

Qualitative Outcome  
Assessment report 2020:  
Soil and water  
conservation project

**Dalmia Bharat Foundation**  
**April 2021**



Ernst & Young Associates LLP  
Golf View Corporate Tower - B  
Sector - 42, Sector Road  
Gurugram - 122002  
Haryana, India

Tel: +91 124 464 4000  
Fax: +91 124 464 4050  
ey.com

Any person intending to read this report should first read this notice and its appendix

28 April 2021

Dalmia Bharat Foundation  
Quantum Building, 2nd Floor,  
Sector-3, Plot no. C-3, Noida,  
Uttar Pradesh 201301

Dear Vishal Bhardwaj,

We have completed our engagement to conduct impact assessment of projects undertaken under soil and water conservation. Our engagement was performed in accordance with our Statement of Work (SOW) dated 18<sup>th</sup> January 2021 under our Agreement, and our procedures were limited to those described in the SOW.

During the period 25-01-2021 to 22-04-2021, EY reviewed the documents provided by the management, had discussions with soil and water conservation beneficiaries. A survey was conducted ensuring complete consistency with the SOW. Our impact assessment report for soil and water conservation project resulting from our work (engagement) is attached with this letter.

Our work has been limited in scope and time, and we stress that more detailed procedures may reveal issues that this engagement has not. The procedures summarized in impact assessment report for soil and water conservation project does not constitute an audit, a review or other form of assurance in accordance with any generally accepted auditing, review or other assurance standards, and accordingly we do not express any form of assurance.

Any comments on, or opinions stated regarding the functional and technical capabilities of any products proposed or referred to, whether or not expressed as being those of Ernst & Young Associates LLP are based on the information provided by the product vendors to Ernst & Young Associates LLP, or provided by Dalmia Bharat Foundation (the 'Company') and, while Ernst & Young Associates LLP does not have reason to believe that this information is in any way inaccurate or incomplete, responsibility for its accuracy and completeness does not rest with Ernst & Young Associates LLP.

#### **Restrictions on the use of our work product(s)**

Consistent with our SOW, impact assessment report for soil and water conservation project is (are) intended solely for the information of the Company and is not intended to be and should not be used by anyone other than these specified parties.

The impact assessment report for soil and water conservation project does not represent a conclusion on the adequacy or effectiveness of internal controls, a conclusion on/assessment of the effectiveness of the client's program/process/function, an assessment of compliance with regulation/industry best practice.



These findings and recommendations, process narratives, business cases, test results, etc. included in impact assessment report for soil and water conservation project, along with the underlying procedures, were performed and reviewed by Dalmia Bharat Foundation personnel.

We appreciate the cooperation and assistance provided to us during the course of our work. If you have any questions, please call Saunak Saha (+91 70421 98448).

A handwritten signature in black ink that reads 'Saunak Saha'.

Very truly yours,

Saunak Saha

Associate Partner, Ernst & Young Associates

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# 1. Introduction and background

## 1.1 About Dalmia Bharat Foundation

Dalmia Bharat Foundation was registered on 31<sup>st</sup> December 2009 as a not-for-profit organization under the Income Tax Act, 1961. It is spread across 13 states and has an outreach population of more than a million.

### Scope of this report

This report includes an assessment of the soil and water conservation initiatives which has been undertaken by DBF for the past 10 years. Our assessment period is confined to the construction of initiative till 31<sup>st</sup> March 2020. Water and soil projects covered under this report are Dalmiapuram, Ariyalur (including Sendurai), Kadapa, Belgaum, Umrangso, Cuttack, Ramgarh, Jawaharpur and Nigohi.

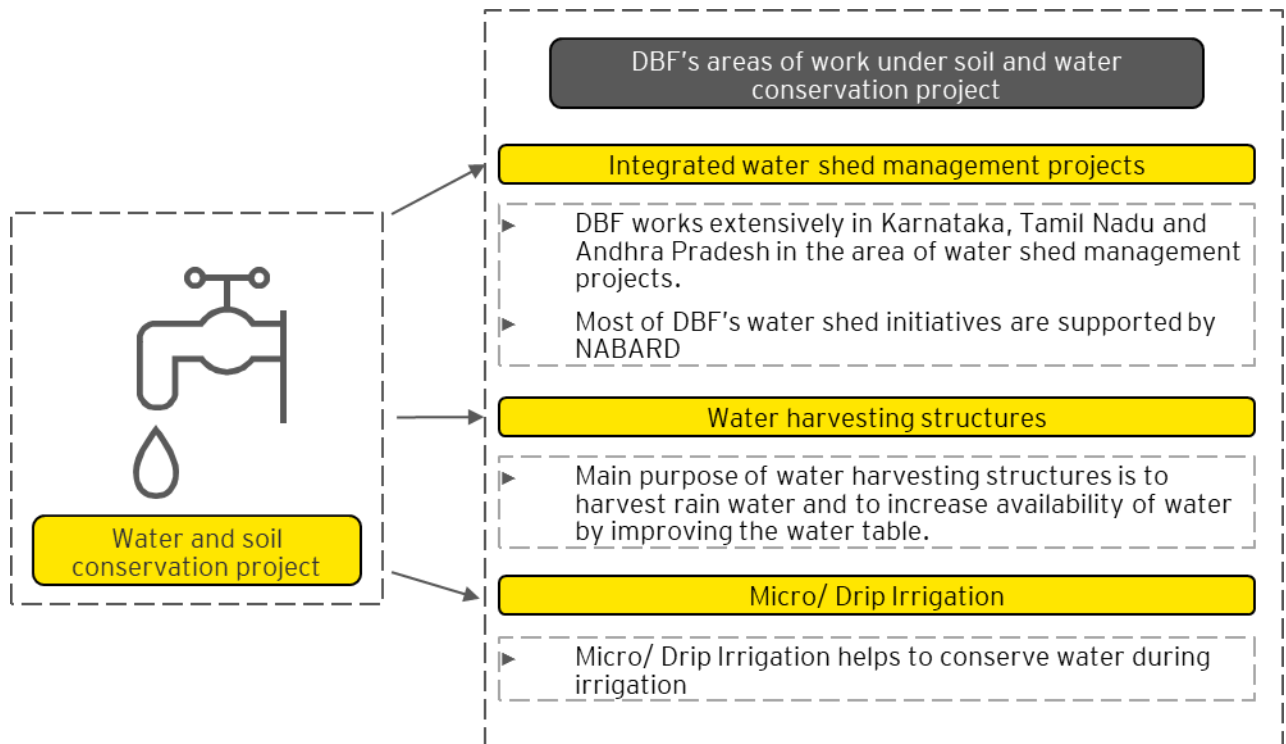
## 1.2 A snapshot of soil and water Initiative

Dalmia Bharat Foundation is extensively working on watershed management projects located in Tamil Nadu, Andhra Pradesh, Karnataka, Assam, Odisha and Uttar Pradesh. The intent of soil and water project is to conserve and harvest 50 million m<sup>3</sup> of water by 2030 and the objective of this project is to maximize the crop and milk productivity to increase income of beneficiaries. DBF is working on the construction and maintenance of water harvesting structures (i.e. farm pond, village pond, check dam, borewell recharging, roof water harvesting, micro irrigation and ring well) which are mostly located in village areas. The village ponds have maximum number of beneficiaries, as it benefits the whole village. DBF is increasing its partnership with institutions like NABARD to scale up its initiatives for soil and water conservation.

