

Haryana Community Forestry Project

**Benefits from
water harvesting dams
for landless households**

A study report

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Table of Contents

ABSTRACT AND SUMMARY	1
INTRODUCTION	4
METHODOLOGY.....	4
SAMPLE FRAME	5
QUANTITATIVE SURVEY	5
QUALITATIVE SURVEY.....	6
DATA ANALYSIS AND INTERVIEW RESULTS.....	7
INCOME AND EMPLOYMENT	8
WOMEN	11
THE MONSOON EMPLOYMENT GAP	11
BABAR GRASS	11
VEGETABLE TRADING	12
PADDY TRANSPLANTING.....	12
LABOUR SUBSTITUTES.....	12
HARVEST WORK	12
RATION CARDS	13
SUBSIDIARY OCCUPATION	13
DAYS OF LANDLESS EMPLOYMENT	15
MIGRATION.....	17
DEBT.....	18
HOUSING QUALITY	21
ACCESS TO ELECTRICITY	23
ACCESS TO DRINKING WATER	25
ACCESS TO IRRIGATION WATER AND THE VRMC.....	27
LIVESTOCK	28
<i>Livestock Numbers</i>	28
<i>Buffalo and Cows</i>	28
<i>Goats</i>	29
<i>Bullocks</i>	29
LIVESTOCK OWNERSHIP	29
LIVESTOCK MIGRATION	33
MILK PRODUCTION	33
FODDER PRODUCTION AND AVAILABILITY.....	35
STALL FEEDING	39
ANNEX 1	40
VILLAGE BHAGWANPUR.....	40
VILLAGE MIRPUR	41
TORUN AND BHEDIWALA	41
THASKA	42
ANNEX 2.....	43
CHECKLIST FOR LANDLESS STUDY.....	43

LANDLESS REPORT

Abstract and Summary

The fact that the dams constructed by HCFP have benefited the landless is unequivocal. The benefits have been seen in 2 principle areas, which have had downstream effects through the individual dam community's economies.

The landless rely on multiple employment opportunities, which present themselves at different times of the year. The basic cycle remains unchanged; the quantity of work has significantly increased. The better use of irrigation water has increased crop yield and increased crop diversity. Fodder crops have been cultivated for the first time, whereas prior to the dam berseem and fodder sorghum could only be purchased at high cost and with difficulty. Now berseem and fodder sorghum are cultivated in their fields under irrigation, greatly improving the nutritional quality of buffalo and cow diet. With the improved diet quality, milk production revenue has increased between 17 – 137%; or on average IRp 1,466/lactation.

As a consequence of the increased fodder availability and ease of collection, there has been an overall increase in buffalo and cow numbers. However, in some communities these livestock numbers have fallen, probably due to poor animal husbandry. Goat numbers has seen a substantial increase. Such increases results in increased revenue into each community's economy.

Similar to the introduction of berseem and fodder sorghum, paddy and wheat yields have increased, farmer's estimate the yields have more than doubled. Increased agricultural labouring work has resulted. Landless have seen a significant increase in waged labour available. The additional income resulting is difficult to estimate. Moreover, the availability of irrigation water has resulted in a greater diversity of agricultural crops, the gradual introduction of onion, seed crops and other higher value agricultural crops. Many of these crops have a higher labour requirement, such as in one village the use of herbicides and itinerant labour has been seen. With further crop diversification it is highly probable that this trend will continue.

The increased milk production and the increased availability of labour work have resulted in an increase in construction work, with landless using the Indira Avas Yojna house construction scheme as a vehicle onto which to build additional rooms. Consequently, the survey has found that there has been wholesale house refurbishment in a number of landless communities. These additional rooms are outside the grant scheme, so have to be funded from other sources, such as loans, but principally the cash to finance the property extension has come from the result of their own economic activity.

The government has installed water and electricity reticulation systems, a number of landless have funded the extension and installation of pipes and taps right into their own properties. Such extensions may cost in the region of IRp 2,000 – 3,000, which is funded from their own resources. Often this is from accumulated wage earning work.

Landless involved in the construction trade have seen an increase in business, with peak work periods falling immediately after either the paddy harvest or the wheat harvest.

The migration of landless has decreased in the context of increased agricultural labouring opportunities. Explanation may be found in the increased reliance on tube wells faced with poor electrical supply; a strong motive for re-evaluating the role of the dam. Very few examples of economic migration were found. No cases of distress migration have been found. The reduction in migration was corroborated by an elderly Kathgarh respondent who noted that migration has dropped to virtually nothing. Most migration now involves individuals finding agricultural labouring work in nearby villages.

The level of indebtedness among the landless households has seen increases over the period of the project. In some communities debt levels have increased by an overall average of 53%. Loans may be used to fund their house (or primary dwelling) construction. However the trend is for increasing debt levels, which is of serious concern, requiring monitoring and regular review. In spite of the spiralling debt, some households, particularly in Thaska remain, seemingly, staunchly debt (risk of default) averse.

Negative impacts have been found, but are limited to the increased travel time to find grazing. A fact negated by the increased availability of fodder grasses and babar grass in the dam catchments.

The impact of the dams on the lives of women has been positive. Grass collection times have been halved, through the collection of berseem and fodder sorghum and the proliferation of fodder grasses in the dam catchment area. The prohibition of grazing in the catchment has increased the variety of different preferred grass species.

When the landless are asked what are the benefits they have received from the dam, the answer is always “none” or “nothing”. Strictly true, but the indirect benefits are both tangible and quantifiable. Livelihoods have been enhanced; standards of living have been raised. However, the landless involvement in the dam remains tangential. Technically the landless are supposed to be linked to the dam through the VRMC and/or SHGs. Reality has demonstrated there is no link. To compensate the landless through their involvement in trading irrigation water, suggests that these benefits are small in comparison to the benefits accrued from fodder production and agricultural labouring. Besides such a scheme will be difficult to administer; aside from persuading land owners in such a scheme.

Nevertheless, the involvement of the landless in the dam requires satisfaction. A project design fault was perhaps the involvement of the landless at the start, which faded as the project progressed and developed. There appears to be the need to develop and enhance groups (VRMC and SHGs), however, forest staff have neither training nor expertise in group formation and development. An institutional lacuna perhaps exists as group formation either as a VRMC or an SHG has been shown to involve the landless or focus on the landless, to their profit, elsewhere in this and other projects. If forest staff had a modicum of expertise, plus a clear role to play that is enshrined in their job description or

ToRs, the group formation process, which would automatically include the landless, would be put on a firmer footing.

As stated at the start, the landless have benefited from the dam, albeit indirectly. However, they deny the link. It is perhaps important, both politically and from a public relations perspective to have a strategy in place to convince the landless of the dam's role in their increasing prosperity. Convincing them of the dam's benefit, will encourage their further involvement. As in the longer term, siltation will become more acute, denying access to suitable quantities of water, which will limit crop and livestock productivity and will curtail crop diversity. These three form the basis of their new found economic prosperity.

The results from the landless survey must be at best described as indicative. The sample frame was small, based on a small population. No statistical inference can be made; indeed none of the data has been subjected to any further statistical analysis, beyond basic statistics – average, mode and frequency distribution. Hence the conclusion and explanations given have to be treated with caution.

Introduction

The Haryana Community Forestry Project has constructed 19 earthen dams in Panchkula and Yamunanagar Districts. The communities associated with these earthen dams have been given capacity building and training to form a Village Resource Management Committee (VRMC), through which to administer and manage the dams and the distribution of the irrigation water.

Irrigation water, by its nature will directly benefit the land owners. However, 9 of the 19 participating communities have landless as part of their societies. The benefit to the land owning class is obvious, but the benefit to the landless households from the dam is more obscure and difficult to quantify.

The purpose of the landless study is to gain insight into how the dams and access to irrigation water has benefited the landless, both directly and indirectly. The results of the landless survey can be cross referenced with other landless household studies, as well as to inform future project design, future project activities, and contribute to policy design and rural development strategy. Thus, ensuring that the landless and other disadvantaged can gain access to the benefits of the project and their basic entitlements.

Methodology

The landless survey data collection was undertaken in three parts.

Table 1. Landless households (HH) in villages with a water harvesting dam

Village	Total population	With baseline data	In baseline with farm labour ¹	Sample for survey
Bharauli	20	20	17	17
Mirpur	2	2	2	2
Kaimbwala	2	1	1	2
Turon	20	10	10	10
Dhandion	0	0	0	0
Banswala	0	0	0	0
Mandappa Badhaur	0	0	0	0
Mawas	0	0	0	0
Rana (Mirpur 2)	0	0	0	0
Bhediwala (Turon 2)	21	21	21	21
Ibrahimpur	25	25	13	13
Bhagwanpur	80	41	34	34
Kansli	15	9	3	9
Thaska	70	37	27	27
Kathgarh	80	46	38	38
Nanheri	0	0	0	0
Nayagaon	33	17	17	17
Total Number of Landless Households	368	229	183	190²

¹ In almost all cases as primary occupation, in 13 cases as secondary occupation

² Approximate number

Sample Frame

The 1st part consisted of an interrogation of the project M & E database to determine the numbers and names of the landless in the different dam communities.

