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[1]*PM Shri School, Jawahar Navodaya Vidyalaya Tuljapur, District- Dharashiv (MS)- 413 601.*
[2]*Principal, Shankarrao Dhamdhere Arts & Commerce College Talegaon Dhamdhere, Tahsil- Shirur, District- Pune (MS)- 412 208.*

Address for correspondence:
PM Shri School, Jawahar Navodaya Vidyalaya Tuljapur, District- Dharashiv (MS) E-mail:
chaudharikishor99@gmail.com

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A Scientific Comprehensive Study of Available Water Resources for Making 'Water Self-sustaining Village Karandi' Tahsil Parner in Ahmednagar District (M.S.)

Dr. Kishor C. Chaudhari[1], Dr. Arjun H. Musmade[2]

Abstract

Since Karandi village is situated at a higher altitude than the surrounding villages, the only widespread source of water is rainfall. Because the water that is available in large quantities from wells and borewells in the village, the water is soaked in the ground only by rain. Due to the unique geographical location of the village, a large amount of water available through rain flows out of the village as compared to the surrounding villages. Because the village does not have enough capacity to intercept and store the water received during monsoon. Due to the unique flat and plateau terrain, it is not possible to create a large storage pond or tank in the village. But if the villagers bring to mind and make constructive use of the available resources with one mind and one thought, it is possible to make the village a 'water self-sustaining village'. Key initiatives include well and borewell recharge programs, ensuring efficient rainwater harvesting, and creating farm ponds to store water at the field level. Additionally, the plan emphasizes soil conservation through continuous contour trenches (CCTs) and gabion structures to reduce runoff and enhance groundwater recharge. Strengthening existing check dams, deepening water bodies, and removing accumulated silt are also proposed to maximize water retention.

Key Words: Water Resources, Graphing, Water Self-sustaining Village, Meter Hectare ArcMap-10.8, SPSS.

Introduction:

The question often comes to mind that there is a permanent drought in Parner tahsil or lack of water due to lack of planning. Despite receiving average or above rainfall every year, most of the villages in the central, eastern and north-eastern parts of the tahsil face severe water scarcity since the end of March. Agriculture is the main occupation of the villagers in this area. Considering the scarcity of water, it is difficult to get water only for drinking purposes, but it has become difficult to get water for summer agriculture. As a result, employment opportunities have decreased and unemployment has increased. Karandi village also comes in this group and water issue is at the forefront. Considering the location and extent of the village, it is higher than the surrounding villages and the only source of water is rain. Rainwater harvesting capacity is inadequate. Therefore, a large part of the total water received by rain in the outskirts of the village flows outside the village. The real key and research point is that even though water is flowing through the village's river channels till mid-January, After the next two months, tankers will have to supply water for drinking water. The water problem can be easily overcome if the resources owned by local farmers are properly utilized in a skillful and scientific manner through public participation. Democratization or regenerative development is not an easy matter. Also, it is now clear that no matter how much money is poured in the name of relief than water, drought cannot be eradicated forever.

Therefore, development should be aimed at achieving social equity by eradicating agricultural poverty and equitable distribution of water.

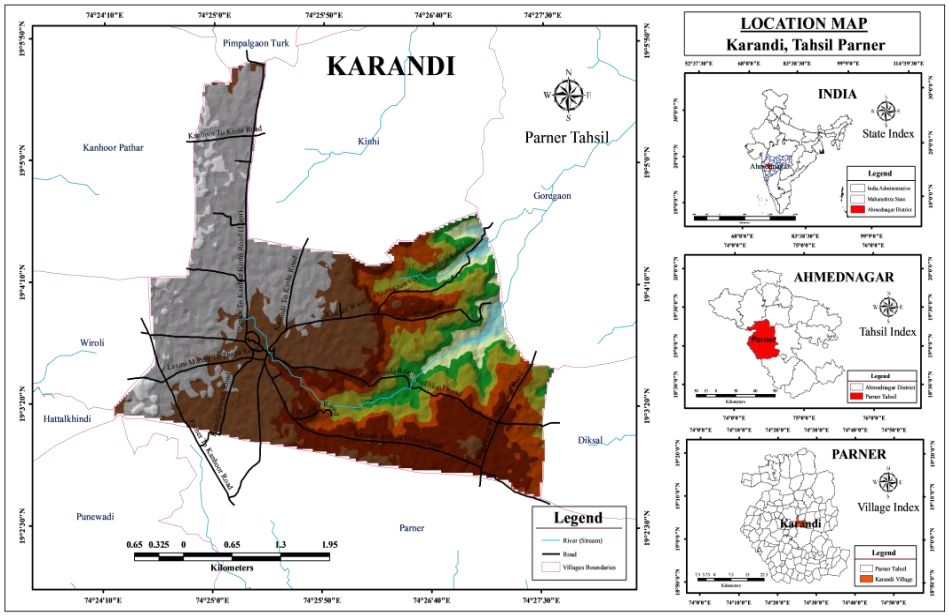
Location of the Study Area:

