SOCIO-ECONOMIC IMPACT OF CHECK DAMS

A survey of Alwar and Sikar districts of Rajasthan

June 2011

An Indicus Analytics study on Check Dams (Rain Water Harvesting Projects) Undertaken by PHD Rural Development Foundation (PHDRDF) of PHD Chamber of Commerce and Industry

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ORGANISATIONAL PROFILE

PHD RURAL DEVELOPMENT FOUNDATION (PHDRDF)

The PHD Chamber of Commerce and Industry has been in service of the business community of north India for more than 105 years. Realizing its societal responsibilities and to live by its chosen motto *"In Community's Life and Part of it"*, the PHD Chamber founded two Foundations - namely, the PHD Rural Development Foundation (PHDRDF) and the PHD Family Welfare Foundation (PHDFWF). This was more than two decades ago. These two registered non-profit organizations have been actively executing integrated rural development and family welfare projects in northern India, with special focus on environment protection, women empowerment, mother and child care, prevention of HIV/AIDS.

PHD Rural Development Foundation registered under the Indian Trust Act, 1882, 80G of the IT Act, 1961 and the FCRA. The broad governance of the Foundation is looked after by a Governing Body which consists of eminent persons like Industrialists, Chartered accountants, Environmentalists, Academicians, Former Bureaucrats and Representatives from NGOs. The main objectives of the Foundation are:

-To help and create a self–propelling rural society by way of ensuring people's participation to sustain balanced growth of both people and natural resources in all directions and dimensions.

-To provide expertise, information and assistance to rural masses for their capacity building to reduce poverty, tackle environment problems, assume responsibility for their health and pursuing education and use/manage their local resources so as to unfold avenues for gainful employment.

Indicus Analytics:

INDICUS ANALYTICS is a specialized economics research firm based in New Delhi. It has been providing research inputs to Central and State ministries, institutions such as The World Bank, UNICEF, Stanford University, Harvard University, Maryland University, USAID, Rajiv Gandhi Foundation and many other national and international institutions. Key decision-makers such as the former President of India Dr. APJ Abdul Kalam, the Prime Minister Dr. Manmohan Singh and the Finance Minister Mr. P. Chidambaram have all referred to our work as we cover a wide range of aspects of the Indian economy.

Its area of analysis includes modeling, indexation, monitoring and evaluation, socio-economic surveys and analytical studies. Indicus research covers whole lot of areas that include socio-economy, macro economy and trade, industry and infrastructure, policy and law, demography and poverty. Indicus also has a product suite which helps strategists, marketers, analysts, and researchers understand the Indian economy and markets at granular levels.

Wide variety of media groups at national level including Economic Times, Hindustan Times, Indian Express, Business Standard, India Today, Outlook have carried cover stories based on our work.

Summary

Rajasthan is an agrarian economy with three quarters of its population depending on agriculture for their livelihood. However, the natural water resources are adverse and scarce with average annual rainfall way below the national average. Besides this, the state also lacks adequate irrigation infrastructure to facilitate agricultural production. The per capita income of the state is one of the lowest with high poverty levels as compared to the national level. The unemployment rate in Rajasthan is also highest among all Indian states. With the objective of rural development and poverty alleviation in the state of Rajasthan, the PHD Chamber of Commerce & Industry had undertaken construction of check dams in Alwar and Sikar districts to facilitate rainwater harvesting, so as to help the villagers access alternative sources of water for irrigation and other requirements. This method is an efficient measure to tackle problems of drought, dry wells and low water tables. The rationale of the present study is to evaluate the extent of socio-economic development and poverty alleviation in the districts, after the construction of the check dams.

The PHD Chamber has built nearly 125 check dams in Alwar and Sikar districts, which have brought about significant improvements in the lives of the villagers. Before the check dams were constructed, wells and hand pumps were the only sources of water used for drinking and irrigation. After the construction of the check dams, water from it is utilized for different purposes like farming, irrigating, drinking, bathing, animals and household activities.

It was observed that the check dams have helped in harvesting rain water in the two districts of study. They have helped in raising the water levels of the wells, thereby providing comfort for the villagers in accessing alternative sources of water for day-to-day activities. This has helped in availability of enough water for drinking and irrigation

Due to check dams, the cultivated area and the irrigated area have increased substantially. Check dams have improved the crop pattern. In most of the cases, the major crops that used to be cultivated earlier were wheat, mustard, bajra, and maize; after the construction of check dams villagers have started cultivating vegetables, grams, tomatoes, lady's fingers, chillies, round gourd, bottle gourd, etc. After the construction of check dams, the number of animals in the region has increased.

Check dams have aided in increasing the productivity of land. The income of the villagers has increased manifold due to increased agricultural output and other related economic activities. New economic activities such as construction of houses, purchase of agricultural tools and machinery, repayment of loans, etc are some positive outcomes undertaken by the beneficiaries of the check dams. The villagers are satisfied with the adequacy of check dam water. However, they expressed their expectations of more developmental activities around the area, going forward.

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1) Introduction

Water is one of the most important natural resources and is a key element in socio-economic development of any civilization. As any economic activity like agriculture, industry or domestic activity is heavily dependant on this resource, its ready and sustained availability is one of the basic building blocks of the society.

With the increasing world population and diversely emerging economic activities, the continuous depletion of the natural resources is on the rise. Ground water depletion is a major challenge that the world faces today. The escalating demand over the coming times is bound to lead to scarcity of water.

In order that such scarcity does not hamper the development of the world, it is important to improve the efficiency of planning and management of water resources at a micro, national or state level. In other words, a water resource plan, consistent with over the economic, social and environmental policies of the country, is an important element to ensure that the water resources contribute to the country's development objectives. The implementation of these policies would contribute to combating the global challenge of water scarcity.

1.1) Water Resources in India

India has sizable resources of water and a large cultivable land area but also a large and growing population to feed. Erratic distribution of rainfall in time and space leads to conditions of floods and droughts which sometimes occur in the same region in the same year. India has about 16% of the world population and only 4% of average annual runoff in the rivers.

India is influenced by two seasons, namely the south-west monsoon, and the dry months outside the monsoon. There are large variations in the amounts of rainfall received at different locations. Annual rainfall in India varies from less that 20cms to over 1000cms with low intensity of rainfall over regions of North and South-West and high intensity 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	50 million ha.
Natural Runoff (Surface & Ground Water)	1869 Cubic km
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: Compiled from Environmental Information System, India

1.2) Agriculture Scenario

Agriculture accounted for 14.6% of the country's gross domestic product (GDP) in 2010. The sector provided the principal means of livelihood for 58.4% of India's population. It accounted for about 10% of the total export earnings and provided raw materials to a large number of industries. Although yield per hectare is less in case of India compared to the world, India has managed to increase its agricultural produce year on year. The total foodgrain production reached 236 million tons the financial year 2010-11.

Summary of agricultural statistics of India (2009-10)

Area under cultivation	Production (Food grains)	Yield (Food grains)	Area under irrigation
121.37 mn hectares	236 mn tonnes^	1798 kg/hectare	46.8 (%)*

Source: Ministry of Agriculture, GOI
*** Data pertains to 2007-08**
^ Data pertains to 2010-11

Experiences in a large number of states have shown that better access to water improves agricultural productivity and incomes dramatically. The example of Gujarat, which has achieved close to double-digit agricultural growth during the 2000s, is well known; it is also well known that the construction of check damns and exploitation of the irrigation potential has been an integral part of that state's agricultural strategy. Rajasthan has been unable to generate the same improvements although its agro-climatic conditions are similar.

1.3) Rainfall situation in Rajasthan

Rajasthan being a desert area, its climate varies mostly from arid to sub-humid. To the west of the Aravalli hills, the climate is marked by low rainfall, extreme diurnal and annual temperatures, low humidity and high-velocity winds. To the east of the Aravallis, the climate is semi-arid to sub-humid marked by lower wind velocity and higher humidity and better rainfall.

The annual rainfall in the state differs significantly 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 more fortunate eastern 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). Thus, the volume and reliability of rainfall vary considerably across the state, and have a decisive effect on the agricultural potential and the occupational choices of the population.