From Table 1, a total of 368 landless households (HH) were identified. Table 1 also shows the individual community breakdown. It was decided to break the landless survey into a quantitative survey of 145 landless households; representing a 39% sample; followed by a qualitative survey of a 20% sample of the 145 landless households covered in the quantitative survey.

Quantitative Survey

The 2nd component was a quantitative survey, in addition to a series of farmer group discussions (FGD) in each dam community where landless were known to be present.

A survey document was compiled, seeking to quantify the before dam construction situation and the after dam construction situation. The data for the “before” and “after” situations was left vague, as the earthen dams were constructed during the period 2001 – 2005. Therefore the “before” dam situations may extend in some cases up to 1998/99, with the “after” situation up to the date of the survey. The survey, by default, covers a decade and the life of the project.

The quantitative survey covers the following areas:

- Main occupations and income
- Subsidiary occupations and income
- Migration
- Debt
- House quality
- Access to electricity
- Access to drinking water
- Access to Irrigation water
- Livestock numbers
- Livestock migration
- Milk production
- Fodder production and availability
- Stall feeding

The quantitative survey was undertaken in December 2006. The survey consisted of quantitative enumeration of the before and after situation, based on the historical recall of the respondents (before situation) and direct observation (after situation). The data was collected using passive observation methods and a questionnaire.

In addition focus group discussions (FGD) with landless households were held to gain insight into the data collected. The FGD reports are in Annex 1, the quantitative data collected is available electronically.

Neither Turon nor Bhediwala (Turon 2) were covered in the quantitative survey as the landless in these villages were considered to be de facto landed, having access to irrigated land. Subsequent investigations found that the 30+ households were de jure landless as they did not have title (Patas) to land. In reality, the landless had access (encroached) to forestry land or other designated land, often less than 1 acre (0.4 Ha) and often in difficult locations. Locations where access was difficult or the risk of flooding or erosion was high.

The Bhediwala and Turon households were covered in the second qualitative survey. Four households were selected and interviewed, 2 households from the Gujjar community and 2 households from the Mehra (Kasbar Rajput) community.

Qualitative Survey

The 3rd component of the landless survey was a qualitative survey of a 20% sample of the 145 households involved in the quantitative survey.

The quantitative survey had done an excellent job of collecting quantitative data, but required strengthening in determining some of the reasons and factors, why there have been changes within the landless households. The reductionist approach was adopted on account of limited time and resources.

The qualitative survey sample frame, by community, is given in Table 2. A total of 38 interviews were conducted representing a 24% overall sample. The interviews were semi-structured, based on a check list. The checklist covers all of the topics outlined in the quantitative survey. A copy of the checklist is given in Annex 2. Selecting the households to be interviewed was carried out as a proportion of the total number of landless households in the village, by selecting every nth (e.g. 4th, 5th or 6th) household on the village landless household list. With only 3 and 2 landless households to interview in Kansli and Mirpur respectively, these were not sampled, but interviewed in their entirety.

Table 2. Table showing the sample frame, by community for qualitative survey component

Village	Number of landless HH in the quantitative survey	Number of landless HH sampled in the qualitative survey	Percentage of the quantitative survey
Bharauli	17	4	24
Kathgarh	35	6	17
Ibrahimpur	11	3	27
Kansli	3	3	100
Thaska	27	6	22
Bhagwanpur	33	6	18
Mirpur	2	2	100
Nayagaon	17	4	24
Turon	13	4	31
Total Number of Landless Households	158	38	24

Each named household was visited; the interview was conducted as a conversation. Not all topics were covered in a single interview, but on a per community basis, all the topics were covered.

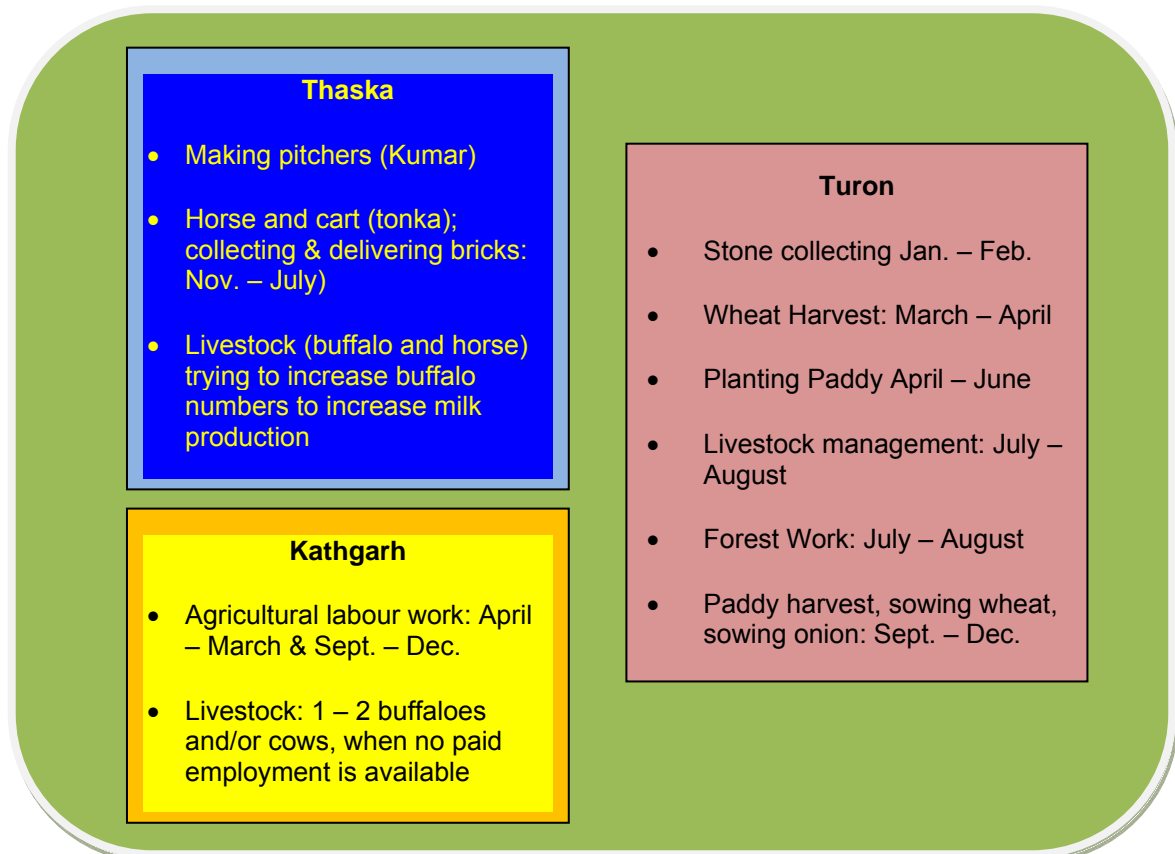
On arrival at the household, the household head was frequently not available, in which case the interview was conducted with the household head's nearest relative: his wife, parent or in some case his children (over 20 years).

Data Analysis and Interview Results

The tables have been constructed using data from both sources. An analysis of data distribution has been undertaken on the results of the quantitative survey, supplemented with information collected from the semi-structured interviews. Sometimes the data from the different sources appeared antagonistic, in which case the qualitative survey was given credibility. Frequently it supported the result of the qualitative survey, serving to enrich the analysis.

The total population of landless is small, 368 households. The quantitative survey has sampled 145 households, a 39% sample. The qualitative survey has taken a 24% sample of the quantitative survey. Statistically, we have started from a small population group, the samples taken are reductionist. With the small population sizes, no statistical analysis has been attempted, beyond the basic statistics of average, range and frequency distributions. Whilst every effort has been made to ensure accuracy, the small population and sample sizes means the output from the survey has to be treated with caution. Further verification work and cross referencing other work will be required.

Box 1. Examples of multiple employment opportunities and income sources for 3 communities



Income and Employment

Congruent with findings of other studies, in Haryana and other parts of India (Madhya Pradesh, Orissa and Chhattisgarh), the analysis of landless have multiple revenue sources and different employment at different times of the year. Migration supplements income, where there is no employment or over supply of labour within the context of their community.

Examples of the landless households' annual income and employment opportunities for 3 communities (Kathgarh, Thaska, Turon) are given in Box 1.

As can be seen from these examples, the landless have multiple employment opportunities, governed by the season. Creating multiple income sources, some of which are paid in cash, others paid in kind (wheat or paddy).

Table 3 shows the timing of the agricultural labouring work and general building labouring work that is undertaken throughout the year. Agricultural labouring work is undertaken by both men and women. The annual cropping pattern has changed through the introduction of berseem and fodder sorghum; in addition the intensity of cropping has changed. Crops are being harvested; there is less crop failure due to drought.

