

# Increasing the Revenue with Construction of Ponds and Arhar Plantation

**Bhawesh Kumar Mahto**

*Symbiosis School of Economics, Pune*  
*E-mail: bhaweshmccullum@gmail.com*

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**Abstract**—India is one of the leading producers of pulses; but is suffering from inflation because of low production. We haven't been able to meet the demand for pulses, mainly because of bad harvest and not being the first choice of the farmers. Production of pulses has a high risk, so the farmers opt to go for a safe crop like paddy. Production of other crops has also gone down because of lack of water during the rainy season. Being an agricultural based economy we must try to improve the production of crops. Instead of just relying on rain, many farmers have constructed ponds to increase the production. The purpose of this study is to analyze the economic impact of a pond; change in income of the farmers due to construction of a pond. Study is also done to check the difference in income between farmers who had opted for the production of Arhar (split red gram) in the bund of their pond and who hadn't. Production of Arhar in the bund is an easy way to earn money, no extra land is consumed, and Arhar plants will help in maintaining the bund and will prevent it from collapsing. A primary research work was done with the sample of 50 farmers, from the district of East Singhbhum & Saraikela (Jharkhand). The study was done on the ponds constructed by Tata Steel Rural Development Society (TRSDS). Out of the sample, 25 farmers were involved in the production of Arhar and 25 weren't. Data for current production and production before the construction of the pond was collected and then verified by the TRSRS. Change in income per acre of land & difference in change of income (between one who opted for Arhar and one who didn't) was also calculated.

## 1. INTRODUCTION

India is an agricultural based economy, most of rural household are depended on the agricultural production. 56.6% of total workforce is depended on agricultural sector ("Census of India: Economic Activity", 2001). As per estimates by the Central Statistics Office (CSO), the share of agriculture and allied sectors (including agriculture, livestock, forestry and fishery) was 15.35 per cent of the Gross Value Added (GVA) during 2015-16 at 2011-12 prices ("Agriculture Sector in India", 2016). Improvement in this sector will result in development of more than half of the workforce of India. Government has come out with many policies, regulations to help this sector, but still the development in the agricultural sector is stagnant because of low production, which is a result of low untimely rainfall. A huge amount of crops get destroyed because of draught and flood. Farmers can't

completely rely on the rainfall for irrigation, so some farmers have taken the help of pond for the irrigation purposes, government along with few NGO's are helping the farmers with construction of a pond. In the year 2016, 10 states had been declared as drought affected the state of Karnataka, Chhattisgarh, Jharkhand, Orissa and Madhya Pradesh had a drought percentage of more than 90%. Karnataka and Andhra Pradesh has been affected from drought since the past two years, Uttar Pradesh and Maharashtra has been suffering since 2014. The issue of drought in India has been from the past few years, but the condition is becoming worse, in 2013-14 only 3 states had been affected from drought the number increased to 5 states in 2014-15 and eventually to 10 states in 2015-16 (Ram & Deo, 2016).

### 1.1 Benefits of a Pond

Many Indian states are suffering from Drought, almost 10-11 states are declared as Drought effected since the past 3-4 years, in situation like these, ponds have become more and more important and also common, they're a good source of water conservation, pond water is utilized all year long, having a fresh water source makes the lives of rural India more easy (since very few sources of water are available to them). Ponds not only help in preserving water for use in summer but also in the tree, pulse plantation (on the bund), fishery and also in domestic uses, it becomes a lifeline where there aren't any source of fresh water. It decreases dependence of people from Rainfall. People have been able to go for 2-3 crops a year; the production has increased which also resulted in increase in income, better and easy lifestyle. New source of Income has immersed. People are now getting involved in fishery, tree and pulse plantation in the bund. Pond water is also used for domestic purposes like drinking, cooking, cattle feeding and many other activities. Ponds act as a supporting group for people supporting for drought. Lives of many cattle are saved because of ponds. From agricultural to domestic uses, from Fishery to horticulture Pond has helped the farmers in many ways.