Karandi village is centrally located in Parner tahsil in the upper basin of river Godavari. It is extending between 19°02'41''N and 19°05'41''N latitudes and 74°24'14''E and 74°27'35''E longitudes. The total area of Karandi village is 1521 hectares. The shape of the village is irregular, about 60% of the land is flat, 20% hilly and 20% deep.

Considering the extension of the village, the east-west distance is 5.90 km and the north-south distance is 6.64 km. The adjoining villages are Pimpalgaon Turk in the north, Kinhi in the northeast, East Goregaon and Diksal, Parner in the south, Punewadi and Hattalkhindi in the southwest, Wiroli in the west, and Kanhoor Pathar in the northwest in Parner tahsil of Ahmednagar district.

Parner city is 8.38 km south of Karandi, Ahmednagar city is 38 km east and Pune city is 105 km southwest.

Fig. No. 1



Aim of the Study:

The main aim of the research is to assess the total available water resources of the village and suggest appropriate measures to make Karandi a 'Water Self-sustaining Village'.

Objective:

To assess the available water resources and suggest measures for making 'water self-sustaining village'.

Database and Methodology:

In the present research, primary as well as secondary information have used to assess the available water resources in the study area. The information required for the research has collected from various sources such as primary information obtained through questionnaire, group discussion, personal interviews and observations and secondary information such as Gram Panchayat, Talathi Office, Department of Agriculture, Department of Water Conservation, Google Earth Imagery, District Census Handbook etc. With the help of Microsoft Excel and SPSS software, data has analyzed by tabulating and graphing.

Discussion and Results:

The annual average rainfall of Karandi village is 530 mm which is higher than the annual average rainfall of Parner tahsil (486.9 mm). The total available water is 322.45 mh if the total water received by rainfall is subtracted from evaporation and percolation [1]. Also, water available through wells and borewells is approximately 7.76 mh, which means the total annual available water resource of the village is 330.21 mh. Under the current cropping pattern, the total annual water demand is 845.26 mh, which is 515.05 mh less than the water demand [1].

Water Resources:

Table No. 1
Water Resources in Karandi Village

Sr. No.	Water Sources	Total Numbers
1	Percolation Tanks	04
2	K. T. Weirs	07
3	Mud Nala Bund (MNB)	08
4	Farm Pond	136
5	Wells	267
6	Borewells	534