The difference between the before and after dam construction scenario is the increased demand for labour and the need to hire agricultural labour to carry out specific husbandry operations. Since the dams, with irrigation water available, the quantity of crop to harvest has increased substantially. It is not possible to quantify, some farmers and landless consider the quantity of crop harvested have more than doubled. Recent paddy harvested in Nanheri, gave a farmer estimated yield of 30 Qu/acre, a hitherto unheard of figure; less than 10 Qu/acre being the norm. Wheat yields have seen similar substantial yield increases.

As one landless labourer put it, from the Rabi, there is a lot of crops to harvest, compared to rainfed conditions, where often there was no harvest, due to drought or poor growing conditions. Consequently the amount of cash flowing through the landless community as a result of a paid employment has evidently increased. Unfortunately, the sum cannot be substantiated as no time based data has been collected.

From a construction or building trade perspective, farmers have disposable income, with the sale of the paddy harvest and/or with the sale of the wheat harvest. Therefore the building trade receive commissions in April/May and September/October, with the main construction work period being from October – March. No building work is available during the monsoon (June – August). The reason for the April – May building period, bricks are frequently sold at discounted rates prior to the monsoon, otherwise the brick kilns will be carrying stock throughout the monsoon period. Moreover, bricks lose quality, if they become soaked in water.

Landless in Bharauli and Kathgarh appear to have greater chances of paid employment in Raipur Rani or Kala Amb respectively. In these cases their wives often seem to be looking after livestock, but they do not appear to be working as agricultural labourers. Some wives collect animal fodder, others pay for the

collection of animal fodder. During interview with these landless, the livestock numbers had been increased, either through purchase or retention of breeding stock. The respondents were confident that fodder was available and milk production revenue sufficient to sustain a business.

Table 3. Table outlining some of the occupations that the landless undertake for general agricultural building and construction work

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
					No or very little agricultural or construction work						
Weeding wheat		Wheat harvest						Land preparation	Wheat sowing		
Weeding onion			Onion harvest								Onion transplanting
				Wood cutting							
					Berseem and fodder sorghum harvesting						
							FYM application				
Sugarcane planting								Sugarcane harvest			
			Paddy planting	Paddy transplanting				Paddy harvest			
"Ban" – rope making									Babar grass collection		
Construction work		Peak construction work							Construction work		
Fodder collection for livestock						Peak fodder collection period					
Many animals stall fed during this period						Some animal grazing					

Women

Women are involved in paddy transplanting, the paddy harvest, the wheat harvest and in the weeding of all crops. The women have the responsibility of gaining employment, the money going to maintain the family. Their field work is over and above that of tending their livestock feeding, cutting grass and carrying water, notwithstanding other household tasks. Their subsidiary occupation is considered key to the maintenance and well being of the family unit. No female labour timeline was undertaken, but it is probable that women's labour may have increased, a potential negative impact.

The Monsoon Employment Gap

Irrespective of skills, there is no or very little work during the period May, June and July (the monsoon period). Heavy rains plays havoc with any construction work. There is no crop work at this time, except bund maintenance, usually undertaken by family members.

When asked how they (the landless) survived during the period, many survived on conserved grain (wheat) or savings. Fodder grass cutting work was available from about June onwards, depending on monsoon onset. If Buffalo and/or cows are in milk, the milk production will either help supplement household nutrition or be sold. Landless migration at this time of year to find temporary work may increase. If the landless are unwilling or unable to migrate, they may borrow money off relatives or shop keepers. No case of landless taking loans to bridge the monsoon period was found.

Babar Grass

In many dam communities, the right to cut babar grass is administered by the VRMC. The VRMC and/or the official contractors will negotiate rights from the Forestry Department. The right to harvest babar is sold to a contractor (or contractors) (e.g. Bharauli and Kathgarh). Theoretically no one else, other than the designated contractor, has the right to cut, collect and carry babar grass from the dam catchment area. The officially designated contractors sub-contract the babar grass collection on a 50% share basis. In some villages a collection fee of IRp 200 – 500/season is paid to the official babar grass contractor.

Babar grass sells at IRp 3.5/Kg, through manufacture into rope (ban) it will sell at IRp 1,500/Qu. Some rope makers estimate they can make 4 Quintal (Qu) rope per year, making IRp 6,000/year out of the business (estimated gross turnover). In Kathgarh, for example, a respondent knew 2 officially VRMC recognised contractors, for whom 8 – 12 babar collectors were working. Each collector was paying an IRp 50 yearly fee.

There is no control over the numbers of sub-contractors nor the quantity of grass extracted. However, the market will control the level of extraction. Since the prohibition of grazing animals in the dam catchment, the landless interviewed were in agreement that the quantity of babar grass available in the dam catchment has risen. Whether this lesson, the absence of unrestricted grazing, allowing regeneration of the forest area, has been noticed by the VRMC or others were not tested. But greater management of the common area will result in

higher production, an impossible vision, given the grazing pressure and the number of stakeholders involved.

Vegetable Trading

A few landless engage in vegetable trading, income is reasonable from November – March; the period when most vegetables are traded at low prices; Prices affordable to all. Outside of the above period, vegetables are expensive, with people unwilling to pay the high prices, turnover drops considerably.

Paddy Transplanting

Paddy transplanting is frequently undertaken by contractors. Contract rates range from IRp 2,000 – 4,000/acre, depending on area to be planted and the time within the season. Early planting tends to be more expensive, with competition for labour. Later paddy planting appears to have a degree of slack in the labour market, so tends to be cheaper.

Labour Substitutes

The use of pre-sowing and/or pre-emergent herbicide in paddy cultivation is used, but not widely. The pre/post planting use of herbicides does reduce subsequent weed emergence, the need for subsequent weeding is also reduced. However, the use of herbicides carries risks; Atrazine or Simazine used in a field adjacent and downstream of an earlier planted paddy has resulted in a 100% loss of the crop in the lower field.

Land owners in Panchkula District have the option of using people from Bihar for transplanting and weeding work. These migrants can often mobilise large numbers quickly, their pay rates often undercut the indigenous landless. Harvest work is usually undertaken by the indigenous landless.

Harvest Work

Harvest work wage is fixed and usually paid in kind:

- Paddy: several rates have been cited: 1/11th, 1/12th or 1/20th of the harvest for every acre harvested (cut and threshed). The proportion is negotiated, depending on the crop density, the estimated yield and the area to be harvested. Assuming a 15 Qu/acre yield, means payment of 1.3 Qu, representing IRp 900, which will be handed to the landless family engaged. If more than 1 family is involved, then proportions will be assigned.
- Wheat: 80 Kg for every acre harvested (cut and stocked). Assuming IRp 900/Qu is equivalent to IRp 720/acre.
- Maize: Harvest usually undertaken by family labour
- Pearl millet: Harvest usually undertaken by family labour
- Onion and potato: Transplanting, cash wage IRp 50/day; harvesting, cash wage IRp 50/day.

With the reduced incidence of crop failure, many of the landless have stated that there has been a significant increase in agricultural labouring work available. In interview, it was not unusual for respondents to state that they had harvested 2 acre paddy and 3 acre of wheat. One Nanheri land owning farmer stated he had harvested 26 – 30 Qu of paddy from an acre, resulting in his view from supplemental dam water irrigation, giving any hired labour 2.1 – 2.5 Qu (or 1/12th of the harvest). Prior to the dam, yields were at best 10 Qu/acre delivering a 0.8 Qu harvest wage payment. The difference represents a potential 200% increase in harvest wage payment.

If, as one respondent stated, he had harvested 3 acre wheat in the 2006/07 Rabi season, he was paid 240 Kg wheat, enough to feed his family for 6 months.

Ration Cards

The role of ration supplementation cannot be overlooked for the SC, ST and OBC, who make up the majority of the landless.

- White card – no ration supplementation
- Yellow card – able to purchase fixed quantities of wheat at IRp 5/Kg, in addition to other foodstuffs.
- Pink card – able to purchase fixed quantities of wheat at IRp 2/Kg, in addition to other foodstuffs