The below table shows the total capacity of water structures as constructed by DBF, it also shows number of each water structures and its corresponding number of beneficiaries.

Particulars	UoM	Tamil Nadu		Andhra Pradesh	Karnataka
		Dalmiapuram	Ariyalur (including Sendurai)	Kadapa	Belgaum
<b>Capacity added as on 31<sup>st</sup> March 2020</b>	m <sup>3</sup>	16,09,590	30,94,554	22,50,630	16,67,553
<b>Village Pond</b>	Nos	8	12	12	1
<b>Beneficiaries</b>		13,500	7,332	5,758	9,991
<b>Farm Pond</b>	Nos	93	181	526	105
<b>Families</b>		93	181	526	105
<b>Check Dam</b>	Nos	5	6	8	2
<b>Beneficiaries</b>		2,500	3,953	6,242	400
<b>Borewell Recharging</b>	Nos	2	1	7	2
<b>Beneficiaries / Families</b>		425		7	2
<b>Roof Water Harvesting</b>	Nos	1	1	2	0
<b>Beneficiaries</b>		425	380	165	
<b>Micro Irrigation</b>	Acres	263	407	501	447
<b>Families</b>		192	106	450	447

Particulars	UoM	Assam	Odisha	Uttar Pradesh, Sitapur District		Uttar Pradesh, Shahjahanpur District
		Umrangso	Cuttack	Ramgarh	Jawaharpur	Nigohi
Capacity added as on 31 <sup>st</sup> March 2020	m <sup>3</sup>	1,34,912	1,53,266	7,17,393	8,17,882	4,62,494
Village Pond	Nos	1	39	21	8	12
Beneficiaries		110	28,800	18,600	8,513	13,200
Micro Irrigation	Acres	0	0	111	125	111
Families				41	150	40
Ring well	Nos	21	0	0	0	0
Families		850				

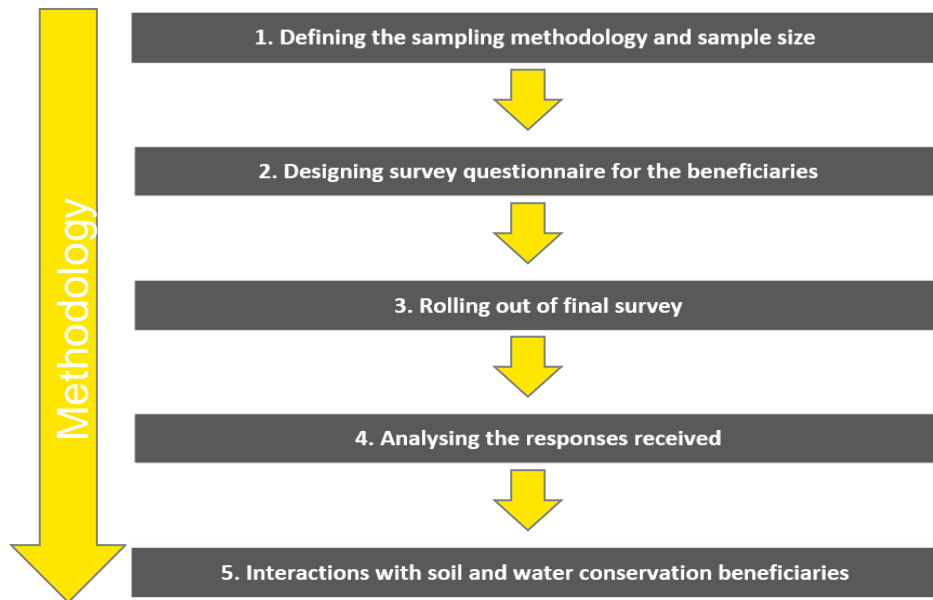


### 1.3 Need/Objective for outcome assessment Study

A large area of agriculture land in the country is dependent on seasonal rainfall. With the increase in population and industrialization the demand and consumption of water has increased substantially. We are facing situations like water scarcity and the rainfall patterns are changing because of climate change. Now, there is a need for integrated watershed management projects, so that water can be conserved and effectively utilized for productive purposes.

In this impact assessment report, we are going to assess the direct and indirect impacts of water and soil projects. The purpose of this report is to analyze the performance of water and soil projects with respect to indicators such as improvement in water table level of the impact zones, change in green cover and other environmental impacts, availability of water for productive uses, improvement in agriculture need and hence income, improvement in milk production of animals and hence income, impacts of watershed projects and sustainability and maintenance of structures. We have also tried to gauge the performance of soil and water projects which are in a specified area and have suggested the ways in which it can be further improved.

## 2. Approach & Methodology



### 1. Defining the sampling methodology and sample size

We have used the stratified random sampling method to shortlist soil and water conservation beneficiaries, after the statistical analysis sample size was determined.

### 2. Designing survey questionnaire for the beneficiaries

The survey questionnaire was designed to know the KPIs for soil and water conservation project, both before and after the implementation of soil and water conservation project. The survey questionnaire was divided into six sections, the first section of survey was related to the basic information of the beneficiaries, the second section was related to questions regarding village pond, farm pond and check dam, the third section was related to questions regarding borewell, the fourth section was related to questions regarding micro irrigation, the fifth section was related to questions regarding ring well and the sixth section was related to questions regarding overall feedback for soil and water conservation project. The survey consisted of 104 questions. However, due to branching of the survey questionnaire, the number of questions differed for different respondents.

### 3. Rolling out of survey

The survey was conducted online, and the survey link was sent to the soil and water conservation beneficiaries. The survey was rolled out in six languages namely; Hindi, Tamil, English, Telugu, Odia and Kannada. The survey was conducted in Hindi for Ramgarh, Jawaharpur and Nigohi; in Kannada for Belgaum; in Tamil for Dalmiapuram and Ariyalur (including Sendurai); in Telugu for Kadapa; in English for Umrangso and in Odia for Cuttack. All the responses were collected within a week. After completion of survey, all the survey responses were translated back in English to maintain consistency of the responses.

### 4. Analyzing the responses received

We received survey responses from 561 respondents which is more than the minimum required sample size. For a few subjective questions, the responses were not clear, those responses were not accounted for in this report. All questions were categorized under various indicators namely: improvement in water table level, change in green cover and other environmental impacts, availability of water for productive uses, improvement in agricultural yield, improvement in milk production of milch animals, impacts of watershed projects and sustainability and maintenance of structures.

### 5. Interactions with soil and water conservation beneficiaries

Interactions were conducted with 2% of survey respondents to understand their view of soil and water conservation project, their aspirations and scope for further improvement.

