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THE ROLE OF WELLS TO SUSTAINABLE IRRIGATION IN PARNER TAHSIL OF AHMEDNAGAR DISTRICT (MS): A SYSTEMATIC ANALYSIS

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Abstract
Groundwater is the most important natural resource for humans and the surrounding environment. It supplies potable, industrial, and irrigation water; and maintains the ecological base flow of rivers, lakes and wetlands while maintaining the biodiversity and habitat of sensitive ecosystems. Groundwater is generally of healthier quality than any surface water; less vulnerable to contaminants, seasonal and perennial fluctuations; and spread over a more uniformly large region. It serves as an important source of freshwater, where surface water (such as lakes, rivers, tributaries and small streams) is scarce or inaccessible. During the monsoon season, the groundwater in the tahsil is naturally and in small quantities manually renewed and it is used as ground water from various sources throughout the year. Due to these innate properties, the use of ground water is progressively increasing in the district including tahsil. Most of the ground water in the study area is used for irrigation by wells. Out of total irrigated area in the tahsil 57.56% area is irrigated by wells only. The purpose of our review article is to provide a holistic view of the contribution of wells to sustainable irrigation in the tahsil by compiling literature and summarizing observed findings.
Keywords: Water Resources, Irrigation Structure, Well Irrigation, Sustainable Irrigation, Soul of Agriculture etc.

Introduction

The well in the tehsil is one of the most important groundwater sources of irrigation used since ancient times. The river Ghod flows from the western boundary of the tahsil and the Mula river flows from the northern boundary of Parner tahsil. Besides, no major outer river flows through the interior of the tahsil. Also, under the Kukdi Irrigation Project, only 27 villages south of the study area are getting water from outside the tahsil through canal irrigation facilities. In addition, wells are the only reliable source of irrigation water, including drinking water, in villages away from major rivers and canal irrigation facilities in the rest of the tahsil. There are six major irrigation sources available in the tahsil. These include river canals, wells, tube wells, tanks and lakes.

Sources of Data:

To fulfill the objectives of the study, the data has been collected from different sources related to study area.

1. Census of Ahemdnagar district, 2011 and after processing of the data into percentage different table has been prepared.
2.District Gazetteer of Ahemdnagar district

Aims and Objectives:

1. The main aim of the present research work is, to find out village wise total irrigated area and well irrigated area in the Parner tahsil of Ahmednagar district.
2. To assess the village wise area under Well irrigation and analyzing the role of Wells in sustainable irrigation of Parner tahsil.

Objectives of the Study:

The mainaimof the present paper is, understanding the nature of occupational structure inAhemdnagar district. Secondly, assessing and analyzing the situation of work participation rate for regional development

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in terms of total workers has been carried out.

Methodology:

The entire work is based on secondary data; in the present study. Tehsil has been considered as a basic unit of investigation. The population character of occupational structure for Ahemdnagar

Sources of Data:

To fulfill the objectives of the present study, the secondary data has been collected from different sources related to study area.

1. Tahsil Agriculture Department.
2. Ground Water Survey and Analysis Department, Ahmednagar (GSDA).
3. Census Handbook of Ahmednagar District, 2001 and 2011.
4. District Gazetteer of Ahmednagar District.