Subsidiary Occupation

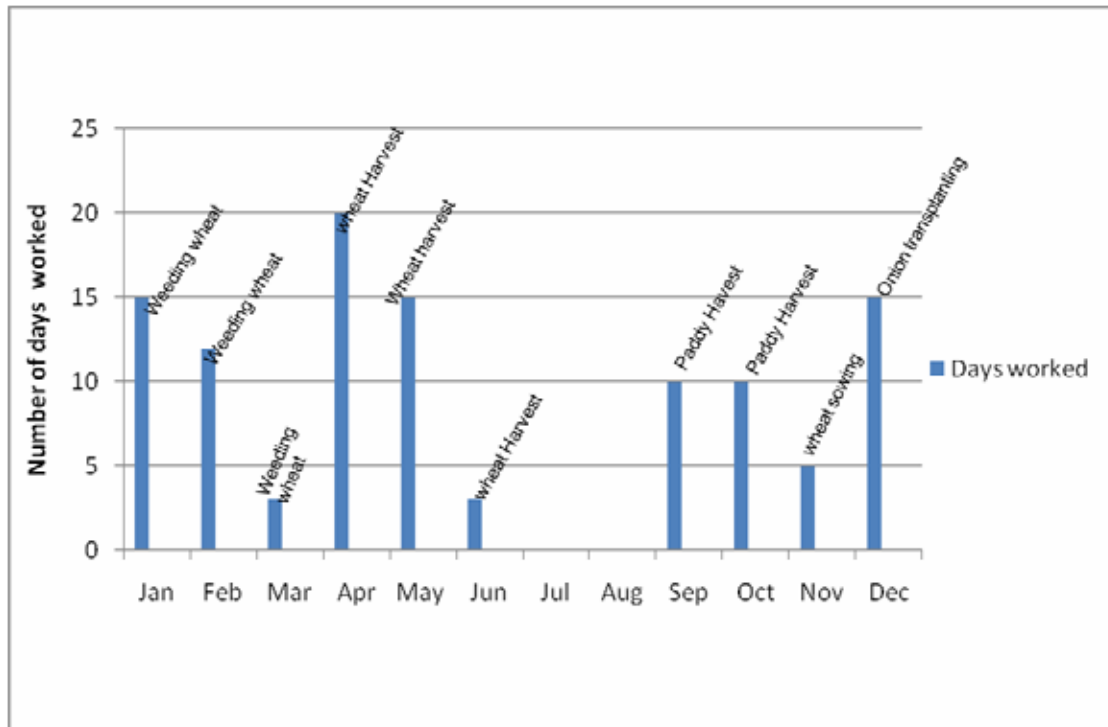
Depending on current financial circumstance and caste, the respondents' wives may or may not work as agricultural labourers. All wives look after the livestock, through the provision of water and fodder. Most buffalo and cows are now stall fed, but may be grazed from June – September. Families with less than 5 goats tend to stall feed them, they cannot spare the labour for grazing. Greater than 5 goats, it appears the small herd is grazed, often in conjunction with a neighbour's herd.

Harvest work, weeding and transplanting (see Table 3) occur at set times of the year. Outside of these periods, the landless undertake other activities such as babar grass collection. Nevertheless, in the period June, July and August no or very little work is available. The provision of work at this time of year would be useful.

A number of landless interviewed had work with the project or with the Forest Department. During the period of the project the income stream has proved useful in paying for social events, children's education and in the purchase of consumables (mobile telephones, radio based terrestrial telephones seem to be proliferating amongst the landed and the landless of Nayagaon and Nanheri). Looking to the longer term, with no project, the development of these communities' natural resources potential will become increasingly important.

In an effort to quantify the number of days of employment and the types of operation, a bar chart (see Figure 1) for a landless agricultural labourer has been developed.

Figure 1. Estimated number of days worked by an Agricultural Labourer



Wage rates vary, depending on location, time of year and on occasions the type of work. Between Panchkula and Yamanunagar there is often an IRp 20 – 50 difference, a function of labour supply and demand. Labour appears to be in short supply in Bharauli, consequently land owners are accessing alternatives. Demand of labour is high at sowing time; wages are understood to rise for a short period to accommodate early planting. Some work like onion transplanting or paddy transplanting attracts higher wages; the use of contractors reduces the upward pressure on wages.

Given that the US\$ - Rupee exchange rate is IRp 40/US\$, the labourer earns IRp 23/day/year, equivalent to US\$ 0.57/day, some way below the Millennium Development Goals (MDG) of US\$ 1/day.

These days worked were supplemented with income from 1 buffalo and the potential sale of a buffalo male calf. The labourer migrated on a daily basis to neighbouring villages, to undertake labour work essentially following the season. Consequently the total income for this landless agricultural labourer is estimated to be as follows, assuming an IRp 70/day wage rate:

Table 4. Income calculation for an Agricultural Labourer

Activity	Month	Estimated Income
Weeding Wheat and other crops	January	INR 1,050
	February	INR 840
	March	INR 210
Wheat harvest – harvested 2 acres = 160 Kg wheat, priced at IRp 900/Qu	April	INR 1,440
Wheat harvest, some summer season crops planted	May	INR 1,050
No Work	June	INR 210
	July	INR 0
	August	INR 0
Paddy harvest - 3 ac at 1/12th of harvest - about 2 Quintal at IRp 675/Qu	September	INR 1,350
5 days, sowing wheat and other crops	October	INR 700
Onion transplanting	November	INR 350
	December	INR 1,050
Income from milk production (1 buffalo)		INR 3,000
Total Income		INR 11,250

Days of Landless Employment

The quantitative survey collected data on days employed through farm labour within the village, by the household head and other household members. The average number of days employed has been analysed.

Table 5 shows the average number of days employed in a year, by all household members before and after dam construction. A comparison of average days of household employment before and after dam construction shows that all landless households in all communities have seen an increase in the average numbers of days employed, Bharauli excepted.

Kansli has shown a 50% increase from a very low base, rising from an average of 13 days to 20 days/year, an increase of 7 days. Ibrahimpur has seen an average of 22½ days per household per year. Notwithstanding the dam's dysfunctionality, 2 tube wells have been installed and commissioned; the area under irrigation has increased. Consequently the area under paddy, wheat and summer season crops has increased, with a commensurate increase in demand for labour

Other communities have seen increases, but not of the same order, with Nayagaon seeing a 12% increase in employment, a high figure given its remote location. Bhagwanpur has seen only a marginal increase (0.94%). There are

problems with dam management in Bhagwanpur, with most of the water being used to irrigate paddy, rather than the Rabi season crops. Employment opportunities are limited with paddy compared to Rabi season crops.

Table 5. Average number of days employed in a year (through farm labour within the village) by all household members, by community, before and after dam construction

Community	The average number of days employed by all household members, in different communities, before dam construction	The average number of days employed by all household members, in different communities, after dam construction	The percentage increase or decrease in average days employed by all household members, in different communities
Bhagwanpur	54.24	54.75	0.94%
Bharauli	86.47	57.94	-32.99%
Ibrahimpur	78.45	100.9	28.62%
Kansli	13.33	20	50.04%
Kathgarh	86	99.71	15.94%
Mirpur	0	144	
Nayagaon	67.94	76.17	12.11%
Thaska	88.88	94.47	6.29%

The figures shown in Table 5 are for the number of days in a year a landless household finds agricultural labouring work within the village. Landless households have access to multiple income sources; agricultural labouring work is an important, but not their total income. These figures do not represent the total employment profile; there will be other work, which was not interviewed.

Expressed in monetary terms, assuming a wage rate of IRp 50/day means that households in Thaska, Mirpur, Nayagaon and Kathgarh have an increase in income of IRp 279, IRp 7,200, IRp 411 and IRp 685 respectively. With the exception of Mirpur, these are small sums, but even an IRp 279 will purchase 18½ Kg atta (assuming atta is 15 Rp/Kg), which may represent a 4 – 5 day supply of atta for an average landless family. It is anticipated that the percentage differential will increase as the respective community cropping patterns change, irrigation water management improves, and irrigation pipelines are extended and better maintained.

Bharauli has experienced a 33% reduction in employment since the dam was constructed. The reduction represents 28½ days or IRp 1,425 loss of income (assuming the wage rate is IRp 50/day). There are 17 landless households in Bharauli. The reduction of employment represents a gross loss to the Bharauli economy of IRp 24,225. The fall is likely to be made good by (may indeed be caused by) employment opportunities in Raipur Rani and the increase in buffalo and cow numbers; 5 and 4 animals respectively.

The cropping pattern and the Bharauli economy have changed significantly since dam construction, away from paddy/wheat to the cultivation of seed crops (cauliflower, carrot and radish). As previously stated these crops are labour intensive or labour demanding.

Interviews with landless has suggested that labour availability among the landless is tight. A number of landless households interviewed in Bharauli suggested that seed producers were starting to focus on labour saving alternatives. The Bharauli landless have seen a reduction in agricultural labouring opportunities, something confirmed by an apparent 33% reduction in the average number of days employed as agricultural labourers (see Table 5). The seed producing land owners are now using pre/post emergent herbicides or labour from Bihar (being a cheaper option).

Migration

Data collected by the quantitative survey showed considerable variability in migration between the individual communities. Table 6 shows the total number of days migrated by landless households in the individual communities. Most of the communities had shown a significant increase in migration, ranging from an extra 655 days (Bhagwanpur) to no change in the number of days spent migrating (Kansli and Nayagaon).

The Kansli result deviates from the accepted norm and contrasts significantly with the days employed data. Kansli has a reputation of being a migrant based community, something confirmed by the qualitative survey, which found large numbers were migrating to Punjab to cut poplar trees. According to information collected these migrants stayed away for 6 – 8 months, returning during the monsoon, when work was curtailed. It is therefore surprising to see only 50 days are spent migrating. Much of the migration work is felling poplar trees, attracting a daily wage of IRp 80 – 150/day. Considerably better than they receive from agricultural labouring work.

