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Impact Assessment of Jalyukt Shivar Structures on Five Villages in Ambajogai

Mr. P.A.Vedpathak[1], Prof. P.A.Hangargekar[2]
[1, 2]*Department of Civil Engineering, STB COE,Tuljapur, Dr.BAMU, Aurangabad*

Abstract: ***Maharashtra has always faced droughts. The drought has persisted for four consecutive years and has affected drinking water security and crop production and productivity severely all over the Maharashtra state. Maharashtra government has launched a new program named Jalyukt Shivar Abhiyan to make Maharashtra a drought-free state by 2019. The JYS proposes a framework for village level water balance calculation which includes estimation of crop-water requirements, drinking water stress etc.***
JYS promotes an integration and coordination between various government agencies and program during planning and implementation levels and stresses on people's participation as one of the key objectives. The program aims to make 5000 villages free of water scarcity every year.
This transformation has been possible with concentrated efforts towards developing watersheds, improving ground water levels, de-silting and decentralizing water sources and increasing the area under irrigation.
Keywords: Draught, Scarcity, Ground water, irrigation, crop productivity and water requirement.

I. INTRODUCTION

In the state of Maharashtra, inconsistency of rains in the very times of crop growth and discontinuity of rains create drought-like situation and agriculture field is heavily impacted. Considering irrigation facilities in the state, factors mainly challenging development of state are - limited irrigation facility (according to report of water and irrigation committee, even if entire irrigation capacity is utilized, 44% area will remain dryland), large coverage of drought-prone area (159 Lacs Hectare which means 52% of cultivable area), large proportion of poor and downgraded land (42.20%), increasing uncertainty in the agricultural field due to uneven, unpredictable, and intermittent rainfall. For last four decades, heavy ups and downs have been observed in the production of crops on dryland in the state. Less availability of water is a major factor responsible for this situation.

To make water available for assured farming and for drinking, solutions under water conservation if strategically designed and implemented in integrated manner with coordination of all departments, provision for drinking water and protected irrigation for crops can be definitely made.

To permanently overcome drought situation, Jalyukta Gaav (waterfull village) campaign was implemented, the government was thinking of preparing organized action plan to make ‘water for all - drought-free Maharashtra and to permanently overcome drought situation and implementing ‘Jalyukta Shivar’ (waterful surrounding) campaign to increase water availability.

Almost 82% area in the state is dryland while 52% area is drought-prone. There are 188 Talukas (2234 villages) where groundwater level dropped for more than 2 Meter and drought situation were declared in 19059 villages from 22 districts in the year 2014-15.

This ‘Jalyukta Shivar’ campaign needs to be implemented in these locations on priority. Also, provisions should be made to ensure water scarcity situation is not created in future in the remaining part of the state.

Therefore, government is authorizing implementation of Jalyukta Shivar campaign in all districts of the state, in order to permanently overcome drought situation by convergence of funds approved for schemes under various departments and through MREGS/MLP/MP, fund/District-level fund /Non-governmental organizations /CSR and public participation. Keeping these issues in view, the present study, ‘Impact Assessment of Jalyukt Shivar Abhiyan for 5 viiages in Ambajogai, Dist. Beed on Water Availability was undertaken with the following objectives,

II. OBJECTIVES

Considering drought-like situation occurring frequently in the state, Jalyukta Shivar campaign is being taken up under 'water for all - drought-free Maharashtra 2019.

A. Harvesting maximum rainwater in the surrounding of village itself.
B. Increasing level of groundwater.
C. Increasing area under irrigation
D. Increasing water storage capacity of existing and dysfunctional water sources (small dams/ percolation tanks / CNB).
E. Extracting sludge from existing water sources through public participation and increasing water storage of water sources.
F. Encouraging tree plantation and planting trees.
G. To study the effect of water conservation works on water availability.
H. To assess the impact of water conservation works on irrigation potential and crop-productivity.

III.MATERIALS AND METHOD

A. Structures Under Jalyukt Shivar Yojana

1) *Earthen Nala Bund (ENB):* The earthen bund is constructed where the loose boulders are not available. The soil of the surrounding area is used for the construction of bund. The earthen bund is supported by the vegetation plantation on it. The top of the earthen bund is of 0.60 meter. The height of the bund is upto 1 meter. This type of bunds are constructed in low rainfall and upto 10 ha catchment area of watershed. This bunds helps to decrease soil erosion, slows the surface runoff and the vegetation planted on it creates the greenery, help in ecological improvement.

a) Essential geographical conditions
b) Protective bund on the drains having depth less than 1 Mt.
c) Nala having watershed area from 10 to 1000 Hectares.
d) Nala with both the banks – distinct & visible.
e) Width of Nala – less than 15 Mt.
f) Bottom slope – less than 3%.
g) No waste (chi bad) land nearby.
h) Availability of pakkamurum or rock at the spot of the weir.

