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Assessment of Jalyukt Shivar Abhiyan Water Conservation Scheme in Karjat Tehsil of Ahmednagar District, Maharashtra-Using GIS Technique

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ABSTRACT

The Maharashtra Government in India has launched a water conservation scheme entitled 'Jalyukt Shivar Yojana.' Jalyukt Shivar (JYS) Campaign is a flagship programme of State Government. The aims of this scheme is to bring water empowerment to the drought-affected villages to make Maharashtra Drought Free by the year 2019. The target of this programme to make 5000 villages free of water scarcity every year. The main objective of this research is assessing the village wise wok of water conservation methods. The study was conducted for entire Karjat tehsil. Total sixteen water conservation strategy implemented in all villages of Karjat Tehsil. Such as Compartment bunding, Nala extension, well recharge, sediment extraction, farm pond, drip and sprinkler irrigation, hydrofracturing, continuous contour trench, plantation, Kolhapur type weir, gabion structure, cement nala dam, loose boulder structure, water stock making pond and percolation tank. The geographical information system platform used for creating village wise each layers of conservation methods. This work shows through the choropleth map. Result shows from these case studies different water conservation schemes are implemented in this tehsil which are helpful for farmers and society. The storage capacity of nalas, dams are increase as well as groundwater level also increased.

Key words : *Jalyukt shivar, Water conservation, Water scarcity, Rainwater harvesting, Drought.*

Introduction

Water is one of the most important resources needed for the existence of living being. The water pays vital role in economic and agricultural development. The near about 82 percent area comes under the rain-fed and 52 percent area is under drought prone condition in Maharashtra. The pattern of rainfall in this region Jalyukt Shivar is one of the most important step initiated by government of Maharashtra for making drought free Maharashtra up to 2019. Its aims to bring to opulence to farmers andits land through water conservation methods. The water conservation scheme become a large movement in whole Maharashtra.

Integrated watershed management programme is core part and back bone of Jalyukt Shivar Yojana. Jalyukt Shivar Abhiyan is an Integration and Convergence of the various schemes implemented by various departments and pulling the funds from all resources like District planning committee, Agriculture department, dynamic watershed development programme, Mahatma Gandhi Jalbhumi Abhiyan, department of water conservation, national micro irrigation programme, scarcity funding Participation etc. (Pachkor and Parbat, 2017).

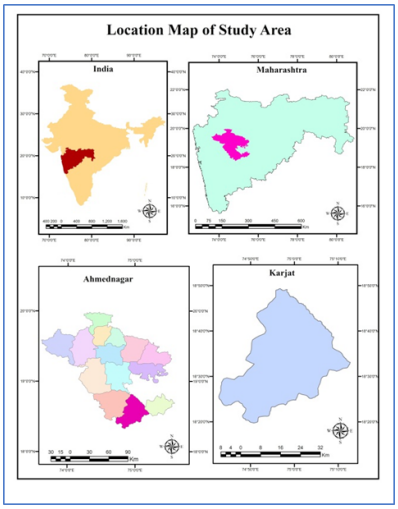


Fig. 1. Location Map of Study Area

Study Area

The proposed study area is the Karjat Tehsil covers within 18°19′86′′N to 18°49′86′′N latitude and 74°43′20′′ to 75°13′20′′ E longitude of geographical location.

Study area locating on the number of toposheet these are 47J/11, 13, 14, 15, 47N/1, 2, 3. The Karjat Tehsil having an area 1503.61 Sq. kms. The average height of these from mean sea level is 594 Mts. Administratively this area is Sothern part of Ahmednagar district. The average annual rainfall in the Karjat tehsil is 540 mm. About 85 percent rainfall is received from south west monsoon from second week of June to September and remaining 15 percent is contributed during non-monsoon months (return monsoon). It is totally depending upon the rainfall but recently some part of Karjat is covered by canal irrigation system. The present study areas belong to drought prone area.

Aims and Objectives

The aim of the study to evaluate and assess the water conservation work done by Jalyukt Shivar Abhiyan.

Objective

To assess the village wise water conservation strategies under the JSA.