In Mirpur, the demand for labour is strong, from waged labour in Raipur Rani, village based agricultural labour and from other sources. Mirpur has 2 landless households, who during interview suggested that they had stopped migrating. Instead, they were finding adequate work locally, indicating that there is strong demand. More recently, the itinerant labourers' camps have been expanding or establishing new camps.

In Thaska, the average number of days spent migrating has fallen, as has the total number of days. The recent increase in employment opportunities in Kota Amb, which is about 10 km distant, has seen many landless find employment. Similarly in Bharauli, where the dam was instrumental in changing the cropping pattern to seed crop cultivation; the level of migration has increased, principally because the employment opportunities offered by factories and stone crushers are driving the migration process. Waged agricultural labour cannot compete with these opportunities.

Table 7 shows the average number of days spent migrating by individual landless households, reflecting the total number of days spent migrating in Table 6. On an individual basis, significant increases in average number of days spent migrating per household have been seen in Ibrahimpur and Bhagwanpur of 54% and 47% per household respectively.

A fundamental question is the increased migration, in the context of apparently increased agricultural labouring work opportunities. Mirpur and Thaska have

seen decreases in migration.

During interview, Ibrahimpur respondents suggested that acute water problem may be forcing people to migrate. Poor electricity supply has meant that deep tube wells are not performing to expectation, the dam is completely dysfunctional. The poor delivery of water is insufficient to sustain good crop yields, no crop failure was seen, but many Ibrahimpur landless suggested that low crop yield was a direct consequence of poor irrigation water application; a strong incentive to revitalise their dam. In Bhagwanpur, poor dam management and the focus on paddy, reducing Rabi season employment opportunities may be an explanation.

Table 6. The total number of days spent per year migrating to find employment by community, before and after dam construction

Community	Total number of days spent migrating before dam construction	Total number of days spent migrating after dam construction	Difference; increase or decrease average number days spent migrating
Bhagwanpur	1205	1860	655.00
Bharauli	1640	1840	200.00
Ibrahimpur	860	1260	400.00
Kansli	150	150	0.00
Kathgarh	1740	1990	250.00
Mirpur	550	0	-550.00
Nayagaon	1280	1280	0.00
Thaska	2050	1734	-316.00

Table 7. The average number of days an individual landless household migrates per year to seek employment, before and after dam construction

Community	Average number of days spent migrating before dam construction	Average number of days spent migrating after dam construction	Percentage increase or decrease in the average number days spent migrating
Bhagwanpur	36.5	56.36	54%
Bharauli	96.5	108.23	12%
Ibrahimpur	78.18	114.54	47%
Kansli	50	50	0%
Kathgarh	49.71	56.85	14%
Mirpur	275	0	-100%
Nayagaon	75.29	75.29	0%
Thaska	75.92	64.22	-15%

Debt

Overall, the level of debt has increased among all landless households. Table 8 shows the total levels of debt for each of the dam communities. Bhagwanpur and Bharauli have seen significant levels of debt increase of 53% and 36% respectively. These levels of debt increase are congruent with the national level of debt increase among the agricultural community.

Such levels of debt increase over a 5 – 10 year period must be of political, social and economic concern. These levels of debt increase are unsustainable. Some mitigating reasons exist for these debt increases, the landless households appear to be taking on debt for a variety of reasons, principally through house construction, as over the life of the project the level of house refurbishment has been high. The house quality section shows there has been wholesale house refurbishment, from poor quality housing to good quality housing. Part of the house refurbishment process has to be financed from their own resources, hence the need for finance and increased debt.

Table 8. The total community based debt, held by landless households, before and after dam construction

Community	Total debt held by landless households before dam construction (Rp)	Total debt held by landless households after dam construction (Rp)	Difference; increase or decrease in total debt (Rp)
Bhagwanpur	316,000	480,500	164,500
Bharauli	283,000	387,000	104,000
Ibrahimpur	55,000	74,000	19,000
Kansli	20,000	30,000	10,000
Kathgarh	185,000	204,000	19,000
Mirpur	29,000	38,000	9,000
Nayagaon	114,000	197,000	83,000
Thaska	70,000	108,000	38,000

In some cases debt has been taken on in 1995 – 2000, no repayment has ever been made or was intended. Most respondents admitted to default and have never taken a loan since. A proportion of the debt seen in Table 8 will be long term incipient debt; no attempt has been made to quantify this figure. There appears to be lower levels of delinquency among the landless who have taken some form of debt in the last 5 years.

Debt on an individual household basis (see Table 9), shows that Bharauli has seen the highest increase in debt, closely followed by Bhagwanpur and Nayagaon with increases of 36%, 52% and 72% respectively. The reasons for the steep increase in debt has never been articulated by the landless interviewed. In Nayagaon, the debt increase may be indirectly associated with the dam. Several landless as a result of information received at field days have invested in vermi-compost structures. In addition at least 2 landless households are known to have obtained an IRp 35,000 livestock loan. The livestock loan is a government supported scheme, linked to animal husbandry training and a 50% subsidy on the purchase of a buffalo.

In Bharauli, the debts may be to fund the investment in livestock, as buffalo, cow and goat numbers owned by landless have all increased. Notwithstanding that, the Indira Avas Yojna Scheme (home building) has been very active. As stated in the house quality section, many landless take the basic structure and add significantly to it.

The number of individual landless households with debt before (and after) the dam construction is shown in Table 10. In all communities, except Bharauli and

Kathgarh, there has been no change in the numbers of indebted landless households. Bharauli has seen one household taken on debt, probably to finance house construction or to purchase livestock (less likely). Kathgarh has seen the number of indebted household drop (4). It is difficult to determine the reason (or complex of reasons). However the community is politically very well connected, with their own resident MLA. It may be that some debt has been written off. Nevertheless, the community's economy rests on milk production and on sugar cane, both of which are highly profitable, sufficient to repay debts.

Experience has shown, elsewhere in the Haryana Community Forestry project, that landless and poor households can and do repay debts of IRp 20,000 and more. Hence the indebted landless in the dam communities do have the capacity to do likewise, particularly in view of increased economic activity.

Table 9. The average debt held by landless households, in individual communities, before and after dam construction

Community	Average debt held by individual households before dam construction (Rp)	Average debt held by individual households after dam construction (Rp)	Difference; increase in the average individual household debt (Rp)	Percentage increase between before and after dam construction
Bhagwanpur	9,575	14,560	4,985	52%
Bharauli	16,647	22,764	6,117	37%
Ibrahimpur	5,000	6,727	1,727	35%
Kansli	6,666	10,000	3,334	50%
Kathgarh	5,285	5,828	543	10%
Mirpur	14,500	19,000	4,500	31%
Nayagaon	6,705	11,588	4,883	73%
Thaska	2,592	4,000	1,408	54%

Those individual landless households without any debt, has remained unchanged between the before and after scenarios. The numbers have remained constant. Thaska is apparently very risk or debt averse, with 22 of the 27 households not taking any debt or loan. The reason(s) is not known, however the proximity to Kala Amb with a lot of employment opportunities may account for the unchanging debt situation.

The dam construction has had no direct effect on the level of debt. Nevertheless, through the construction of the dam, the follow-up project activities through the establishment of SHGs, the initiation of savings and loan activities, the reduced risk and increased confidence of having irrigation water which assures a yield, has perhaps influenced the landless into taking out loans. The access to credit will allow the landless to capitalise on the livestock and other opportunities presented as a result of the dam.

The loans have focused on home construction and investment in livestock. The livestock loans may be a result of the increased confidence of achieving a viable livestock enterprise because of green fodder availability. All of which will serve to increase the level of indebtedness, nevertheless the indebtedness figure has to be monitored. However, the average debt of a landless household is by far lower than the debt levels experienced by land owning households. These farmers

often have a total loan portfolio running to lakhs of rupees, where repayment is often impossible. In these cases the excessive debt has led to social problems and a breakdown in agricultural activity.

Table 10. The number of individual households, by community, who carried debt, before and after dam construction

Community	Total number of households with debt before dam construction	Total number of households with debt after dam construction	Difference; increase or decrease in numbers of households with debts
Bhagwanpur	24	24	0
Bharauli	13	14	1
Ibrahimpur	5	5	0
Kansli	1	1	0
Kathgarh	16	12	-4
Mirpur	2	2	0
Nayagaon	9	9	0
Thaska	5	5	0

Housing Quality

Figure 1 and Figure 2 show the assessed house quality before and after dam construction in each dam community. Definitions have been determined for a “good house” – a brick built house, rendered, with a tiled or tin roof; a “half good” house – a house which is not rendered, or the roof construction is poor. A “poor” house will be of mud construction, with or without a tin or tiled roof. A “thatched roof” is a mud built house with a thatched roof.

Overall, there has been a significant increase in house quality. In Bhagwanpur, Bharauli and Thaska the landless dwellings have shown the highest increases in “good” house construction of 1,400%, 333% and 180% respectively. Other communities including Ibrahimpur have shown increases, but not in the same proportion. Mirpur is the exception with the landless housing adjudged to have remained in the same “poor house” construction state.