Source of Data: *Data Computed by Researcher from Various Sources.*

Fig. No. 2

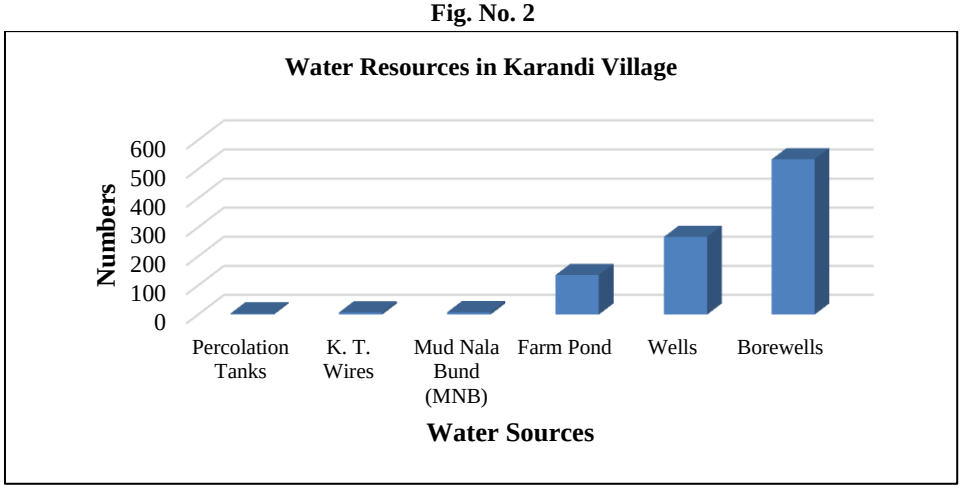
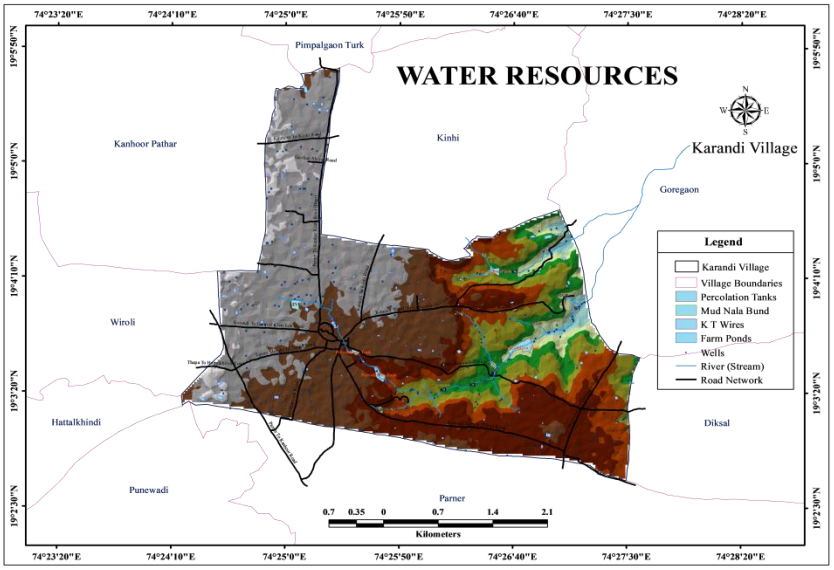


Fig. No. 3



1.1 Well Distribution and Refilling:

Today the village has more than 267 wells with an average depth ranging from 12 feet to 65 feet. The distribution of wells is equal in all shiwars (sides) of the village. The water runoff during the monsoon season can be stored in wells at high places in the village. Therefore, the rain water will be stored and the amount of water percolating into the soil will also increase, it will help to increase the ground water level.

1.2 Borewell Distribution and Refilling:

Today the total number of borewells in the village is more than 534. The average depth of village borewells ranges from 150 feet to 650 to 700 feet. Only 15 percent of these borewells are operational and only 7 percent are getting water from borewells throughout the year. Today, the remaining 85 percent borewells are responsible for the decline in the groundwater level of the village. Drilling of borewells should be banned as increasing number of borewells is drastically depleting ground water table. But constructive use of these available borewells will help to raise the ground water level today to a level that may not have risen in the past or in the future. As it takes months to percolate a few feet of water in the ground, it can be done in a few hours/days through these borewells. For this, it is possible to fill the closed bores with a little effort, which is available in abundance in the village and in the outskirts of the village through people's participation, with the advice of experts. Through this, at least 35 percent of the water flowing in the village can be diverted. For this, it is very important to plan an action program on priority basis.

Farm Pond Distribution and Refilling:

More than 136 Farm Ponds are owned by farmers in all shiwars (sides) of the village. During the rainy season, if water is stored in these farm ponds through people's participation, water can be saved from runoff.