2) *Continuous contour Trenching (CCT):* Land is most important source in development of human being. So the conservation of the land has to be priority. According to Economic Advisory of Agriculture in Maharashtra, there is 23% (70.60 lakh hact.) area is uncultivable (GoM-2003). The CCT is constructed on the land not available for cultivation (class 5 and 6). For the construction of the CCT the prior permission of the landowner is must. The CCT work is done in upper and middle part of the watershed, which has upto 33 percent slope. CCT is helpful to prevent 450 cubic meter runoff per hectare. On the upper part of CCT the plantation is done which prevent the soil erosion and the CCT help for the surface runoff reduction and water seepage in lower part of soil and rock strata. The distance between two CCT is decided according to slope of land. For 0 to 4 percent slope, the distance between two CCT is 10 to 12 meter; for 4 to 8 percent slope, the distance is 8 meter; for 8 to 15 percent slope, the distance is 6 meter and for 15 to 33 percent slope, the distance is 3 meter.

3) *Loose Boulder Structure:* Loose boulder structures are constructed to prevent the gully and stream erosion. These bunds are constructed where the catchment area is not more than 10 hectare. The small loose boulder structure is constructed where the catchment area is not more than 5 hectare. The boulder from the surrounding area is selected for bund construction. For support of this bund, the plantation of grass and other plants is done.

4) *Cement Nala Bund:* Since 1972-73, under the Integrated Watershed Development Programme, the work of cement nala bunding is being done for raising ground water level and prevention of soil erosion. This is a permanent structure having long life sustainability. The farmers are also coming forward with the demand of cement bandharas on the nalas. In Khatavtahsil, number of cement Nala bunds are constructed on the strategic location.

5) *Gabion Bundhara:* When loose boulder is covered with iron grid, this is called as gabion bandhara. The gabion bandhara is constructed where the slope of nala is 3 percent. The length of the bund is not more than 10 meter.

a) The structure made from the dubber and wire mesh, across the nala bed.
b) Suitable, simple and less expensive for the sites where, it is not possible to provide soil bunds due to non-availability of proper location for the weir

c) And cement bunds due to pukka foundation problem.
d) Recharge to nearby well though percolation of stored water in the nala bed.

6) *Farm Ponds:* This is the most effective water harvesting structure but Indian farmers do not put it to regular use. Farm pond is of small size depression mode for collection of surface runoff and the collected water will be used in scarcity time. These farm ponds are helpful for ground water recharge, if a dug well or a bore well is located near such a farm pond.

7) *Compartment Bunding:* Compartment Bunding means entire field is divided into small compartments with pre determined size to retain the rainwater where it falls and arrest soil erosion. The compartmental bunds are formed using bund former. The size of the bund depends upon slope of the land. They provide more opportunity time for water to infilterate into the soil and help in conserving soil moisture.

8) *Water Accumulating Deep Trenches (WADT):* Deep trenches are used both on hill slopes as well as on degraded and barren waste lands for soil and moisture conservation and afforestation purposes. The trenches break the slope and reduce the velocity of surface runoff. It can be used in all slopes irrespective of rainfall conditions (i.e., in both high and low rainfall conditions), varying soil types and depths.

9) *De-silting of Water Body:* Process of removing the deposited silt from water body is known as de-silting. “Silt is the residue of plants and waste material including plastic.

10) *Rejuvenation of tube body:* When one tube well became defunct, farmers had no other way but to invest their hard-earned money on drilling a new tube well to quench the thirst of their land.

11) *Recharge Shaft:* The artificial recharge to ground water aims at augmentation of ground water reservoir by modifying the natural movement of surface water utilizing suitable civil construction techniques. Artificial recharge techniques normally address to following issues

12) *DOHA:* Generally ,Rejuvenate means to restore a former state, or to make fresh and new again. River rejuvenation is also a process a Rejuvenate. River rejuvenation involves a renewed period of vertical erosion to achieve a new and lower base level **(** base level is the lowest level to which erosion by running water can takes place) . The fall in base level means river now has more has more power to available. This is used to actively erode the irregularities. So that the river can once again , over time achieve a state of equilibrium by creating a long, smooth profile. In watershed management , river rejuvenation means deepening and widening of river basin for increase capacity of river.

a) *Suitability:* It is suitable where slope of river bed is slight .

b) *Operation:* In river rejuvenation , block are formed in river basin for deepening and widening of river. Block size is 30m x 100m x 2m. this block is excavate with help JCB or manually. This block are excavate throughout the length of rive .distance between two block is 1 m to 3 m.