The principle reason for the improved house construction quality is the active promotion of the Indira Avas Yojna house improvement scheme. Under the scheme, eligible groups obtain an IRp 25,000 grant from the Government. The grant administered and managed by the Panchayat is to construct:

- A kitchen
- A bathroom
- A veranda
- A living room cum bedroom.

Figure 2. House quality before dam construction

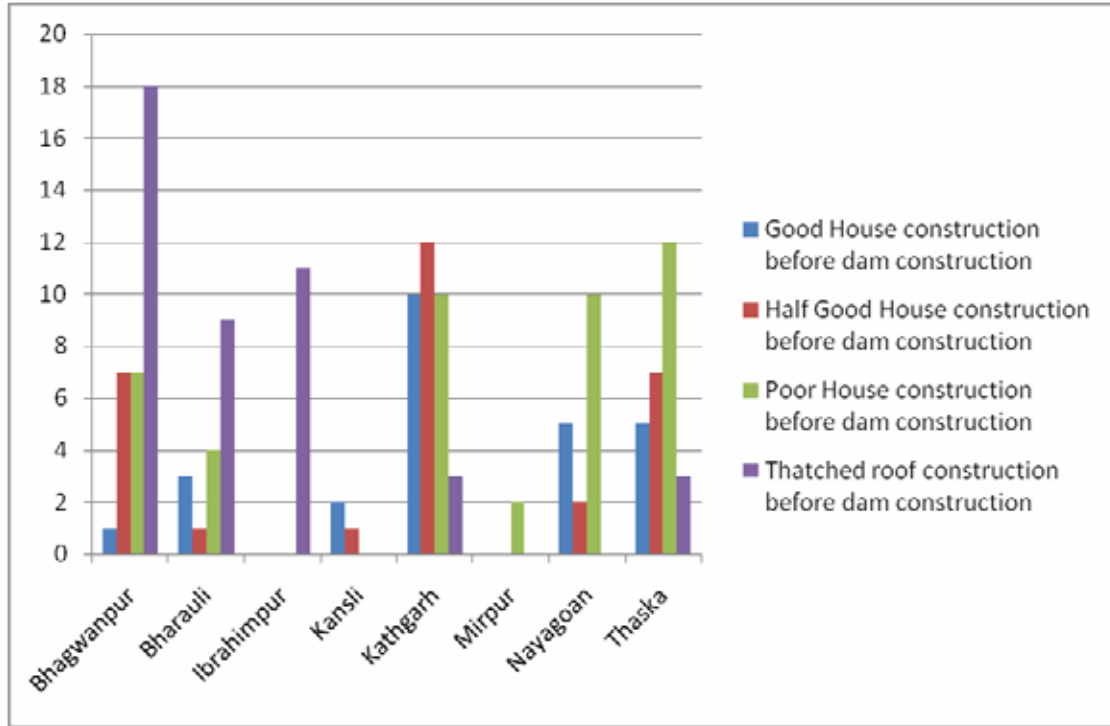
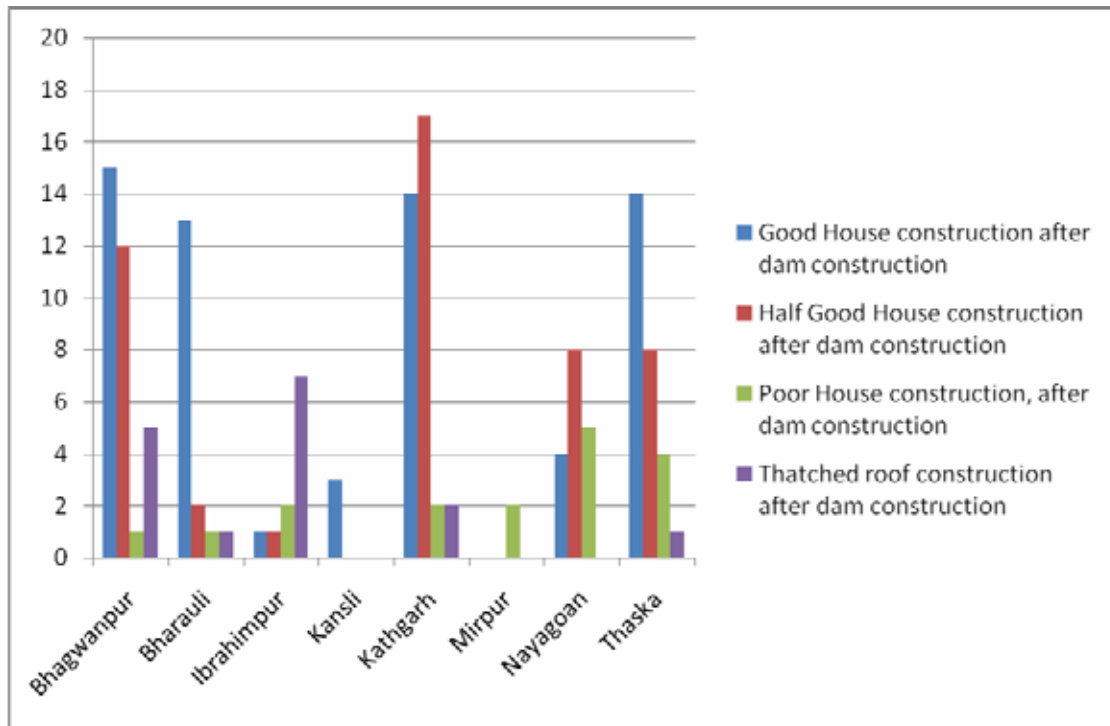


Figure 3. House quality after dam construction



Many of the landless family respondents interviewed had added a number of rooms, both at the side (at ground level) and as another storey. In Bharauli, a

respondent started with the basic Indira Scheme room format and has added 2 storeys. The additional rooms have been constructed and paid for by the respondent's family. The cost can be up to IRp 80,000 (for 2 rooms). The money has come from a number of sources, labour work, relatives or taken loans from shop keepers (1 respondent has an IRp 6,000 debt from different hardware stores) or from bank loans. (A Bharauli landless has taken an IRp 10,000 loan from a finance institution in Raipur Rani, specifically to finance house construction.)

Respondents maintained that the dam construction had no influence on their home construction activities. Nevertheless, there is strong evidence that the dam does have indirect influence, as many respondents acknowledged that the increased economic activity within the community was a reassurance. The evidence is anecdotal, but landless (and landed) have built or are building structures, the finance for which must come from their own economic activity and to a certain extent from loans, grants and subsidies.

Access to Electricity

Most dams were constructed 2001 – 2005, the period when many households acquired a formal connection to the electricity grid. A formal connection is defined as the installation of an electricity meter by the electricity company. No connections attract a 100% subsidy; the connections have to be paid for, IRp 500/connection deposit.

All communities, with the exception of Ibrahimpur, have seen an increase in the number of households connected to the grid (See Figure 4 and

Figure 5). Thaska and Bharauli have seen 140% and 133% increases in connections respectively. All landless households in Kansli have paid for electricity connections.

The project cannot claim that as a result of the dam, people subscribed to an electrical connection. Nevertheless the process of rural electrification may have proceeded at a perhaps accelerated pace in the dam villages, through the ability and confidence to pay the deposit and maintain payments for electricity consumed.

All farmers interviewed stated that they had no problems paying the monthly electricity bills, which were in the order of IRp 80 – 150/month. The first electricity bill, some 6 months after installation was always large, being the accumulation of 6 months unpaid bills, about IRp 600. The spike in payment sometimes caused problems. Respondents stated because of the increased work available, they had little trouble in paying the electricity bill.

Some respondents interviewed stated that they had connected to the grid as a family. A family member had made the formal request, the metre was installed in the relative's house, and connection was made to adjoining relatives houses'. The bill was divided equally irrespective of proportion of electricity used.

Lighting is clearly important culturally; having light is an overt and clearly visible status symbol. There almost appears to be a social stigma attached to those who have been unable to afford electricity. Bhagwanpur had 20 connections before dam construction and 16 connection subscribed after dam construction. The reduction in the number of connections is inexplicable; superficially it appears that 4 landless have been disconnected.

The most frequently voiced complaint is about disruption of electricity supply. It is understood to be "off" more than it is "on". Respondents estimated that the electricity was "on" for about 8 hrs in 24 hrs; an issue that will compromise development. All deep tube wells have submerged electrical pumps; irrigation to fields is delivered over a period of days rather than hours, increasing the water used and often compromising crop performance.