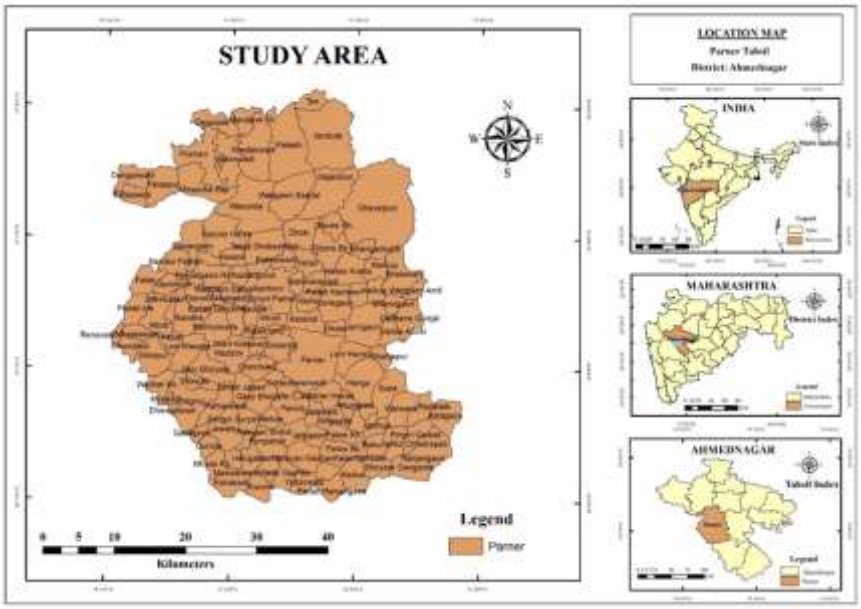
Methodology:

1. The whole work is based on secondary data; in the present research work.
2. The village is considered a fundamental component of the investigation. 'Contribution of village wise wells in the Parner tahsil for sustainable irrigation.'

Location of the Study Area:

Parner tahsil is situated partly in the upper Godavari basin and partly in the Bhima basin occupying a somewhat central location in Maharashtra state. It is extending between 18°49'55"and 19°21'17" North latitudes and 74°10'18" and 74°38'33" East longitudes. The tahsil is irregular in size, 57.9 km long and 45.3 km wide. Among the tahsils surrounding the study area, Sangamner to the north, Rahuri tahsil is to the northeast, Nagar tahsil to the east and Shrigonda tahsil to the southeast in Ahmednagar district. There are also two tahsils from Pune district; Shirur to the south and Junnar to the northwest. The tahsil comprises of 131villages spread over an area of 1933.99 sq. km. Parner tahsil is one of the 14 tahsils of Ahmednagar district and is the largest in size. While the area of the tahsil accounts for 11.34 percent of the total area of the district. Ahmednagar city is 40.7 km east of Parner and Pune city is 95.1 km southwest. While studying the distribution of cultivable area in the tahsil, it is observed that 11.05% area is under forest, 71.61% area under agriculture, 03.63% area under cultivable waste and 13.71% area which is not available for cultivation. Considering the area under agriculture, irrigation facilities are available for 20.51 per cent of the area, while the remaining 79.49 per cent is non-irrigated.

Fig. No.1 Location Map of Parner Tahsil



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Discussion and Results:

Source of Irrigation:

There are six major sources of irrigation, covering 284333 hectares of agricultural land in the tahsil. Irrigation sources wise information can be explained on the basis of the table below (Table No.1).

Table No.1 Sources of Irrigation in Parner Tahsil

Sr. No.	Source of Irrigation	Area (hector)	Percentage
1	Canal	9109	32.04
2	Well	16365	57.56
3	Tube Well	1517	05.34
4	Tank	128	00.45
5	River	1311	04.61
6	Lake	03	00.01
Total		**28433**	**100.00**

Source: Tahsil Agriculture Office, Parner.

The canal is the second largest source of irrigation in the tahsil and covers 32.04% of the area (9109 ha); The well is the number one source of irrigation and covers 57.56% of the area (16365 ha); 5.34% (1517 ha) area is covered by Tube wells, the third largest source of irrigation;4.61% (1311 ha) area under river falls under fourth rank irrigation source; 0.45% area (128 ha) of tahsil under tank irrigation and 0.01% (3 hectare) area under lake irrigation facility. According to statistical observations, well is the largest source of irrigation among the various irrigation sources in the tahsil. That is why we are going to study the detailed information of the number one source of irrigation from the present research.

