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A STUDY OF THE IMPACT OF FARM POND ON THE FARMERS IN AMRAVATI TALUKA REGION

Statistics

KEYWORDS:

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ABSTRACT

In this study a survey of villages is conducted to study the impact of farm ponds on the farmers of Amravati Taluka Region. A sample of beneficiaries of Rashtriya Krishi Vikas Yajana is selected using a suitable sampling method. Social and demographic factors of the area are studied. Collected data is analysed using different statistical tools and some recommendations are made.

1. INTRODUCTION

Agriculture is the main source of Indian economy and near about 65% of Indian population directly depends upon agriculture. Our agriculture experts try to develop new technologies for increasing productivity and reducing the cost of production. In recent years agriculture sector in India has witnessed spectacular advances in production and productivity of food grains, fruits, vegetables etc.Although Maharashtra is highly industrialize and agricultural state in India. Most of agricultural lands in Maharashtra still depend upon traditional monsoon season but it is not sufficient for agricultural production that is why irrigation facilities are being extended so that agriculture could be made less dependent upon monsoon. Irrigation in Maharashtra includes network of major and minor dams, wells and other rain water harvesting projects such as Farm Ponds.

In Maharashtra, main crop in Amravati region is the chili pepper, Anjangaon surji and Achalpur is famous for growing cotton,betel, orange, bananas. Warud, Morshi, Chandur bajar, are famous for growing Nagpuri oranges. In Amravati about 2/3 of cultivated land depends upon monsoon.Government of Maharashtra has introduced several schemes to improve surface water availability in irrigated and rain fed areas for increasing the productivity, which is as follows.

- Tree planting on community lands in identified watersheds
- Western ghat development program
- NABARD – WDF assisted watershed development program
- River valley program
- Gram sachivalaya yojna(G.S.Y.)
- Rahtriya Krishi Vikas Yojna(R.K.V.Y.)

National Rural Development Scheme is a scheme of additional central assistance launched in August 2007 as a part of the 11th five year plan by the government of India. Rashtriya Krishi Vikas Yojna (R.K.V.Y.) is introduced to deal with the problem of water crisis in agriculture, under this scheme Farm Pond is provided to the farmers. A project of Rs. 92.74 crores was approved for farm Ponds as the first project of National Rural Development Scheme in 2007 – 2008. The same commitment confined next year when another project of Rs. 123.79 crores was approved for Farm Ponds. Implementation of schemes was initiated in two major cotton growing regions of Vidarbha and Marathvada in 2007–08 in the district of Amravati, Yeotmal, Akola, Buldhana, Washim, Wardha, Chandrapur, Nagpur, Latur, Osmanabad, Nandes, Hingoli, Parbhani, Aurangabad, Jalna, and Beed. It was extended to Khandesh region in 2008 – 09 covering the districts of Jalgaon, Dhule, Nandurbar, Nashik and Ahmednagar. Finally, Maharashtra approved a multiyear Farm Ponds project in 2009 – 10 with allocation of Rs. 224.00 crores.

The scheme has been finally implemented in as many as 250 talukas of 25 districts of the state.Under this scheme, subsidy is extended to farmers who take up construction of farm ponds of specific designs approved by the department of agriculture. The average subsidy amount ranges from Rs. 52000 to Rs. 82500 depending on the size of the ponds constructed while the actual cost to the farmers ranges from Rs. 1.5 lacks to Rs 2.5 lacks.

1.1 About Farm Ponds

A farm pond is a large hole dug out in the earth, usually square or rectangular in shape in which harvest rain water is stored for future use. It has an inlet to regulate inflows and outlet to discharge excess water. The pond is surrounded by small bund, which prevents washing away banks of the pond. The size and depth depend on the amount of land available, the type of soil, the farmer's water requirements and the cost of digging. Water from the farm pond is taken to the fields either manually or by using water pump or by both methods. The selection of site for a farm pond is critical. The pond must be located in corner of a plot of land so that it does not disturb farm operations like cultivation. It must be located at 3m away from other farmer's fields. The slope of the land and the slope's direction must also be carefully evaluated so that water from rain is collected in the farm pond.

A test pit is dug out before finalizing the location and depth of digging. The digging of earth can be done with a combination of manual labor or with machines like excavators and tractors. Soil conditions must be carefully considered. Use of machines for digging and transportation is the best method in some situations; human labor is used for leveling, bun formation, and construction.