Figure 4. Before dam construction: Households with and without a connection to the electricity grid

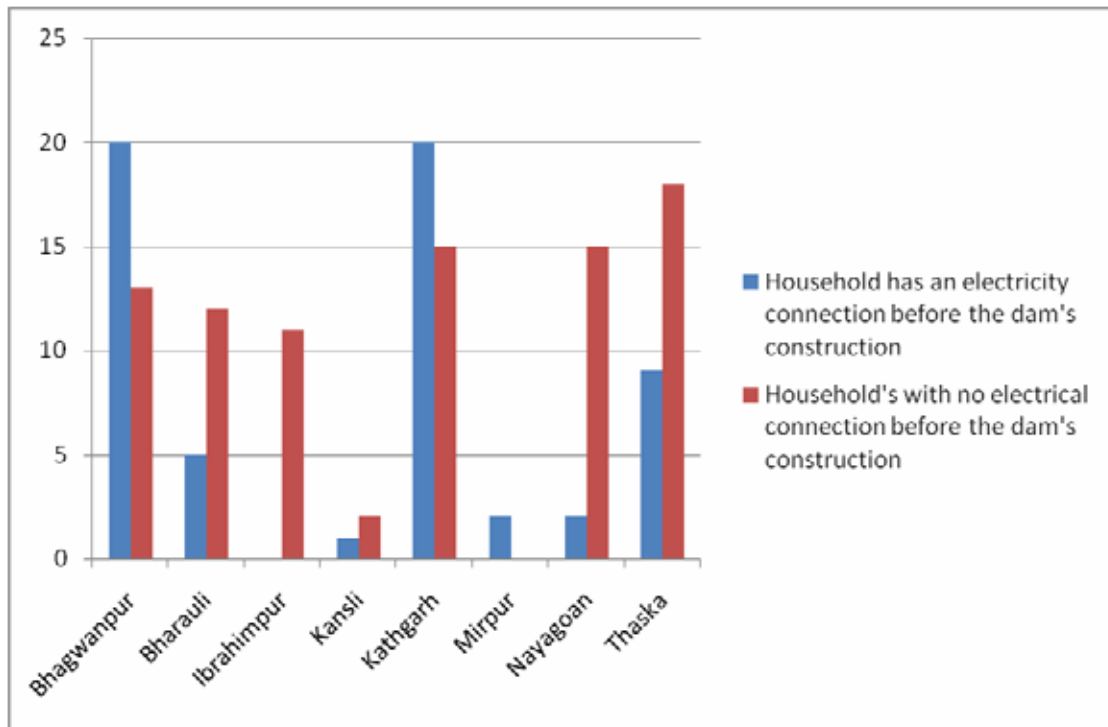
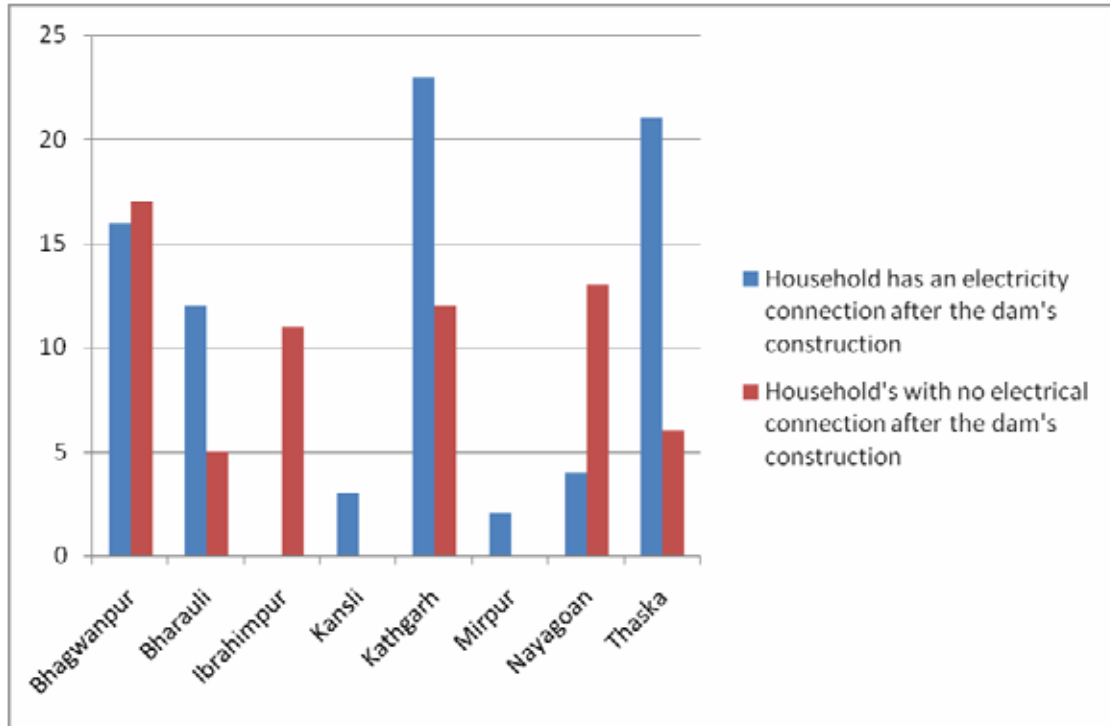


Figure 5. After dam construction: Households with and without a connection to the electricity grid

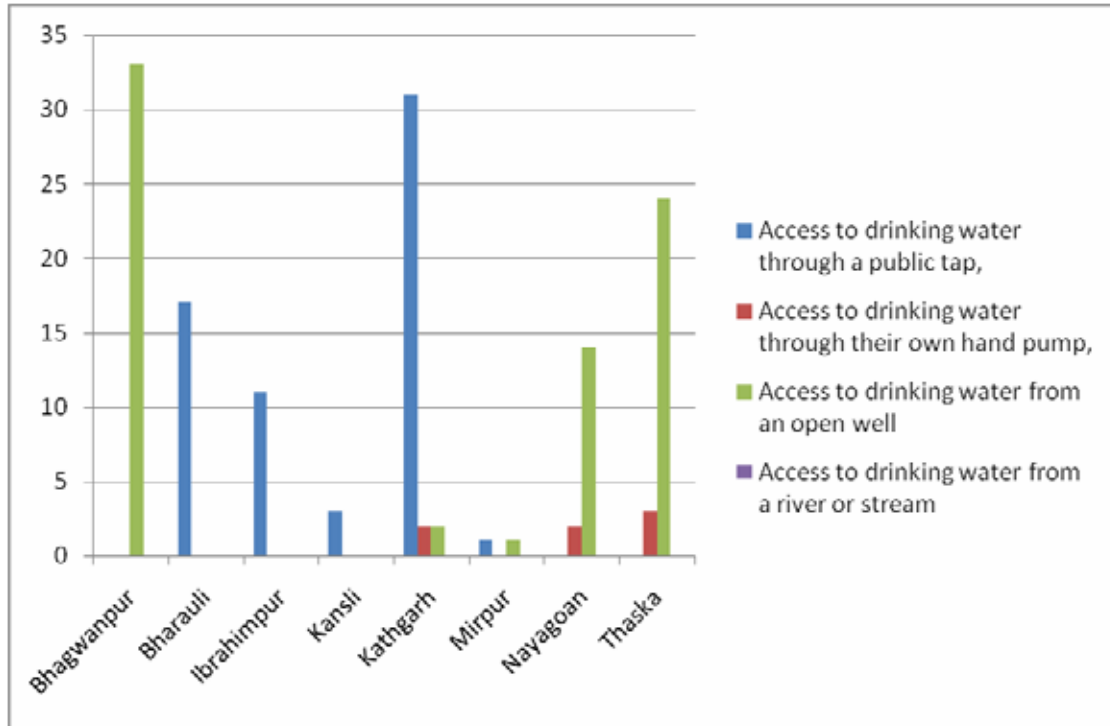


Access to Drinking Water

There has been significant change. All landless from Bhagwanpur (100%), 85% of landless from Thaska, 41% of Nayagoan landless have over the dam construction period received reticulated water supply through a tap. Overall, 86% of landless receive drinking water through a government funded water reticulation system, contrasting with 44% before the dams were constructed. Only 2 landless claim they receive drinking water from an open well, when before dam construction 74 landless families (51%) obtained water from an open well.

The provision of drinking water is a Panchayat and State Government responsibility. The construction of water reticulation systems was independent of the dam's construction. Furthermore the dam's presence or absence did not have any influence on the installation of village water reticulation systems; these follow previously agreed District Development Plans. The Health Department in conjunction with the Public Works department installed and maintains the drinking water reticulation system.

Figure 6. Drinking water access before dam construction



Prior to the dam’s construction Bharauli, Kathgarh, Kansli and Ibrahimipur already had a water supply (see

Figure 6) installed. Over the period of dam construction, water reticulation systems were installed in Bhagwanpur, Thaska and Nayagoan.