Fig. No.2

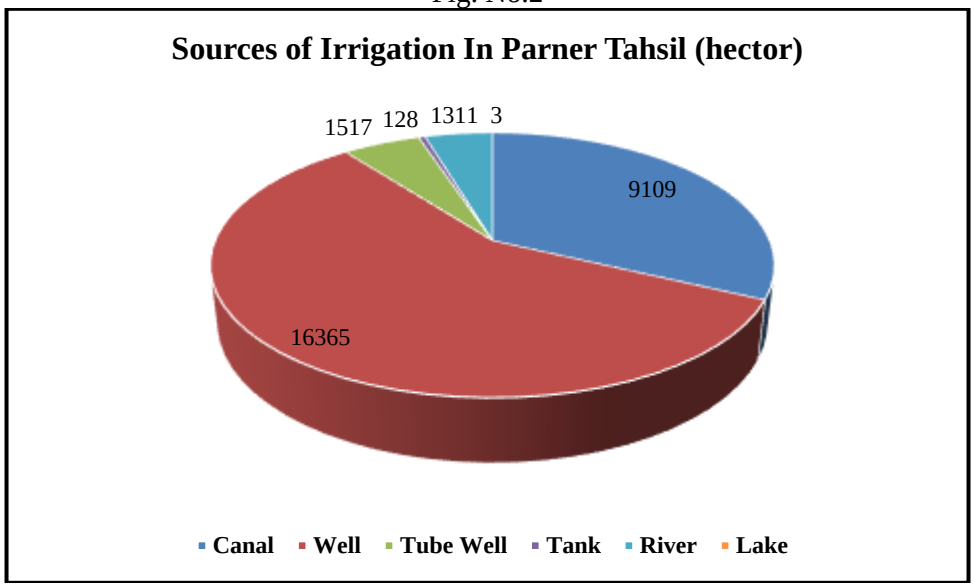

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Fig. No.3

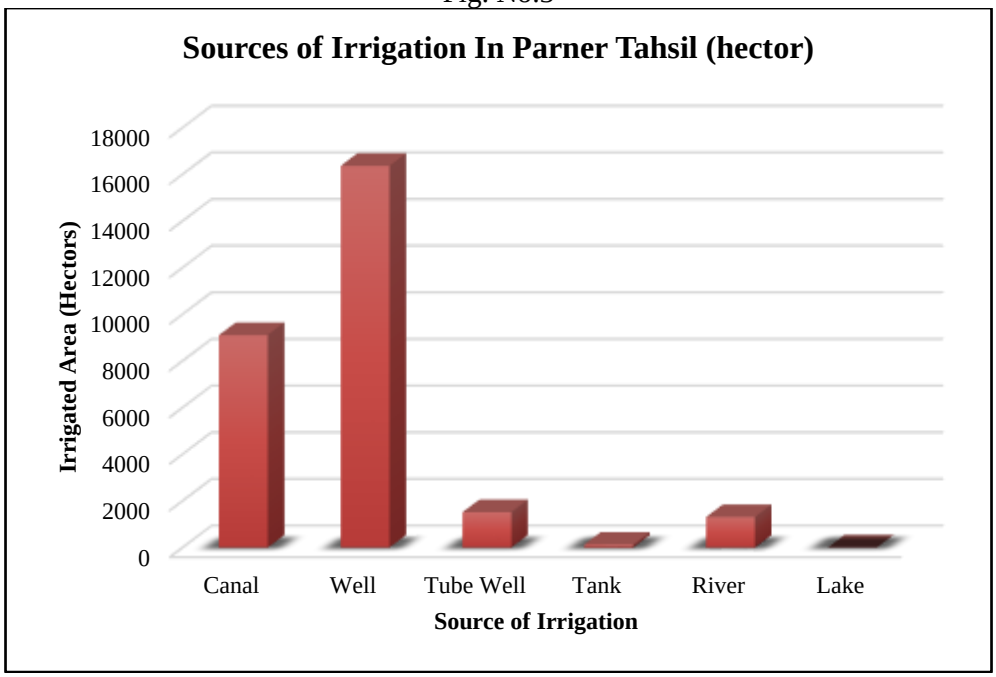
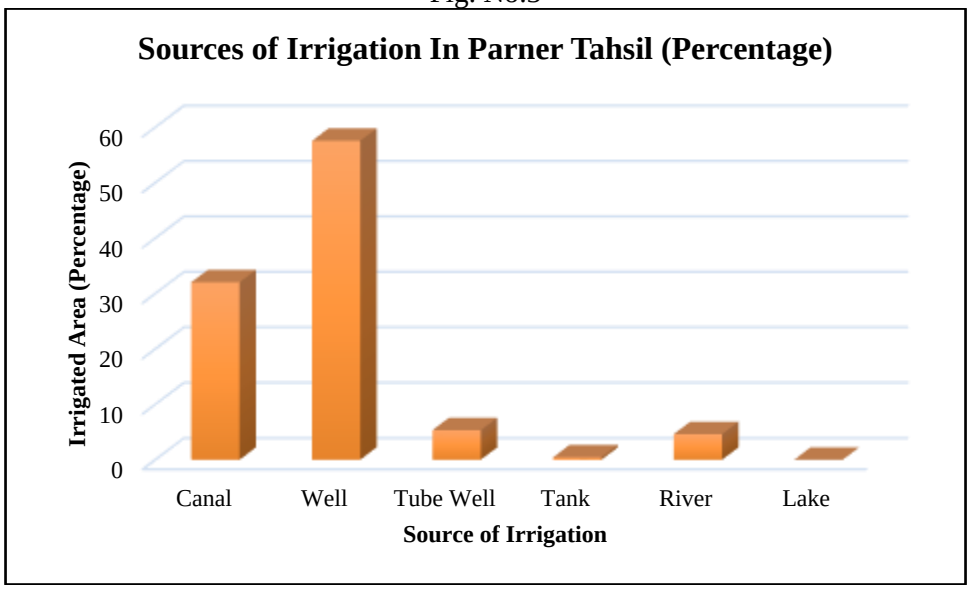


