



Socio-Economic Impact of Check Dams

Constructed by PHDRDF in Sikar district of Rajasthan

February 2015

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With an objective to know the impact of check dams constructed by PHDRDF in the Sikar district of Rajasthan, PHD Research Bureau conducted a survey-based study which analyses the socio-economic impact on people of the district.

This report is prepared Rural Development Foundation (RDF) which is one of the Corporate Social Responsibility initiatives of the PHD Chamber. The Chamber under the aegis of its PHD RDF undertook rain water harvesting through construction of check dams to help the farmers and dwellers of Rajasthan since it is a water deficient state.

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Saurabh Sanyal
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Executive Summary

One of the major challenges that the world faces today is depletion of ground water. India has around 17% of the world population and only 4% of average annual runoff in the rivers. Irregular distribution of rainfall in space and time leads to conditions of floods and droughts in many areas. Large variations have been noted in the amounts of rainfall received at various locations.

The agricultural sector is one of the most important sectors of the Indian economy as it accounts for nearly 58.4% of employment in the country. Past experiences in many states have shown that agricultural productivity and incomes increased significantly with better access to water. However, Rajasthan has not been able to generate the same improvements in its agricultural scenario. Rajasthan being a desert area, its climate varies largely from arid to sub-humid. Agriculture plays a vital role in State's economy. It contributes around 22.5% of the gross state domestic product of Rajasthan state. Around 80% of Rajasthan's population is dependent on agriculture for its livelihood.

Rain water harvesting through check dams in the state of Rajasthan is a must to ensure that there is enough supply of water for drinking purposes and irrigation. As a part of its Corporate Social Responsibility initiatives, the PHD Chamber, under the aegis of its Rural Development Foundation (RDF), undertook rain water harvesting through construction of check dams to help the farmers and dwellers of Rajasthan since it is a water deficient state. The objective of the present study is to evaluate the socio-economic development amongst the people living in the regions of Sikar district, which has been covered under the check dam projects by the PHD Chamber RDF. The respondents comprise village heads, villagers and builders of the check dams. According to the survey, the check dams have a positive impact on the people dwelling in the regions of Sikar district. The survey revealed that after the construction of check dams there has been a significant change in the socio- economic status of the villagers. The inadequacy of surface water has made rain harvesting inevitable in the area. The respondents do not have to search for alternative sources of water now.

The check dams have significantly contributed to the increase in the groundwater recharge of well in all the villages surveyed. The construction of check dams has increased the crop production as well as crop yield. Changes in the farming practices of some farmers have also been observed. The overall change in the crop pattern has been positive for all the villages as farmers have seen an increase in crop production. The check dams have helped the farmers as they have facilitated the farmers with proper irrigation facility which has boosted the agriculture sector in the district. After the construction of check dams, the area under cultivation has expanded remarkably. The number of animals has increased in the villages after the construction of check dams. The construction of check dams has led to increase in agricultural productivity due to which the farmers do not have to leave their villages in search

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of work in the nearby urban areas. According to the survey, there has been a remarkable increase in the average income of the villagers after the construction of check dams. It was also observed that the lift irrigation system constructed in some of the villages have witnessed higher yield than villages which do not have it.

The farmers who are using the water through the Lift Irrigation System suggested that there should be expansion in the lift irrigation system to boost productivity if the agriculture sector in their villages. Spring irrigation, hand pumps and bore well should be provided in order to facilitate the irrigation facilities in the villages. Also, the health and education facilities in the villages need to be improved. Drainages and sewers need to be covered while clean drinking water tanks should be made available. In addition, electricity should be provided and more schools and hospitals should be constructed.

1. Introduction

Water is one of the most important natural resources of any country that decides socio-economic development of any civilization. Ready and sustained availability of water is one of the most important requirements for the development of the economic activities as agriculture, industry or domestic activities are heavily dependent on this resource. Increasing world population and new emerging economic activities has put excessive pressure on natural resources, thus leading to their increased depletion. One of the major challenges that the world faces today is depletion of ground water. The increasing demand for water in future is bound to lead to scarcity of water. Thus it is important to improve the efficiency of planning and management of water resources at a micro, state and national level so that such scarcity of water does not hamper the development of the world. In other words, the water resources contribute significantly to the overall development of a country. Thus a water resource plan, consistent with the socio-economic and environmental policies of a country, is inevitable. The effective implementation of these policies would contribute to fight the global challenge of water scarcity.

1.1 Water Resources in India

Although India has sizable water resource and large cultivable land area but India's growing population is much large as compared to its available resources. India has around 17% of the world population and only 4% of average annual runoff in the rivers. Irregular distribution of rainfall in space and time leads to conditions of floods and droughts in many areas. India is influenced by two seasons, namely the south-west monsoon, and the dry months outside the monsoon. Large variations have been noted in the amounts of rainfall received at various locations. Annual rainfall in India varies from less than 20cms to over 1000cms with low intensity of rainfall recorded over regions of North and South-West and high degree of rainfall over East, North-East and the South-West coast. While the average annual rainfall is less than 13 cm over western Rajasthan, rainfall at Mausiram in the Meghalaya is as much as 1141 cm.

Summary of Land and Water Resources of India

Particulars	Quantity
Geographical Area	329 million ha.
Flood Prone Area	40 million ha.
Ultimate Irrigation Potential	140 million ha.
Total Cultivable Land Area	184 million ha
Net Irrigated Area(2010-11) P	63.60 million ha.
Natural Runoff(Surface & Ground Water)	1986.5 billion cubic metres
Estimated Utilizable Surface Water Potential	690 Cubic km.
Groundwater Resource	432 Cubic km.
Available Groundwater resource for Irrigation	361 Cubic km
Net Utilizable Groundwater resource for irrigation	325 Cubic km

Source: PHD Research Bureau, compiled from Environmental Information System, India

1.2 Agriculture Scenario in India

The agricultural sector is one of the most important sectors of the Indian economy as it accounts for nearly 58.4% of employment in the country. The sector supplies food, fodder and raw materials to the vast segment of industrial sector. Post the implementation of Green Revolution in 1960s, India achieved self sufficiency in the foodgrains production and recorded significant growth in rural economy during 1970s and 1980s. However, the improvement in agricultural sector recorded in 1970s and 1980s is gradually disappearing. Since 1990, agricultural sector has displayed a poor performance and has become major cause of concern for food security, rural poverty and increase in food prices.

The agricultural sector contributed about 10% of the total export earnings and provided raw materials to large number of industries. Although yield per hectare of Indian agricultural sector is less as compared to other countries of the world, India has managed to increase its agricultural produce every year. The total foodgrain production reached 264.38 million tonnes during the period 2013-14.

Summary of agricultural statistics of India (2013-14)

<i>Area under cultivation</i>	<i>Production (food grains)</i>	<i>Yield(Food grains)</i>	<i>Area under irrigation</i>
121.37 mn hectares	264.38 mn hectares [^]	2111 kg/hectare	46.8(%) [*]

Source: Ministry of Agriculture, GOI

Note- * Data pertains to 2007-08

[^] Data pertains to Third Advance Estimates Production of Oilseeds & Other Commercial Crops for 2013-14

Past experiences in many states have shown that agricultural productivity and incomes increases significantly with better access to water. One of the best examples is that of Gujarat, which has achieved close to double-digit agricultural growth during the 2000s. It is also well known that the construction of check dams and exploitation of the irrigation potential has been an integral part of that state's agricultural strategy. But as compared to Gujarat, Rajasthan has not been able to generate the same improvements in its agricultural scenario, although both the states have similar agro-climatic conditions.