## 2.1 Sampling methodology and sample size



### Step 1: Sample size for analysis

#### Formula

$$SS = \frac{Z^2 (p)(1 - p)}{C^2}$$

1. Here, Z= Z value (For 95% confidence level, the value is 1.96)
2. P= Planning value (it is taken as 0.5)
3. C= Confidence interval (margin of error), it is taken as 0.04
4. SS= Sample size

Calculation,

$$SS = \frac{1.96^2 \times 0.5 \times (1 - 0.5)}{0.04^2} = 600.25$$

Applying population correction for finite population,

#### Formula of new sample size

$$\text{Sample size} = \frac{SS \times X}{SS + X - 1}$$

1. Here, X= Population size= 2,000
2. SS= Previously, calculated sample size

Calculation,

$$\text{New sample size} = \frac{600.25 \times 2,000}{600.25 + 2,000 - 1} = 461.86 = \sim 462$$

The number of survey responses we got is 561, which is more than minimum required sample size.



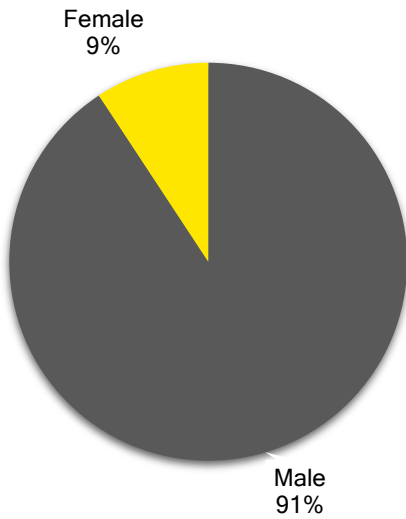
### Step 2. Sampling approach

Proportionate to the capacity of DBF's water structures in a district, the number of beneficiaries has been selected for survey.

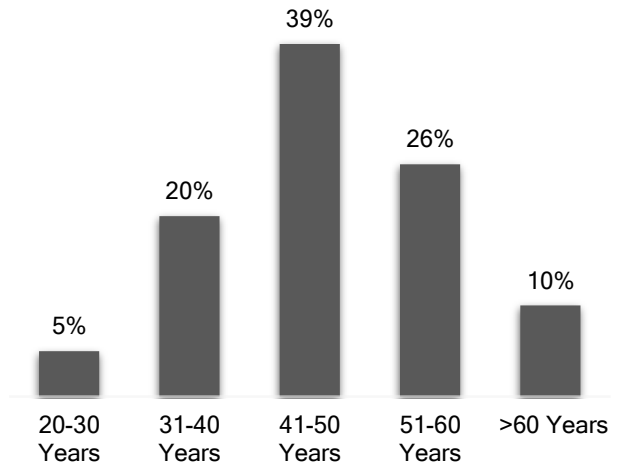


### 3. Demographic profile of the respondents

**Fig 1: Gender diversity**



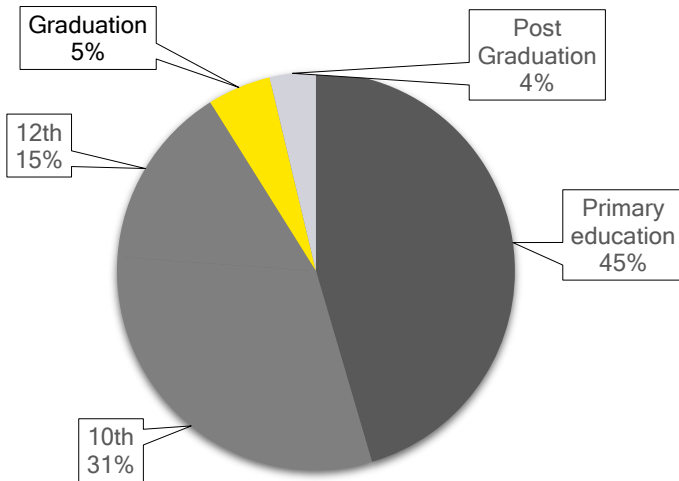
**Fig 2: Age categorisation**



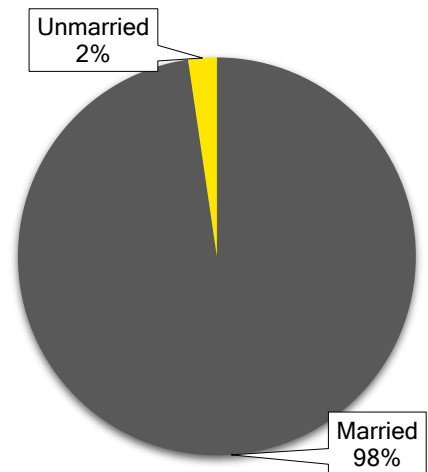
Understanding the demographic profile of respondents is essential to get an accurate inference from the survey data and group discussions. We have collected the demographic data for some of the key indicators like age, gender, education, marital status, etc. to get an overview of the demographic profile of the respondents.

About 91% of the survey respondents are male, 39% of the respondents are between the ages of 41-50 years and 98% of the respondents are married, which implies that most of the respondents are mid-aged married men. About 45% of the respondents have only completed their primary education and a further 31% have completed their 10<sup>th</sup> class, which implies that most of the respondents are not highly educated.

