. The word clean is nothing but proper management of waste and sanitation facilities while as the word green interprets agrarian economy flourished at its optimum. Ultimately water management helps in keeping the places clean and green. On one side low yields due to low irrigated acreage in rain-fed areas & on other side water crisis due to increasing pressure on agriculture due to increasing demand from industrial sector. Also, safe drinking water and proper sanitation facility is another issue [2]. Ministry of Rural Development (MRD), Department of Water & Sanitation & various other organizations constantly work for the problems through various schemes & programs. But the achievements are not satisfactory. At village level PRI has the power to decide on various aspects. To utilize & empower this power of PRI, very village needs to identify its prior needs & developmental aspects on broader spectrum. Having a well-structured methodology for every village covering each of the aspect will definitely help as a toolkit to implement the solution of problem in sustainable ways. Water shortage & its absence leads to food crisis, drought & loss of life. All human civilizations (Egyptian, Indian, Islamic, Chinese, Japanese) were built & prospered around the water sources which were worshipped & managed properly. One also finds the traces that kings & emperors contributed lot in water management. In India, the period between the year 230 and 1294, various empires like Satwahan, Wakatak, Chalukya, Rastrakut, Yadav were prospered through proper & skilled water management [3].

Precipitation is another source of water of getting water supply. While this precipitation itself is the evaporation from these sources. Major water sources are the primary source-rain, surface water, ground water, waste water. In India most regions experience rainfall only four months in a year. The flow is reduced after the monsoon & may completely vanish during the summer. When flows are seized, this cycle changes & the biological equilibrium is disturbed affecting all the lives dependent on it. Nowadays, this disturbance has increased mainly because of the overexploitation & misuse. By concentrating water at few locations & using it extensively for human use disturbs the water cycle over far wider areas. [4] Water demand always aims at

adequacy, equity & purity which have direct relation with people’s health, welfare & quality of life. Modern water management systems are mainly dependent on arresting flows & creating storages which is completely statistical & technological approach only to cater the demand side. One more major aspect is to keep the streams free from sewage & other waste dumping. Therefore, waste disposal is an integral part of water management system. It will be easier if management systems incorporate the pollution abatement laws & environmental safeguards dictated by concerned ministries. It has been recognized by all leading scientists of the world that ecological processes are the life supporting systems which must be kept viable & functioning to achieve sustainability in every aspect of life. Therefore, it is important to understand & meet the ecological needs through protection & restoration of water sources.