Database and Methodology

In the present study the secondary data usedfor analysis of water conservation strategy in study area. These data were collected from different data sources. Like Agriculture department, department of water conservation etc. The village wise data of different water conservation methods join to shape file by using ArcGIS 10.1 software. With the help of these data set we prepared different choropleth map of Jalyukt Shivar Yojana.

Results and Discussion

It reveals the village wise work distribution of Jalyukta Shivar Abhiyan in Karjat tehsil in Ahmednagar District. The all choropleth map represents the village wise distribution and implementation of all scheme in the the study area. About sixteen water conservation strategies are used in this region.

Compartment Bunding

The block of farm as well as land was bounded by compartment from all sides is called as compartment bunding.The compartment bunding are formed using bund former. In Jalyukt Shivar Abhiyan the compartment Bunding water conservation strategy used everywhere in agriculture area. Because of compartment bunding promote to infiltration of water in to soil and also help to conserving soil moisture. Compartment banding is very beneficial for low infiltration rate and medium to high clay content soil. Compartment bunding conserve rainwater and it is reduced runoff, soil and soil nutrient loses. This method was very simple method, due to farmers are adopted it in different region.

Compartment bunding scheme implemented under the Jalyukt Shivar Yojana. The compartment bunding work done by Government of Maharashtra in 56,699 hectors in Karjat tehsil. The red color indicates high work of compartment bunding invillage. The scheme was started firstly in adoptive village Ruigavhan, Kuldhaarn, Chilawadi, Koregaon, Kombhali, Khandavi, Pimplawadi etc. in Karjat tehsil. The south and north east part of study area express low work of compartment bunding.

Continuous contour Trenches

Continuous contour Trench (CCT) is more significant water conservation strategy. Continuous contour Trench are excavating constant trench on according to contour lines, which is prepared with the help of contour marker. Its size was two foot wide

and one foot deep. Mainly this work was done in forest area and hilly area.

Generally, the continuous contour trenches work is done in fallow land (Malran). The CCT scheme was implemented in 3818 hectares areas. The hilly, barren and fallow land is very useful for this work. The Kuldharan, Dombalwadi, VadgaonTnapura, Chakhalewadi, village have high forest, fallow and barren land area. In north and south area very low CCT work were found. Near about one to four hectors CCT worked done. But hilly and fallow land area is very favorable for continuous contour trench.

Sediment Extraction

The extracted sediment from pond, lake, dam and river is used in agriculture where the soil quality is low. After the extraction of sediment, the storage capacity of dam, river, pond increases due to sediment extraction water conservation strategy used under the Jalyukt Shivar Yojana.

The sediment extraction is crucial water conservation method which is promoted to decrease of water storage and artificial recharge. The Bitkewadi, Chande Kh, Diksal they extract high sediment from lake, dam and river or small stream averagely up to 50 cubic meterof total catchment and Chapdgaon, Benwadi, Deshmukhwadi, Mandali, Taju, Nimbe, Kombhali has extracted sediment up to average 16 cubic meters of catchment. Tanks, ponds found at very large scale. The sediment was extracted up to thousands cubic meters. The total 23022 cubic meters sediment were extracted, it is future storage capacity of water bodies in Karjat Tehsil.

Nala Extension and Deepening work

Nala deepening and widening is eco-friendly water conservation structures built up to harvest rain water below ground level. The deepening and widening means removal sediment material from base to flood level of nala and create space for water storage. The nala bed deepening up to 1 to 3 meters but it is depending on size and shape of nala, physioclimatic and hydrogeological condition. In every village there are nalas, they need widening and deepening. After the completion of this work farmers are benefited due to water lever increase of their wells. This strategy effectively solved drinking water problems.

Nalas extension and deepening work done overall in Karjat tehsil but it is varying village wise. The total 775 cubic meters area of nalas extent and deepen in study area. The north and western side shows red and orange colour has indicates high nala widening and deepening up to 25 cubic meters. The central part is dominated by yellow colour it is express 10 to 15 cubic meter (medium) nala deepening and extension. South, north and some part of east side is shows low work of NED. It is totally depending on existence of nala, dam, pond.