IV. RESULT AND DISCUSSION

This chapter deals with the results obtained during the research work. This study was depends upon the water requirement and water availability in the selected area. Results obtained during the research work are presented by the graphs and tables and analysis was done on the basis of these results. after every 4 to 5 years draught was observed in that region. The main problem has been observed in summer season i.e. from March to June in every year.

Table 1: Details of average Ground Water table Depth in the project areas (in meters)

Sr. No.	Name of villages	Sources	Pre-project level	Post-project level
1	Mandava (pathan)	Open Wells	0.3	1.8
2	Mamdapur	Open Wells	0.4	2
3	Yelda	Open Wells	0.3	1.75
4	Moha	Open Wells	0.6	1.9
5	Bodhegaon	Open Wells	0.6	1.4

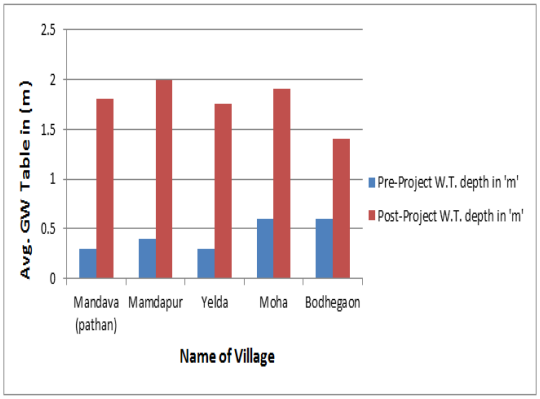


Table 2 : Status of Water Distribution by Tankers

Sr. No.	Name of Village	No. of tankers required				
		May-2015	May-2016	May-2017	May-2018	May-2019
1	Mandava (Pathan)	23	6	0	0	0
2	Mamdapur	6	2	0	0	0
3	Yelda	27	8	0	0	0
4	Moha	39	12	0	0	0
5	Bodhegav	19	5	0	0	0

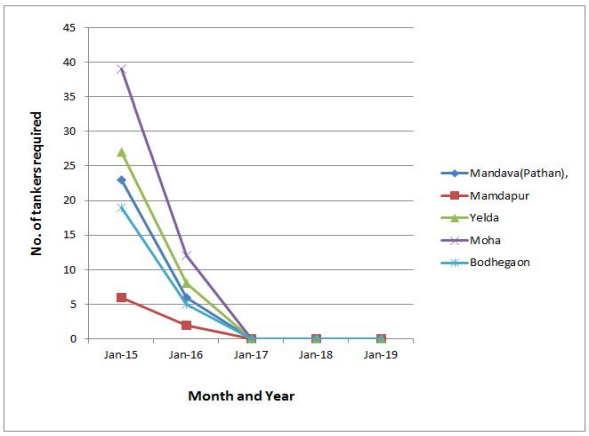


Table 3: Sourse wise irrigation status

Sr. No.	Name of Village	Pre-project				Post-project			
		Canal	Well	Bore wells	Ponds	Canal	Well	Bore wells	Ponds
1	Mandava	0	85	150	0	0	127	267	0
2	Mamdapur	0	48	27	0	0	81	78	0
3	Yelda	0	35	150	0	0	95	293	0
4	Moha	0	170	165	0	0	246	280	0
5	Bodhegav	0	98	110	35	0	182	219	35