1.2 Advantages of Farm Pond

- Farm Ponds provide water to start growing crops, without waiting for monsoon.
- Farm Ponds recharge ground water
- Farm Ponds improve drainage
- Farm Ponds supplies water for domestic purpose and livestock
- Farm Ponds provide water for irrigation during season between rainfalls. This increase the yield of crop, the number of crops, and the diversity of crops that can be grown.
- Farmers are able to apply adequate farm inputs and perform farming operations at appropriate time, thus increasing their productivity, income and their confidence in farming.

1.3 Disadvantages of Farm Pond

Likewise the advantages, the beneficiaries also expressed that there

were disadvantages which are noticed after the construction of farm ponds. One of major such disadvantage expressed was loss of land for farming.

- Loss of land for Farming
- Overflow to farms
- More sedimentation
- Wild animal damaging the crops
- No inflows

2. OBJECTIVE OF THE RESEARCH

Objective of this study is to assess the use of Farm Ponds on crop yield. In particular the study focuses on

1. To study the impact of farm ponds on farmer's economy.
2. To study the various uses of the water provided by the farm ponds.
3. To study water related problems in villages before and after the provision of farm ponds.
4. Examining the impact of Farm Ponds on Crop yield and area under irrigation.
5. Assess the constraint and options to improve Farm Ponds scheme.

3. Review of literature

In a study conducted by Lakshmi Prabha entitled "Impact of farm ponds on cropping pattern" – A case study on Vembedu village in Tamilnadu. She observed that the cropping pattern has changed before and after the farm ponds. The irrigated area has increased from 24.58% to 40.28% after farm ponds. There is also change in average net income of the household after comparing situation before and after farm ponds construction.

Another study done by Saraswati P. Patil and S.B. Gaikwad "Diffusion trend of farm ponds technique in upper Krishna basin of Maharashtra". In this study they observe that farmers of drought region have use the farm ponds for collecting the surface runoff water. They use this water throughout the year gives good result to the farmers so they adopted farm ponds as an innovative technique.

From 46th Annual report of Agriculture and finance Corporation of India on "Impact assessment study of farm ponds in 13 districts of Nagpur, Amravati and Latur divisions of Maharashtra"[6]. One of major impact found due to farm ponds is the increase in water level in the existing wells of the beneficiaries. There is significant improvement in water level which is varying from 17 to 53% among different post south west monsoon month of 2011-12, when compared to before project situation. Overall about 1 miter increase in depth of water is reported during the month of February.

The Agriculture and finance Corporation has been reported to provide crop demonstrations, seeds, fertilizers and pesticides, pump sets, sprinklers/ drip irrigation units and undertook study tours to these RKVY farm pond beneficiaries. In all about 21% of the beneficiaries had availed one or more of the above facilities/ subsidies, majority of them are from input supply like treated seed, recommended doses of fertilizers and pesticides.

4. Methodology

The primary data is collected from the agriculture department in Amravati taluka, there are 261 beneficiaries farmers in overall 63 villages for whom sanction and amount for constructing Farm Pond was provided by the Maharashtra state government during the year of 2007 to 2009 under Rashtriya Krishi Vikas Yojna [4].

The study is based on this data and population consist of 261 beneficiary farmers. The sample is selected from the population by the use of two stage sampling. At first stage 5 villages are selected from the 63 villages by the use of probability proportional to size without replacement method (ppswor) for this Lahiri method was adopted to select villages. The selected 5 villages are Pusda, Shirala, Walgaon, Parsoda, Nandura bu.

The second stage units (sample beneficiaries) are selected from the selected first stage unit by SRSWOR. In planning a sample survey for estimating the population parameters, the important question is how to determine the size of the sample to be drawn. It can be done by specifying the degree of risk or precision in terms of permissible loss and level of confidence. In this research study the population consist of 261 farm ponds. By total count population mean $X = 4.14$ and $S^2 = 9.4470$,and number of sampling units are chosen with a permissible marginal error of 5% and 99 percent confidence coefficient, with the use of simple random sampling without replacement [1],[3]. Using the formula

$$n = n_0/(1+n_0/N), \qquad \text{where } n_0 = t^2S^2/\epsilon^2$$

The sample size thus obtained is 55 approximately, which is distributed among 5 villages and from each village 11 beneficiaries are selected. Information is collected from these beneficiary farmers using a questionnaire.