Loose Boulder Structure

The loose boulder structure is used for water conservation in hilly areas, there is small streams, gullies are found. Its larger than the gully plugs. LBS reduced the erosion of bank they controlled velocity of runoff. Mainly LBS creates in forest as well hilly area, it is small barrier in flow of channel which is constructed by using rock boulders, gravel, disk and rectangular shape stones.

The eastern side of Karjat tehsil comes under Nandikeshwar Dongar, due to 90 percent loose boulder structure is created in this area. The Kanola river originates in this area, most of sub streams and channels are originate in this area and joins the main river. The basin area of these river covered by loose boulder structure. In other side there is no LBS found. Total 238 loose boulder structures are creating under the Jalyukt Shivar Abhiyan.

Percolation Tank

Percolation tank is significant water conservation method which is to promote augmentation of groundwater level. The tank is artificially created on the surface of the earth. Submerging land used for the creates of percolation tank, because they have high permeability. It is similar to CNB and CD but storage capacity is high. Generally, percolation tank constructed in terrain which is highly weathered and fractured rocks for highly recharge. Seventy nine percolation tank are renewed and constructed under the Jalyukt Shivar Abhiyan in study region. The south east, central and north west area was dominated by percolation tank. Some part of south and north side has few percolation tanks.

Gabion Structure

The gabion structure is generally used in Maharashtra, Andhra Pradesh and Madhya Pradesh etc. it is constructed by using boulders which are locally available, the boulders are stored in steel wire mesh and embind it in the form of rectangular blocks put it across the natural stream chan-