1.4) Agrarian Economy of Rajasthan

Agriculture plays an important role in State's economy. It contributes about 26 per cent of the State's gross state domestic product. Around two-thirds of Rajasthan's population is dependent on it for its livelihood.

The state is the leading producer of coarse cereals, pulses, gram, oilseeds and seed spices. Agriculture in Rajasthan is largely dependent on rains, only 35% of the total agricultural area is irrigated. Out of the total area irrigated 65 to 70% area is under wells and tube well irrigation.

Rajasthan: Summary of agro Statistics

Sr. No	Components	Growth/ratio
1.	Population dependent on agriculture	Two Thirds
2.	Agriculture GDP at current prices	Rs79994.97Crore
3.	Growth of Agriculture GDP (Avg. from FY2001 to FY 2011)	8.30%
4.	Agricultural sectors contribution in GSDP	26%
5.	Food Grain production (Thousand Tonnes)	11283.4
6.	State's contribution to national food grain production	5.17%
7.	State's rank in food grains production	7th
8.	Yield Kg/Hectare (of total food grains)	890
9.	Total agricultural area irrigated	35%
10.	Area under wells and tube well irrigation	60-70%
11.	Rice Production (Thousand Tonnes)	228.3
12.	Wheat Production (Thousand Tonnes)	6326.5
13.	Coarse Cereals Production (Thousand Tonnes)	3828.1
14.	Pulses production (Thousand Tonnes)	900.5
15	Oil Seeds production (Thousand Tonnes)	4469.2
16.	Cotton production (Lint)	284.4
17.	Sugarcane production	135.4

Source: Compiled from RBI and Economic Review of Rajasthan 2009-10
Note: The data above pertains to 2009-10

1.5) Socio-economic scenario in Rajasthan

Although, several schemes of poverty reduction have been undertaken in Rajasthan, the state has not been able to perform very well in the social sector. Its poverty level hovers around the national level, while the state performs worse as compared to national average in case of literacy and Human Development Index. Rajasthan has the highest unemployment rate in India and the per-capita income of the state is about the lowest among the states.

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

Indicators	Rajasthan	India
Poverty	22.1%	27.5%
Literacy	67.1%	74.04%
Per-capita Income	Rs34189	Rs46492
Human Development Index	.71	.52
Unemployment rate	18%	9.4%

Source: Compiled from various sources

1.6) Need for Check Dams in Rajasthan

Rain water harvesting through check dams in the desert province of Rajasthan is imperative to ensure enough drinking water or water for irrigation. This method is an efficient measure to tackle the problems of drought, dry wells and low levels of water table. This has in many cases helped to increase the productivity of land and in turn to increase the agricultural production in the villages. The consequent rise in the income level of farmers has reversed the migratory trends of the villagers to urban areas and has promoted sustainable development

It may be mentioned that the check dams are small scale, low cost structures constructed across a stream to slow or hold the flow of rainwater. They are made either of temporary materials such as brush, poles, wire and loose rocks or of more permanent masonry materials. They are advantageous in 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 "to improve the livelihoods of the poor communities through water harvesting thereby saving ground and surface water resources from depletion and by creating self reliance and community ownership"

Detrimental effects of developmental activities on water and biological resources often lead to land degradation and depletion of natural resources which in turn weakens the ability of communities to depend on their environment for their livelihoods. Therefore, in order to safeguard our environment and humanity at large from such negative effects, it is imperative to give thrust to implementation of programmes related to water management, soil conservation, afforestation and wasteland development.

Towards this end the PHDRDF has taken initiative of implementing Water Harvesting Projects in the State of Rajasthan nearly a decade ago in the water deficit rural areas which are semi-arid and mostly dependent on rain. About 25-30 percent of the population in this area lives below the poverty line. Unfortunately, most of these villages have not seen cultivation for the last 8-9 years because the water table has gone down drastically and rainfall has been extremely deficient and other surface water resources have dried up to a large extent. The men-folk have migrated to urban sectors to work as labourers in Punjab, Haryana and other farther States, especially to work in Brick-Kilns, Construction Sector etc.

3) Objectives

The PHD Chamber of Commerce & Industry, which serves the states of Jammu & Kashmir, Uttarakhand, Punjab, Haryana, Himachal Pradesh, Uttar Pradesh, Delhi, Rajasthan, Madhya Pradesh, Chattisgarh 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 and the nation.

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 200 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 Alwar and Sikar districts, which have been covered under the check dam projects by the PHD Chamber 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:

- To estimate the change in recharge of ground water due to check dams.
- To assess the change in area under irrigation and cultivation, before and after the construction of check dams
- To compute the change in crop production before and after construction of dams.
- To estimate the change in the level of total income before and after construction of dams.
- To evaluate the change in socioeconomic status of the people in the two districts before and after the construction of check dams.

4) Methodology

4.1) Sample selection

The study has been conducted on the basis of survey of people from Alwar and Sikar Districts. The sample size is 52; respondents have been chosen in such a manner that each respondent is a beneficiary of a different check dam. So, the survey has responses on 52 check dams. 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. The head of the construction team is an experienced builder, who has been designing such anicuts/ check dams for last three decades (he worked with Shri Rajender Singh at Tarun Bharat Sangh who created a large number of such structures across Rajasthan and Gujarat). Only in few cases was technical help sought from Irrigation Department and our member organizations. The basic aim has been to keep the cost low and designs simple.

Amongst the total check dams surveyed in the two districts, the sample has been categorized according to the year of construction which range from year 2003 to year 2010. The two categories of check dams are old and new check dams, wherein, old ones comprise the ones constructed between 2003 and 2007 and the new ones comprise the ones constructed between 2008 and 2010. There were 23 responses on old and 29 responses on new check dams.

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 two districts selected for the study

4.2.1) Alwar

The Alwar district is situated in the north-east of Rajasthan between 27°4' and 28°4' north latitudes and 76°7' and 77°13' east longitudes. The geographical area of the district is 7, 828.97 sq. km., which is about 2.5 percent of the State. The rainfall distribution in the district is uneven and scattered, which sometimes result in floods and sometimes in drought; they affect the agricultural production as well as cropping pattern in Kharif and Rabi seasons. The average annual rainfall is about 650 mm in about 30 rainy days. Agriculture in the district by and large depends on rainfall. The main source of irrigation is wells and tube wells. Tube wells irrigate about 1,92,861 hectares whereas, wells irrigate about 2,65,169 ha. Other sources like canals, tanks irrigate about 404 hectares.

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.

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

4.3) Significance of rain water harvesting in Alwar and Sikar districts

Owing to the low intensity of rainfall in the Alwar and Sikar districts, lack of perennial sources of water and the primarily agrarian nature of economy, the water requirement is very high. Thus, in order to deal with such issues, water conservation is the only way out. The inadequacy of surface water has made rain harvesting inevitable in the area. Rain water harvesting is the technique of collection and storage of rain water at 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 was analyzed and categorized to evaluate the impact of the water harvesting projects in the form of check dams on the livelihood of the villagers.

The survey revealed that a variety of economic activities have been undertaken in these districts as a result of construction of the dams. A vast majority of the respondents have undertaken activities like construction and renovation of houses, while a number of them bought agricultural inputs and private vehicles. Many of them have improved their quality of life by way of procuring amenities for a better life and meeting social obligations. A good proportion of the villagers have been sending their children to school, and there is an increased awareness of and willingness to pay for higher education. A sizable population has also been able to repay its loan obligations. All such activities have helped in raising the standard of living of the villagers.

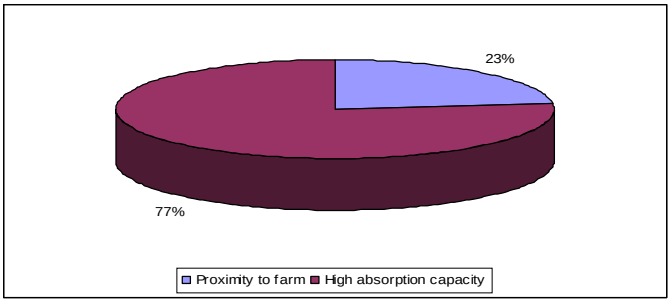
5.1) Construction, Storage & Utilization of check dams

5.1.1) Selection of sites for construction of check dams

According to the field workers who constructed the dams or are in charge of their repair and maintenance, more than 70% of the check dam sites were selected on the basis of the absorption capacity of land, for unless the ground is rocky, water collected by check dams is liable to seep away. Storage of water is feasible only if the ground is impermeable. So geological conditions were the prime factor in the choice of sites for check dams. Less than 30% were selected on the basis of proximity to the farms.