5. Analysis

Social and Demographic profile of beneficiary farmers

Education	Percentage
Illiterate	16.37%
Primary School	30.91%
High School	20.00%
H.S.C.	20.00%
Graduate	12.72%
Water availability	
Very Poor	16.00%
Poor	38.00%
Medium	37.00%
Sufficient	9.00%
Sources for irrigation	
Bore Well	32.46%
Canal	22.10%
River	24.67%
Others(Nala)	20.77%
Sources for Farm Pond	
Direct rainfall	50.54
Springs	13.40
Small streams	14.43
Lakes	6.18
Others	15.45
Season wise use	
Kharip	30.91
Rabbi	16.37
Both	25.45
No use	27.27

To test whether there is increase in yield of crops after construction of Farm Ponds or not for this null hypothesis H_0 is

H_o: There is no significant increase in yield of crops after construction of Farm Ponds

H_i: There is a significant increase in yield of crops after construction of Farm Ponds

Wilcoxon Signed Ranks Test

Ranks

		N	Mean	Sum of Ranks
After – Before	Negative Ranks	6[a]	11.00	66.00
	Positive Ranks	33[b]	21.64	714.00
	Ties	16[c]		
	Total	55		

a. After < Before
b. After > Before
c. After = Before

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Test Statistics[b]

	After - Before
Z	-4.528[a]
Asymp. Sig. (2-tailed)	.000

a. Based on negative ranks.
b. Wilcoxon Signed Ranks Test

Here, in first table we can see that total number of negative ranks are 6, mean rank is 11 and sum of negative rank is 6 similarly, total number of positive ranks are 33, mean rank is 21.64 and sum of positive rank is 714. A tie between the ranks is 16. In second table we observe that p-value is 0.000 which is less than 0.05 hence we reject the null hypothesis H_0 that is H_1 is accepted. Thus, there is a strong evidence that there is significant increase in yield of crops after construction of Farm Ponds.

5.1 Increase in area under irrigation

To test whether there is increase in area under irrigation after construction of Farm Ponds or not.

H_0: There is no significant increase in area under irrigation after construction of Farm Ponds

H_1: There is a significant increase in area under irrigation after construction of Farm Ponds

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
After – Before	Negative Ranks	5[a]	3.00	15.00
	Positive Ranks	15[b]	13.00	195.00
	Ties	35[c]		
	Total	55		

a. After < Before
b. After > Before
c. After = Before

Test Statistics

	After – Before
Z	-3.384
Asymp. Sig. (2-tailed)	.001

In the first table we see that total negative ranks are 5,mean rank is 3 and sum of negative rank is 15 similarly, total positive ranks are 15,mean rank is 13 and sum of positive rank is 195. A tie between the ranks is 35. In second table we observe that p-value is 0.001 which is less than 0.05 therefore, we reject the H0. Thus, there is a increase in area under irrigation after construction of Farm Ponds. But among 55 respondents 35 reported tie , hence there is moderate increase in area under irrigation.

5.2: Agreement among the farmers about use of water in Farm ponds for different purposes.

In this study of Farm Ponds, there are different purposes for which the water in the Farm ponds is used and to check the agreement among the farmers about the use of water in the Farm Ponds for different purposes, for this Kendall's Coefficient of Concordance i.e. Kendall's W test is used.

H_0: There is no agreement among the farmers about the use of water in the Farm Ponds for different purposes.

H_1: There is an agreement among the farmers about the use of water in the Farm Ponds for different purposes. The Kendall's test statistic is:

$$W = \frac{s}{\frac{1}{12} * m^2(k^3 - k)}$$

k = Number of ranks = 5
m = Number of respondent = 55
$s = \sum (R_j - \bar{R}_j)^2$ = Deviation of sum of square = 9662.8
$1/12 * m^2(k^3 - k)$ = maximum possible sum of squared deviation.
W = 0.3194

Here we see that $k \geq 5$ and $m > 15$,
Since, $m(k-1)W \sim \chi^2(k-1)$
$= m(k-1)W$
= 70.2749

Now, we calculate the p- value using CHIDST function in MS-Excel
p- value = 1.9858E-14

Thus W = 0.3194 which indicates some level of agreement among the Farmers about the use of water in the Farm Ponds for different purposes. Also the p-value < 0.05, thereby allowing us to reject the null hypothesis. Thus, there is an agreement among the farmers about the use of water in the Farm Ponds for different purposes.