1.3 Rainfall situation in Rajasthan

Rajasthan being a desert area, its climate varies largely from arid to sub-humid. To the east of the Aravallis, the climate is semi-arid to sub-humid marked by higher humidity, better rainfall and lower wind velocity. To the west of the Aravalli hills, the climate is marked by low rainfall, extreme diurnal and annual temperatures, high-velocity winds and low humidity. The annual rainfall in Rajasthan differs substantially, ranging from less than 10 cm in north-west part of Jaisalmer region (lowest in the state), to 20 to 30 cm in the regions of Ganganagar, Bikaner and Barmer, 30 to 40 cm in the regions of Nagaur, Jodhpur, Churu and Jalor and more than 40 cm in the regions of Sikar, Jhunjhunu, Pali and the western fringes of the Aravalli range. The eastern

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side of the Aravallis sees 55 cm rainfall in Ajmer to 102 cm rainfall in Jhalawar. Mount Abu in the Sirohi district in the southwest region receives the highest rainfall in the state (163.8 cm). The volume, frequency and reliability of rainfall varies considerably across the state, and therefore it has a considerable impact on the agricultural potential and the occupational choices of the population of the people of Rajasthan state.

1.4 Agrarian Economy of Rajasthan

Agriculture plays a vital role in State's economy. It contributes around 22.5% of the gross state domestic product of Rajasthan state. Around 80% of Rajasthan's population is dependent on agriculture for its livelihood.

Rajasthan state is the leading producer of coarse cereals, pulses, gram, seed spices and oilseeds. Agriculture sector in Rajasthan is largely rainfed with only 35% of the total agricultural area is irrigated. Out of the total area irrigated, nearly 60% to 70% of the area is under wells and tube well irrigation.

Rajasthan: Summary of agro Statistics

<i>Sr. No.</i>	<i>Components</i>	<i>Growth/ratio</i>
1.	Population dependent on agriculture	80%
2.	Agriculture GDP at current prices(FY 2014)- (in lakhs)	15027681
3.	Growth of Agricultural GDP(Avg. from FY 2005- FY2014)	5.3%
4.	Agricultural sectors contribution in GSDP	22.5%
5.	Food Grain production(in thousand tones)	18034.1
6.	State's contribution to national food grain production	7.5%
7.	State's rank in food grain production(FY 2013)	4 th
8.	Yield Kg/ Hectare(of total food grains) (FY 2013)*	1482
9.	Total agricultural area irrigated	35%
10.	Area under wells and tube wells irrigation	60-70%
11.	Rice production(in Thousand Tonnes)	222.5
12.	Wheat production(in Thousand Tonnes)	8953.5
13.	Coarse Cereals Production(in Thousand Tonnes)	6913.1
14.	Pulses production(in Thousand Tonnes)	1945
15.	Oil seeds production(in Thousand Tonnes)	6200
16.	Cotton production(Lint)- (in thousand tones)	1300
17.	Sugarcane production(in tones)	401.8

Source: Compiled from RBI, MOSPI and official web portal of government of Rajasthan

Note: * Fourth Advance Estimates, Department of Agriculture and Cooperation

1.5 Socio-economic scenario of Rajasthan

The state has improved substantially on the socio-economic front. Though the literacy rate at 67.06% is below national average of 74.04%, the percentage of population below poverty line stands at 14.7% which is well below the national average of 21.9%. Further, the unemployment rate is 3.2% in Rajasthan and the human development index of the state was recorded at 0.71. The per capita income of the state is recorded at Rs. 65098 in 2013-14.

Socio-economic indicators: Rajasthan vis-à-vis India

Indicators	Rajasthan	India
Poverty	14.7%	21.9%
Literacy	67.06%	74.04%
Per-capita Income	Rs 65098	Rs 74380
Human Development Index	0.71*	0.59^
Unemployment rate	3.2%**	4.7%**

Source: Compiled from various sources

Note: *- Human Development Index of Rajasthan is for the year 2007

^- Human Development Index of India is for the year 2011

** - Unemployment rate calculated on the basis of Usual Principal Status Approach

1.6 Need for Check Dams in Rajasthan

Rain water harvesting through check dams in the state of Rajasthan is a must to ensure that there is enough supply of water for drinking purposes and irrigation. This method of rain water harvesting is an effective measure to reduce the problems of drought, dry wells and low levels of water table. With the help of this technique, agricultural production and productivity in many villages has increased manifold. The consequent rise in the income level of farmers has reduced the migration of farmers to urban areas and thus has promoted sustainable development.

It must be mentioned here that, the check dams are small scale and low cost structures which are constructed across a stream to slow or hold the flow of rainwater. They are made either of temporary materials such as brush, wire, poles, and loose rocks or of more permanent masonry materials. These check dams are used to store surface water for use, both during and after the monsoon. They also help in ground water recharge, which raises the water table in the area.

2. Background of the Rain Water Harvesting Project

The goal of Rain Water Harvesting Project is -

1. Reducing the depletion of ground and surface water resources and thus improving the livelihoods of the poor communities.
2. Developmental activities often lead to land degradation and depletion of natural resources, thereby weakening the ability of the village communities to depend on natural environment for their livelihood. Therefore, it is important to give thrust to the implementation of programmes related to water management, afforestation, soil conservation and wasteland development in order to safeguard our environment and humanity from such negative effects of development activities.

Towards this end, nearly a decade ago, the PHDRDF has taken the initiative of implementing Water Harvesting Projects in the water deficit and rain fed rural areas of the State of Rajasthan. About 25-30% of the population in this area lives below the poverty line.

Most of these villages of Rajasthan have not seen cultivation for the last many years because their water table has gone down drastically and rainfall has been extremely below average and other surface water resources have dried up to a large extent. The men of many villages have migrated to urban areas, to work as labourers in Punjab, Haryana and other farther States, especially to work in Brick-Kilns, Construction Sector etc.

3. Objectives of the study

The PHD Chamber of Commerce & Industry which has 12 states and one union territory under its command area which are Jammu & Kashmir, Uttarakhand, Punjab, Haryana, Himachal Pradesh, Uttar Pradesh, Delhi, Rajasthan, Madhya Pradesh, Chattisgarh, Bihar, Jharkhand and the Union Territory of Chandigarh, has always aimed to be an important stakeholder in the development of the northern and central states of India. As a part of its Corporate Social Responsibility initiatives, the PHD Chamber, under the aegis of its Rural Development Foundation (RDF), undertook rain water harvesting through construction of check dams to help the farmers and dwellers of Rajasthan since it is a water deficient state. The project spanned the districts of Alwar and Sikar. In totality, the RDF has been able to construct around 125 check dams in the area. The objective of the present study is to evaluate the socio-economic development amongst the people dwelling in the regions of Sikar district, which has been covered under the check dam projects by the PHD RDF. The analysis would also assess the impact of check dams on the ground water recharge, area under irrigation and cultivation, income generation and livelihood of the people concerned, by comparing their economic status before and after undertaking the construction of the projects.

The specific objectives of the study include:

1. To evaluate the change in socioeconomic status of the people in the Sikar district before and after the construction of check dams.
2. To estimate the change in the level of total income before and after construction of dams.
3. To compute the change in crop production before and after construction of dams.
4. To assess the change in area under irrigation and cultivation, before and after the construction of check dams
5. To estimate the change in recharge of ground water due to the construction of check dams.
6. To assess the difference in productivity of villages using LIS and those which do not use LIS.

4 Research Methodology

4.1 Sample selection

The study has been conducted on the basis of survey of people from Sikar District. The sample size is 270; respondents have been chosen in such a manner that each respondent is a beneficiary of the check dams. Hence, the survey has responses from 11 villages namely Avinashi, Bhagwanpura, Chudla, Dass Ki Dhani(Dubra), Hatideh, Kishanpura, Loharabas, Lohiya Ki Dhani, Misrala Ki Dhani, Ramalayavas and Sawalpura. The respondents have been chosen on the basis of random sampling strategy out of people who use check dam water.

The respondents comprise village heads, villagers and builders of the check dams. The villagers were identified from among the households within close proximity to the check dams who were the beneficiaries of the check dams. The village heads also helped in identifying the respondents. All of the respondents are primarily engaged in agriculture and allied activities within their respective villages. Since the designs were simple and based on local traditional wisdom of creating water bodies, local builders have constructed the check dams. Amongst the total check dams surveyed in the Sikar district, the year of construction range from year 2003 to year 2010.