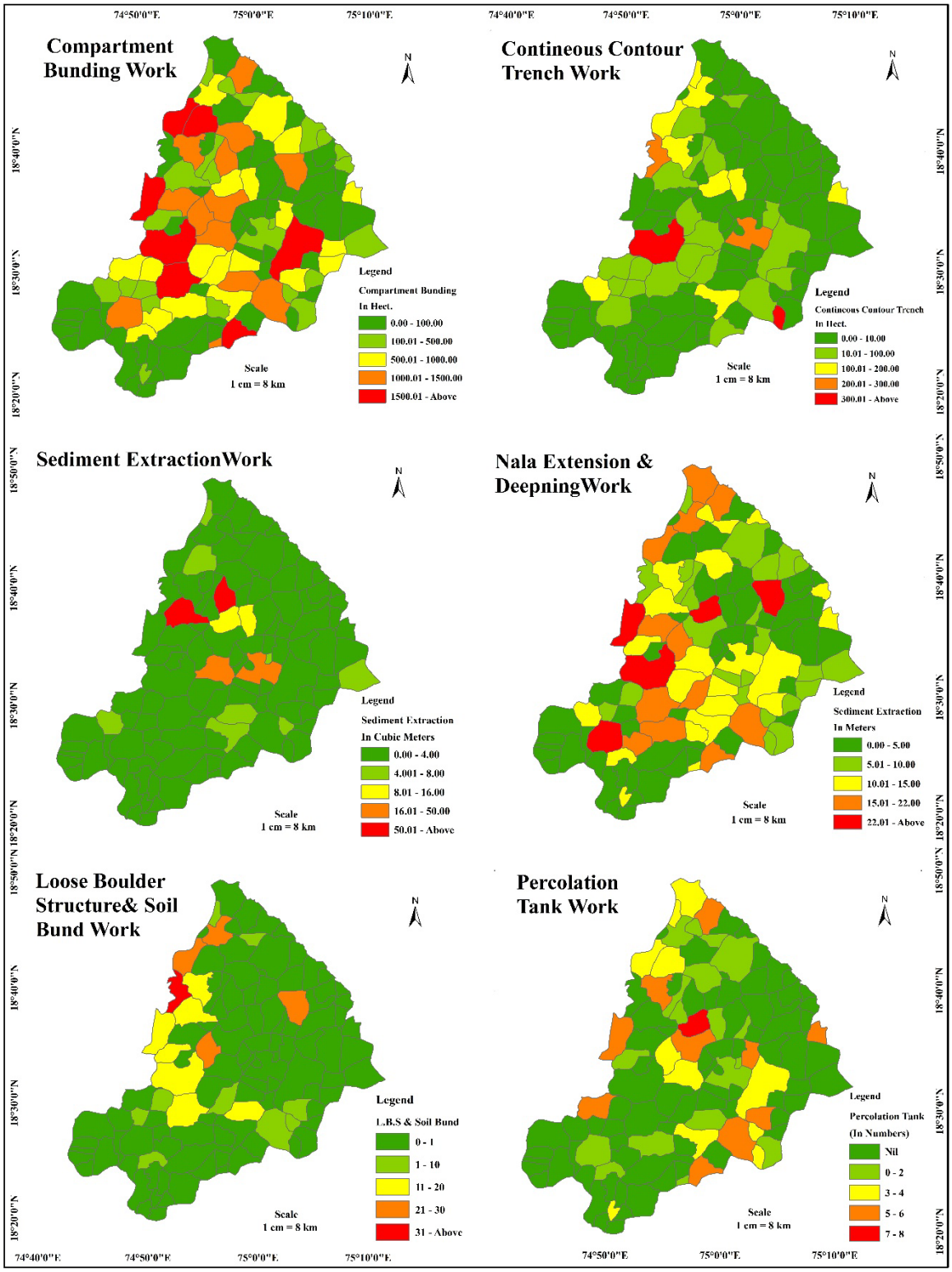


Fig. 2. Jalyukta Shivar Abhiyan Scheme Maps of Karjat Tehsil
Data Source: MRSAC/ Water Conservation Department, Government of Maharashtra

nel to make it as a small dam. This structure used in the channel which having width up 10 to 15 meters and height is up 0.5 meters.

The gabion structure is found in east and north west side of Karjat tehsil. The Chakhalewadi, Shimpore, Anandwadi, Mhalangi and Khatgaon has 6 to 10 gabion structures and Khandavi, Chapdgaon has 2 to 4 gabion structures. Remaining part of Karjat tehsil has no gabion structure constructed under Jalyukt Shivar Abhiyan. Total 57 gabion structure are constructed under this scheme.

Kolhapur Types Bandhara (KT weir)

Kolhapur type weir techniques is low height small dam along the river, it is constructed for water storage in rainy season for meeting demand of agriculture. Kolhapur type weir structure is constructed on the flow of stream channel having considerable gap between two piers to allow the passage to water stream. The gap between being locked with gate. This structure creates reservoir at the upstream area.

The total 33 Kolhapur type weir structures are constructed on Kanola river channel in northern and western part of Karjat tehsil. The Takali, Koregaon, Netakewadi, Loni, Mhalangi this village has 2 to 8 Kolhapur type weir structures. In other villages no Kolhapur type weir structures were created.

Cement Nala Bund

Cement Nala Bunds or Check dams are constructed at across to small stream having gentle slope and sufficient thickness of permeable bed. The height of these structure is mostly up to 2 meters, width is up to 15 meters and catchment of the cement nala up to 40 to 100 hectors. It is mainly based stream width and excess water.

The cement nala band has constructed in central and north side part of study area under scheme of Jalyukta Shivar Abhiyan. Highest CNB are constructed in surrounding area of Karjat city, Kombhali, Mandali village has 10 to 30 CNB structures. Other some villages have up to 5 cement nala band. Total 135 cement nala band constructed under the Jalyukt Shivar Yojana.

Water Stock Making Pond (Talav)

Water stock making pond or Talav is natural or artificially depression. That is smaller than a lake. Generally, it is creating nearer part of village or settlement for the fulfilled the demand of water for agriculture and domestic purpose. Storage capacity and catchment area is larger than the check dam, percolation tank etc.

The total 125 water stock making pond or talav are constructed and rejuvenate by using Jalyukt Shivar Abhiyan water conservation scheme. The east to west middle belt is covered by water stock making pond or Talav. Highest water stock making pond or Talav created and repaired in Kuldharan, Pimalwadi, Koregaon, Kaprewadi and chakhalewadi between 6 to 14. The 16 villageshave developed 3 to 6 water stock making pond or Talav.