Fig. No.3



Area under Well Irrigation:

The role of irrigation in economic development and food security is well known in developing countries. It affects the growth of the nation and contributes to the welfare of the people [1]. In India, agriculture has been the primary source of income since pre-independence times and is still the main source of employment for the majority of the people. Wells play a vital role in irrigating most of the area in the tahsil as it is affordable even to the smallholder farmers. Out of net sown area (NSA) in tahsil, only 20.51% area (28433 ha) is under irrigation. This irrigation area is covered by some sources like canals, wells, tube wells, rivers, tanks and lakes. The largest area of these various sources is 16,365 hectares under well irrigation (Table No.2).

Circle Wise Area under Well Irrigation:

Considering the irrigated area covered by the Circle wise wells in the study area, the highest area of 3411

hectare falls under well irrigation in the villages falling under Nighoj Circle, and the lowest area of 1530 hectares falls in the villages falling under Bhalwani Circle. If we consider the irrigated area under net wells out of the total irrigation sources, then the irrigated area under net wells is 94.15% of the area under villages under Parner Circle. Villages with the lowest net well irrigation area fall under Nighoj Circle (29.02%). Considering the net well irrigation area falling under all other circles, e.g., Wade Gavhan (57.27%), Wadzire (71.06%), Supa (75.39%), Takali Dhokeshwar (86.33%), Bhalawani (89.68%) and Palashi (90.75%) (Table No.2).The rest of the paragraph discusses in detail the area covered by village wise net well irrigation.

Table No.2 Circle Wise Irrigated Area Under Wells of Parner Tahsil

Sr. No.	Name of Circle	No. of Villages	T.G.A. (Hector)	T.I.A. (Hector)	W. I.A. (Hector)	Percentage of W. I. A. to T. I. A.
1	Bhalawani	13	26256	1706	1530	89.68
2	Nighoj	21	21527	11754	3411	29.02
3	Palashi	15	47485	2378	2158	90.75
4	Parner	14	18046	1691	1592	94.15
5	Supa	14	19263	2487	1875	75.39
6	Takali Dhokeshwar	19	23741	1894	1635	86.33
7	Wade Gavhan	20	19500	3417	1957	57.27
8	Wadzire	15	17581	3106	2207	71.06
Total		**131**	**193399**	**28433**	**16365**	**57.56**