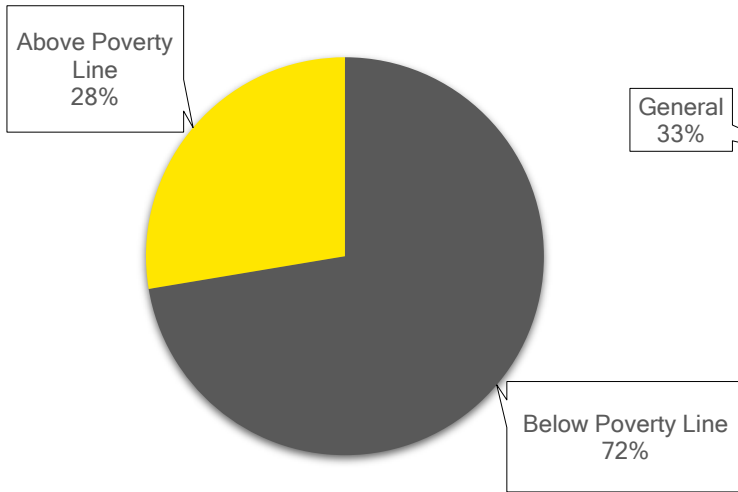
**Fig 3: Educational status**



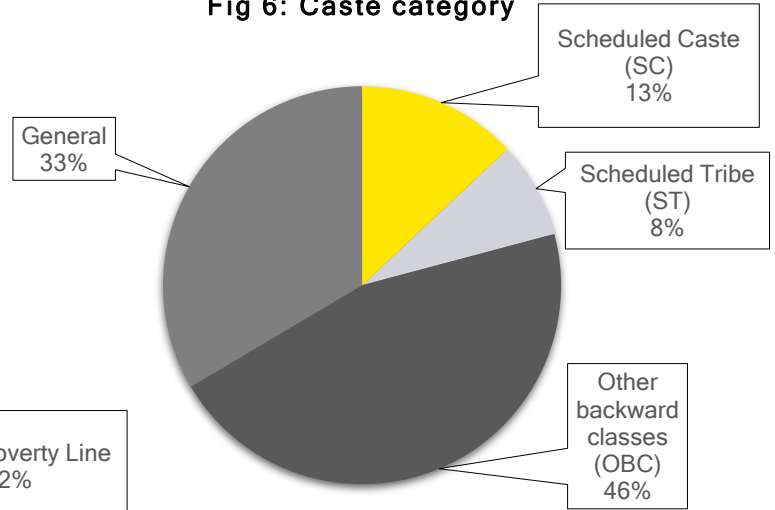
**Fig 4: Marital status**



**Fig 5: Financial status**

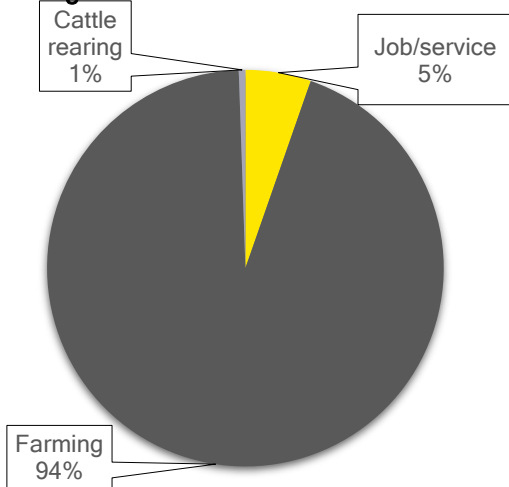


**Fig 6: Caste category**

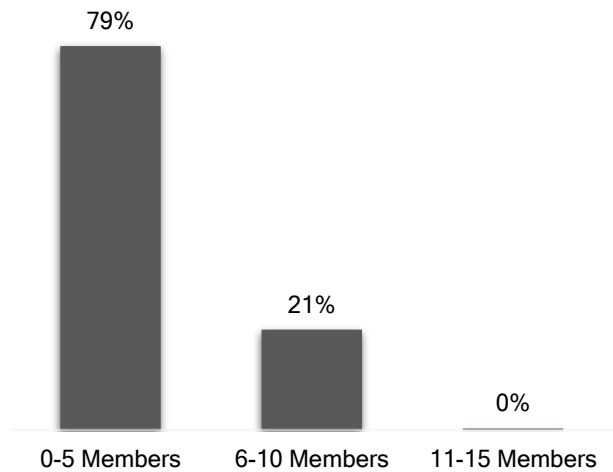


In order to assess the means of livelihood and economic status of the respondents, the feedback on their prime source of income as well as the monthly income of the respondents were gathered. About 72% of respondents are Below Poverty Line (BPL) therefore indicating soil and water conservation projects are getting to the poorest section of the society. About 95% of the respondents have farming and cattle rearing as their main source of income, this implies that most of the respondents are farmers and they are the major beneficiaries of soil and water conservation project and about 5% of the respondents who are in job/service are using water for domestic and drinking purposes.

**Fig 7: Main source of income**

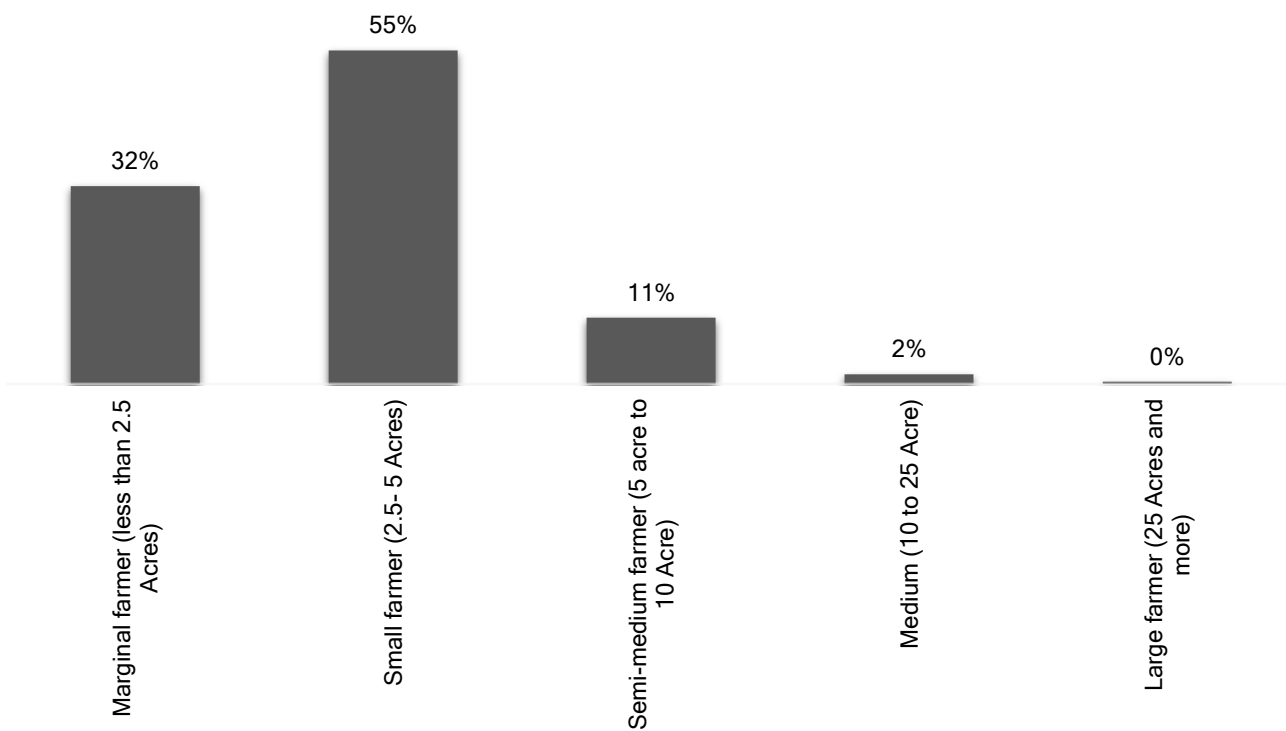


**Fig 8: Number of family members**



About 79% of the respondents have a small family and a further 55% of the respondents are small farmers (land holding of 2.5 to 5 acres), which implies that most of the respondents have a small family and less than 5 acres of farming land.