Farm pond

Farm ponds are small water bodies constructed in farm by excavating or dug out and excavated soil is used to embankment around all sides of the pond. The water is usually harvested from a small catchment area. The stored water then used for agriculture during long periods. This method is used to collect excess runoff and stored during monsoon or rainy season. The stored water can be used in drought or water deficiency condition for crop.

Under the JYS scheme 147 farm pond are created in the study region. Mulewadi village adopted by Government of Maharashtra at initial stage of these scheme. The village have highest numbers of farm pond. Central and west part of Karjat tehsil is occupied by farm pond water harvesting structure.

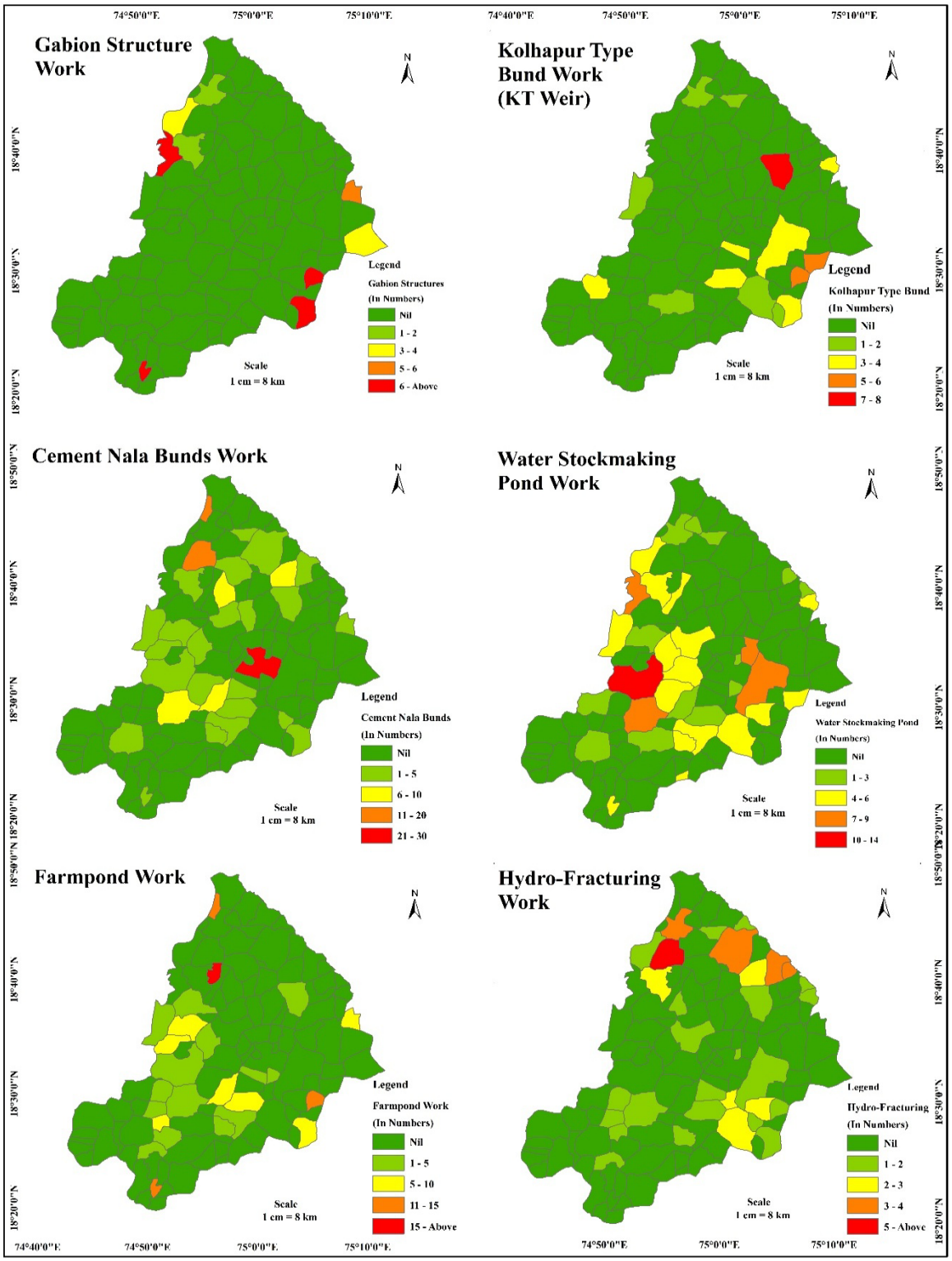
Hydro-fracturing

Hydro-fracturing is play vital role in development of groundwater level of borewell in the hard rock terrain. The hydro-fracturing technique is used to widen and cleaning the crack and fissures in the rock of strata by using injecting water with high pressure down the borewell. This technique firstly used for enhancing gas and oil.