### 1.2 Production of Pulses

India is the largest producer and consumer of pulses, but production has consistently lagged behind demand. Pulses

form the main source of protein in a vegetarian diet; besides, the hay and straw are useful as cattle feed. Pulses being leguminous plants are also important nitrogen fixing agents. Therefore, crop rotation with pulses helps restore nitrogen depleted in the soil due to cereal cultivation ("Step-motherly Treatment", 2002). Pulses are consumed in most part of the country, the average yield of pulses like Chick pea, Lentil and Pigeon pea is more than 650 kg/ha. The average yield of all pulses in 2010 was just 648 kg/ha, whereas it was 890 kg/ha for the world. India being the largest consumer suffers a lot because of this deficit. In 2009-10, India imported 35.09 lakh tones of pulses and exported just 0.99 lakh tones. Very few states in India have a good productivity as per land contribution (in pulse production), Jharkhand contributes to more than 9% of pulse production while just consuming just 8% of land. States like Madhya Pradesh have a lower productivity rate, as they contribute for 17% of total land used for production but the quantity of production is around 12% (%age contribution for India). Chick pea, Lentil and Pigeon pea are the most popular Pulse in India for production. 9 states, 8 states and 4 states are involved in the production of Chick pea, Pigeon pea and Lentil respectively (Singh, n.d.). Other pulses produced in India are Urdbean (Kharif and Rabi) & Mongbean (Kharif and Rabi)

## 2. ISSUE

Since the independence of India, the Indian economy has suffered a lot because of failure in the agricultural sector. All the people are dependent on this sector, either directly or indirectly. From employing more than half the workforce to affecting the lifestyle of people by inflation, the agricultural sector affects our nation in many ways. Because of drought agricultural sector is suffering a lot, the production has gone down. Indian economy is suffering because of inflation, huge amount of exports of pulses. Farmers dependency on the rainfall should be reduced, so that low rainfall will have no or very less effect in the Indian economy. Focus must be given in increasing the production of Pulses to reduce the imports from nations like Canada, Myanmar, USA & Australia. Import of pulses during 2010-11 from Canada, Myanmar, USA & Australia was 13.91, 6.91, 2.62, and 2.25 (lakh tones) respectively (Singh, n.d.). Major exports for India in pulses include 0.74 lakh tone to Pakistan; 0.24, 0.23, 0.17 & 0.16 lakh tones to Algeria, Turkey, Sri-Lanka and United Arab Emirates respectively. There's a huge gap between the amount we import and the amount we export. Pulses are cultivated in more almost all the states, India's contribution to the total production of Pulses was 23.46% followed by Canada (7.93%), China (7.03%), Myanmar (6.89%), Brazil (5.29%) and many more (Singh, n.d.). India is one of the major producers but the gap between the demand and supply is resulting in a loss for India, Focus should be given on the production of pulses with a target to increasing export and reducing the dependency on other nations.

A total of 254 districts (266 for Rabi crop) from 10 states have been declared as drought affected. A huge amount of fund is assistance from NDRF (National Disaster Response Fund) to these drought hit states. In the year 2015-16 a total of 42,143.43 crore of support was requested from these 10 states, out of which 12,773.34 was approved (Ram & Deo, 2016). The government is giving a huge amount of money because of bad rainfall, if 10 out of 29 states are failing to perform well in this agriculture; development in the sector becomes very difficult. Failure in production in these states clearly shows how important it is to address the issue of Irrigation; if nothing is done India will suffer more and more. Because of these situation Ponds are playing a very important role in supporting the agricultural sector. How much impact does a pond have on the income of the farmers has been dealt in this paper.

## 3. SAMPLE

One of the major drought affected state is the state of Jharkhand, with 92% districts affected with drought in 2016 (only Karnataka and Chhattisgarh have more drought affected area- 93%) around 336.94 crore had been approved as aid to the state of Jharkhand (GOI, MAFW-2016). The government received application for construction of more than 1 lakh Dobhas (small size pond), of which more than 55,000 have been constructed (Pandey, 2017). TSRDS (CSR wing of Tata Steel) has constructed around 300 ponds in the past 3-4 years, and has helped in the maintenance of the pond. TSRDS is working in the districts of Saraikela & East Singhbhum (Jharkhand) which are also suffering from drought. For the study, district of East Singhbhum & Saraikela was ideal as it was suffering from drought; a good number of ponds were constructed by the state government and NGO's. Water retention also varied from 10 to 12 months in this district, the constructed ponds were well maintained. The level of water in these ponds also varied, making this district a good sample to study.

Around 20% of the pond which were taken into study had water retention of 8 months, 40% pond had the water retention of 10 months and rest 40% had the water retention of 12 months. Size of the pond varied from 80 ft in breadth to 150ft, length varied from 100 ft to 170ft and the height varied from 10ft to 15 ft. The area of the pond varied from 0.1837 acres to 0.4133 acres. The land which was cultivated from the pond varied between 2.5 acres to 7 acres.