The statistical tools used for the study are simple aggregates and averages which have been used to depict the status of cultivated and irrigated land, yield of crop production, income generation and other parameters before and after the construction of check dams. The data have been presented in graphs and charts for lucid illustration. Some qualitative analysis has also been incorporated in the study to support the opinions and relevant reactions of the respondents and to get a better idea of the impact of these check dams.

4.2 Profile of the Sikar district selected for the study

4.2.1 Sikar

Sikar district has a geographical area of 7,742.44 sq km spanning across 74°44' to 75°25' east longitude and 27°27' to 28°12' north latitude. The maximum temperature in summer is 48

degrees centigrade; in winter, the minimum temperature is 1 degree centigrade; temperatures in summer months go very high, and the winters are very cold. The average rainfall is 459.8mm.

In the district, the daily exploitation of underground water for irrigation and domestic use purposes is very high as compared to its recharge, which results in depletion of water table. Climatically this is better than as compared to other arid western plain regions like Bikaner, Jaisalmer and Barmer, Phalodi, Shergarh, Osian and many others districts. In Sikar district, the drainage system is not that well developed, consequently much of the rain flows in the rainy season after covering some distance disappear in the sandy fields.

4.3 Significance of rain water harvesting in Sikar district

Due to the agrarian nature of economy, poor rainfall and lack of perennial sources of water, the water requirement in the district is very high. Thus water conservation is the only solution to all these problems. The inadequacy of surface water has made rain harvesting inevitable in the area. Rain water harvesting is the technique in which rain water is collected and stored at the surface or in sub-surface aquifers, before it is lost as surface run-off.

The main techniques of rain harvesting are:

- The storage of rain water on surface such as in tanks, ponds, check dams, weirs etc,
- Recharge to ground water such pits, trenches, dug wells, hand pumps etc

5. Data Analysis

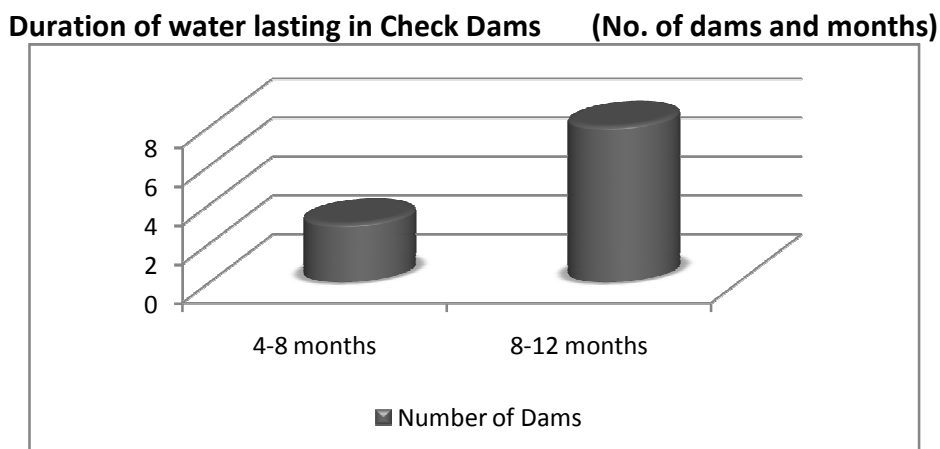
The data collected from the survey, done in eleven villages was analyzed to evaluate the impact of check dams on the livelihood of villagers. During the survey, PHD Research Bureau conducted an analysis to know about the benefits of not only the check dams but also the Lift Irrigation System constructed in 3 out of 11 villages being surveyed and how it has facilitated agriculture growth of those villages in comparison to villages without the Lift Irrigation System.

The survey revealed that after the construction of check dams there has been a change in the socio- economic status of the villagers, as there has been an increase in income, improvement in standard of living, people have now started living in pukka houses, there has been an improvement in their eating habits, an increase in the livestock with people and an increase in crop productivity. Further, there has been a positive change in the social framework of the village as these villages have become modernized and farmers have now become financially independent and sound. The ducation facilities in the village have improved alongwith the irrigation & water resources. There has been immense employment generation and income from non-agricultural activities has increased.

Socio-economic impact of Check Dams

5.1 Water lasts in reservoirs (average time)

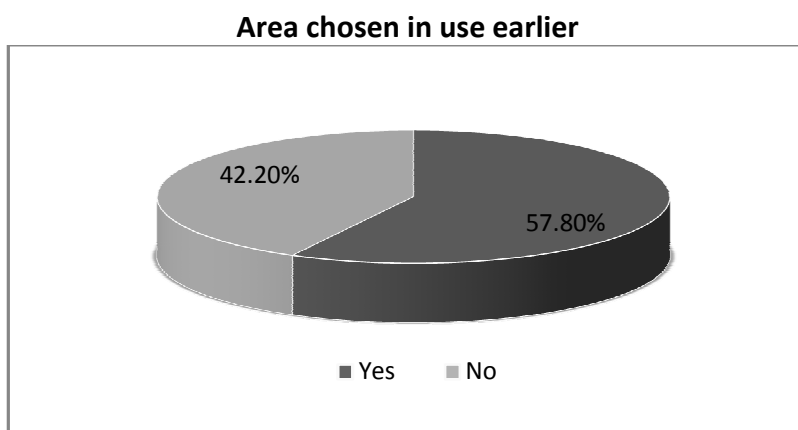
According to the villagers, the water lasts in the reservoirs for periods ranging from 4 months up to 12 months. Out of the 11 check dams, 3 dams hold water for 4-8 months and 8 dams hold water for 8-12 months.



Source: Study on socio-economic impact of check dams constructed by PHD RDF in Sikar district Rajasthan, February 2015

5.2 Area chosen in use earlier

According to the respondents, the area chosen for the construction of dams was in use before by the villagers as almost 58% of the people used the land for the purpose of agriculture, herding and grazing and 42% did not use the land at all.



Source: Study on socio-economic impact of check dams constructed by PHD RDF in Sikar district Rajasthan, February 2015

5.3. Existing sources of water

The sources of water present in the villages are wells, tube well, bore well, hand pumps and the average proportion of water supply coming from these sources is about 28.25%. Three villages namely Chudla, Kishanpura and Misrala ki Dhani also have the Lift irrigation system.

5.4. Lift Irrigation system (LIS)

According to the survey, there has been a substantial increase in yield of crops with a significant increase in cultivated as well as irrigated area in the villages.

In the areas without the lift irrigation system, the cultivated area increased from 41601 sq. meters to 71547 sq. meters which is an increase of 72%. On the other hand, the villages with lift irrigation system witnessed an increase of 77% in the cultivated area from 32536 sq. meters to 57464 sq. meters.

The irrigated area in Non-LIS villages registered an increase of 104% as the area increased from 25576 sq. meters to 52122 sq. meters while the villages with LIS witnessed a significant increase from 25980 sq. meters to 53579 sq. meters which is an increase of 106%.

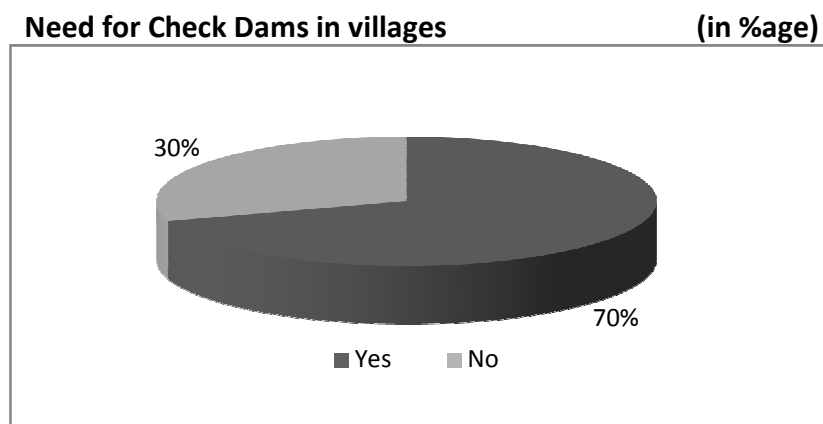
The yield of the crops increased significantly in villages with LIS, as the crop yield increased by 110% after the construction of check dams and LIS. On the other hand, the villages without LIS witnessed 86% increase in crop yield after the construction of check dams. During the survey, the villagers attributed their increase in crop production to LIS and asked for more installation of this system to facilitate crop yield.