The hydrofracturing method is used on practical based in 72 villages for recharging borewells. The village from northern area of Karjat they have used this structure for improving groundwater level of borewell. But the awareness about these techniques is very low in society. Due to this technique used in very little villages.

Well Recharge

Total 402 wells are rejuvenated under the Jalyukt Shivar Abhiyan scheme. The scheme is increases from middle to north part of Karjat Tehsil. The Kombhali, Chande, Chapadgaon, bitkewadi villages highly rejuvenate open wells. Near about 75 per-



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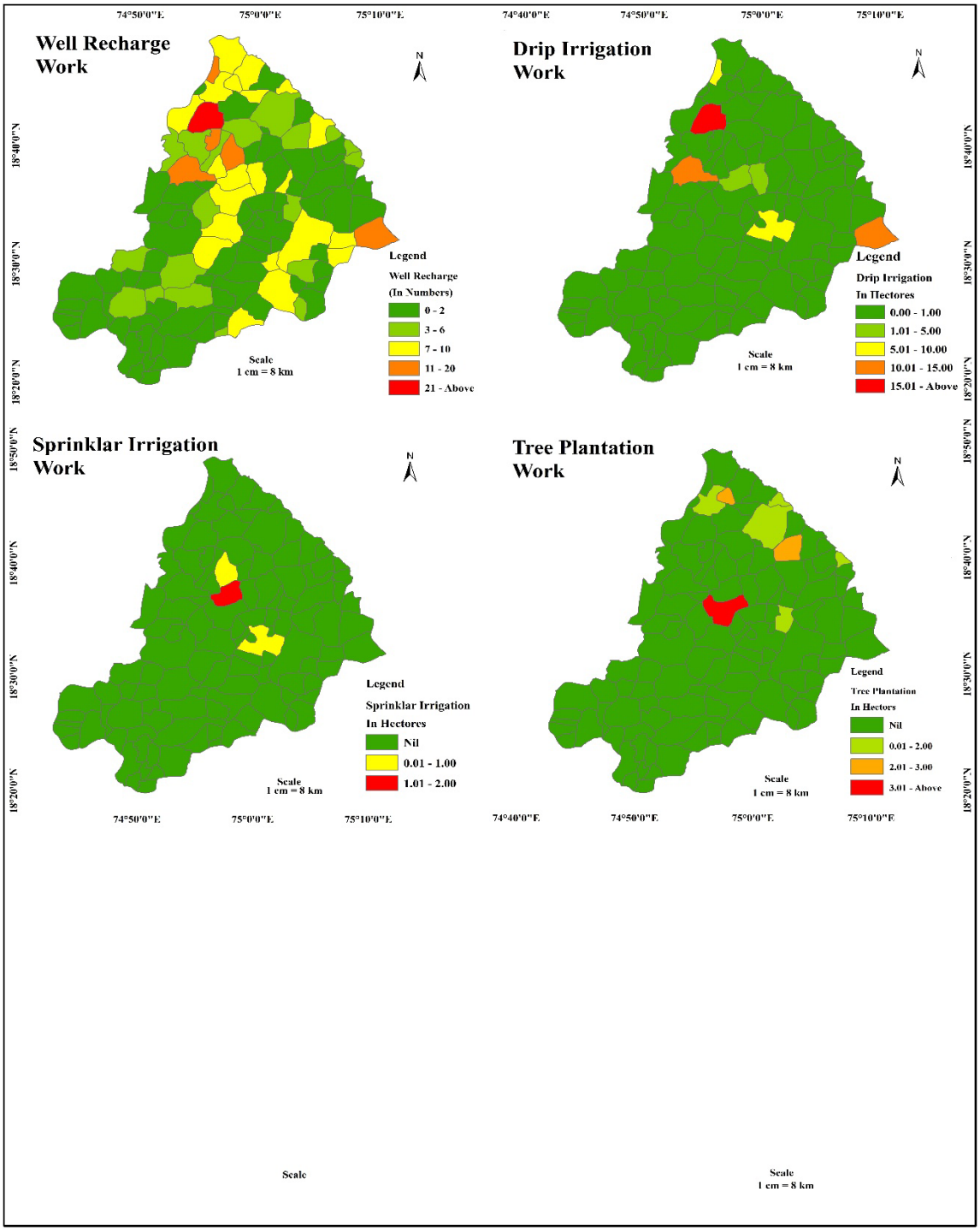