## 4. METHODOLOGY

A quantitative study was done on the ponds constructed in the past 2-3 years in the district of East Singhbhum and Saraikela. Since ponds have become an important source of water for irrigation, fishery, plantation and many domestic activities. This study is done with an aim to find the importance of pond in income of a farmer, change in their income due to construction of a pond. Study is also done to find the difference in change of income if one goes for plantation of Arhar on the bund of the pond or not. A total of 50 ponds were

taken for the study which belonged to 7 different blocks (District- East Singhbhum& Saraikela). The entire 50 sample had their ponds constructed within the last 1-2 years. 25 of the total sample had opted for Arhar plantation in the bund of the pond, rest of the 25 decided to wait for 2-3 years before going for Arhar plantation.

A survey, interview& group discussion was done with the beneficiary to collect data for the production before the construction of the pond and data for the current year, then the market price of the crops were verified from the government websites and the production was rechecked from the TSRDS data. Their current income and past income was then calculated from the data collected during the survey and the market prices of that time. Construction of pond consumed some amount of agricultural land, so while doing the analysis and calculation the total area consumed by the pond and agricultural land is taken into consideration, not just the area of cultivation, total area comprises the land which is cultivated by the help of pond and the area of land consumed by the pond, the data for the previous years, or before pond construction is calculated for the same data. Total income and total land owned by the farmer is not taken into study as not all the land is cultivated by the pond .Previous and current income from the given amount of land is calculated and verified.

From the data collected in the survey, the income of the farmers was calculated. Income per acre of land before the construction and after the construction is calculated by dividing the total income and total area used, and then the increase in Income is calculated with respect to the income before the construction of the pond. The difference in Increase of income is also calculated between farmers who opted for Arhar plantation and who didn't. Income per acre of land is calculated on dividing the profit and total land used (not total area cultivated). While calculating the revenue earned by the farmers, income from fishery, cattle, horticulture, and tree plantation was not taken into consideration. Only agriculture and Arhar plantation was taken into consideration as fishery, tree plantation and cattle's rearing takes time to generate income.

## 5. RESULTS

The data was collected from 50 different ponds across 7 blocks in 2 districts of Jharkhand. 50 ponds having an area of 14.89 acres were covered in the survey. Total area of land which was covered in the survey was 252.39 acres. Data collected from 50 ponds are given in table 1.

**Table 1: Before and after pond economical data**  
(Area in acres, profit in thousand and ratio in thousand/acres)

	Before Pond	After Pond
<b>Area of pond</b>	0	14.89
<b>Area of land cultivated</b>	252.5	237.5
<b>Total area</b>	252.5	252.39
<b>Profit from the land</b>	2161	3173.5
<b>Profit/acre of land</b>	8.558	12.574

Area of the land cultivated before pond is almost same as the total are used after pond, Some amount of land was used (wasted) in construction of the pond, Around 15 acres of land has been used in construction of the pond, area land available for agriculture has decreased from 252.5 acres to 237.5 acres. But the profit from cultivation has increased by a good margin. Total profit from 50 samples, (with area 252.5 acres) was 2161000 rupees which has now increased to 3173500 rupees. Earlier a farmer was able to generate 8558 rupees per acre of land (on an average) which has now increased to 12574 rupees. After the construction of pond, farmers have been able to earn 4016 rupees extra per acre of land. Construction of a pond has seen around 45% increase in their per acre profit.

**Table 2: Difference in income for farmers who opted for Arhar and who didn't (Area in acres, profit in thousand and ratio is thousand/acre)**

	Arhar	Without Arhar
<b>Area of Pond</b>	7.53	7.36
<b>Area of land cultivated</b>	120	117.5
<b>Total area</b>	127.53	124.86
<b>Profit from land</b>	1780	1393.5
<b>Profit from land(before pond)</b>	1098	1063
<b>Change in profit</b>	682	330.5
<b>Change in profit/acre of land</b>	5.348	2.647
<b>Profit/acre of land</b>	13.958	11.160

The 25 farmers who opted for Arhar plantation in the bund of pond saw a huge rise in their income. The difference in the area cultivated by farmers who opted and who didn't opted for Arhar was just 2.7 acres. But the difference in their profit was around 386500. Profit for the farmers who opted for Arhar plantation was comparatively more than who didn't opted for Arhar. Profit per acre of land for farmers who didn't opted for Arhar was just 11160 whereas for farmers who opted for Arhar was 13958. The difference in per acre of land profit is 2798. Farmers who opted for Arhar earned 25% more than the ones who didn't opted for Arhar.