Comparison of LIS and Non LIS

S. No.	Parameter	LIS			Non-LIS		
		Before Check Dam	After Check Dam	Percentage Increase	Before Check Dam	After Check Dam	Percentage Increase
1.	Cultivated area (in sq m)	32536	57464	77%	41601	71547	72%
2.	Irrigated area (in sq m)	25980	53579	106%	25576	52122	104%
3.	Yield (in sq m)	32374	67985	110%	22662	42086	86%

5.5. Need for Check Dams in villages

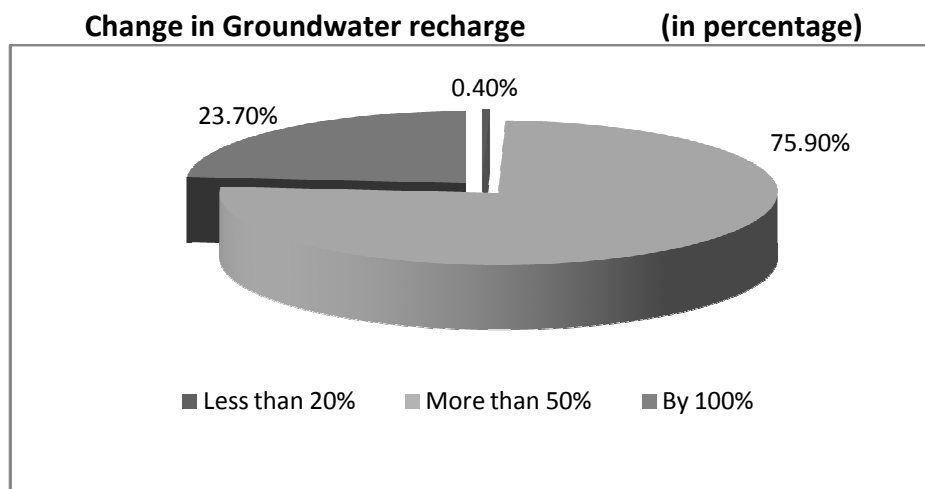
According to the survey, there was a need to have the check dams in the villages as 70% of the villagers responded that there was a need for check dams in their villages.



Source: Study on socio-economic impact of check dams constructed by PHD RDF in Sikar district Rajasthan, February 2015

5.6. Difference made by check dams to groundwater recharge in wells

The check dams have facilitated the process of rainwater harvesting and thereby increased the levels of groundwater recharge in the wells of the villages surveyed. Out of the 11 check dams, 2% of the dams have contributed to ground water recharge by less than 20%, 75% of them have contributed by more than 50% while 23% of the check dams have contributed to the groundwater recharge by full 100%. Hence, the check dams have significantly contributed to the increase in the groundwater recharge of well in all the cases.



Source: Study on socio-economic impact of check dams constructed by PHD RDF in Sikar district Rajasthan, February 2015

5.7. Change in crop pattern due to check dams

Respondents from all the villagers are mostly farmers who have seen a change in their crop pattern after the construction of check dams. There has been an increase in the number of crops planted after the construction of check dams. Before the advent of dams, farmers used to grow mainly kharif crops and rain fed crops. The major crops cultivated by the farmers were bajra, guar, jowar, mustard etc. Further, after the construction of check dams they are able to produce wheat, maize, mustard, vegetables, peanuts, channa, jowar, bajra, guar, mirch, dalhan, peas, tinda and taramira.

Farmers have also experienced an increase in crop production as they are now able to sow many crops in comparison to one crop being grown earlier before the construction of check dams. The construction of check dams has increased the crop production as well as crop yield. Changes in the farming practices of some farmers have also been observed. In a nutshell, the overall change in the crop pattern has been positive for all the villages as farmers have seen an increase in crop production.

5.8. Improvement in the yield of agricultural production

All farmers said that the production of all the major crops increased after the construction of check dams.

Increase in Average Yield of Production of major crops			(Kg/acre)
Crops	Production (Before Check Dams)	Production (After Check Dams)	Percentage Increase(approx)
Bajra	270	490	81
Gram	150	480	220
Maize	360	570	58
Mustard	330	600	82
Wheat	632	1420	125

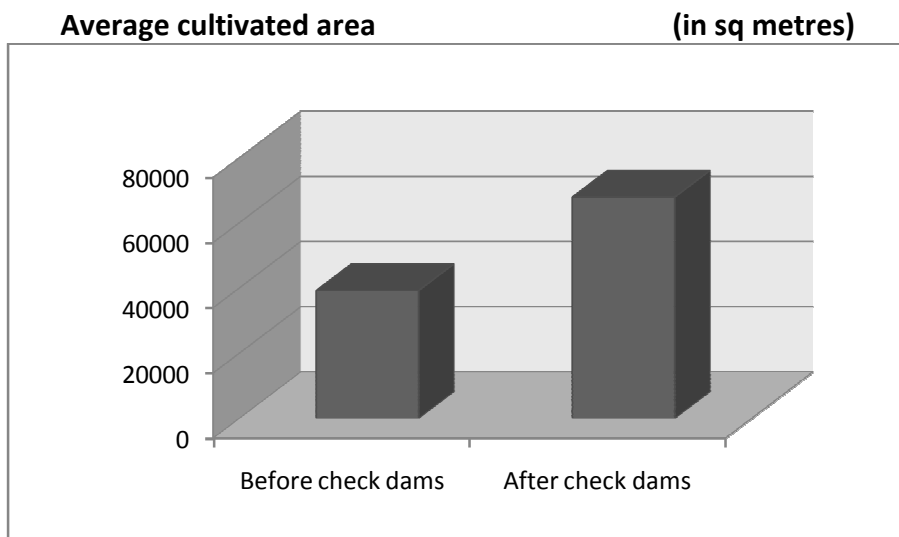
Source: Study on socio-economic impact of check dams constructed by PHD RDF in Sikar district Rajasthan, Feb 2015

The average yield of wheat increased by around 125%, while the yield of bajra and mustard grew by more than 80%. The yield of maize increased by 58% and gram production has shown remarkable growth of 220% due to construction of check dams.

5.9. Area under cultivation

The check dams have helped the farmers as the check dams have facilitated the farmers with proper irrigation facility which has boosted the agriculture sector in the district. This is evident from the increase in area under cultivation as the average total area under cultivation has increased from 39172.5 sq. meters before the construction of check dams to 67823.5 sq. meters, registering an increase of about 73% in area under cultivation in the villages.