Source: Tahsil Agriculture Department, Parner.
T.G.A. = *Total Geographical Area,*
T.I.A. = *Total Irrigated Area,*
W. I. A. =*Well Irrigated Area*

Village wise area under well Irrigation:
The average village wise area of the tahsil is 217.05 hectare under irrigation. In terms of village wise irrigated area in the study area, the highest area is in Nighoj village (2000 ha) and the lowest area is in Gatewadi village (8 ha).

Table No.3 Frequency Distribution of Villages According to Well Irrigated Area

Sr. No.	Groups of Well Irrigated Area (ha)	No. of Villages	Percentage of Villages
1	000.01 To 200.00	104	79.39
2	200.01 To 400.00	23	17.56
3	400.01 To600.00	03	02.29
4	600.01 To 800.00	01	00.76
Total		131	**100.00**

Source: Tahsil Agriculture Department, Parner.

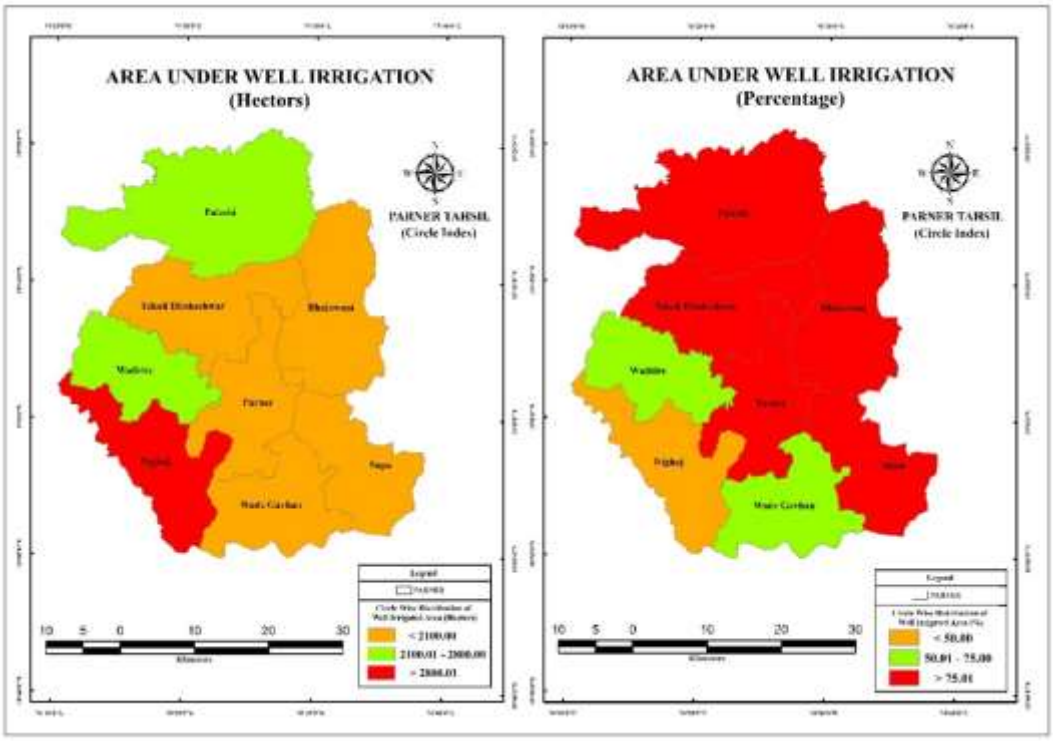


Fig. No.4

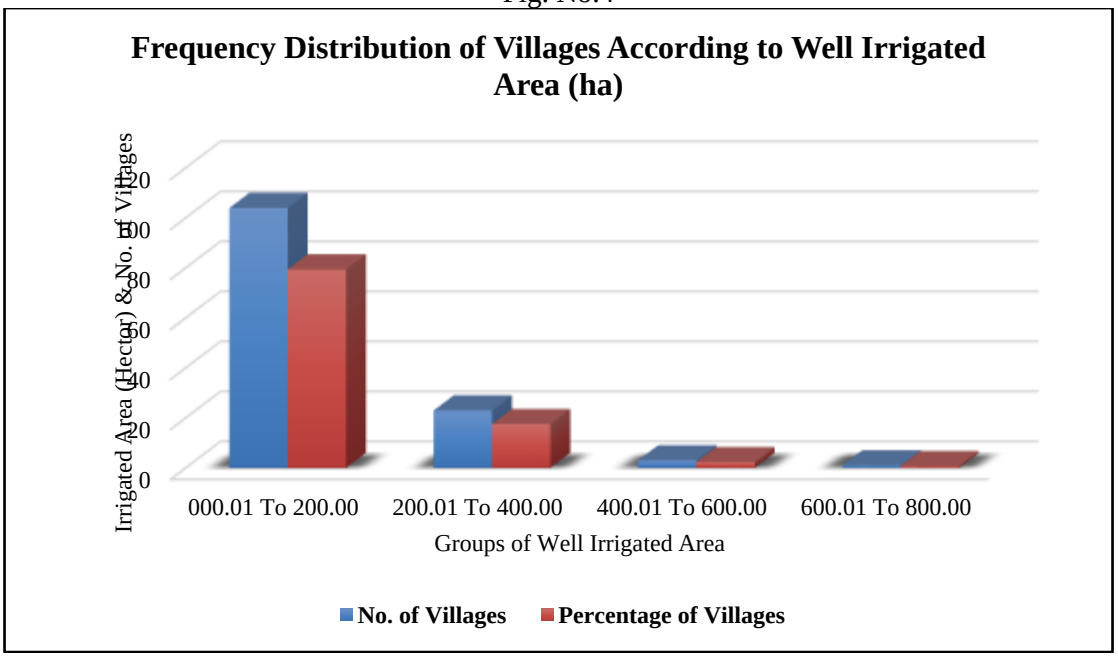


Table No.4 Frequency Distribution of Villages According to Percent Wise W.I.A. to T.I.A.

Sr. No.	Groups of W.I.A. (ha)	No. of Villages	Percentage of Villages
1	00.01 To 20.00	08	06.11
2	20.01 To 40.00	19	14.50
3	40.01 To 60.00	07	05.34
4	60.01 To 80.00	15	11.45
5	80.01 To 100.00	82	62.60
Total		131	**100.00**

Source: Tahsil Agriculture Department, Parner.