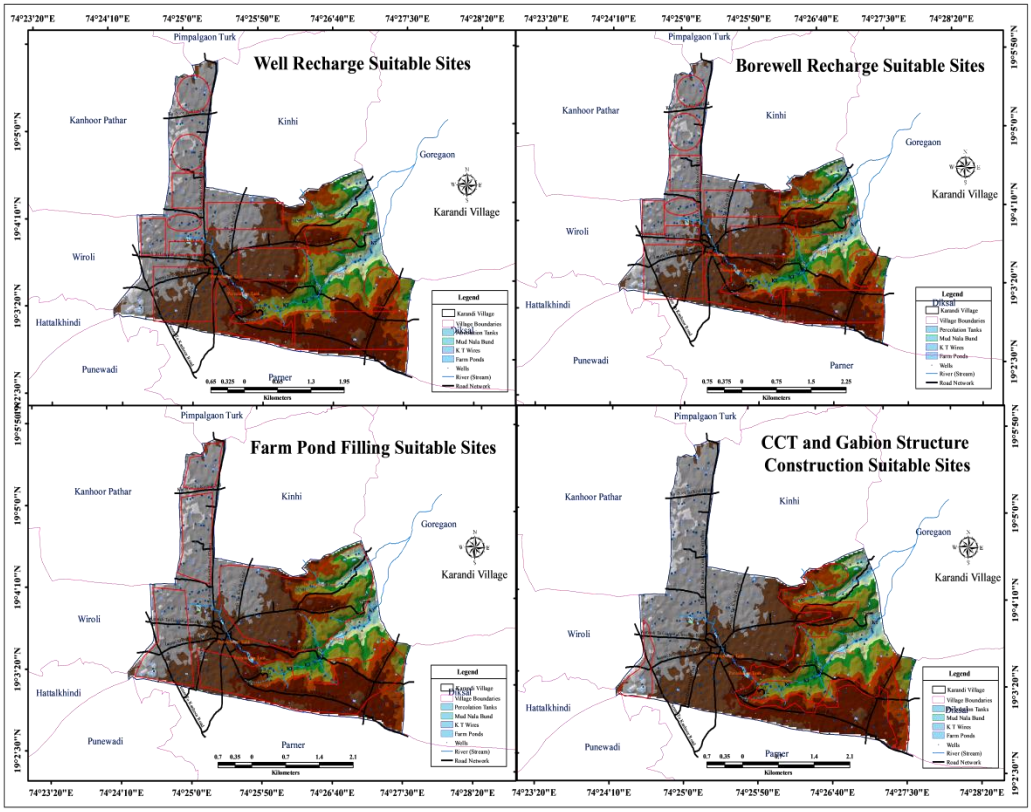
Sludge Removal:

The village has 4 Percolation Tanks, 8 Mud Nala Bunds and 7 K. T. Weirs. It is necessary to remove the silt from public participation and government schemes, deepen and widen it and at necessary places (in Percolation Tank, Mud Nala Bund, K. T. Weirs) to dig borewells to a certain depth to increase the amount of water percolation in the ground and blasting to break the hard rocks in it [3]. It requires priority and sustained comprehensive efforts.

Continuous Contour Trench (CCT) and Gabion Structure Work:

The location of Karandi village is higher than the surrounding villages. Considering the topographical structure, the general slope of the village is towards the east. The hilly part of the village is in the eastern part (Umbardara, Kadani, Ambamachi, Ranmala, Suruda and Dhodap) and to some extent in the western part (Thapa). In these hilly areas, measures such as 'Continuous Contour Trenches' (CCT), 'Stone Dam' (Gabion Structure) and 'Vanrai Bandhara' need to be designed to block the flow of water flowing down the slope. Water can be intercepted and percolated into the ground and the soil carried along with the water will also be protected. For this, works can be implemented through public participation and government schemes like MGNREGA.

Fig. No. 4



Deepening of Roadside Drains:

A practical program of water interception, storage and drainage should be implemented by deepening the roadside drains leading from village to neighboring villages and to all farms, so that run-off rainwater is intercepted and will percolate, thereby contributing to the rise in groundwater levels.