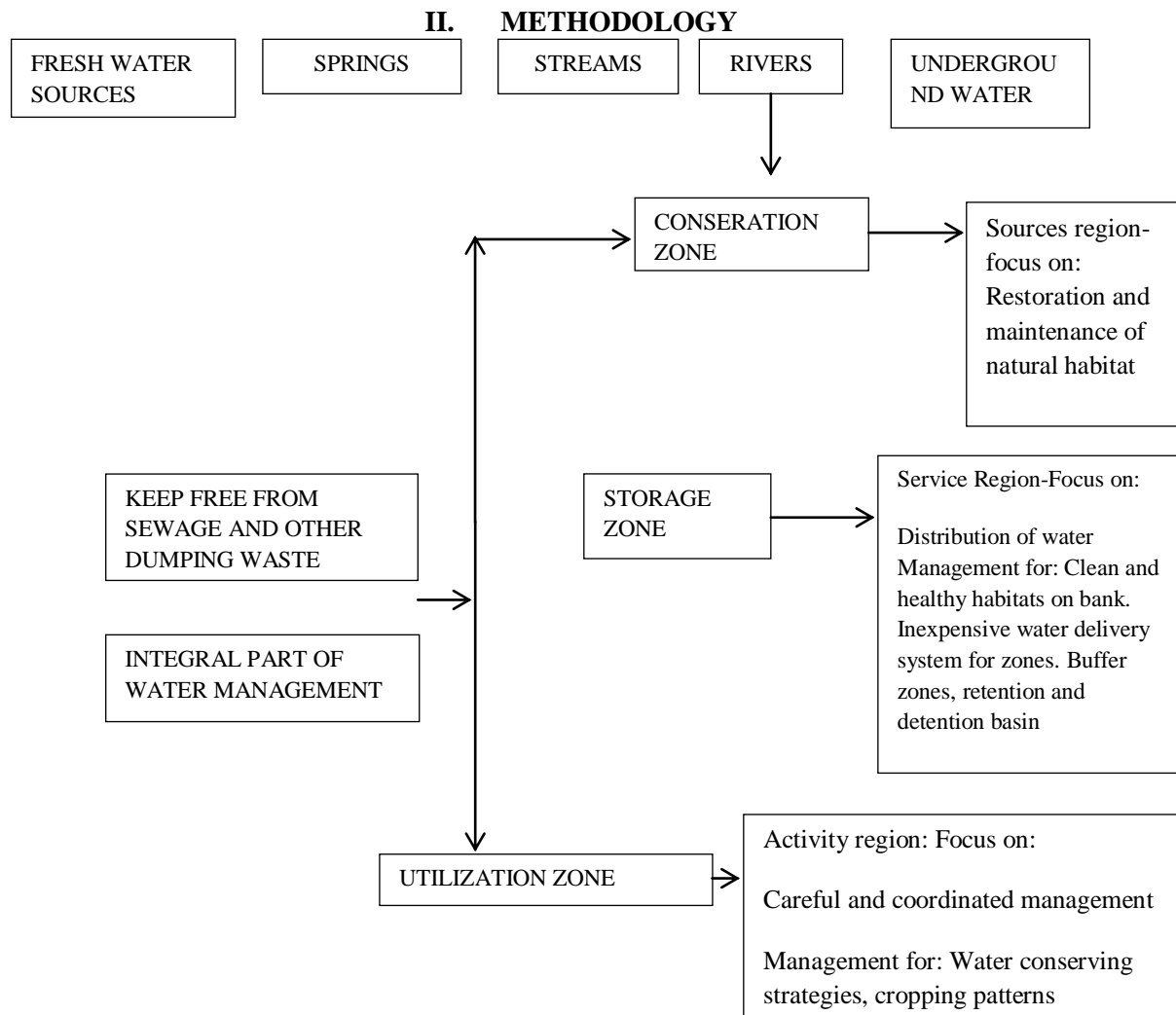


Figure 1: Flow diagram showing water conservation

2.1. Understanding the relation between water sources & village life:

Village is first part of a nation where it starts structuring. Figure 1. shows different methods of conserving water in village. By the long travel of generation these settlements got the recognition of village. Water is basic need for all livelihood activities [5]. The fragile & fertile land along the sources was the main source of food & other dependencies. Agriculture, animal husbandry, forest were the main sources of economy for which ample water source was the main trying element between village & its economic development. Manmade lake & maintained surroundings ecosystem with holy temple atmosphere was the identity of each & all Indian villages. If anyone goes on tracing history before British period, there were 20 lakh lakes in India. There was lake at every farm land and village. [3] Britisher’s identified this fact & started demolishing the well managed & fragile lake ecosystems. After 1960 the track of village development was changed totally where people started depending up on the government for their each & every need. Irregularity of monsoons, changing lifestyles & increasing pressure on agriculture due to huge demand from industrial sector together impart the

difficulties on water management systems. For cities 135 liter per capita demand (lpcd) is the water provision requirement which includes both water & sanitation demands. While as for villages it is 35-55lpcd excluding sanitation needs. This indicates that the thorough understanding of changing lifestyle at village level needs to be considered while catering other requirements.

2.2. Traditional Methods of Water Purification [6]:

- i. Strychanes potatroum (*Kataka seeds*) are natural coagulants used for purification of muddy water.
- ii. Morenga olifers (*drumstick*) seeds are used as a coagulant. They also inhibit growth of bacteria & fungi.
- iii. Vetiveria zizanoides (*khas*) are laid in a clay jar which has a few tiny holes in its bottom. Water filtered through this layer of roots is not only clear but also has a pleasant smell.
- iv. The values underlying the water management system also attach a positive value to the act of sharing & creating water sources for others such as constructing tanks & wells.
- v. In southern India, it is noted that establishment of tanks is traditionally considered as one of the ‘*Saptasantas*’-seven kinds of wealth.