**Fig 9: Agriculture land owned by respondents**



## 4. Improvement in water table level

Fig 10: Water level increase around the respondent's area

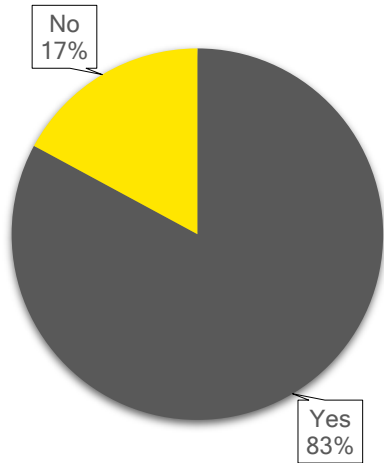
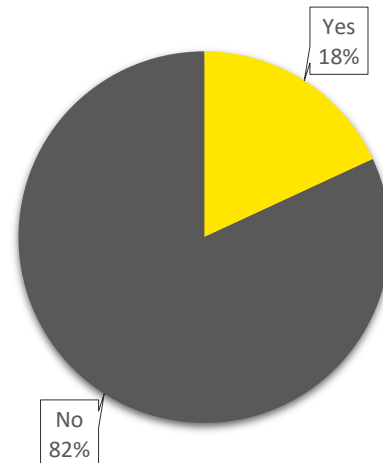


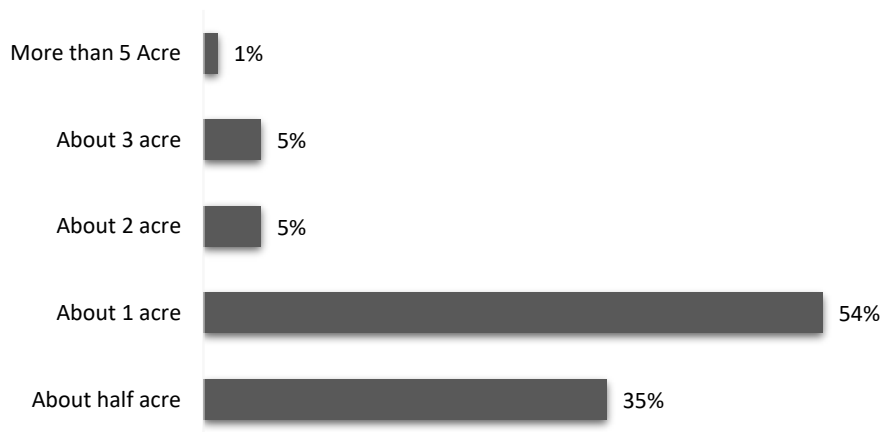
Fig 11: After DBF's intervention, farming on barren land



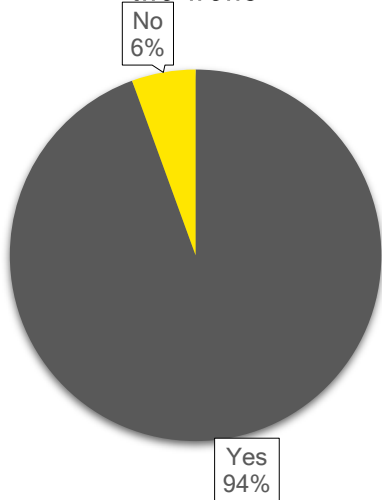
About 83% of the respondents have replied that there is increase in water level, further 18% of the respondents have said that they were able to farm on the barren land after implementation of soil and water conservation projects, which implies that due to these interventions there is increase in water table locally.

After DBF's intervention, among the respondents who started farming on barren land, about 54% of the respondents were farming on about one acre of previously barren land.

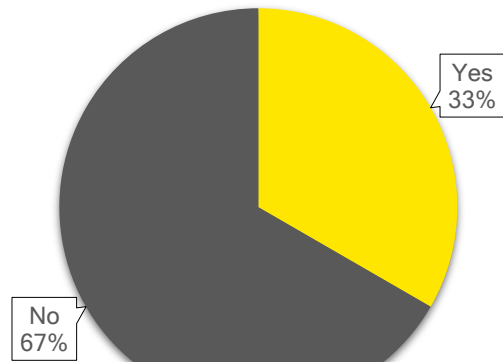
Fig 12: After DBF's intervention, area of barren land on which respondents started farming



**Fig 13: Increase in water level in the wells**



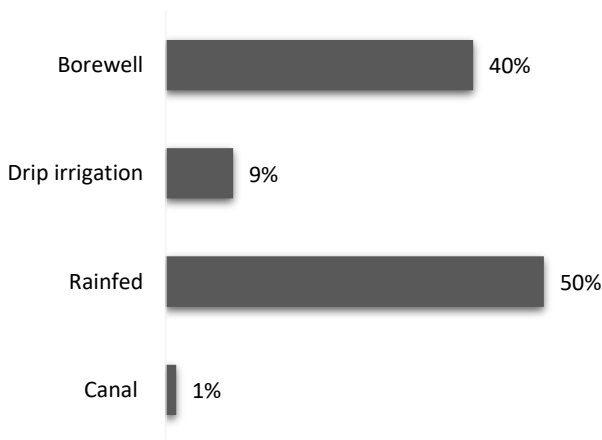
**Fig 14: Recharge of dry wells**



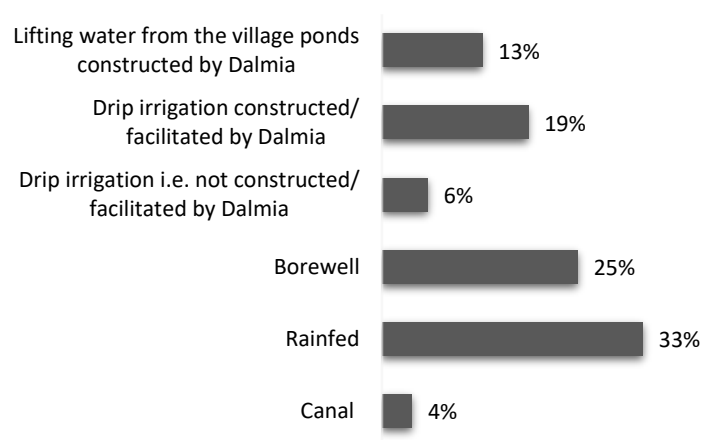
About 94% of the respondents have replied that there is increase in water level in the wells and a further 33% of the respondents have said that dry well are recharging due to DBF's intervention, which implies that overall the water level in the wells have increased and few of the dry wells are also being recharged.

Earlier 50% of respondents were dependent on rain and 40% of the respondents were dependent on borewell, now about 33% of the respondents are dependents on rain and 25% of the respondents are dependent on borewell, which implies that due to DBF's efforts there is a diversification of sources of water for irrigation and farmers are not fully dependent on the rainfall and borewell for the irrigation.