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Fig. No.5

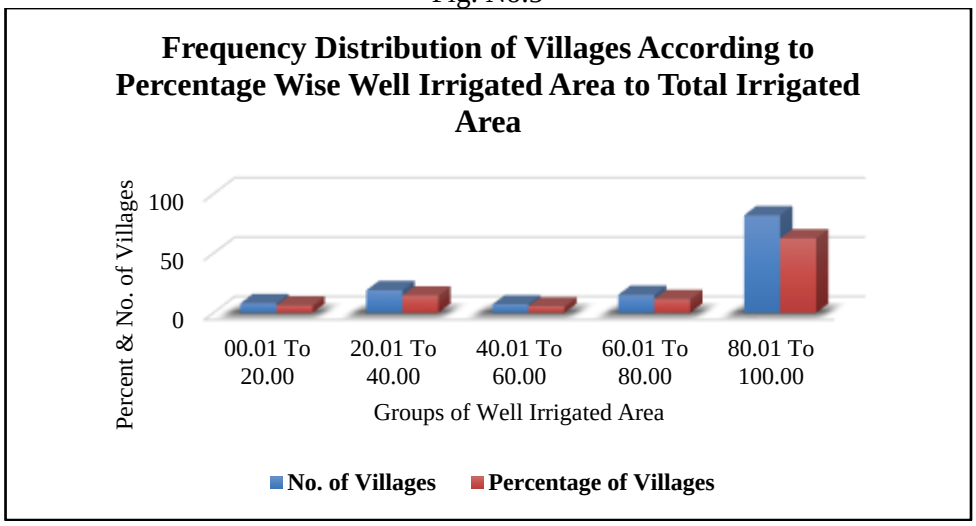
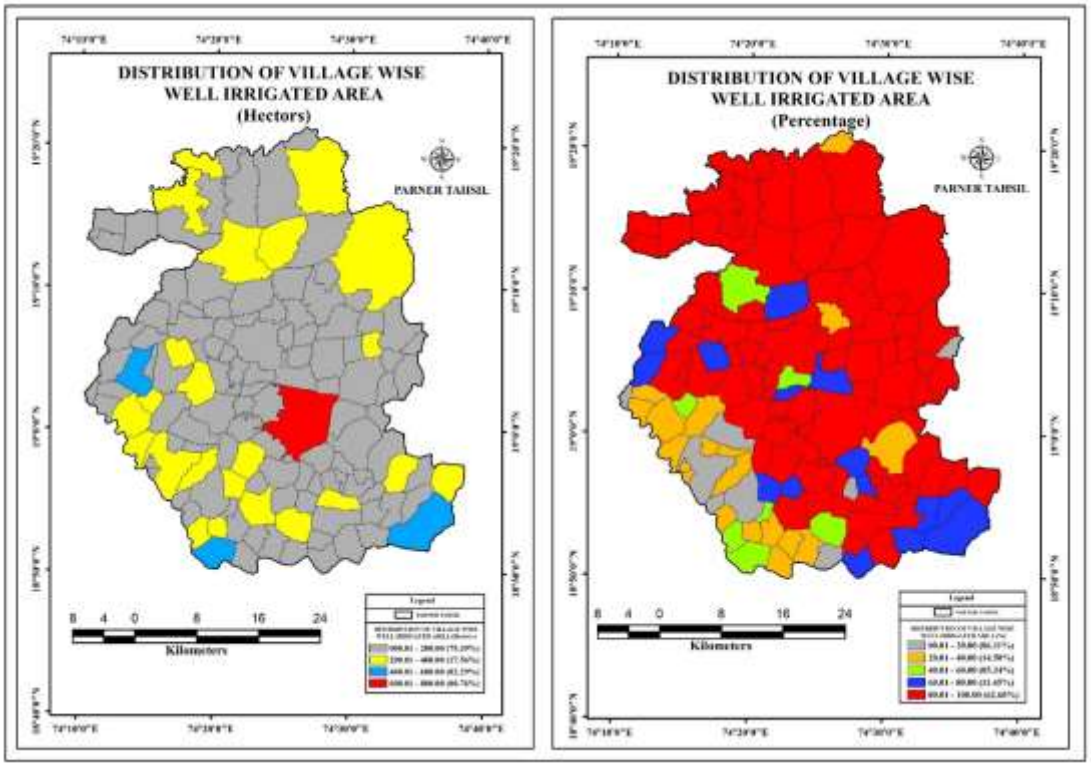


Fig. No.6



There are eight villages in the study area with up to 20% irrigated area under well irrigation (Table No.4). These include Wadgaon Amli (3.07%), Devi Bhoyare (9.07%), Yadavwadi (13.35%), Jawala (15.38%), Nighoj (15.50%), Renwadi (16.21%), Gadilgaon (19.23%) and Ghanegaon (20.00%).

There are nineteen villages in the tahsil with 20% to 40% irrigated area under well irrigation. These includes Wadgaon Gund (20.30%), Chombhut (22.11%), Gunore (22.87%), Dhawanwadi (24.24%), Wade Gavhan (24.43%), Morwadi (24.81%), Wadner Bk. (25.38%), Mhaskewadi (26.67%), Loni Mawala (30.08%), Tas (31.25%), Tikhol (32.10%), Kurund (32.91%), Shirsule (33.00%), Shirapur (33.57%), Patharwadi (33.70%), Ralegan Therpal (34.31%), Hakigatpur (34.34%), Mawalewadi (37.07%) and Hanga (37.54%).