2.3. Conventional practices of Water management in India:

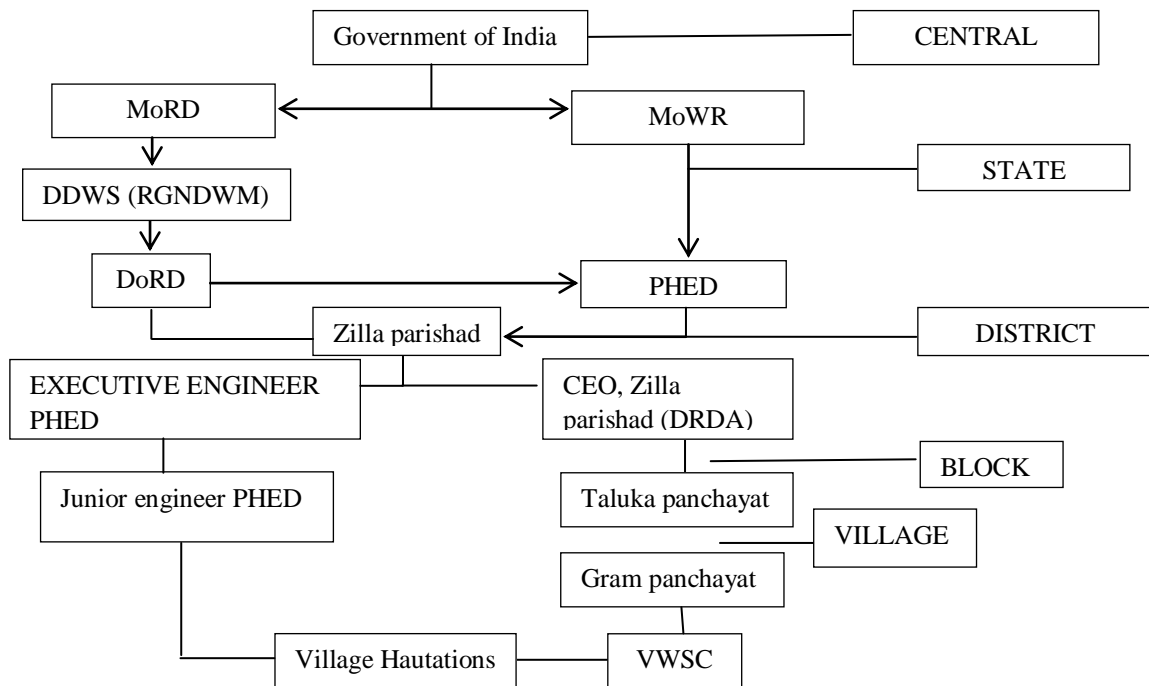


Figure 2: Process diagram of Water management at [7]

To avoid crisis due to water stressed conditions, central government now providing funds to the states under Accelerated Rural Water Supply Program (ARWSP) for taking up projects on rainwater harvesting, water recharge & other methods (Annexure).

2.3.1. Initiatives directly or indirectly related to water management:

- The creation of Global Water Initiative (GWI) comes at a time when more than 1 billion people lack access to improved water sources & more than 2.6 billion people lack adequate sanitation [8].
- The Millenium Development Goal of India-Goal 7 ensures environmental sustainability [9].
- Schemes under Minimum Needs Program (MNP) & Accelerated Rural Water Supply Program (ARWSP). The state government has implemented various schemes for improving the water supply coverage over a period of time. Apart from government agencies, World Bank, German Development Bank (KfW) & other NGO’s are actively involved in implementing water supply schemes in rural