**Fig 15: Before DBF's intervention, source of irrigation for your farms**

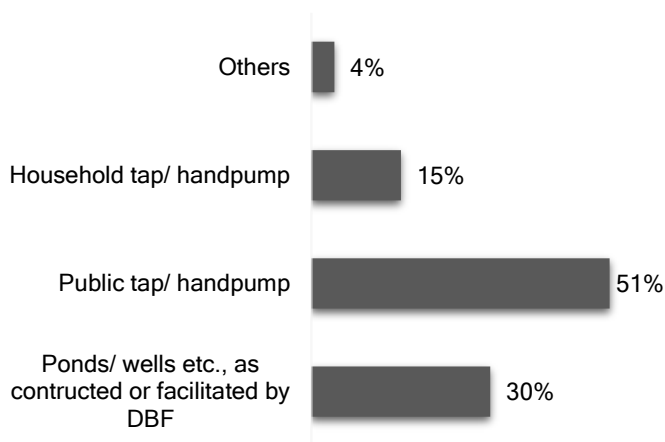


**Fig 16: After DBF's intervention, source of irrigation for your farms**

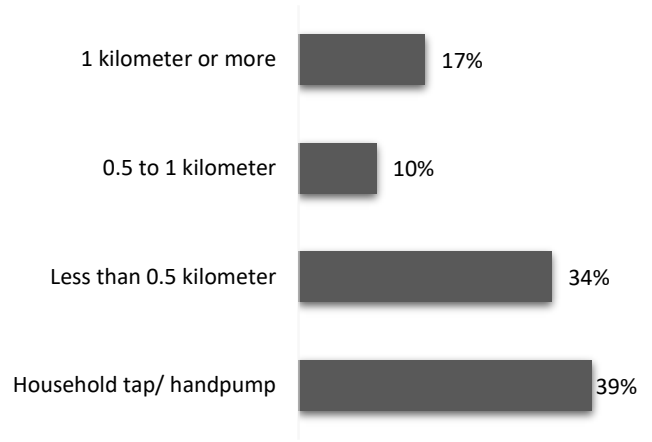


## 5. Availability of water for productive uses

**Fig 17: Main source of water for domestic purposes**



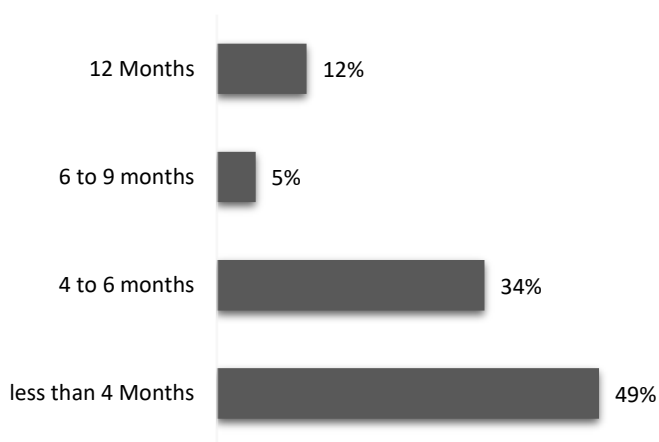
**Fig 18: Distance of main source of water for domestic purposes**



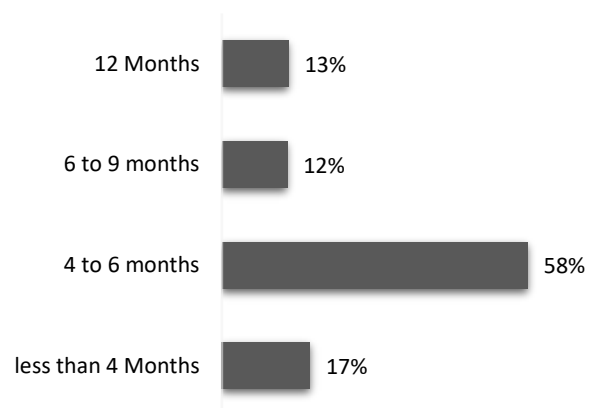
About 30% of the respondents are using village/farm pond/ ring well/ borewell constructed or facilitated by DBF as main source of water for the domestic purposes and about 73% of the respondents have to travel less than 500 m to fetch water for domestic purposes. However, about 27% of the respondents have to travel more than 500 m to collect water for domestic purposes, which implies that there is a scope for further construction of water structures by DBF.

Before DBF's intervention 49% of the respondents said that water availability in water bodies was less than 4 months. After DBF's intervention 17% of the respondents say that water availability in water bodies is less than 4 months. Overall, there is improvement in water availability after DBF's intervention.

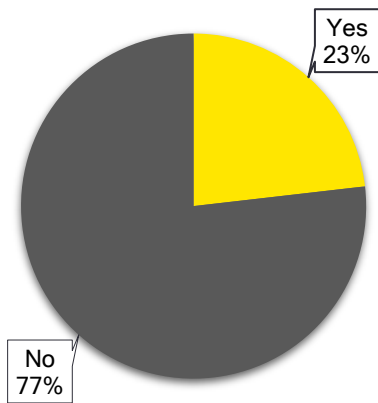
**Fig 19: Water availability in water bodies before DBF's intervention**



**Fig 20: Water availability in water bodies after DBF's intervention**



**Fig 21: Village ponds developed by DBF, used for pisciculture/fish farming**



About 23% of the respondents are using village ponds, developed by DBF for pisciculture, which implies that respondents have additional source of income as well as food due to village ponds.

## 6. Improvement in agricultural yield

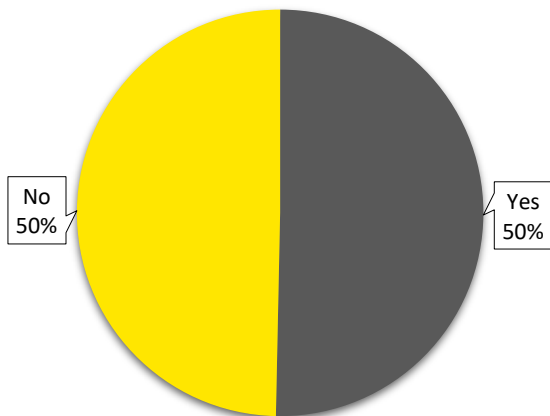
S. No.	Crop	Unit	Before DBF's intervention	After DBF's intervention	Percentage increase
1	Bengalgram	Quintal/ acre	4.64	7.7	66%
2	Chilli	Quintal/ acre	16.68	19.22	15%
3	Wheat	Quintal/ acre	16.27	22.28	37%
4	Maize	Quintal/ acre	19.22	19.46	1%
5	Paddy	Quintal/ acre	17.22	21.87	27%
6	Sugarcane	Quintal/ acre	333.12	357.17	7%

Above table shows analysis of the agriculture yield for top crops as grown by the respondents, it shows the agriculture yield of crops before and after implementation of the DBF's soil and water conservation project.

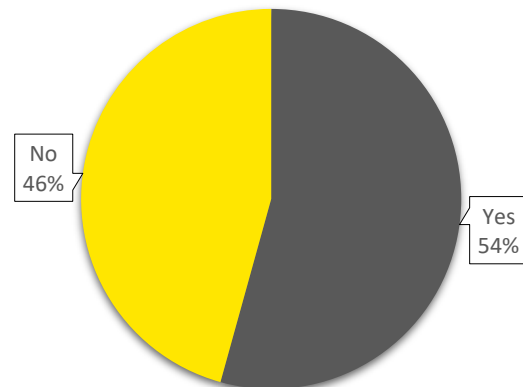
It can be seen from the above table that the agriculture yield of crops has increased due DBF's intervention.

About 50% of the respondents have replied that field bunding activity have helped them in increasing the agriculture yield of the crop and a further 54% of the respondents have said that field bunding activity is helpful in reducing soil erosion and improving the soil retention, which implies that the field bunding activity carried out by the DBF is helpful to the respondents.