These were the sites where ground conditions permitted the choice of sites closer to the areas where the water would be most useful. Thus, the location of check dams depends primarily on the character of the ground; economic considerations are secondary.

Basis for site selection



Source: Survey of check dams in Alwar & Sikar districts of Rajasthan, April 2011

5.1.2) Construction and capacity of check dams

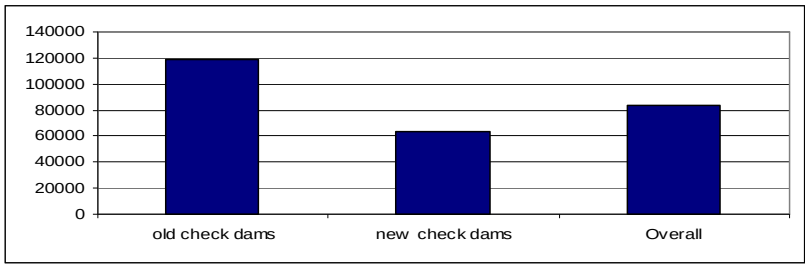
To get a brief overview of the total capacity of the check dams and their dimensions, the village engineers and builders of the check dams were surveyed. They informed us that in most of the cases, the check dam site was unused before its construction. The land was used mainly for grazing and herding, in only a few cases it was used for agricultural activities.

The total water holding capacity of old check dams ranges from 2500 cubic meters to 400,000 cubic meters; the average water-holding capacity was 118,637cubic meters. While the volume of 8 old check dams lies in the range of 1,000,000 to 4,000,000 cubic meters, 12 are within the range of 20,000 to 10,00,000 cubic meters and 3 between 2,500 and 20,000 cubic meters.

Amongst the new check dams the total water holding capacity ranges from 300 cubic meters to 24,00,000 cubic meters with the average water-holding capacity of 63,453 cubic meters. The volume of 5 new check dams lies in the range of 1,000,000 cubic meters to 2,400,000 cubic meters, 10 are between 100,000 cubic meters and 1,000,000 cubic meters, and 14 lie in the

range of 300 to 50,000 cubic meters. The overall average water holding capacity of the check dams is 83298.4 cubic meters.

Average water holding capacity of check dams (cubic meters)

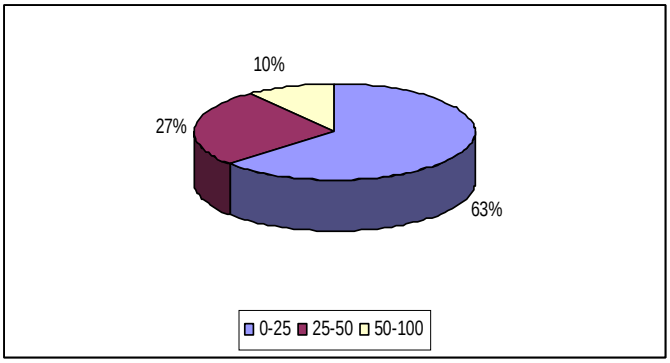


Source: Survey of check dams in Alwar & Sikar districts of Rajasthan, April 2011

5.1.3) Water storage in reservoirs during good and bad years

It was found that the check dams fill up during good years, where the village receives good rainfall. However, the total capacity is not used during bad years due to deficiency of rain. The survey revealed that in 63% of the check dams, the water stored was up to 25% of the total volume during bad years, while in case of 27% of the check dams, water stored was up to 50% of the total volume. Around 10% of the check dams were filled up to 100% of the volume even in years of deficient rains.

Percentage of water retention in bad years

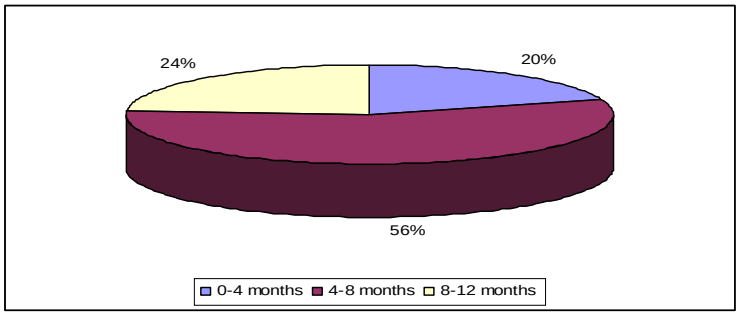


Source: Survey of check dams in Alwar & Sikar districts of Rajasthan, April 2011

5.1.4) Duration of water storage in the reservoirs

According to the villagers, the water lasted in different durations for periods ranging from less than 4 months to full 12 months. While in 20% of the check dams enough water collected for 0-4 months, water in 56% of the check dams lasted for 4-8 months and in 24% of the cases, water lasted for 12 months.

Duration of water holding in check dams (months)



Source: Survey of check dams in Alwar & Sikar districts of Rajasthan, April 2011

Several villagers and farmers were interviewed to understand the impact of these check dams on their farming patterns and output, socio-economic status and overall wellbeing. It was observed that there has been a significant change in the farming pattern and increase in income. The check dams have benefited the people in a number of ways which are discussed below.

5.1.5) Utilization of check dam water

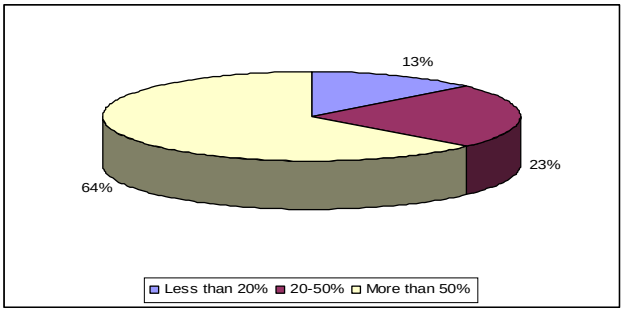
It was observed that the check dam water was utilized by the villagers for various purposes like farming, irrigating, drinking, bathing, animals and household chores.

5.2) Impact of check dams on socio-economic status of people

5.2.1) Recharge of ground water

The check dams have facilitated the process of rainwater harvesting and thereby increased the ground water levels in the districts surveyed. Out of the total check dams, 64% have contributed to ground water recharge of more than 50%, followed by 23%, with recharge of 20-50% and only 13% with less than 20% of ground water recharge. Thus, the check dams significantly increased ground water recharge in most locations

Percentage of ground water recharged due to check dams

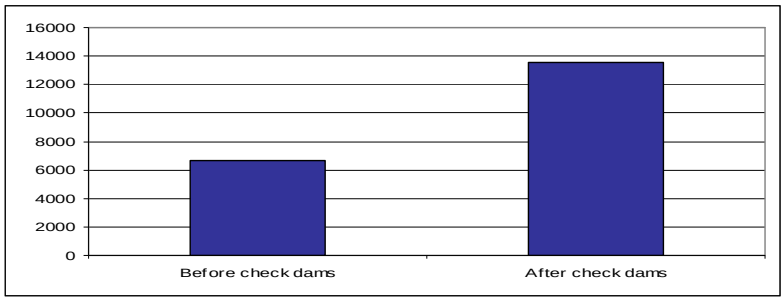


Source: Survey of check dams in Alwar & Sikar districts of Rajasthan, April 2011

5.2.2) Area under cultivation

The check dams have facilitated agriculture in the districts, which is evident from the increase in area under cultivation. The total area under cultivation has increased from 6,682 acres to 13,529 acres, posting an increase of 102.5%.