In seven villages like Kohokadi (41.71%), Majampur (49.69%), Narayan Gavhan (50.47%), Karjule Harya (53.85%), Mhase Kh. (54.55%), Pabal (55.84%) and Wiroli (58.33%), 40%to 60% of the area is under well irrigation.

In fifteen villages like Rui Chhatrapati (60.47%), Ranjangaon (66.67%), Hatalkhindi (70.00%), Padali

Ranjangaon (71.60%), Pimpri Gawali (72.22%), Wadner Haveli (72.73%), Sangvi Surya (73.24%), Karandi (75.00%), Mhasne (75.00%), Takali Dhokeshwar (75.85%), Darodi (76.67%), Bhoyare Gangarda (77.42%), Wadule (78.95%), Kalas (78.95%) and Padali Ale (78.95%)60%to 80% of the area is under well irrigation. In 32 villages like Deswade (80.77%),Koregaon (81.40%), Sultanpur (81.48%), Mungashi (81.82%), Kadus (82.95%), Sawargaon (83.52%), Kalamkarwadi (84.44%), Pimpalgaon Rotha (84.62%), Loni Haveli (85.11%), Waghunde Bk. (87.22%), Gatewadi (87.50%), Chincholi (88.32%), Akkalwadi (88.73%), Nandur Pathar (89.47%), Diksal (90.00%), Ganji Bhoyare (90.17%), Baburdi (90.32%), Wasunde (90.91%), Bhalawani (91.67%), Mandave Kh. (92.31%), Ralegan Shindhi (92.39%), Jategaon (93.02%), Gargundi (93.33%), Wadgaon Sawtal (93.90%), Alkuti (94.18%), Palwe Bk. (95.00%), Palwe Kh. (95.02%), Panoli (95.24%), Bhandgaon (95.77%) and Pimpalner (98.81%) 80%to 99.99% of the area is under well irrigation. In 52 villages of the tahsil, 100 percent irrigation is done through wells. These include Dongarwadi, Katalwede, Palaspur, Mhasoba Zap, Pokhari, Waranwadi, Khadakwadi, Palashi, Venkute, Gajadipur, Dhavalpuri, Bhangadwadi, Dhotre Bk., Dhotre Kh., Dhoki, Kasare, Kaknewadi, Pimpalgaon Turk, Bhondre, Wadgaon Darya, Pimpri Pathar, Kanhoor, Wesdare, Bahirobawadi, Hivare Korda, Malkup, Daithane Gunjal, Sarola Advai, Jamgaon, Kalkup, Padali Kanhoor, Goregaon, Kinhi, Punewadi, Parner, Siddeshwarwadi, Garkhindi, Babhulwade, Padali Darya, Jadhavwadi, Sheri Koldara, Wadzire, Randhe, Sherikasari, Pimpri Jalsen, Shahjapur, Supa, Waghunde Kh., Apdhup, Walwane, Rayatale and Astagaon.

Conclusion:

Out of total irrigation in the tahsil, 57.56% area is under single well irrigation. The well is the only source of irrigation which is used for more or less irrigation in all the villages of the tahsil. Out of 131 villages, 52 villages have 100% irrigated area under well irrigation only. The well is the only source in the field to be irrigated by such a large number of sources irrigated by a single source. In 102 villages in the study area, more than 50% of the irrigation was under well irrigation only. It is noteworthy that even in the villages southwest and south of the study area where canal irrigation facilities are available, irrigation facilities are provided only through wells in times of deficit and revive the crops in those areas. The well is the only reliable source of water in the tahsil which is available to the crops as per their requirement in case of intermittent or erratic rainfall during the rainy season. This means that the role of wells in all sources of irrigation is extremely important considering the overall study area. From this it can be seen that if irrigation is the soul of agriculture, then there is no issue in saying that well is a sustainable source of irrigation in the Parner tahsil.

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