**Fig 22: Field bunding activity helpful in increasing yield**



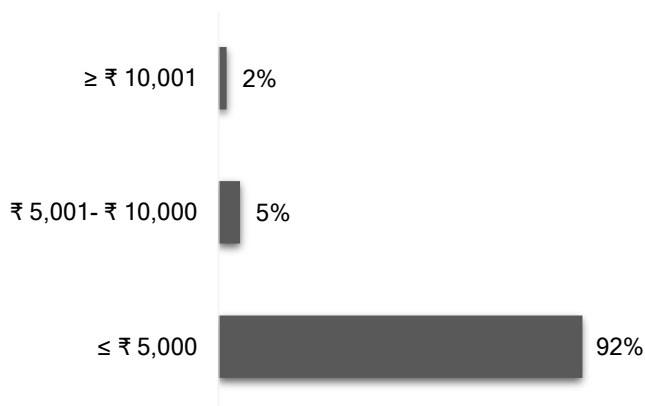
**Fig 23: Field bunding activity helpful in reducing soil erosion and better soil retention**



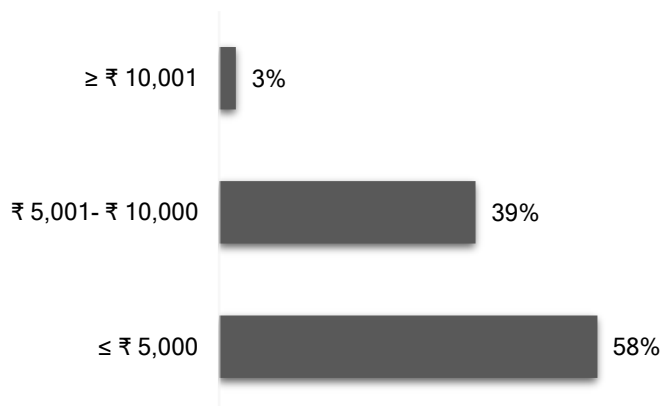


## 7. Improvement in milk production of milch animals

**Fig 24: Before DBF's intervention, income from milch animals in a month**



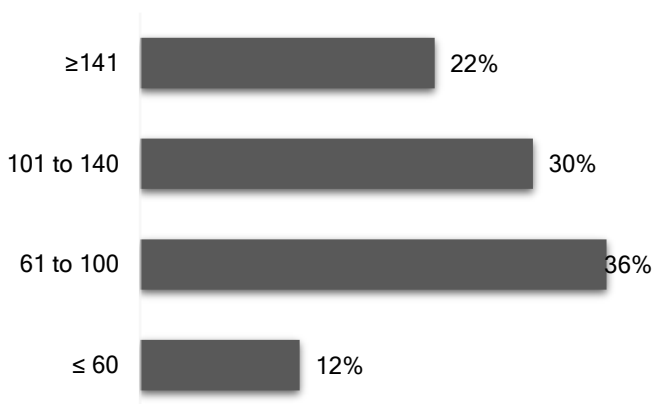
**Fig 25: After DBF's intervention, income from milch animals in a month**



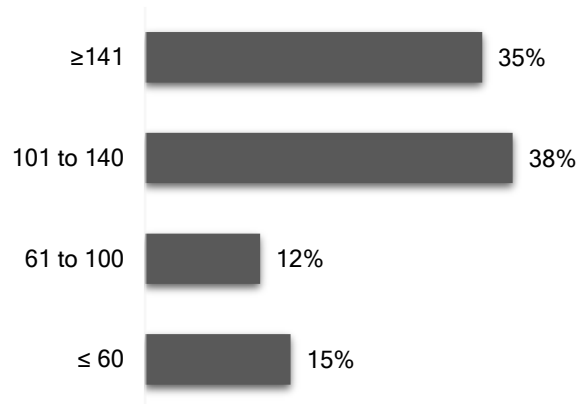
Before DBF's intervention, about 92% of the respondents were earning less than ₹ 5,000 from milch animals in a month, however after implementation of DBF's interventions about 42% of the respondents are earning more than ₹ 5,000 income from the milch animal in a month, which is a significant increase.

Before DBF's soil and water conservation project, the milch animals produced more than 100 liters of milk per animal in a month for about 52% of the respondents. After DBF's intervention, the milch animals are producing more than 100 liters of milk per animal in a month for about 73% of the respondents. This directly implies that milk production of the milch animals is increasing due to the initiatives taken by DBF.

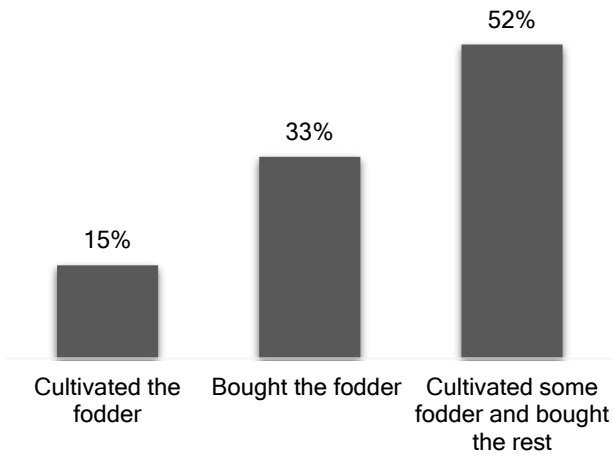
**Fig 26: Before DBF's intervention, milk produced per animal in a month in liters**



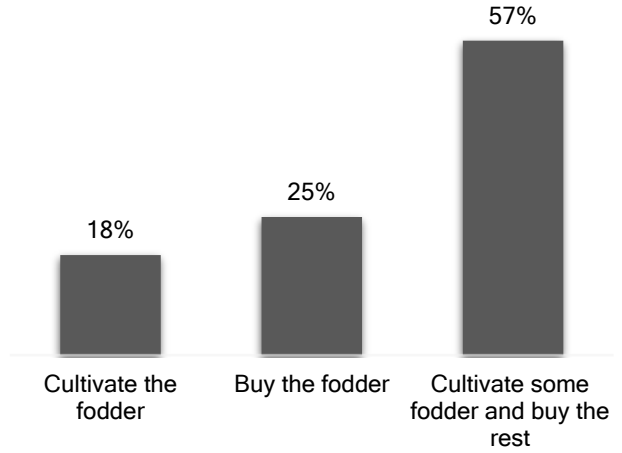
**Fig 27: After DBF's intervention, milk production per animal in a month in liters**



**Fig 28: Before DBF's intervention, source of fodder for milch animals**



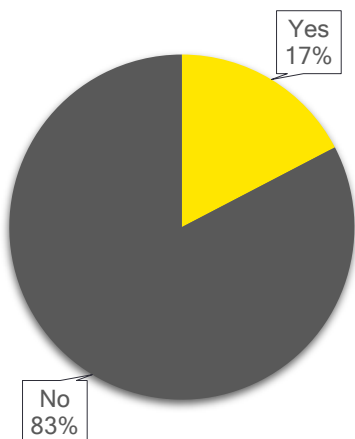
**Fig 29: After DBF's intervention, source of fodder for milch animals**



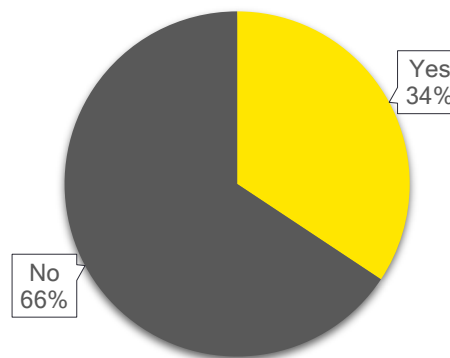
Before DBF's interventions, 33% of the respondents directly bought the fodder from the market, which has dropped to 25% of the respondents after DBF's intervention. Currently 57% of the respondents cultivate some fodder and buy remaining from the market.