Profit per land for farmers before pond was just 8558, but after the construction of pond, the profit per income of land increased to 11160 who didn't opt for Arhar and 13985 who opted for Arhar. The farmers who opted for Arhar saw a huge increase in their profits, their profits increased by 5348 rupees per acre, around 62% increase from their profit before the construction of pond. For the farmers who didn't opt for Arhar the increase in income was not that big, their increase in income per acre of land was 2647 rupees, which is just 31% increase from before profits before pond.

The farmers who opted for Arhar saw huge change in their income in comparison to the farmers who didn't opted for Arhar. Change in profit for them was twice as much as the farmer who didn't opt for Arhar. The difference in before profit for before pond and after pond is also good. On an average a farmer saw an increase of rupees 4000 per acre of

land (approximately). In the sample, the smallest land cultivated by a pond was 2.5 acre and the biggest was 7 acres. So the increase in the profit of farmer was in range of rupees 6620 to rupees 34400 (approximately). On an average a pond increases the profit of a farmer by rupees 4016 acres and if a farmer opts for Arhar plantation on the bund which takes up very minimal area they can increase their income to 13958 rupees per acres, which is 5400 more than their before pond Income.

## 6. CONCLUSION

From the results we can conclude that Construction of pond increases the profit of a farmer. In this sample of 50 ponds from Jharkhand, a drought hit state construction of pond helped farmers in increasing 45% of their income. Farmers who opted for Arhar saw their income increase by 62% and ones who didn't opt for Arhar saw their income increase by around 30%. Plantation of Arhar helped farmers in increasing their profit by huge amount, the rate at which their profit increased was twice more than the farmers who didn't opt for Arhar. So we can conclude that Construction of pond helps a farmer a lot in economic terms, and his profit will increase if he goes for Arhar plantation. Arhar plantation on the bund of the pond hardly consumes any agricultural land, but helps in increasing profit by a large extent. If the farmers are informed about the benefits of having a pond and about Arhar plantation Indian agricultural system will gain many benefits, farmer will be able to produce well even in drought weather, and the states which have adequate rainfall will able to increase their production.

Framers will be able to increase their profit by going for pulses, if the farmers are able to generate good profit from Arhar (like in Jharkhand) Pulse production will become one of our main crop and will not face any step motherly treatment. There's a huge gap between the demand of Pulses in India and the amount which our farmers are able to produce, because of that India is forced to import from other Nations. If focus is given on improving this sector, in helping the farmers produce more pulse and try to meet the demand on its own. If India becomes self sufficient in pulse sector, the amount of pulse imported will reduce.

The government should come up with schemes to help the farmers; they should support farmers in construction of Ponds. The increase in Income was possible because of pond; farmers were able to recover from losses because of Ponds. In this case TSRDS helped in the construction of ponds, but the rate at which ponds are constructed are very low, Government, NGOs and Farmers should try to build more ponds, and if in times of heavy rainfall Ponds help in collecting rainwater, increasing the ground water level and reduces the chances of floods. In this study only agricultural crop, Arhar plantation was taken into consideration while calculating the Income.

Ponds have more benefits than agricultural improvement. Pond is also used for Fishery, Horticulture and feeding cattle which also helps farmer in increasing their profits. Pond water is also used for domestic purposes like drinking, cooking food, bathing, etc. After the construction of Ponds the number of people falling sick has also reduced (in that region) because of availability of fresh, clean water. People belonging to the nearby region are also able to use that water in case of emergency. In situation of drought, unavailability of fresh water, the neighboring people are using the pond water for basic domestic activities. When the pond is filled with water, (during the rainy and winter season when the level of water is high) the neighbors sometimes use the water from the pond to irrigate their land.

So construction of pond and cultivation of Arhar or any other pulses helps the farmer in increasing their profit by a huge amount & if farmers are informed about this, it'll be beneficial for farmers in facing a drought situation and in increasing their profit. Ponds are helpful in many ways; construction of a Pond has an economic and social impact on the people living near the pond and the beneficiary.

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