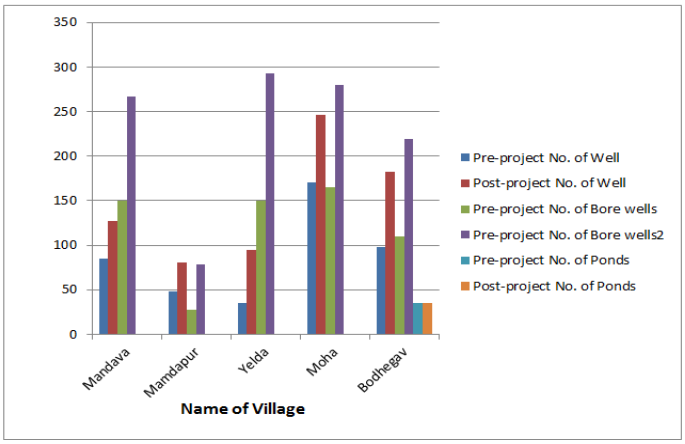


Table 4: Household facilities and assets available

Sr. No.	Name of Village	Total No of Households	Pre-Project (2016)			Post-Project (2019)		
			House hold with safety Latrine	Household with Vehicles		House hold with safety Latrine	Household with Vehicles	
				2 Wheeler	4 Wheeler		2 Wheeler	4 Wheeler
1	Mandava (pathan)	430	320	190	13	419	315	40
2	Mamdapur	115	90	50	5	110	99	22
3	Yelda	559	30	90	23	385	330	76
4	Moha	1056	550	545	13	997	837	85
5	Bodhegaon	402	310	305	8	390	350	42

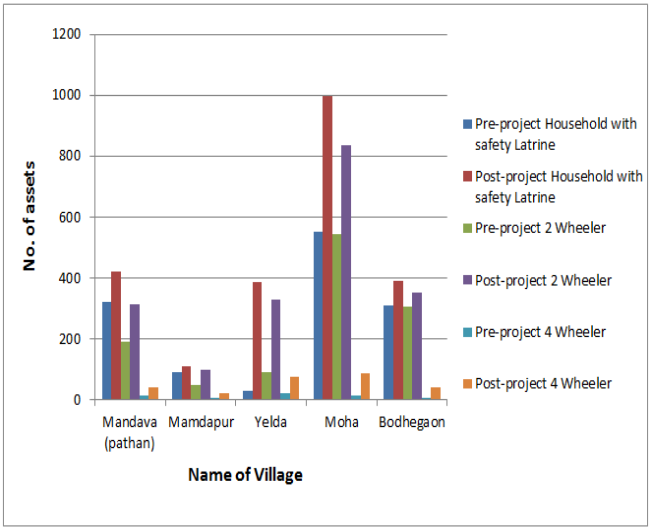


Table 5: Summary of details of Kharif, Rabi and Seasonal Crop Area and Production

Name of villages	Season	Pre project		Post project	
		Area(ha)	Total Production(MT)	Area(ha)	Total Production(MT)
Mandava (Pathan)	Kharif	577	717	616	826
	Rabi	347	436	472	663
	Summer Seasonal Crop	44.5	240	107	665
Mamdapur	Kharif	144	129	154	147
	Rabi	87	80	118	123
	Summer Seasonal Crop	13	75.6	53	222.6
Yelda	Kharif	1196	1442	1276	1663
	Rabi	528	664	719	1009
	Summer Seasonal Crop	34.5	190.8	100	531.75
Moha	Kharif	1132	1489	1204	1715
	Rabi	680	853	926	1298
	Summer Seasonal Crop	99	540	206	1446.6
Bodhegaon	Kharif	454	504	479	577
	Rabi	317	400	432	608
	Summer Seasonal Crop	84	450	186	1213

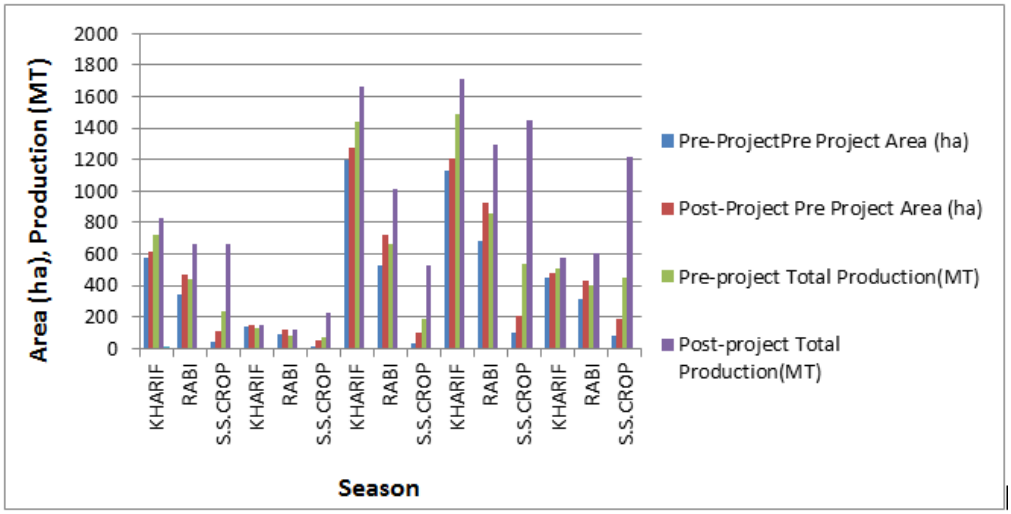


TABLE 6: MIGRATION STATUS

Sr. No.	Name of Village	Total Households	Population as per 2011 - census	Pre Project Status	Post Project Status
				No. of persons migrating	No. of persons migrating
1	Mandava	430	2144	432	272
2	Mamdapur	115	794	243	153
3	Yelda	559	2764	1092	688
4	Moha	1056	4467	485	306
5	Bodhegav	402	1886	320	202