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cent villages rejuvenate open wells.

Drip Irrigation

The groundwater level decreases due to over exploitation. Through different artificial recharge method can increase ground water level. The open well has significant role in artificial recharge of groundwater. By using this recharge method will bring water back to if the well was dried. Drip irrigation is the most powerful water providing system for growing crops.

This system conserves 80 percent water compared other systems. Drip system delivered water to each plant separately in continuously small quantities through dripper. The implementation of drip irrigation scheme is very low at village level, a few villages are benefited by this technique. Total 714 hectares area comes under the drip irrigation system which is used for pomiculture farming. Highest drip irrigation techniques used in Kombhali, Chapadgaon, Bitakewadi, Karjat, and Mandali.

Sprinkler

Sprinkler micro irrigation system includes in Jalyukt Shivar Yojana. Sprinkler system is similar to natural rainfall. the awareness about this irrigation system is very low. This method was not suitable for all crops it is only beneficial tree crop, due to sprinkler irrigation system is used in only few villages. Only three hectares area cover by sprinkler irrigation system. Itslower than drip irrigation system. The sprinkler technique used in only three villages. Such as Karjat, Chande Khurd and Walvad.

Tree Plantation

The tree plantation scheme funded by Samajik Vanikaran and Forest department. Absent 29 hectares plantation is done in different villages in Karjat tehsil. The both side area of roads and barren land was selected for the tree plantation. Tree plantation is controlled soil erosion process. This work is mainly done in hilly area.

Conclusion

The different water conservation scheme has been brought under the one ceinture through Jalyukt Shivar Abhiyan, which support recollect rainwater and create decentralization of water storage compartment and increase groundwater level for use inagriculture. The different funding agencies are support for execution of Jalyukt Shivar Abhiyan. The sixteen method launch under the JSA scheme. The study area created own water potential under the Jalyukt Shivar Abhiyan it is very beneficial for farmers. The study area has come under the drought prone region. After the JSA work the groundwater level has increased and near about 90 percentage area occupy by cultivated area. There is very good scope for the crop diversification in Karjat tehsil. After this campaign farmers are to turn dynamic farming. Like pomiculture. This scheme helpful for overcome permanently water scarcity and drought condition.

References

Ajay Kolekar, Anand B. Tapase, Ghugal, Y.M. and Konnur, B.A. 2020. Impact Analysis of Soil and Water Conservation Structures- Jalyukt Shivar Abhiyan- A Case Study, Geo M East 2019, SUCI. 47–53 : 2020.

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.

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.

Nikita Nanaware and Khadake, N.V. 2019. Assessment on Jalyukt Shivar - A Case Study @ Ranzani Village Tal-Pandharpur. *International Journal for Scientific Research & Development.* 7 (2) : 500-502

Niranjan J. Khillare, 2017. Analysis of Delays in Works under Jalyukt Shivar Campaign, *International Journal for Scientific Research & Development.* 5 (4) : 1059-1066.

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.

Sanade, V.M., Sandesh, S., Dongare, Vijay, D. Hande, Sainath, D. Patil, Siddheshwar, Dhavan, D. and Prajakta S. Lokhande, 2019. A Research Paper on Jalyukt Shivar Abhiyan Assessment (Sonavade) and Design of Water-Efficient Village (Save). *International Research Journal of Engineering and Technology.* 6 (6) : 2200-2204.

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.