Conclusion:

The ratio of total available water and actual water demand in Karandi village is very uneven. If the gap between water demand and supply is to be bridged, joint efforts from both sides are necessary. To reduce water demand, it is necessary to decide and implement seasonal cropping pattern based on local soil, water and climate. Along with this micro-irrigation system should be preferentially adopted so that water demand is reduced. It is necessary to implement the existing well and borewell recharge program with a comprehensive campaign, along with rainwater harvesting in farm ponds. Deepening and widening of Percolation Tanks, K. T. Weirs and Mud Nala Bunds can increase the water storage capacity as well as the percolation rate. These efforts will reduce the gap between water demand and supply of Karandi village and help the village become 'water self-sustaining village'. Hitherto irrigation and agriculture were dominated by the 'industrial approach'. Watersheds and agriculture are being 'managed' without sufficient awareness that they are biological parts of natural systems. Henceforth, the triad of water management should be democratization, equity and revitalization development.

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Conflicts of interest

There are no conflicts of interest.

References:

1. Chaudhari K. C., Musmade A. H. 2022. “A Geographical Analysis of Jalyukta Shivar Abhiyan Water Conservation Scheme in Parner Tahsil of Ahmednagar District (M.S.).” International Journal of Mechanical Engineering, Kalahari Journals, Vol. 7 (Special Issue2, Jan.-Feb. 2022), 110-116.
2. Pachkor, R. T. and Parbat, D. K. 2017. Assessment of Works under Jalyukta ShivarCampaign- A Case Study of Pusad Region. International Journal for Research in Applied Science & Engineering Technology. 5 (4): 1614-1619.
3. Patil, Vilas & Toradmal, Agastirishi. (2021). Assessment of Jalyukt Shivar Abhiyan Water Conservation Scheme in Karjat Tehsil of Ahmednagar District, Maharashtra- Using GIS Technique. Ecology, Environment and Conservation. 27. S70-S78.
4. Kudale, M. B., Jadhav, M. C., Nimbarkar, G. G. and Thorat, O. R. 2018. Impact and Assessment of Jalyukt Shivar Abhiyaan, Water Conservation Schemein Maharashtra State of India. Trends in Biosciences. 11 (15): 2541-2543.
5. Ajay Kolekar, Anand B. Tapase, Ghugal, Y.M. and Konnur, B.A. 2020. Impact Analysis of Soil and Water Con servation Structures- Jalyukt Shivar Abhiyan- A Case Study, Geo M East 2019, SUCI. 47-53: 2020.
6. Niranjan J. Khillare, 2017. Analysis of Delays in Works under Jalyukt Shivar Campaign, International Journal for Scientific Research & Development. 5 (4): 1059 - 1066.
7. Zeeshan Adib Ahmed, Pachkor, R. T. 2015. Jalyukta Shivar -A Combat to Water Stresses in Maharashtra. International Journal for Research in Applied Science & Engineering Technology. 3(10): 102-108.
8. Dawale, E. R., Wanjari, P. S., Patil, S. A. and Lokhande, M. A. 2018. Generation of Potential Treatment Maps for the Development of Water Resources and Water Conservation Using Remote Sensing & GIS: A Strategy for Jalayukt Shivar Abhiyan, Maharashtra, 19th Esri India User Conference 2018, 01-09.
9. Jeya, R., Venkatakrishnan, G. R., Rengaraj, R., Rajalakshmi, M., Kumar, K. P. M., & Boopathi, S. (2024). Water Resource Managements in Soil and Soilless Irrigation Systems Using AI Techniques. In *Convergence Strategies for Green Computing and Sustainable Development* (pp. 245-266). IGI Global.
10. Volk, J. M., Huntington, J. L., Melton, F. S., Allen, R., Anderson, M., Fisher, J. B., ... & Yang, Y. (2024). Assessing the accuracy of OpenET satellite-based evapotranspiration data to support water resource and land management applications. *Nature Water*, *2*(2), 193-205.
11. Ghobadi, F., & Kang, D. (2023). Application of machine learning in water resources management: A systematic literature review. *Water*, *15*(4), 620.