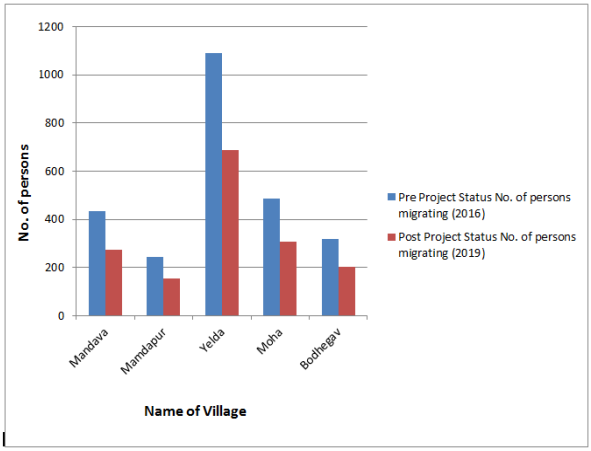
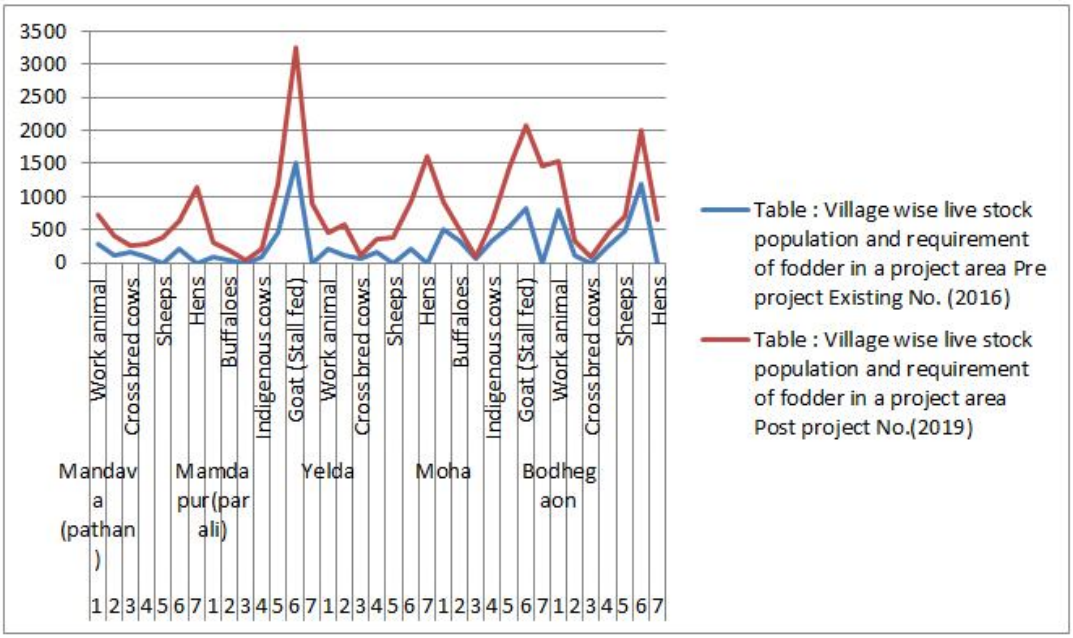


Fig. Graphical representation of live stock population in the project area



V. CONCLUSIONS

While studing the Jal Yukta Shivar Yojana impact of water conservation works of "Jalyukt Shivar Abhiyan" at Mandava (Pathan), Mamdapur, Yelda, Moha and Bodhegaon villages was studied with respect to rainfall,availability of drinking water, Ground water table, land use pattern, irrigation potential and productivity of different crops of the village. The data was collected by using standard survey format (questionnaire) during personal interview method in the village. This data was compared with previous data to assess the impact of water conservation structures on irrigation and crop productivity. On this information following conclusions are determined:

A. Increase in availability of drinking water in the villages
B. Increasing level of groundwater.
C. Increasing area under irrigation
D. Decrease in area under dry land and increase in area under irrigated crops
E. Increase in greenry and vegetation cover
F. Increase in social and economical standards
G. Reduction in migration for employement.

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