## 8. Other impacts from watershed project

**Fig 30: Before DBF's intervention, respondents who used mixed cropping**



**Fig 31: After DBF's intervention, respondents who use mixed cropping**

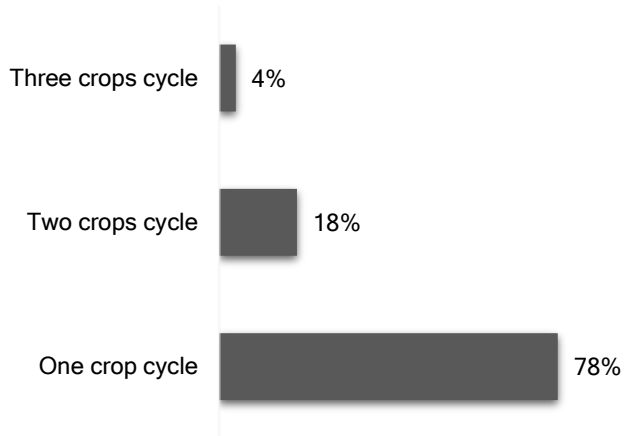


Before DBF's intervention, only 17% of the respondents used mixed cropping, it has increased to 34% of the respondents after the DBF's intervention.

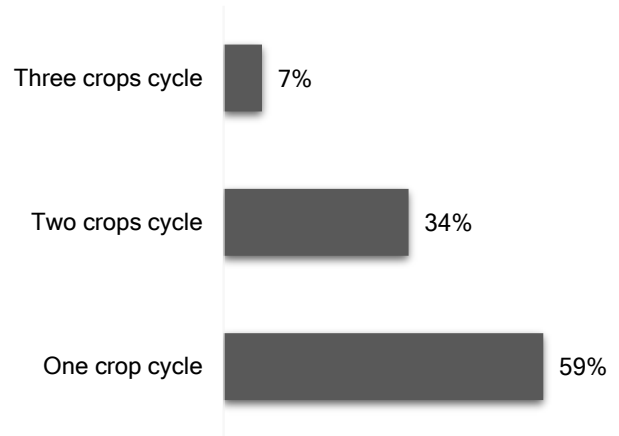
About 18% of respondents have started to use mixed cropping who earlier were not using mixed cropping. The below table shows the change of income of the respondents who started to use mixed cropping after DBF's intervention.

S. No.	Income per month	Before DBF's intervention	After DBF's intervention
1	≤ ₹ 5,000	18	4
2	₹ 5,001- ₹ 25,000	70	83
3	₹ 25,001- ₹ 50,000	4	4
4	≥ ₹ 50,001	1	2

**Fig 32: Before DBF's intervention, number of crop cycle**



**Fig 33: After DBF's intervention, number of crop cycle**



About 78% of respondents grew only one crop per cycle before implementation of the DBF's soil and water conservation project. After DBF's intervention, about 41% of the respondents grow more than one crop cycle, which implies that due to the increase in number of crops cycle, the respondent's income has increased.

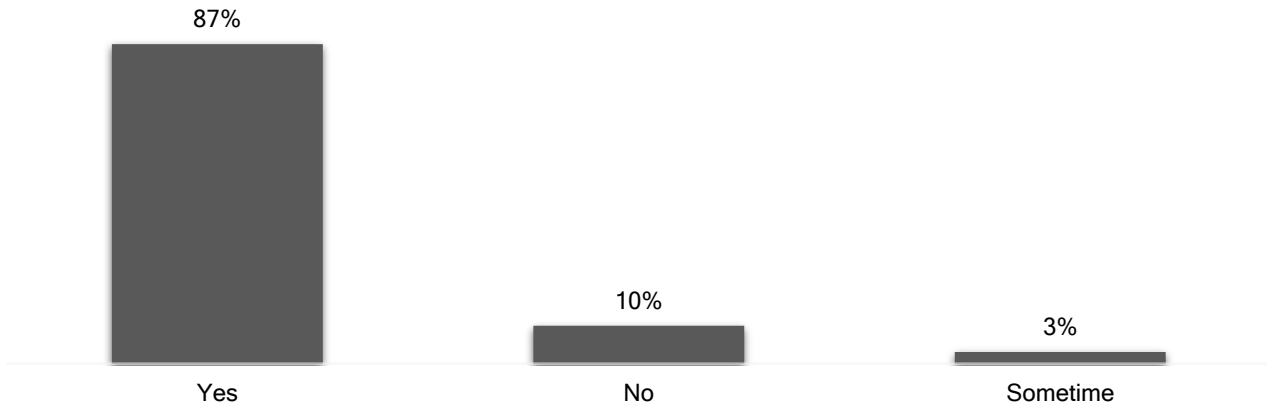
About 28% of the respondents have increased the number of crops they grew per cycle after DBF intervention. The below table shows the change of income of the respondents who started to grow more crop per cycle after DBF's intervention.

S. No.	Income per month	Before DBF's intervention	After DBF's intervention
1	≤ ₹ 5,000	13	1
2	₹ 5,001- ₹ 25,000	103	111
3	₹ 25,001- ₹ 50,000	6	8
4	≥ ₹ 50,001	19	21

## 9. Status of maintenance of water structures

For farm pond, check dam, micro irrigation and ring well 100% of the respondents replied that it is properly maintained. Out of forty-one respondents, one respondent replied that borewells are not maintained properly. However, about 10% of the respondents replied that village ponds are not maintained properly.

**Fig 34: Village ponds are maintained regularly**



Below table shows overall ratings of the water structures, as provided by the respondents.

S. No.	Water structure	Bad	Average	Excellent
1	Village pond	1%	34%	65%
2	Farm pond		6%	94%
3	Check dam		3%	97%
4	Borewell Recharge		57%	43%
5	Irrigation		38%	62%
6	Ring well			100%
8	Overall Rating as provided by respondents	0.2%	28%	72%

## 10. Appendix

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# Disclaimer

- It is practically difficult to thoroughly study all project related aspects of the organization and programs, within the limited time period. Based on our methodology for carrying out such reviews, we conducted review of the programs and processes for this review and held discussion with management, program representative and a limited number of stakeholders. We have also reviewed data/ documents made available by the client.
- The key findings in this report are based on review of relevant documents made available by the client and consultation with limited number of relevant stakeholders. The work carried out and the analyses thereof are essentially based on the discussions and records provided by them. No physical monitoring or measurement was undertaken as part of this study.
- If non-conformance is not reported in certain areas other than those reviewed, it shall not be construed that the program related aspects are completely and effectively implemented in these areas. It is strongly recommended to review such issues on a continual basis. Information presented in this report is based on documents provided by the management, discussions with limited number of relevant stakeholders and therefore, the findings of this report are valid as of the date of the review. The conclusions presented in this report are Ernst & Young's interpretation of the information obtained during the course of this assessment