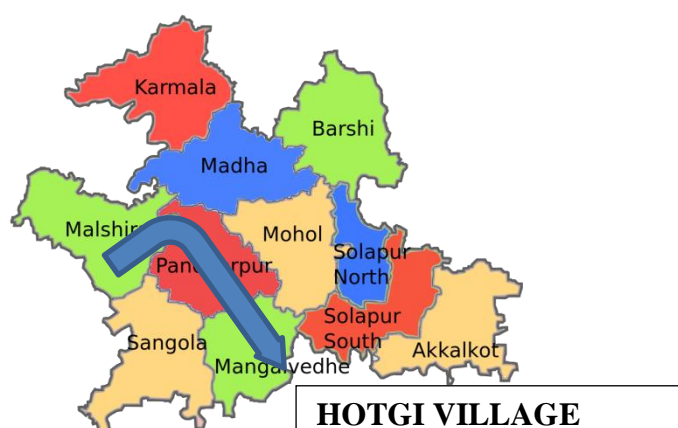
Maharashtra. In Maharashtra, the *Zilla Parishad's* (ZP) have been identified as the District Implementation Agency (DIA) [10].

Following measures need to be brought into effect at every government body:

- a) Recycling & reuse of domestic waste water should be collected into community water treatment plants for cleaning & recycling.
- b) Rooftop rainwater harvesting is essential to ease pressure on piped water supply. The rainwater that goes waste should be channelized, harvested & made use to meet ever increasing domestic water needs.
- c) Storage of water in the form of soil moisture & ground water with the surface is the ideal form by which water should be conserved & put to better economic advantage. Such a measure would prevent 150 million hectare from soil erosion & facilitate optimal utilization of water.
- d) In every village, either the existing tank should be restored or a watershed should be developed. Watersheds have the potential of creating employment opportunity besides enhancing crop productivity due to assured water.
- e) Borewells promised to end water problems & they did help easing the problem to some extent. However, it has inflicted serious problems too. Irrigation borewells have created more havoc due to exploitation of ground water.
- f) The nitrogen & much of the phosphorus & potassium normally required for agricultural crop production would be supplied by the effluent in waste water. In addition, other valuable micronutrients & the organic matter contained in the effluent will provide additional benefits [11-12].

III. EXPERIMENTAL ANALYSIS

The village study is selected at random to understand the variations in implementation of schemes & programs at contextual level. 'Hotgi' as a village is selected which belongs to hot-dry region of Maharashtra where water scarcity & periodic drought are major issues. The site is located in south Solapur district of Maharashtra. It is situated 12 km towards south from the core city of Solapur- almost at fringe of the city. The total geographical area of the village is 2500Ha. of which the village cluster area is around 18,944m² which is approximately 1.9Ha. Below (figure.3) precise geographical image is showed as well as adjoining commercial lands are also displayed.



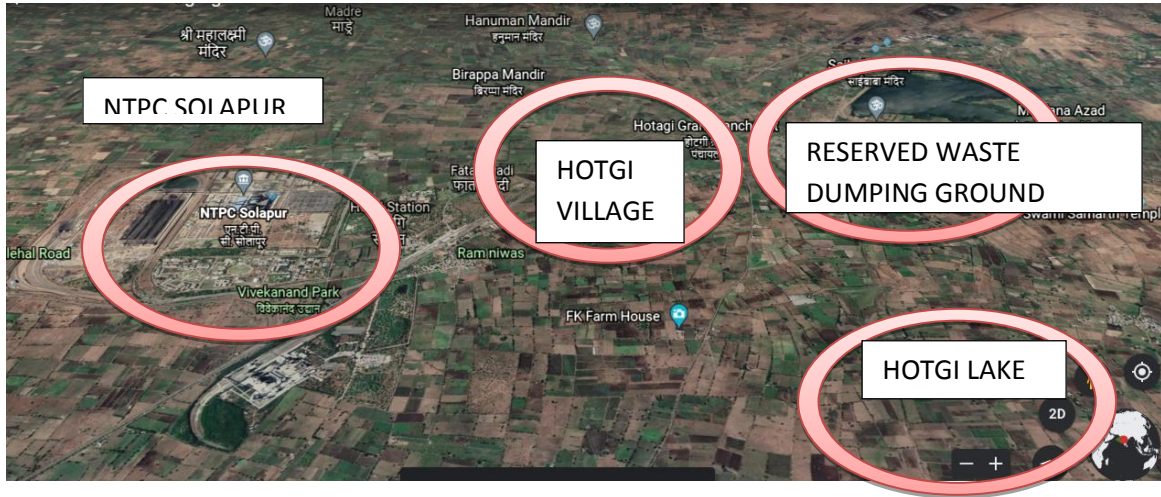


Figure 3: Geographical location of village

The project area falls under hot & dry climatic conditions. The annual rainfall is 350-650mm. Below table shows how much annual rainfall is observed annually over a period of ten years.