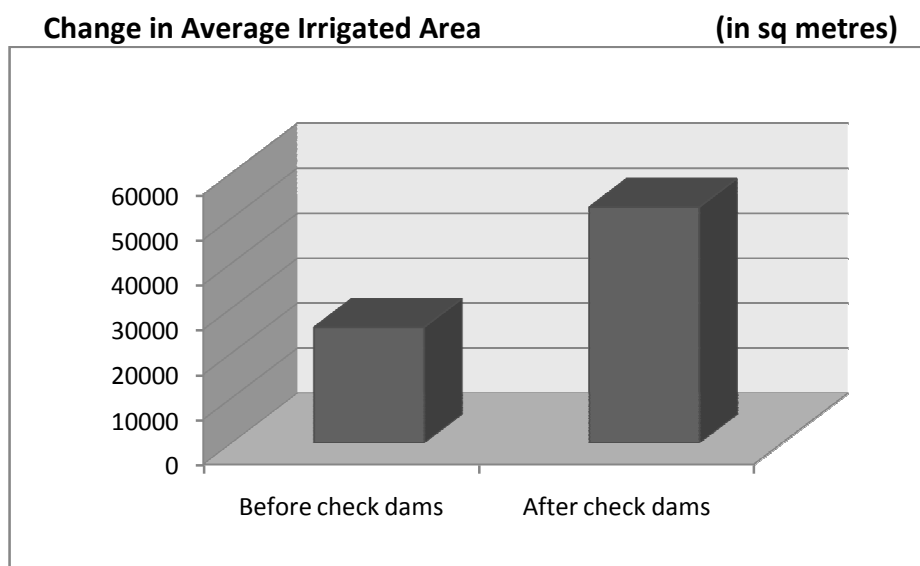
Socio-economic impact of Check Dams



Source: Study on socio-economic impact of check dams constructed by PHD RDF in Sikar district Rajasthan, February 2015

5.10. Area under irrigation

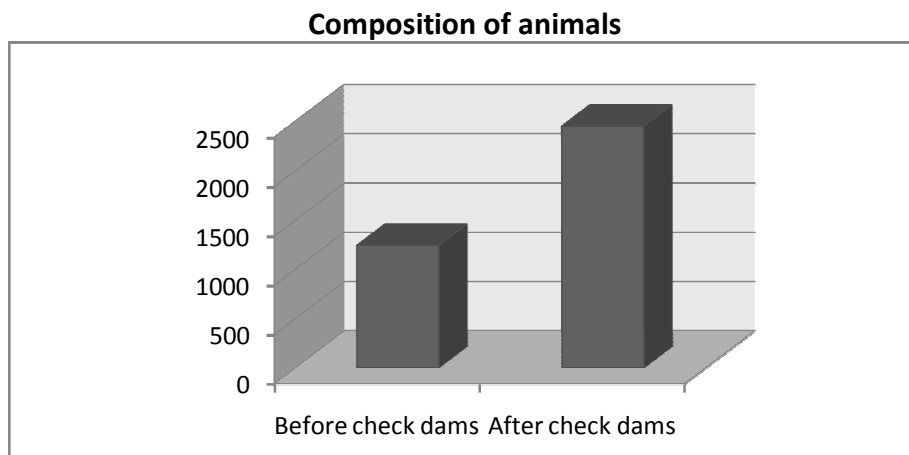
The construction check dams had a significant impact on the area under irrigation. After the construction of check dams, the area under cultivation has expanded remarkably. The total area under irrigation has increased from 25737.3 sq. meters to 52445.9 sq. meters, registering a 104% increase in area under irrigation in the villages.



Source: Study on socio-economic impact of check dams constructed by PHD RDF in Sikar district Rajasthan, February 2015

5.11. Change in composition of animals

The number of animals has increased in the villages after the construction of check dams. On an average the number of animals in the eleven villages before the construction of check dams was almost 1243 which increased to 2452 after the check dams, registering a 97% increase in the total number of animals.



Source: Study on socio-economic impact of check dams constructed by PHD RDF in Sikar district Rajasthan, February 2015

5.12. Impact of check dams on time and effort

According to the respondents, they save on an average 53% of their time and effort in fetching the water from far off distances for their consumption after the construction of check dams.

5.13. Impact on migration

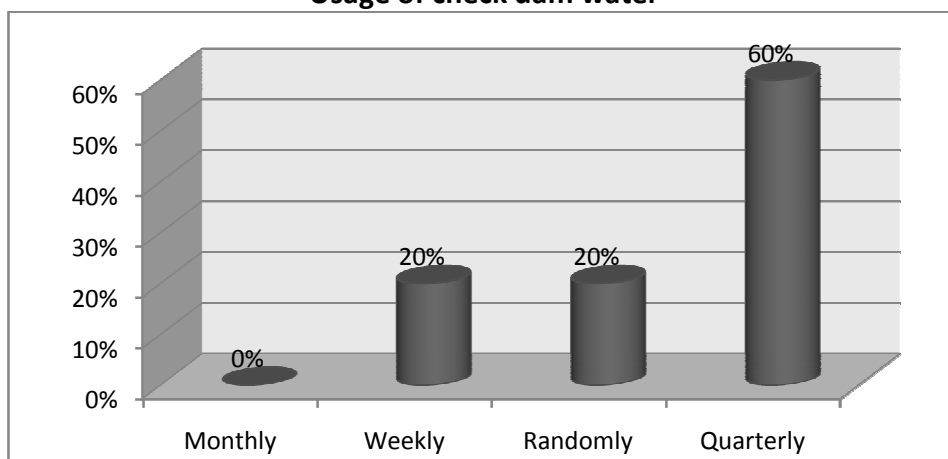
According to the survey, the construction of check dams has impacted the migration process in the villages significantly. Earlier, the farmers were forced to leave their farms and villages and migrate to cities in search of work as they were not able to earn their livelihood from agriculture due to lower productivity. However, the construction of check dams has led to increase in agricultural productivity due to which the farmers do not have to leave their villages in search of work in the nearby urban areas.

5.14. Usage of check dams water

The survey revealed that the villagers use water either weekly, monthly, quarterly or randomly depending on their needs. 60% of the respondents use the dam water quarterly mainly for the purpose of agriculture, irrigation, animal husbandry and drinking. The villagers themselves decide the access to water from the check dams.

Socio-economic impact of Check Dams

Usage of check dam water



Source: Study on socio-economic impact of check dams constructed by PHD RDF in Sikar district Rajasthan, February 2015

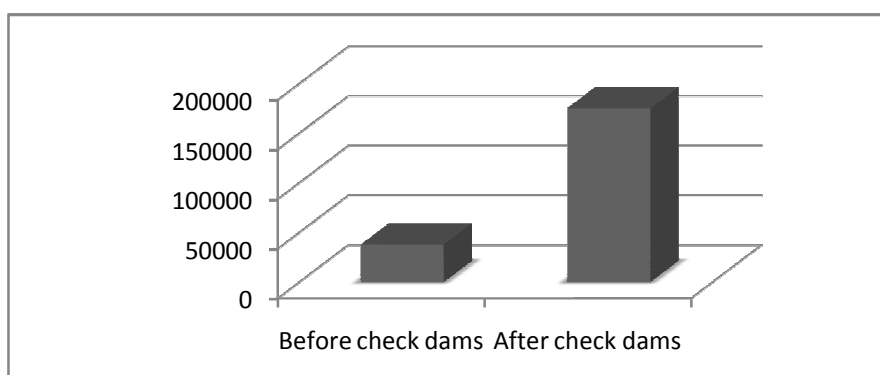
5.15. Adequacy of water of check dams

According to the respondents, on an average the check dams' water is 81.2% adequate. Thus the respondents do not have to search for alternative sources of water.

5.16. Change in income of the respondents

According to the survey, there has been a remarkable increase in the average income of the villagers after the construction of check dams. Check dams boosted agriculture growth and facilitated allied and other non-agricultural activities due to which income of people increased more than proportionately. The average annual income of people before check dams was approximately Rs. 37734 and after check dams it has increased to Rs. 175137, registering an increase of almost 364%.

Change in average income of the farmers (in Rs.)



Source: Study on socio-economic impact of check dams constructed by PHD RDF in Sikar district Rajasthan, February 2015

5.17. Socio- economic impact: Dam wise analysis

To know about the impact of check dams on Sikar district, 11 villages were identified where the check dams have been constructed by PHDRDF. The dam wise analysis for each of the villages is as follows-

5.17.1 Phutipal dam, Sawalpura

Phutipal dam constructed in Sawalpura village of Sikar district in 2004 is 500 m long, 50 feet wide and has a height of 8 feet. The dam irrigates an area of 1185697.75 square meters and the water lasts in the reservoir for about 6 months.