Increase in total area under cultivation (acres)

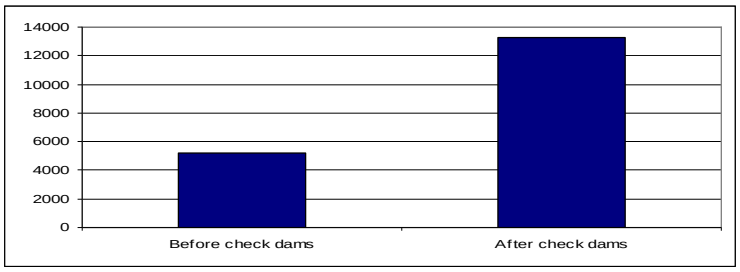


Source: Survey of check dams in Alwar & Sikar districts of Rajasthan, April 2011

5.2.3) Area under irrigation

The check dams have also contributed to an increase in the area under irrigation, which is vital for a dry state like Rajasthan. The total area under irrigation has increased from 5, 216 acres to 13,258 acres posting an increase of 102.5%. Thus, almost all the area under cultivation is under irrigation as a result of the check dams.

Increase in area under irrigation (acres)



Source: Survey of check dams in Alwar & Sikar districts of Rajasthan, April 2011

5.2.4) Change in Cropping Pattern

The major crops cultivated before the construction of check dams were wheat, bajra, mustard, barley, jowar and maize. After the farms were irrigated by the check dam water, some new crops have been cultivated, such as vegetables including chillies, tomatoes, lady's fingers, potatoes, onions, coriander and round gourd. Besides this, the production and yield of crops already under cultivation have increased manifold.

5.2.5) Change in composition of animals

The numbers of animals has increased around the area of the check dams after their construction. The number of animals ranged between 10 and 3000 before the check dams were built, and 20 and 5000 after they were built. The average number of animals around the check dams before their construction was 708, while after their construction it was 903.

It was found that animal rearing has now become an alternative source of livelihood for the people. The villagers said that with the increase in incomes following the construction of dams, they were able to purchase animals and develop animal rearing as an alternative occupation. There is an increase in awareness about the benefits of alternative livelihoods which support the farmers in case of contingencies arising out of bad years of monsoon.

5.2.6) Improvement in yield of agricultural production

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

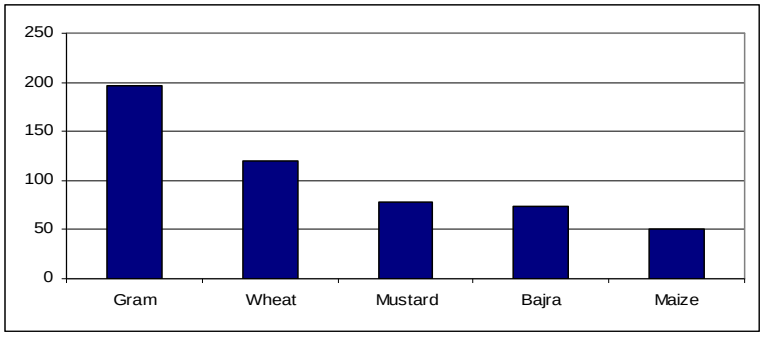
Increase in Average Yield of Production of major Crops (Kg/acre)

Crops	Production(Before Check Dams)	Production(After Check Dams)	Percentage Increase (approx
Wheat	632	1390	120
Bajra	268	465	74
Mustard	328	582	77.4
Maize	356	538	51
Gram	143	425	197

Source: Survey of check dams in Alwar & Sikar districts of Rajasthan, April 2011

The average yield of wheat increased by around 120%, while the yield of bajra and mustard grew by more than 70%. Maize yield increased by 50% and gram production has shown excellent growth due to the check dams.

Percentage increase in yield of production (Kg/acre)

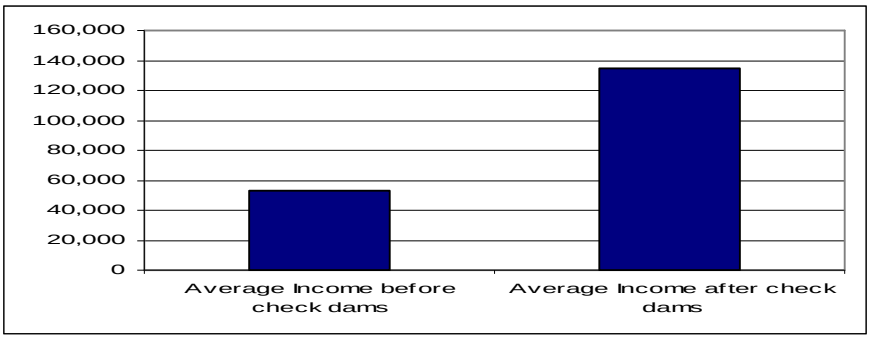


Source: Survey of check dams in Alwar & Sikar districts of Rajasthan, April 2011

5.2.7) Increase in income due to construction of check dams

The household income of the respondents varied from Rs.10,000 to Rs.300,000 before the construction of check dams, whereas, it increased to Rs.25,000-Rs.4,00,000 after the construction of the check dams. The average income of the villagers was Rs.53,370 before the construction of the check dams and increased to Rs.134,615, multiplying about 2.5 times.

Increase in average income due to construction of check dams



Source: Survey of check dams in Alwar & Sikar districts of Rajasthan, April 2011

A majority (99%) of the people found that the water of the check dams were adequate for their use. While most all the people used the check dam water for irrigating their fields, a few of them used it for their animals and others for drinking and other household chores.

6) Conclusions

Although the rain water harvesting project has been extremely successful in improving the socio-economic condition of the villagers of the two districts, there remains further scope to develop the region. Some of the measures are indicated below:

It was felt that a larger number of check dams should be built and the height of existing dams should also be increased. Water tanks and hand pumps should be made available to the villagers so as to facilitate better extraction of ground water. Since agriculture is the predominant occupation in the region, high yielding variety seeds and loans at a reasonable rate of interest should be made available, so as to facilitate the agricultural activities. Plantation farming and animal rearing should be encouraged in relatively arid areas as supplementary livelihood for the villagers.

Besides this, the construction of roads and hospitals is called for to improve the living conditions. Power stations should be built to ensure regular supply of electricity. The region needs more schools. Vocational and computer training centers should be set up to improve the skills of local youth. Community halls and meeting rooms (Chopals) should be constructed to facilitate social gatherings and public forums, which would enhance dissemination of knowledge.

7) Annexure

Annexure-I

Sr. no	Name of the check dam	Year of construction	Length	Height	Breadth	Maximum water holding capacity	Average water holding capacity
						(In meter)	(In meter)
1	Chatara wala Bandh	2006	150	3.5	140	73500	2
2	Kholiwala	2006	100	2	200	40000	1
3	Fatya Khora wala Bandh	2006	100	1.5	200	30000	0.5
4	Oonda Nala wala bandh	2005	50	1	50	2500	0.5
5	Jheel ki Radi Wala	2005	170	2	50	17000	1
6	Rithwala bandh	2004	800	2.5	200	400000	In rainy season it was full
7	Gol Rada wala Bandh	2004	110	2	100	22000	1
8	Palriwala sarovar-1	2003	100	2.5	100	25000	1
9	Dhonk Wala Bandh	2003	400	2	100	80000	1
10	Palriwala Sarovar-2	2003	50	1.5	150	11250	0.5
11	Baba Damodardas wala	-	125	2	75	18750	1
12	Phutipaal	2006	250	2.5	100	62500	2.5
13	Chhatri Wala	2006	500	2	80	80000	1.5
14	Hogadya wala	2004	600	3.5	100	210000	2
15	Papda wala	2007	800	2.5	80	160000	0.5
16	Bhairu Ka Rada Wala	2007	100	2.5	400	100000	1
17	Burja Wala	2007	1550	1.35	50	104625	For 8 months is full, 4 months empty
18	Chokhandya Wala	2007	700	1.5	85	89250	1
19	Kalimaidi Wala	2007	400	2	110	88000	1.5
20	Tapkeshwarwala	2007	1000	4	100	400000	1.5
21	Gadiwaar Wala	2007	300	3	75	67500	3.5
22	Nichla Deh Wala	2007	950	2.1	100	199500	1.06
23	Kharda wala	2007	350	3	200	210000	0.15
24	Burj wala	2010	600	1.5	50	45000	
25	Teenchwala	2010	300	2	70	42000	2 ft available
26	Burj wala	2010	600	1.5	60	54000	slowly declines after rain
27	Bhomyawala	2010	100	1.5	50	7500	1m
28	Hathi Paprawala	2010	400	2	70	56000	depends on irrigation
29	Harsagar	2010	600	2	75	90000	when used for irrigation, it becomes empty