5.3: To check the monotonic correlation between number of times Farm Ponds filled up and number of times Farm Ponds provided irrigation.

To study whether there is monotonic correlation between number of times Farm Ponds filled up and number of times Farm Ponds provided irrigation or not. Therefore, spearman's rank correlation coefficient test is used. The null hypothesis to be tested is

H_0: There is no monotonic correlation between number of times Farm Ponds filled up and number of times Farm Ponds provided irrigation.

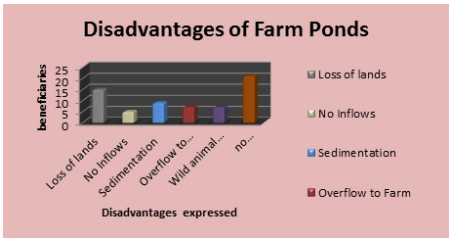
H_1: There is monotonic correlation between number of times Farm Ponds filled up and number of times farm ponds provided irrigation.

Correlations

			VAR00001	VAR00002
Spearman's rho	VAR00001	Correlation Coefficient	1.000	.627
		Sig. (2-tailed)	.	.000
		N	55	55
	VAR00002	Correlation Coefficient	.627	1.000
		Sig. (2-tailed)	.000	.
		N	55	55

Here, p-value is less than 0.05 that is p-value < 0.05 therefore, we reject the H0 means that there is monotonic correlation between number of times Farm Ponds filled up and number of times Farm Ponds provided irrigation. This show that there is monotonic correlation between number of times Farm Ponds filled up and number of times Farm Ponds provided irrigation.

Disadvantages expressed by beneficiaries



The beneficiaries also expressed that there were disadvantages which noticed after the construction. One of major such

disadvantage expressed was loss of land for farming (23.44%).

More than 35%reported that there is no disadvantage.

6.CONCLUSION

It was observed that in Amravati taluka region farmers totally depend directly on rainfall and the sources of water dependent on rainfall are boar well, canal, river, springs and so on. Financial provision for building farm ponds is a step towards water conservation. Conservation of water in farm ponds not only provides water for irrigation but also help to increase underground water level into area of farm pond. Our study covered 55 beneficiaries of farm ponds which were constructed during the year of 2007 to 2009. Some conclusions about the impact of the farm ponds are as follows.

1. More than 80% of beneficiaries are having education less than 12th .91 % farmers reported poor-medium water availability before farm ponds.

2. From the study it is observed that there is monotonic correlation between numbers of times farm ponds filled up and numbers of times farm ponds provided protective irrigation. i.e. if the farmers filled farm pond more the numbers of time by the different sources of water like river, canal, reservoirs, lakes and others the farmer would be able to provide more numbers of time protective irrigation to the farms and can also take different seasonal crops.

2 From the study it was observed that that there is a significant increase in yield of crops after construction of farm pond. Also there is a moderate increase in area under irrigation. After construction of farm pond increment in yield of crops and increase in area under irrigation are recorded this improves the farmer's economy.

3. In our research study we came to the conclusion that with the provision of farm ponds if the government provides the electricity and motor pump which is required to provide irrigation to farms, then the implementation of farm pond project is more easier to farmers. Most of the beneficiary respondent approximately 59% suggested that electricity without load shading and motor pump should be provided by the government to the beneficiary farmers because without electricity and motor pump they are unable to provide irrigation to farm.

4. Farmer's use these farm ponds for different purposes such as provide irrigation to farms, to use drinking water for livestock, to improve the fertility of soil, to make a business of fisheries and other purposes. From the study we can say that there is an agreement among the farmers about the use of water in the farm ponds for different purpose.

5. It is observed that all the source of water in Amravati taluka region depend on monsoon or rainwater directly. In case of low rainfall natural water sources cannot provide sufficient water. Hence there is necessity of conservation of water.

Thus provision of farm ponds under RKVY is beneficial for farmers.

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