According to the survey 70% of the villagers used the area chosen before for the purpose of agriculture, herding and grazing. Before the construction of the check dam, nearly 41% of the water supply came from wells and tube wells. Hence, 55% of the villagers responded that there was a need of check dam in the village. The construction of the check dams has also improved the groundwater level and has changed the cropping pattern of the area concerned. The collected data revealed that the ground water level has increased by more than 50% and the cropping pattern has changed from that of rain fed crops to all type of crops and vegetables, for e.g. Wheat, mustard, maize, jowar, til, channa, mirch, vegetables, peanuts, etc.

Construction of the check dam has also improved the area under cultivation and irrigation, the area under cultivation has increased by almost 47% and area under irrigation by 112%. Also the livestock in the village has increased by more than double.

The construction of check dams have positively impacted to socio-economic status of the villagers, there has been an increase in income by 346%, improvement in standard of living, education, eating habits, crop productivity, farmers have now become financially independent and sound, generation of new employment opportunities.

The construction of check dams has also impacted the migration process of the villagers. The construction of check dams has improved the area under irrigation and cultivation thus facilitating agriculture, consequently the farmers need not migrate to nearby villages and cities in search of work.

The respondents have also given a few suggestions on the possible interventions that can be undertaken in the village in order to make their agriculture practices more efficient and to improve the condition of the village. About 91% of the villagers have responded that there is a need for LIS in the village. Emphasis should be laid on the expansion of dams and improvement of water resources in the village.

5.17.2 Atmaram Dam, Hatideh

Atmaram dam constructed in Sawalpura village of Sikar district in 2010 is 1000m long, 100 feet wide and has a height of 10 feet. The dam irrigates an area of 907281.35 square meters and the water lasts in the reservoir for about 6 months.

According to the survey, 50% of the villagers used the area chosen before for the purpose of herding and grazing. Before the construction of the check dam, nearly 30% of the water supply came from wells, tube wells and bore wells. Hence, 70% of the villagers responded that there was a need of check dam in the village. The construction of the check dams has also improved the groundwater level and has changed the cropping pattern of the area concerned. The survey revealed that the groundwater level has increased by more than 50% and the cropping pattern has changed from that of rain fed crops to all type of crops and vegetables, such as Wheat, mustard, maize, jowar, til, channa, mirch, vegetables, peanuts, etc.

Construction of the check dam has also improved the area under cultivation and irrigation, the area under cultivation has increased by almost 53% and area under irrigation by 122%. Also the number of animals with the people has increased by more than double.

The construction of check dams have positively impacted the socio-economic status of the villagers, there has been a significant increase in income by 258%, improvement in standard of living, education, eating habits and agricultural productivity, irrigation facilities, livestock and social framework. Farmers have now become financially independent and sound, generation of new employment opportunities.

The construction of check dams has also impacted the migration process of the villagers. The construction of check dams has improved the area under irrigation and cultivation thus facilitating agriculture production, consequently the farmers need not migrate to nearby villages and cities in search of work.

The respondents have given a few suggestions on possible interventions that can be undertaken in the village in order to make their agricultural practices more efficient and to improve the condition of the village. About 89% of the villagers have responded that there is a need for LIS in the village. Emphasis should be laid on increasing the depth & height the dam, repair & maintenance of dam. Further improvement in water sources needed, provision of pipeline system and more check dams should be constructed in order to improve irrigation facilities.

5.17.3 Morkhub dam, Chudla

Morkhub dam was constructed by the Rural Development Foundation in the Chudla village of Sikar district in 2010. Its dimensions are 600m long, 200 feet wide and height of 24 feet. The

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dam irrigates an area of 2650621.25 square meters and the water lasts in the reservoir for almost 12 months.

According to the survey, the area chosen for the construction of dam was used for the purpose of grazing by about 58% of the villagers. Nearly 22% of the water supply came from wells and tube wells before the construction of the check dam. Hence, 58% of the villagers responded that there was a need for check dam in the village. The construction of the check dams has also improved the groundwater level and has changed the cropping pattern of the area concerned. The survey revealed that the groundwater level has increased by more than 50% and the cropping pattern has changed from that of rain fed crops to all type of crops and vegetables, such as wheat, mustard, maize, til, channa, vegetables, peanuts, etc. There has also been an increase in crop production and yield of crops.

The construction of the check dam has also improved the area under cultivation by almost 54% and area under irrigation by 129%. The livestock in the village has also increased by more than double.

The construction of check dams have positively impacted the socio-economic status of the villagers, there has been a significant increase in income by almost 557.5%. The villagers also witnessed an improvement in standard of living as they are now able to send their children to schools, pay off their loans, buy tractors and jeeps and constructed houses for themselves. The migration to other villages has also declined as people are able to generate high income from their own farms and are able to find employment in the village itself.

The respondents have given a few suggestions on possible interventions that can be undertaken in the village in order to make their agricultural practices more efficient and to improve the condition of the village. Emphasis should be laid on increasing the height of the dam, repair & maintenance of dam, improvement in water sources, and expansion of the Lift irrigation system (LIS) present in the village. Further, better schemes for the development of the village and expansion of agriculture should be formulated by the State Government.

5.17.4 Bijlideh Dam, Lohiya ki Dhani

Bijlideh dam constructed in Lohiya ki Dhani village of Sikar district in 2009 is 500m long, 150 feet wide and has a height of 8 feet. The dam irrigates an area of 431707.3 square meters and the water lasts in the reservoir for about 10 months.

According to the survey, 37.5% of the villagers used the area chosen before for the purpose of herding. Before the construction of the check dam, nearly 20% of the water supply came from wells. Hence, 42% of the villagers responded that there was a need of check dam in the village. The construction of the check dams has also improved the groundwater level and has changed the cropping pattern of the area concerned.

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The survey revealed that the groundwater level has increased by more than 50% and the cropping pattern has changed from that of rain fed crops to all type of crops and vegetables, such as wheat, mustard, maize, jowar, til, channa, mirch, vegetables, peanuts, etc.

Construction of the check dam has also improved the area under cultivation and irrigation, the area under cultivation has increased by almost 93% and area under irrigation by 71.5%. Also the livestock in the village has increased by almost 32%.

The construction of check dams have positively impacted the socio-economic status of the villagers, there has been a significant increase in income by 210.5%, improvement in standard of living, education, eating habits, economic conditions. Farmers have now become financially independent and sound, new employment opportunities have been generated.

The construction of check dams has also impacted the migration process of the villagers. The construction of check dams has improved the area under irrigation and cultivation thus facilitating agriculture production, consequently the farmers need not migrate to nearby villages and cities in search of work.

The respondents have given a few suggestions on possible interventions that can be undertaken in the village in order to make their agricultural practices more efficient and to improve the condition of the village. About 96% of the villagers have responded that there is a need for LIS in the village. Emphasis should be laid on increasing the depth, height and width of the dam, repair & maintenance of dam, construction of roads, toilets and path to the dam.

Further, setting up of sewing machine centre, computer learning centre for women and girls and generation of new employment opportunities for girls should be provided by the state government. Adequate steps should also be taken for improving the education and health facilities and for upgrading the physical infrastructure of the village.

5.17.5 Hogdaya Dam, Kishanpura

Hogdaya dam was constructed in Kishanpura village of Sikar district in 2004 and is 1000m long, 200 feet wide and 13 feet high. The dam irrigates an area of 1264123.8 square meters and the water lasts in the reservoir for about 9 months.

Before the construction of the check dam, nearly 26% of the water supply came from wells. Thus there was a dire need for check dam in the village. According to the survey, the site where the dam is constructed was previously used for the purpose of herding and grazing.

The construction of the check dams has facilitated the farmers significantly. Not only there has been an improvement in the groundwater level by more than 50% but there has been a considerable change in the cropping pattern as well. The farmers can now grow new vegetables

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such as tinde, tomato in addition to mustard, bajra, taramira and gram grown before the construction of Hogdaya dam.