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30	Shivnagari wala	2010	40	2.5	3	300	-
31	Bou ka nala	2009	600	2.5	80	120000	-
32	Narayanimata wala	2009	100	3	100	30000	1.5
33	Kuchyawala	2009	1015	1.5	100	152250	
34	Kherwada, Radi	2008	300	1.5	60	27000	In rainy season gets full, but slowly declines
35	Dher Wala	2008	700	1	50	35000	0.5
36	Bodya Wala	2008	600	2	200	240000	Slowly Disappear
37	Kali Bhat Wala	2008	350	2	150	105000	slowly declines after rain
38	Dholpapda Wala	2008	600	2	30	36000	1
39	Musandya Wala	2008	1000	2	30	60000	I
40	Baneth wala	2008	120	2	31	7440	July -Feb -march , no water
41	Chhandalwala	2010	100	2.5	32	8000	1.5
42	Dankavwala	2010	1200	2	33	79200	1.5
43	Mohkhubwala	2010	800	3.6	34	97920	3.04
44	Lodhalawala	2010	400	1.5	35	21000	1
45	Nayakuanwala	2010	800	2	36	57600	1.52
46	Birwali	2010	100	3.5	37	12950	3.5
47	Nari deh wala	2009	350	2	38	26600	1.5
48	Atmaram	2009	1000	2	39	78000	1
49	Diya wala	2009	300	2	40	24000	1
50	Bijlidehwala	2008	800	3	41	98400	3
51	Kemra Wala	2008	801	4.5	42	151389	3
52	Sandaled Wala	2008	802	2.25	43	77593.5	1.21

Annexure-II

Sr. no	How well is the capacity utilized		How long does the water last in the reservoir
	Good years	*Bad years*	
1	Full	0.25	8 months
2	Full	0.2	5-6 months
3	Full	0.2	3 months
4	Full	0.1	2 months
5	Full	0.5	6-7 months
6	Full	0.5	9-10 months
7	Full	0.1	1 night (90% of water absorbed by the land)
8	Full	0.1	8 months
9	Full	0.5	4 months
10	Full	10-40%	4 months
11	Full	0.2	7 months
12	Full	0.25	3-4 months
13	Full	0.5	10-16 months
14	Full	0.25	10-12 months
15	Full	0.25	12 months
16	Full	0.2	4 months
17	Full	0.2	6-8 months
18	Full	0.2	6-7 months
19	Full	0.25	12 months
20	Full	0.25	6 months
21	Full	0.25	-
22	Full	0.5	10-11 months
23	Full	0.5	12-14 months
24	Full	0.25	6 months
25	Full	1	12 months
26	Full	Constructed last year	5-6 months
27	Full	0.1	6 months
28	Full		6-7 months
29	Full	Constructed last year	6 months
30	Full	1	6 months
31	Full	0-Jan	7-8months
32	Full	0.2	5 days
33	Full	0.25	6-7 months
34	Full	1	7-8months
35	Full	1	12 Months
36	Full	0.25	6-7 months
37	Full	0.5	5-6 months
38	Full	0.5	8-9 months
39	Full	0.25	7-8months
40	Full	0.5	7-8months
41	Full	0.25	7-8 months
42	Full	0.6	4 months
43	Full	0.5	More than 12 months
44	Full	0.5	6 months
45	Full	0.5	8 months
46	Full	0.25	8 months
47	Full	0.25	8 months
48	Full	0.25	6-7 months
49	Full	0.25	6 months
50	Full	0.5	12-15 months
51	Full	0.25	12 months
52	Full	0.2	4 months

Annexure-III

Sr. No.	Any existence of alternative sources of water		If yes name then what	What proportion of water supply comes from them
	Yes	No		
1	Yes		Well	20% comes from well
2	Yes		Well	40%
3	Yes		Well	10%
4	Yes		Well	50%
5	Yes		Well	10%
6	Yes		Hand pump, well	Drinking, Washing, 30% irrigation
7	Yes		Well	50% irrigation
8	Yes		Well	20%
9	Yes		Well	40%
10	Yes		Well	10-20% for irrigation and drinking
11	Yes		Well	50%
12	Yes		Hand pumps, (wells are totally dry)	Daily use
13	Yes		Well	Only for drinking
14	Yes		Well	10% for irrigation and 5% for drinking
15	Yes		Hand pump, well	Drinking, Washing, 10% irrigation
16	Yes		Well	50% irrigation, drinking
17	Yes		Hand pump, well	only for drinking, washing and irrigation
18	Yes		Well	Drinking, Washing, 25% irrigation
19	Yes		Well	10% for drinking
20	Yes		Hand pumps only for drinking water and for animals	-
21	Yes		Well	40% for drinking and for animals
22	Yes		Well	25%
23		No		
24	Yes		Well	Drinking, Washing, 50% irrigation
25	Yes		Hand pump, Well	Drinking, 40% irrigation
26	Yes		Well	Drinking, Washing, 50% irrigation
27	Yes		Well	50%
28	Yes		Hand pump, Well	Drinking, Washing, 25% irrigation come from well
29	Yes		Hand pump, Well	Handpump for drinking,10% irrigation from well
30	Yes		Well	For daily activities, not enough for irrigation
31	Yes		Hand pump, Well	Drinking, 50% irrigation
32	Yes		Well	50%
33	Yes		Hand pump, Well	Drinking, Washing, 25% irrigation
34	Yes		Hand pump, Well	Drinking, 50% irrigation
35	Yes		Hand pump, Well	Drinking, 60% irrigation
36	Yes		Hand pump, Well	Drinking, 40% irrigation
37	Yes		Hand pump, Well	Drinking, 50-60% irrigation
38	Yes		Well	20-50%
39	Yes		Well	50%
40	Yes		Hand pump, Well	Drinking, Washing, 10% irrigation
41	Yes		Well	10% for drinking
42	Yes		Well	Used the recharge water level

				from well
43	Yes		Well	Used for drinking
44	Yes		Well	50%
45		No		
46	Yes		Well	50% for irrigation
47	Yes		Water tank used before	-
48		No		
49	Yes		Well	10%
50		No		
51	Yes		Well	Water level low, used for drinking and animals
52		No		