Table 1: Annual Rainfall data

Year	Total Annual Rainfall (mm)
2010	458
2011	487
2012	398
2013	310
2014	345
2015	350
2016	521
2017	710
2018	760
2019	918
2020	447

The maximum & minimum temperature recorded in year 2021 are as in table 2 as follows:

Table 2: Temperature in year

	Summer (⁰ C)	Monsoon (⁰ C)	Winter (⁰ C)
Maximum	45	30	22

Minimum	32	25	11
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Complete household survey was done for the year 20 21. The number of the houses is & total population is nos. Other details are in table 3.

Table 3:

Details	Total
Total population	8257
Working population engaged in farming	5779(Around 70%)
Population depending upon agriculturalworks	1074(Around 13%)
Population depending upon other works	520(Around 12%)
Population below poverty line (BPL)	1586 NOS

Agriculture is the main source of economy.

Table 4: Details about agricultural land

Details of agricultural land	Area (acres)
Land under agriculture	6000
Land under water intensive crops	1750
Land under rain fed crops	5000
Land for livestock feeding	12

Common observations and problem identification (please refer photographs in Appendix)

1. Poor management & maintenance of drinking water distribution systems at individual household levels as well as community supply is creating unhygienic conditions.
2. Poor maintenance of open gutters, soak pits & partially completed close gutter systems.
3. Open defecation is still a problem in the village.
4. Very firstly response to *Gram Sabhas* is very much lacking only 4-6 *Gram Sabhas* every year clearly indicates non-willingness of both people & the body.
5. Available fund utilization is not justified due to lack of technological aspects.
6. No efforts taken till today to participate in *Sant Gadge Baba Gram Swachata Abhiyan* or Total Sanitation Campaign (TSC).
7. Exploitation of water resource along the canal by water intensive crops is noticed throughout the year.

IV. RESULTS & DISCUSSIONS

By considering the water requirement for village lifestyle, the daily use water requirement is 65 lpcd (table 5). Considering this standard quantity of water, it comes out to be 436m³. But the provided water through pipeline systems is only 210m³. The need is to manage for the standard water needs (table 8).

Table 5: Standard water required for village lifestyle

Water use for village lifestyle	Quantity (lpcd)
Drinking	5
Bathing	20
Flushing	10
Hand wash	5
Washing-utensils	5
Washing-cloths	20
Total	65

Table 6: Details of provided & required water quantity

Details	Population (nos.)	Provided (35lpcd)m ³	Total(365 days)m ³	Required standard (65lpcd)m ³	Total (365 days)m ³
Water requirement for basic needs	6754	236.39	86282.35	439.01	160238.65
Storage tank capacity(160cu.m)	6754	210	58400	439.01	160238.65
Water supply through pipeline	3377	105	31937.5	219.5	80119.325
Community posts	3377	105	31937.5	219.5	80119.325

Appendix



Diagram 1: canal under construction (left) & usage of borewell and handpump (right)



Diagram 2: connection of borewell through pipes (left) & Hotgi lake (right)

V. CONCLUSION

- As 70% of agricultural land is rain fed, with the help of lake water the opportunities to increase the productivity could be opened to village easily.
- As the assets regarding the water supply & waste water collection are maintained very poorly, the structural & O&M measures must be maintained for clean & hygienic surroundings.
- The existing system of planning is demand oriented which needs to analyzed such that whether fulfillment of this demand leads to sustainable achievements.

VI. FUTURE SCOPE

1. Data requirement should be carried out to check the requirements considering available values.
2. Structural measures should be considered to evaluate storage, distribution & collection systems availability.
3. Conservation measures should be taken up.
4. Proper developmental plan should be prepared.

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