Construction of the check dam has also improved the area under cultivation and irrigation, the area under cultivation has increased by almost 94.4% and area under irrigation by 97.6%. Also the livestock in the village has increased by more than double.

The construction of check dams have positively impacted the socio-economic status of the villagers, there has been a significant increase in income by 461.1%, improvement in standard of living, education, eating habits, livestock, socio-economic conditions and the farmers have now become financially independent and sound, generation of new employment opportunities in non-agricultural activities.

The construction of check dams has also impacted the migration process of the villagers. The construction of check dams has improved the area under irrigation and cultivation thus facilitating agriculture production, consequently the farmers need not migrate to nearby villages and cities in search of work.

The respondents have suggested that emphasis should be laid on increasing the depth, height and width of the dam, repair & maintenance of dam, construction of roads, toilets and path to the dam, expansion of the Lift Irrigation system in the village, provision of pipeline system, motor transportation and improvement in water sources.

5.17.6 Kaladeh Dam, Avinashi

Kaladeh dam constructed in Avinashi village of Sikar district in 2007 is 2000m long, 1000feet wide and has a height of 9 feet. The dam irrigates an area of 3068780.02 square meters and the water lasts in the reservoir for about 10 months.

Before the construction of the check dam, nearly 26% of the water supply came from wells. Hence, 71% of the villagers responded that there was a need of check dam in the village. 58.3% of the villagers said that the area chosen for the construction of check dams was used earlier for the purpose of herding and grazing. The dam site was chosen as it has a high absorption capacity.

With the construction of Kaladeh dam, there has been a substantial improvement in the groundwater level and the cropping pattern of the area concerned. The survey revealed that the groundwater level has increased by more than 50% and the cropping pattern has changed from that of rain fed crops to all type of crops and vegetables, such as tinde, tomatoes, wheat, mustard, vegetables, bajra, taramira and gram.

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Construction of the check dam has also improved the area under cultivation and irrigation by almost 94.2% and 83.7% respectively. Also the number of animals with the people has increased by more than double.

The construction of check dam has positively impacted the socio-economic status of the villagers. With a gigantic increase of 467.4% in average income of the farmers, there has been sizeable improvement in standard of living of the respondents. The villagers are able to find employment in their own villages and are able to educate their children.

The women folk also work in their own farms or find employment in other farms and are able to contribute to their family's income. The increase in agriculture yield has provided greater disposable income to the villagers which they are able to use not only for basic necessities but also for buying houses, jeeps, tractors, livestock and so on.

The respondents have given a few to facilitate them to make their agricultural practices more efficient and to improve the condition of the village. About 94% of the villagers have responded that there is a need for LIS in the village. Emphasis should be laid on increasing the depth, construction of more dams, repair & maintenance of dam, construction of roads, toilets and path to the dam, prevention of dam walls from erosion, provision of pipeline system and availability of engines.

5.17.7 Nichladeh Dam, Bhagwanpura

Nichladeh dam was constructed by PHDRDF in Bhagwanpura village of Sikar district in 2008. It is 1000m long, 200 feet wide and has a height of 8 feet. The dam irrigates an area of 165107.4 square meters and the water lasts in the reservoir for about 10-11 months.

According to the survey, the dam site was previously used by the villagers for the purpose of herding and grazing. Before the construction of the check dam, nearly 24% of the water supply came from wells.

The construction of the check dams has improved the groundwater level by more than 50% and has changed the cropping pattern as gram is also grown now after the construction of the Nichladeh dam in addition to wheat, mustard and jowar.

Construction of the check dam has also improved the area under cultivation and irrigation, the area under cultivation has increased by almost 164.4% and area under irrigation by 156.6%. Also the livestock in the village has increased by more than double.

The construction of check dam has positively impacted the socio-economic status of the villagers as there has been a significant increase in average income by 500.6%. The villagers

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have also improved their standard of living, eating habits and are able to buy fertilizers, pesticides, tractors, livestock to further improve their agricultural yield.

The construction of check dams has also impacted the migration process of the villagers. The construction of check dams has improved the area under irrigation and cultivation thus facilitating agriculture production, consequently the farmers need not migrate to nearby villages and cities in search of work.

The respondents have given a few suggestions on possible interventions that can be undertaken in the village in order to make their agricultural practices more efficient and to improve the condition of the village. About 82% of the villagers have responded that there is a need for spring irrigation facility in the village and LIS. Emphasis should be laid on repair & maintenance of dam, improving water sources, provision of pipeline system, and availability of engines and expansion of dams. Further, the villagers said that there should be more schools, proper roads and hand pumps for easy access to drinking water.

5.17.8 Johadwala Dam, Loharabas

Johadwala Dam was constructed by PHDRDF in Loharabas village of Sikar district in 2009. The dam is 2000m long, 150 feet wide and has a height of 12 feet. The dam irrigates an area of 1148661.9 square meters and the water lasts in the reservoir for about 9-10 months.

According to the survey 42.3% of the villagers used the area chosen before for the purpose of agriculture, herding and grazing. Before the construction of the check dam, only 32% of the water supply came from wells and tube wells due to which 62.5% of the villagers responded that there was a need of check dam in the village. The construction of the check dams has not only improved the groundwater level but has also changed the cropping pattern of the area concerned.

The survey revealed that the groundwater level has increased by more than 50% and the cropping pattern has changed from that of rain fed crops to all type of crops and vegetables, such as wheat, mustard, maize, jowar, til, channa, peanuts, etc.

Construction of the check dam has also improved the area under cultivation and irrigation as the area under cultivation has increased by almost 140.4% while the area under irrigation increased by 92.3%. Also the livestock in the village has increased by more than double. The construction of check dam has positively impacted the socio-economic status of the villagers. There has been an increase of about 288.8% in the average income while the standard of living of the villagers has also improved considerably due to increase in agricultural productivity which has increased the disposable income with the farmers and villagers. The respondents said that they are now able to send their children to school, spend more on basic necessities

such as food, clothing and also able to build new house and buy tractor for their farms and pay off their loans.

The women respondents have also witnessed an upliftment in their socio-economic conditions as they are able to find employment, spend on themselves and contribute to their family incomes and need not travel to far off places for basic necessities. The respondents attribute their improvement in standard of living to the check dam and suggested on increasing the height of the dam and its repair & maintenance. They firmly believe that there should be LIS in their village that would improve their agricultural productivity.

They suggested that there should be provision of pipeline system, borewell system and improvement in water sources. Further, the state government must also work towards improving the education and health facilities and upgrading the physical infrastructure of the village.

5.17.9 Morghat Dam, Dass ki Dhani

Morghat dam was constructed in Dass ki Dhani village of Sikar district in 2012. Its dimensions are 500m long, 250 feet wide and a height of 8 feet. The dam irrigates an area of 1345544.4 square meters and the water lasts in the reservoir for about 9 months.

According to the survey 58.3% of the villagers used the area chosen before for the purpose of herding and grazing. Before the construction of the check dam, nearly 31% of the water supply came from wells and tube wells. According to the survey, 92% of the respondents felt that there was a need of check dam in the village. The construction of the check dams has improved the groundwater level and has changed the cropping pattern of the area concerned. The survey revealed that the groundwater level has increased by more than 50% and the cropping pattern has changed from that of rain fed crops to all type of crops and vegetables, such as wheat, mustard, maize, jowar, til, channa, mirch, vegetables, peanuts, etc.

Construction of the check dam has also improved the area under cultivation and irrigation, the area under cultivation has increased by almost 29.1% while the area under irrigation by 89.7%. Also the livestock in the village has increased by more than double.

The construction of check dams have positively impacted the socio-economic status of the villagers as the respondents witnessed a significant increase in average income by almost 313.9% after the construction of Morghat dam. There has been considerable improvement in standard of living as people have started living in pukka houses, have started sending their children to school and need not travel to far off places to fetch water for drinking. The women respondents said that they have also now become financially independent and sound.