Annexure-IV

Sr. No.	Is any change in crop pattern perceived due Check Dams		If yes, then how
	Yes	No	
1	Yes		Mustard, Bajra, Jowar, Wheat and now vegetable, ladyfinger,chilli
2	Yes		Bajra, Maize, wheat, vegetables, Lady finger, Tilhan
3	Yes		Mustard, Bajra, Jowar, Wheat and now vegetable, ladyfinger,chilli
4	Yes		Wheat, Mustard, Bajra
5	Yes		Taramira, Wheat, Mustard
6	Yes		Mustard ,Jowar, Wheat now vegetables
7	Yes		Mustard, Bajra, Wheat now vegetables, Taramira, Joe, Maize, tobacco etc
8	Yes		Jaw, Mustard, Bajra, Maize, Wheat, Vegetable, Ladyfinger, Tinda, Dhaniya
9	Yes		Bajra, Mustard, Taramira, Now wheat, vegetable, Ladyfinger
10	Yes		Maize, Bajra, Wheat, Now Gram, Ladyfinger, Tomato
11	Yes		Mustard, Jaw, Wheat, now Vegetable, ladyfinger, Potato, Onion
12	Yes		Earlier Bajra, now wheat, Jowar, Barley, Gram
13	Yes		Earlier Bajra, now wheat, Gram, mustard, vegetable
14	Yes		Mustard, Bajra, Taramira, gram, Now vegetable, Tinde, Tomato
15	Yes		Wheat, Gram, Barley, Mustard, Jowar
16	Yes		Wheat, Gram, Bajra, Mustard, Jowar
17	Yes		Wheat, Maize, Bajra, Mustard
18	Yes		Jowar, Wheat, Mustard, Bajra
19	Yes		Earlier Bajra, now wheat also
20	Yes		Bajra, Guar, Moong, Now Wheat, Mustard, Meithi
21	Yes		Earlier Bajra, guar, Macca, wheat, now mustard, Barley ,Vegetable
22	Yes		Earlier jaw, mustard, wheat, Now gram
23	Yes		Wheat, mustard, Jaw, Chana
24		No	
25	Yes		Maize, Bajra, Mustard, Wheat, Jowar, Gram,
26	Yes		Jowar, Wheat, Mustard, Bajra, Maize
27	Yes		Wheat, Mustard, Bajra, now Onion , Ladyfinger
28	Yes		Jowar, somewhat Wheat, Mustard, Bajra
29	Yes		Jowar, Wheat, Mustard- same crops
30	Yes		Earlier Bajra, Jowar, Maize, now along with onion.
31	Yes		Wheat, Mustard, Barley, Maize
32	Yes		Wheat, Onion, Mustard, Gram , Maize , Bajra
33	Yes		Earlier Mustard, Wheat, Gram, Bajra, Barley now Onion
34	Yes		Mustard, Jowar, Wheat, Bajra, now Onion
35	Yes		Maize, Bajra, Wheat, Barley, Mustard
36	Yes		Mustard, Wheat, Onion
37	Yes		Mustard, Jowar, Wheat now vegetables
38	Yes		Mustard, Gram, Bajra, Maize, Wheat, Jowar, now vegetable, Chilli, Lady finger, Tomato
39	Yes		Maize, Bajra, Wheat now Gram and Vegetables
40	Yes		Bajra, Jowar, Mustard, Gram, Wheat
41	Yes		Earlier Bajra, Macca, Wheat, Guar now Chilli ,Tinda, Lockey, Tomato, Watermelon
42		No	
43	Yes		Guar, Gram, Mustard
44	Yes		Mustard, Jaw, Gram, Bajra,Wheat
45	Yes		Earlier only Mustard and Gram, now Wheat,, Tomato, Chili, Vegetables
46	Yes		Bajra, Wheat , Mustard, Jaw
47	Yes		Wheat, Mustard, Gram Now Vegetable, Tomato
48	Yes		Earlier Mustard, now Wheat and Jaw
49	Yes		Gram, Mustard, Wheat Now Meithi, Vegetables, Chili, Tinda
50	Yes		Sarso , Wheat, Chana, Jaw
51	Yes		Mustard, Gram, Taramira, Wheat, Vegetables, Tomato, Chilli, Tinda
52	Yes		Earlier Mustard, Bajra, Now- Wheat, jaw, Tinda

Annexure-V

Sr. no	If yes, what is the difference in yield/ acre		Number and composition of animals in the region	
	Before check dam (kg)	*After check dam (kg)*	*Before check dam*	*After check dam*
1	wheat(400), Bajra(110), Mustard(200), Maize(300), Jowar(100)	wheat(1400), Bajra(300), Mustard(600), Maize(600), Jowar(200)	1000	1500
2	wheat(600), Bajra(400), Mustard(350), Maize(300), Tilhan(100)	wheat(1200), Bajra(600), Mustard(500), Maize(600), Tilhan(200)	60	45
3	wheat(400), mustard(150), Bajra(100), Jaw(250)	wheat(1200), Mustard(500), Bajra(200), Jaw(350)	400	350
4	wheat(400), Bajra(200), mustard(150)	wheat(900), Bajra(400), mustard(300)	500	400
5	wheat(Nil), Mustard(150), Taramira(150)	wheat(1200), Mustard(300), Taramira(250)	1500	700
6	wheat(1100), Mustard(500),Jaw(800)		900	1100
7	Wheat(600), Maize(250), Bajra(250), Jaw(200), Taramira(100), Mustard(200)	Wheat(1200), Maize(500), Bajra(400), Jaw(400), Taramira(200), Mustard(400)	100	120
8	Wheat(700), Maize(200), Bajra(200), Jaw(100), Mustard(300kg)	Wheat(1400), Maize(400), Bajra(400), Jaw(200), Mustard(500)	225	125
9	Wheat(400), Bajra(100), Taramira(100), Mustard(300)	Wheat(1000), Bajra(300), Taramira(200), Mustard(900)	250	200
10	wheat(600), Bajra(250), Maize(600)	wheat(1400), Bajra(600), Maize(900)	70	50
11	wheat(500), Mustard(300), Joe(400)	wheat(1500), mustard(600), Joe(1000)	750	1000
12	Wheat(200), Mustard(150), Bajra(200)	Wheat(200), Mustard(150), Bajra(200)	1500	2000
13	Wheat(nil), Mustard(nil), Bajra(300)	Wheat(1200), Mustard(300), Bajra(700)	500	1500
14	Wheat(600), Mustard(150), Bajra(150),Gram(nil), Taramira(200)	Wheat(1200), Mustard(300), Bajra(300),Gram(300), Taramira(300)	350	500
15	wheat(1000), mustard(300)	wheat(1800), Mustard(500)	80	100
16	wheat(600), Bajra(200), mustard(200), Jaw(200)	wheat(1400), Bajra(400), Mustard(300), Jaw(400)	1000	1375
17	wheat(800), Bajra(250), mustard(250)	wheat(1300kg), Bajra(400 kg), Mustard(350kg)	1200	1600
18	wheat(1100), Mustard(400)	wheat(1500), Mustard(550)	800	1000
19	Wheat(nil), Bajra(100)	Wheat(1000), Bajra(300)	1000	1500
20	Bajra(200), Guar(200), Wheat(nil), Moong(50)	Bajra(400), Guar(400), Wheat(1500), Moong(100)	1000	1800
21	Wheat(400), Mustard(200), Bajra(200), Macca(200)	Wheat(900), Mustard(400), Bajra(400), Macca(400)	1200	1300
22	Wheat(200), Mustard(75), Gram(75)	Wheat(600), Mustard(150), Gram(150)	350	500
23	Wheat(nil), mustard(nil), Jaw(nil), Chana(nil)	Wheat(1600), mustard(400), Jaw(1500), Chana(500)	300	330
24	wheat(900) Barley(600)	wheat(1200) Barley(800)	350	300
25	wheat(1000), Bajra(450), mustard(500)	wheat(1800), Bajra(600), Mustard(800)	500	600
26	wheat(1200), Bajra(450), mustard(400)	wheat(1600), Bajra(650), Mustard(600)	550	600
27	wheat(700), Bajra(400), mustard(500)	wheat(1400), Bajra(800), Mustard(700)	300	150
28	wheat(700), Bajra(200), mustard(400)	wheat(900), Bajra(200), Mustard(600)	20	20
29	wheat(900), Barley(600),	wheat(1300), Barley(800),	1400	1500

	mustard(350)	Mustard(600)		
30	wheat(1000), Barley(700), Bajra(500), Onion(0)	wheat(1400), Barley(1100), Bajra(700), Onion(3000)	500	600
31	wheat(1200), Barley(1000), mustard(450), Maize(700)	wheat(2000), Barley(1200), mustard(650), Maize(900kg)	350	450
32	wheat(600), Bajra(400), Mustard(600), Maize(300), Gram(100)	wheat(1200), Bajra(600), Mustard(750), Maize(400), Gram(350)	3000	3500
33	wheat(800), Barley(800), mustard(600), Bajra(400)	wheat(1100), Barley(1000), Mustard(650), Bajra(500)	3000	4000
34	wheat(1100), Bajra(500), mustard(500)	wheat(1700), Bajra(700), Mustard(700)	400	500
35	wheat(1300), Bajra(400)	wheat(1600), Bajra(500)	1000	1200
36	wheat(400), mustard(800)	wheat(600), Mustard(1500)	410	500
37	wheat(1300), Barley(750), Mustard(350)	wheat(1800), Barley(1000), Mustard(500)	500	600
38	wheat(800), Bajra(200), Mustard(400), Maize(200), Gram(300), Moong(nil)	wheat(1400), Bajra(400), Mustard(600), Maize(400), Gram(500), Moong(150)	500	700
39	wheat(600), Bajra(200)	wheat(1400), Bajra(400)	800	1100
40	wheat(650), Barley(800), mustard(600), Gram(400)	wheat(1500), Barley(1300), mustard(1500), Gram(500)	2500	1700
41	Wheat(200), Guar(100), Bajra(300)	Wheat(800), Guar(200), Bajra(800)	2500	5000
42	Wheat(600)	Wheat(600)	10	20
43	Guar(nil), Gram(nil), Mustard(nil)	Guar(800), Gram(300), Mustard(300)	900	1000
44	Wheat(400), Mustard(150), Bajra(200),Gram(100), Jaw(400)	Wheat(700), Mustard(300), Bajra(350),Gram(200), Jaw(600)	50	60
45	wheat(200)	wheat(800)	70	225
46	Wheat(1000), Mustard(150), Bajra(300), Jaw(450)	Wheat(1400), Mustard(300), Bajra(500), Jaw(700)	700	1000
47	Wheat(800), Mustard(300), Gram(nil)	Wheat(1800), Mustard(600), Gram(400)	250	500
48	Mustard(200)	Mustard(450)	200	500
49	Wheat(400), Mustard(150), Gram(75), Jaw(300)	Wheat(900), Mustard(400), Gram(400), Jaw(700)	80	130
50	Wheat(40), Sarso(30), Chana(50), Jaw(100)	Wheat(600), Sarso(100), Chana(100), Jaw(500)	400	500
51	Wheat(N.A), Mustard(200), Gram(50), Taramira(200)	Wheat(800), Mustard(400), Gram(300), Taramira(400)	50	80
52	Mustard(200), Bajra(200)	Mustard(400), Bajra(400)	500	800

Annexure VI

Sr. No.	Change in Yield /acre	
	Before check dams (kg)	*After check dams (kg)*
1	Wheat(400), Bajra(110), Mustard(200), Maize(300), Jowar(100)	Wheat(1400), Bajra(300), Mustard(600), Maize(600), Jowar(200)
2	wheat(600), Bajra(400), Mustard(350), Maize(300), Tilhan(100)	Wheat(1200), Bajra(600), Mustard(500), Maize(600), Tilhan(200)
3	Wheat(400), mustard(150), Bajra(100), Jaw(250)	Wheat(1200), Mustard(500), Bajra(200), Jaw(350)
4	Wheat(400), Bajra(200), mustard(150)	Wheat(900), Bajra(400), mustard(300)
5	Wheat(Nil), mustard(150), Taramira(150)	Wheat(1200), Mustard(300), Taramira(250)
6	Wheat(1100), mustard(500),Jaw(800)	Wheat(1800), mustard(700),Jaw(1200)
7	Wheat(600), Maize(250), Bajra(250), Jaw(200), Taramira(100), Mustard(200)	Wheat(1200), Maize(500), Bajra(400), Jaw(400), Taramira(200), Mustard(400)
8	Wheat(700), Maize(200), Bajra(200), Jaw(100), Mustard(300)	Wheat(1400), Maize(400), Bajra(400), Jaw(200), Mustard(500)
9	Wheat(400), Bajra(100), Taramira(100), Mustard(300)	Wheat(1000), Bajra(300), Taramira(200), Mustard(900)
10	Wheat(600), Bajra(250), Maize(600)	wheat(1400), Bajra(600), Maize(900)
11	Wheat(500), mustard(300), Joe(400)	wheat(1500), mustard(600), Joe(1000)
12	Wheat(200), Mustard(150), Bajra(200)	Wheat(200), Mustard(150), Bajra(200)
13	Wheat(nil), Mustard(nil), Bajra(300)	Wheat(1200), Mustard(300), Bajra(700)
14	Wheat(600), Mustard(150), Bajra(150),Gram(nil), Taramira(200)	Wheat(1200), Mustard(300), Bajra(300),Gram(300), Taramira(300)
15	Wheat(1000), mustard(300)	wheat(1800), mustard(500)
16	Wheat(600), Bajra(200), mustard(200), Jaw(200)	wheat(1400), Bajra(400), mustard(300), Jaw(400)
17	Wheat(800), Bajra(250), mustard(250)	wheat(1300), Bajra(400), mustard(350)
18	Wheat(1100), mustard(400)	wheat(1500), mustard(550)
19	Wheat(nil), Bajra(100)	Wheat(1000), Bajra(300)
20	Bajra(200), Guar(200), Wheat(nil), Moong(50)	Bajra(400), Guar(400), Wheat(1500), Moong(100)
21	Wheat(400), Mustard(200), Bajra(200), Macca(200)	Wheat(900), Mustard(400), Bajra(400), Macca(400)
22	Wheat(200), Mustard(75), Gram(75)	Wheat(600), Mustard(150), Gram(150)
23	Wheat(nil), Mustard(nil), Jaw(nil), Chana(nil)	Wheat(1600), mustard(400), Jaw(1500), Chana(500)
24	Wheat(900) Barley(600)	Wheat(1200) barley(800)
25	Wheat(1000), Bajra(450), Mustard(500)	Wheat(1800), Bajra(600), mustard(800)
26	Wheat(1200), Bajra(450), Mustard(400)	Wheat(1600), Bajra(650), mustard(600)
27	Wheat(700), Bajra(400), Mustard(500)	Wheat(1400), Bajra(800), mustard(700)
28	Wheat(700), Bajra(200), Mustard(400)	Wheat(900), Bajra(200), mustard(600)
29	Wheat(900), Barley(600), mustard(350)	Wheat(1300), Barley(800), mustard(600)
30	Wheat(1000), Barley(700), Bajra(500), Onion(0)	Wheat(1400), Barley(1100), Bajra(700), Onion(3000)
31	Wheat(1200), Barley(1000), mustard(450), Maize(700)	Wheat(2000), Barley(1200), mustard(650), Maize(900)
32	Wheat(600), Bajra(400), Mustard(600), Maize(300), Gram(100)	Wheat(1200), Bajra(600), Mustard(750), Maize(400), Gram(350)
33	Wheat(800), Barley(800), mustard(600), Bajra(400)	Wheat(1100), Barley(1000), Mustard(650), Bajra(500)
34	Wheat(1100), Bajra(500), mustard(500)	Wheat(1700), Bajra(700), mustard(700)
35	Wheat(1300), Bajra(400)	Wheat(1600), Bajra(500)
36	Wheat(400), Mustard(800)	Wheat(600), mustard(1500)
37	Wheat(1300), Barley(750), Mustard(350)	Wheat(1800), Barley(1000), Mustard(500)
38	wheat(800), Bajra(200), Mustard(400), Maize(200), Gram(300), Moong(nil)	Wheat(1400), Bajra(400), Mustard(600), Maize(400), Gram(500), moong(150)
39	Wheat(600), Bajra(200)	Wheat(1400), Bajra(400)
40	Wheat(650), Barley(800), mustard(600), Gram(400)	Wheat(1500), Barley(1300), mustard(1500), Gram(500)
41	Wheat(200), Guar(100), Bajra(300)	Wheat(800kg), Guar(200 kg), Bajra(800kg)
42	Wheat(600)	Wheat(600)
43	Guar(nil), Gram(nil), Mustard(nil)	Guar(800), Gram(300), Mustard(300)
44	Wheat(400), Mustard(150), Bajra(200),Gram(100), Jaw(400)	Wheat(700), Mustard(300), Bajra(350),Gram(200kg), Jaw(600)
45	Wheat(200)	wheat(800)

46	Wheat(1000), Mustard(150), Bajra(300), Jaw(450)	Wheat(1400), Mustard(300), Bajra(500), Jaw(700)
47	Wheat(800), Mustard(300), Gram(nil)	Wheat(1800), Mustard(600), Gram(400)
48	Mustard(200)	Mustard(450)
49	Wheat(400), Mustard(150), Gram(75), Jaw(300)	Wheat(900), Mustard(400), Gram(400), Jaw(700)
50	Wheat(40), Sarso(30), Chana(50), Jow(100)	Wheat(600), Sarso(100), Chana(100), Jaw(500)
51	Wheat(N.A), Mustard(200), Gram(50), Taramira(200)	Wheat(800), Mustard(400), Gram(300), Taramira(400)
52	Mustard(200), Bajra(200)	Mustard(400), Bajra(400)