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The construction of check dam has also impacted the migration process of the villagers as the farmers need not migrate to nearby villages and cities in search of work.

The respondents have given a few suggestions on possible interventions that can be undertaken in the village in order to make their agricultural practices more efficient and to improve the condition of the village. About 80% of the villagers have responded that there is a need for LIS in the village. Emphasis should be laid on increasing the depth, height and width of the dam, repair and maintenance of dam, construction of roads, toilets and path to the dam.

Setting up of sewing machine centre, computer learning centre for women and girls and generation of new employment opportunities for girls should also be taken care of. Further adequate steps should be taken by the State Government for improving the education and health facilities and for upgrading the physical infrastructure of the village.

5.17.10 Kalimaidi Dam, Ramalayavas

Kalimaidi dam constructed in Ramalayavas village of Sikar district in 2008 is 1000m long, 500 feet wide and has a height of 10 feet. The dam irrigates an area of 1488961.2 square meters and the water lasts in the reservoir for about 10 months.

According to the survey 37.5% of the villagers used the area chosen before for the purpose of herding. Before the construction of the check dam, nearly 38% of the water supply came from wells and tube wells. Hence, 75% of the villagers responded that there was a need of check dam in the village. The construction of the check dams has also improved the groundwater level and has changed the cropping pattern of the area concerned. The survey revealed that the groundwater level has increased by more than 50% and the cropping pattern has changed from that of rain fed crops to all type of crops and vegetables, such as Wheat, mustard, maize, jowar, til, channa, mirch, vegetables, peanuts, etc.

Construction of the check dam has also improved the area under cultivation and irrigation as the area under cultivation has increased by almost 18.1% and area under irrigation by 105.1%. Also the livestock in the village has increased by more than double.

The construction of check dam has positively impacted the socio-economic status of the villagers. There has been a significant increase in income by 232.3%, improvement in standard of living, education, eating habits, livestock, irrigation facilities and productivity due to which the farmers have now become financially sound.

The construction of check dam has also impacted the migration process of the villagers. Check dam has improved the area under irrigation and cultivation thus facilitating agriculture production, consequently the farmers need not migrate to nearby villages and cities in search of work.

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The respondents have given a few suggestions on possible interventions that can be undertaken in the village in order to make their agricultural practices more efficient and to improve the condition of the village. About 88% of the villagers have responded that there is a need for LIS in the village. Emphasis should be laid on increasing the depth, of the dam, repair & maintenance of dam, construction of more dams, roads, toilets and bridges, provision of pipeline system and availability of engines. Further adequate steps should be taken by the State Government for improving the education and health facilities and for upgrading the physical infrastructure of the village.

5.17.11 Camerawala Check dam, Misrala ki Dhani

Camerawala check dam constructed in Misrala ki Dhani village of Sikar district in 2006 is 1500m long, 400 feet wide and has a height of 15 feet. The dam irrigates an area of 1918159.5 square meters and the water lasts in the reservoir for about 12 months.

According to the survey, 45% of the villagers used the area chosen before for the purpose of agriculture, herding and grazing. Before the construction of the check dam, nearly 20% of the water supply came from wells, tube wells and bore wells. Hence, 30% of the villagers responded that there was a need of check dam in the village. The construction of the check dams has also improved the groundwater level and has changed the cropping pattern of the area concerned.

The survey revealed that the groundwater level has increased by more than 50% and the cropping pattern has changed from that of rain fed crops to all type of crops and vegetables, such as Wheat, mustard, maize, jowar, til, channa, mirch, vegetables, peanuts, etc. Construction of the check dam has also improved the area under cultivation and irrigation, the area under cultivation has increased by almost 85.15% while the area under irrigation by 111.23%. Also the livestock in the village has increased by more than double.

The construction of check dam has positively impacted the socio-economic status of the villagers. There has been a significant increase in income by 561.11%, improvement in standard of living, education, eating habits, due to increase in average income of the villagers and generation of new employment opportunities and increase in agricultural productivity.

The construction of check dams has also impacted the migration process of the villagers. The construction of check dams has improved the area under irrigation and cultivation thus facilitating agriculture production, consequently the farmers need not migrate to nearby villages and cities in search of work. About 90% of the villagers have responded that there is a need for expansion of LIS in the village. Emphasis should be laid on increasing the depth, height and width of the dam, repair & maintenance of dam, provision and improvement of water sources. Further, adequate steps should be taken by the State Government for improving the education and health facilities and for upgrading the physical infrastructure of the village.

6. Conclusions

The survey revealed that the much needed construction of check dams in the Sikar district of Rajasthan has led to widespread improvement in the socio-economic status of people. The groundwater level has increased by more than 50% and the cropping pattern has changed from that of rain fed crops to all type of crops and vegetables. According to the survey of 11 villages of the district, the check dams have facilitated increase in agriculture yield and productivity. With the increase in the area under cultivation and irrigation, there has been an increase in crop production, which has boosted the income of the people.

The income increase has helped farmers to increase their livestock, build pakka houses, pay off their loans and buy fertilizers, pesticides and tractors to facilitate their agricultural produce. The number of animals has increased by almost 97% in the villages after the construction of check dams.

With the availability of water facilities, the villagers do not have to travel to far off places to fetch water which has helped villagers save their time and effort by almost 53%. There has also been a positive impact on the migration in the villages as the farmers are able to earn a decent livelihood in their own villages and do not have to search for job in other villages.

Further, there has been an improvement in the standard of living as well as child education in the villages. The women respondents also opined that the construction of check dams have improved their status as they are able to work in their own farms or find employment on others' farms and are able to contribute to their family income.

During the survey, it was found that the villages where the Lift Irrigation System has been installed have witnessed higher agricultural productivity. In the areas without the lift irrigation system, the cultivated area increased from 41601 sq. meters to 71547 sq. meters which is an increase of 72%. On the other hand, the villages with lift irrigation system witnessed an increase of 77% in the cultivated area from 32536 sq. meters to 57464 sq. meters.

The irrigated area in Non-LIS villages registered an increase of 104% as the area increased from 25576 sq. meters to 52122 sq. meters while the villages with LIS witnessed a significant increase from 25980 sq. meters to 53579 sq. meters which is an increase of 106%.

The yield of the crops increased significantly in villages with LIS, as the crop yield increased by 110% after the construction of check dams and LIS. On the other hand, the villages without LIS witnessed 86% increase in crop yield after the construction of check dams.

Going ahead, the LIS should be constructed in other villages also to increase the crop yield significantly that will improve the socio-economic situation of villagers of the district in the coming times.

7. Suggestions

The farmers who are using the water through the Lift Irrigation System suggested that there should be expansion in the lift irrigation system to boost productivity if the agriculture sector in their villages.

The respondents also suggested possible interventions that can be undertaken in the village in order to make their lives better and simpler and to further improve their living standards.

A need was felt for improvement in water sources in the villages for which larger number of check dams should be built and the height, depth and width of the existing dams should be increased. The Lift irrigation system should be installed in all villages and should be further expanded in villages where they are already installed.

Spring irrigation, hand pumps and bore well should be provided in order to facilitate the irrigation facilities in the villages. Respondents also suggested that there is a need for regular repair and maintenance of the existing dams and water sources. Further, pathways to dams should be constructed and trees alongside the dams should be planted. Prevention of dam walls from erosion should also be taken care of. To enhance agriculture productivity, crops must be made available at reasonable prices and High Yielding Variety (HYV) seeds should be made available.

Also, the health and education facilities in the villages need to be improved. Drainages and sewers need to be covered while clean drinking water tanks should be made available. In addition, electricity should be provided and more schools and hospitals should be constructed and power stations should be built to ensure regular supply of electricity

Vocational and computer learning centers should be set up for women so as to enhance their skills, community halls should be constructed for marriages and other events and employment opportunities should be generated for women so as to empower the woman economically and socially.

Also Community halls and meeting rooms should be constructed to facilitate social gatherings and public forums enhancing dissemination of knowledge.

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