Annexure VII

Sr. No.	Number and composition of animals in the region		Cultivated area(Acre)		Irrigated area(Acre)	
	Before check dam	*After check dam*	*Before check dam*	*Before check dam*	*After check dam*	*After check dam*
1	1000	1500	15 acre	15 acre	66 acre	66 acre
2	60	45	46 acre	46 acre	117 acre	117 acre
3	400	350	33 acre	33 acre	66 acre	66 acre
4	500	400	183 acre	183 acre	253 acre	366 acre
5	1500	700	6 acre	6 acre	60 acre	60 acre
6	900	1100	200 acre	100 acre	250 acre	250 acre
7	100	120	66 acre	66 acre	133 acre	133 acre
8	225	125	17 acre	17 acre	85 acre	85 acre
9	250	200	133 acre	133 acre	266 acre	266 acre
10	70	50	16 acre	16 acre	32 acre	32 acre
11	750	1000	83 acre	50 acre	166 acre	166 acre
12	1500	2000	300 acre	100 acre	300 acre	300 acre
13	500	1500	250 acre	Nil	1000 acre	1000 acre
14	350	500	31 acre	31 acre	62 acre	62 acre
15	80	100	100 acre	50 acre	200 acre	300 acre
16	1000	1375	83 acre	83 acre	163 acre	163 acre
17	1200	1600	6 acre	6 acre	13 acre	13 acre
18	800	1000	80 acre	60 acre	140 acre	140 acre
19	1000	1500	30 acre	Nil	100 acre	100 acre
20	1000	1800	150 acre	Nil	750 acre	750 acre
21	1200	1300	125 acre	125 acre	250 acre	250 acre
22	350	500	150 acre	100 acre	200 acre	200 acre
23	300	330	-	-	10 acre	10 acre
24	350	300	100 acre	60 acre	100 acre	100 acre
25	500	600	200 acre	120 acre	200 acre	200 acre
26	550	600	200 acre	120 acre	180 acre	200 acre
27	300	150	100 acre	100 acre	200 acre	200 acre
28	20	20	170acre	30acre	140 acre	170 acre
29	1400	1500	200acre	670acre	200acre	200acre
30	500	600	140 acre	50 acre	140 acre	140 acre
31	350	450	150 acre	80-85 acre	150 acre	150 acre
32	3000	3500	183 acre	183 acre	300 acre	366 acre
33	3000	4000	1400 acre	1400 acre	2000 acre	2000 acre
34	400	500	70 acre	30 acre	70 acre	70 acre
35	1000	1200	200 acre	130 acre	200 acre	200 acre
36	410	500	150 acre	70 acre	130 acre	150 acre
37	500	600	200 acre	120 acre	120 acre	200 acre
38	500	700	30 acre	30 acre	62 acre	62 acre
39	800	1100	80 acre	80 acre	175 acre	175 acre
40	2500	1700	200 acre	100 acre	250 acre	250 acre
41	2500	5000	75 acre	35 acre	350 acre	350 acre
42	10	20	4 acre	4 acre	4 acre	4 acre
43	900	1000	Nil	Nil	150 acre	150 acre
44	50	60	27 acre	27 acre	55 acre	55 acre
45	70	225	100 acre	100 acre	900 acre	900 acre
46	700	1000	20 acre	NA	NA	20 acre
47	250	500	65 acre	40 acre	175 acre	175 acre
48	200	500	200 acre	200 acre	1000 acre	1000 acre
49	80	130	35 acre	35 acre	300acre	322 acre
50	400	500	70 acre	20 acre	200 acre	200acre
51	50	80	100 acre	50 acre	350 acre	150 acre
52	500	800	110 acre	110 acre	475 acre	475 acre

Annexure VIII

Sr. No.	Income of the Respondent	
	Before check dam(Rs)	*After check dam(Rs)*
1	1,50,000	4,00,000
2	30,000	1,00,000
3	10,000	50,000
4	15,000	50,000
5	20,000	50,000
6	40,000	1,00,000
7	1,25,000	2,50,000
8	30,000-70,000	1,00,000
9	30000(from agriculture)	2,00,000
10	70,000	1,00,000
11	20,000	1,50,000
12	1,00,000	1, 50,000
13	From farm Zero income	1,00,000
14	10,000	40,000
15	50,000	1,20,000
16	70,000	2,00,000
17	70,000	1,00,000
18	1,00,000	1,50,000
19	8000-10,000	50,000
20	10,000	50,000
21	10,000-15000	40,000
22	30,000	90,000
23	No cultivation, income from animals	70,000
24	60,000	1,00,000
25	90,000	1,75,000
26	70,000	1,10,000
27	64,000(joint family)	2,50,000
28	30,000	1,00,000
29	1,00,000	1,75,000
30	1,00,000	2-2.5 lakh
31	60,000	1,00,000
32	50000(Joint Family)	3,00,000
33	60,000	1,00,000
34	50,000	1,00,000
35	80,000	1,20,000
36	40,000	1,00,000
37	3,50,000	4,00,000(including farming and teaching)
38	1,05,000(joint family)	2,50,000
39	50,000	1,00,000
40	50,000	1,00,000
41	30,000	1,00,000
42	10,000	25,000
43	10,000 yearly	1,00,000
44	50,000	1,00,000
45	15,000	2,00,000
46	20,000	25,000
47	10,000	2,00,000
48	1,00,000	3,00,000
49	10,000	1,10,000
50	30,000	1,00,000
51	10,000	1,00,000
52	50,000	1,50,000

A Survey on Check Dams

8) Questionnaire

1) Name of the village or area chosen:
_____

2) How was the check dam site chosen? (Choose any one)
- Easy Access to the Villagers
- Proximity to the farm
- High absorption capacity of the check dam

3) Details on the check dam:
- Year of construction? _____
- Location of check dam? _____
- Length and height of check dam: _____
- Breadth of the reservoir:_____
- The maximum water-holding capacity:_____
- The average water-holding capacity:_____
- How well is the capacity utilized/ How full the reservoir gets in

  Good Years _____

  Bad Years _____
- How long does the water last in the reservoir?_____

4) Was the area chosen to be covered in use before?
- Yes
- No

5) If yes, then for what? (Choose any one/ more if applicable)
- Agriculture
- Herding
- Grazing
- Others

6) Is there any existence of alternative sources of water? (Yes/No)

If yes, name them _____

What proportion of water supply comes from them? _____

7) Has the check dam made any difference to groundwater recharge in the wells? (Yes/ No)

If yes then by what proportion:

- Less than 20%
- 20% - 50%
- More than 50%
- 100%

8) Is any change in crop pattern perceived due to this? (Yes/ No)

If yes, then how? _____
If no, then why? _____

9) Is there any change in yield/ acre of crops? (Yes/ No)

10) If yes, what is the difference in yield/ acre?
Before check dam (Acre)_____
After check dam (Acre)_____

11) Cultivated area:
Before check dam (Acre)_____
After check dam (Acre)_____

12) Irrigated area:
Before check dam (Acre)_____
After check dam (Acre)_____

13) What is the number and composition of animals in the region?
Before check dam (Acre): _____
After check dam (Acre): _____

14) Is there any change in the distance from which water has to be fetched for homes, due to this?

- Yes
- No

15) If yes, what approximately is the time and effort saved?_____ _____

16) Have any new economic activities come up in the villages as a result of the dams?

17) How often do the villagers use the check dam water:

- Weekly
- Monthly
- Quarterly
- Randomly

Reasons for using dam water?_____ _____

A Survey on Check Dams

18) How adequate is the check dam water?_____
_____

19) Who decides on access to the water of the check dam?_____ _____

20) Are the villagers satisfied with the administration of the check dam? (Yes/ No)
If no, mention the reasons_____ _____

21) How many schools are there? _____

22) Till what standard?_____

23) Education level of the Respondent _____

24) Income of the Respondent,:
Before check dam_____
After check dam_____

25) Change in socio- economic status:
Before check dam_____
After check dam_____

26) What improvements would be suggested?