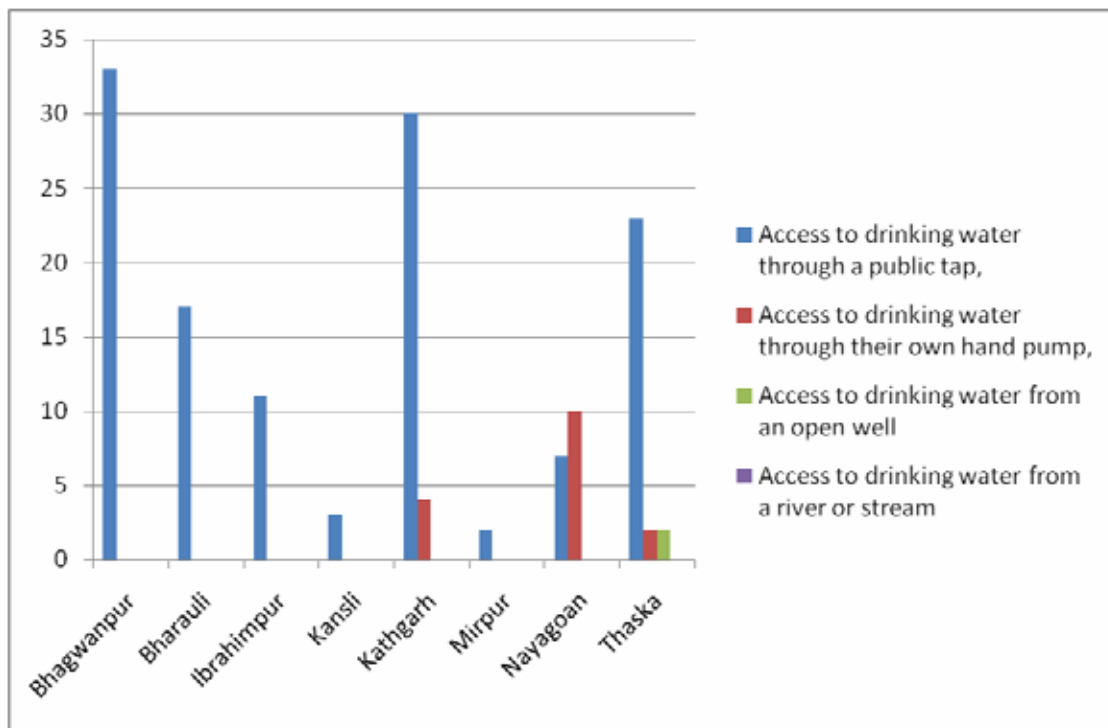
Figure 7 shows the current drinking water access, by community.

The Bhagwanpur drinking water reticulation system has reached all the landless interviewed, not true of Nayagoan and Thaska, where 16 landless are still using hand pumps and open wells. No landless ever used a river or stream.

In interviews, respondents frequently complained of water supply variability. There were sustained periods where drinking water was not available. Disruption

in drinking water supply, results in the landless diverting to the nearest well or hand pump for their drinking water needs.

Figure 7. Drinking water access after dam construction



A number of landless interviewed had paid for the drinking water reticulation system to be extended into their property. For example a landless respondent, at a cost of IRp 2,000, had paid for a tap to be located in his house ; reducing the water collection time to nothing. In another example from Nayagaon, a landless entrepreneur spent IRp 3,000 – 4,000 for the installation of a hand pump in their back yard, thus avoiding water supply disruption. Both extensions had been financed through increased labour work or through increased livestock production, an indirect benefit of the dam. It is anticipated that such water supply extensions will develop over time.

Access to Irrigation Water and the VRMC

The majority of landless interviewed did not have any links with VRMC members or officers. The VRMC is seen as a land owners' institution. Technically one VRMC member had responsibility for linking the VRMC with the landless. That link, *sensu strictu*, was dysfunctional. A few women were members of an SHG, a mixed performance was reported, some SHG's were working well, in others performance was not so good. In the poorly performing SHG's the respondent had not been to a meeting for more than 6 months, no reason had been given, but it may be related to money and status within the society. The conclusion is that HCFP links between the land owners and the landless has considerable capacity for improvement, benefiting everyone.

In so far as the landless were concerned they had not benefited directly from the dam, nor had there been any special HCFP scheme targeted at the landless. Untrue, as the project had a strong focus on establishing SHG's, 3 dam communities did not have SHGs. Nevertheless livestock owners admitted that the dam had brought benefit to them through increased animal fodder availability and improved crop performance and a changing cropping pattern. Many landless regarded these benefits as benefits to the land owners rather than to themselves, an issue of perception.

It has been suggested that the landless should receive some cash in return for their share of the dam irrigation water. The Nayagaon water contractor has paid IRp 50,000 for the dam water. There are 17 landless families in Nayagaon, if 20% of the contracted sum is allocated, each landless family will receive IRp 588.

By contrast, several Nayagaon landless households are developing a milk production business, which according to the calculations in the milk production section makes over IRp 5,000, with a 28% increase being attributed to the dam.

Notwithstanding the problems of establishing a water trading system, it may be easier to let the landless benefit from the dam through their own economic efforts. Nevertheless the Nayagaon VRMC has recognised the issue of the landless and their participation in the dam and has embarked on establishing a system to allow the landless to participate in the dam's overall benefits.

Livestock

Livestock Numbers

Livestock numbers of buffalo, cow, bullock and goats are given in Table 11, the table shows the increase and decrease in animal numbers before and after dam construction.

Buffalo and Cows

Between the communities there has been a rise and fall, with a net increase overall in cow (9) and bullock (4). Buffalo has shown a net decrease. Bharauli has gone against the trend by increasing buffalo numbers by 5.

For cows, congruent with the overall increase in cow numbers, there has been the increase in the number of farmers keeping cows. The increase in cow

numbers has been supported by increased availability of fodder, the reduced time to collect fodder and the availability of drinking water.

The steady increase in cow numbers and goat numbers has been supported over time by the community practice of fielding out of large ruminants to families who do not have large ruminants, by agreeing to purchase the animal after keeping the animal from just after birth to maturity. In such a case, the keeper will purchase the animal for a sum, less the agreed cost of maintenance. Or if the animal keeper cannot afford to purchase, or does not wish to purchase, the animal will be sold back to the original owner for the agreed cost of maintenance. The mortality for buffalo and cow in a village context is believed to be high, in the region of 20%.

Cows are likely to follow the same trend as buffaloes. Being cheaper to purchase than buffaloes, requiring less maintenance (no need for the provision of a wallow) is likely to be more popular. Overall there has been a net increase in cow numbers (9), with Thaska and Ibrahimpur increasing their cow numbers by 7 and 8 respectively. Bhagwanpur has seen cow numbers fall by 7, the reason is unknown, disease and/or poor animal husbandry may be to blame.

Goats

Conversely, the goat numbers show a significant and substantial increase (+ 39) over the 3 – 5 year period which was interviewed.

Goat ownership among the landless has shown a significant increase, an additional 10 farmers. Ibrahimpur has seen 3 landless farmers invest in goat production. Similarly in Kathgarh and Ibrahimpur,

To purchase a goat costs IRp 2,000 – 5,000, depending on age and breed. In contrast, the cost of a bullock, cow or buffalo, this will be between IRp 10,000 – 30,000. A young mature female buffalo can sell for about IRp 30,000, if it is from a clearly defined breed (Kurukshetra). It is possible that livestock farmers may adopt the “build-up” strategy of increasing goat numbers, as a strategy to switch into large ruminants (cows and buffaloes) once they have built their goat herd.

Several landless families interviewed have had money, sufficient to purchase 1 – 2 goats. The money may be a surplus from waged labour. Investing in goats is a way to increase the return on money, higher and easier as compared to bank interest. However risk is significantly higher.

The aggregated increase or decrease of cow, bullock and buffalo numbers, taken over the 3 – 5 year period, before and after dam construction, may not be significant. It is difficult to assess in the absence of information on livestock numbers, kept by landless households over the life of the project. The livestock numbers as currently seen, appear to show the normal variation in number over a 3 – 5 year cycle. The exception is goat, where the trend is for increasing numbers.

Bullocks

A very minor increase in bullock numbers has been observed. The increase in bullock ownership in Nayagaon and Thaska is interesting, as bullocks are a draught animal associated with ploughing and field preparation; It is possible the number of tonka (carts) has increased.

What would have been more relevant is to assess the increase (or decrease) in the number of tractors, trailers and land cultivation equipment. Speculatively the number of tractors per village has probably seen a significant increase, these being purchased by land owners, but will likely be hired by landless. Tractor and trailer availability will set the landless tonka owner at a disadvantage.

Livestock Ownership

Table 12 shows that livestock ownership amongst the landless for all livestock species (buffalo, cows, bullock and goats) has increased. A positive development, but can it all be attributed to the advent of the dam? Probably, because the landless have gained increased access to animal fodder.

Buffalo and cow ownership has shown significant increases. Kathgarh is recognised as a wealthy village, with a spread of enterprises, of which milk production is known to be an important source of income for many landless. The buffalo population has apparently remained static; the cow population has contracted by 2 animals.

Whilst the number of landless owning Buffaloes has seen an increase (an additional 4 landless livestock keepers now own buffaloes), throughout the 8 communities, the actual buffalo numbers have significantly decreased, by 11. Bhagwanpur, Nayagaon and Thaska have sustained the most losses of 5, 2 and 3 buffaloes respectively. The causes for these losses are unknown, but may be accounted for by poor nutrition, disease and problems associated with parturition (hypocalcaemia, hypomagnesaemia).

Table 11. Table showing the Buffalo, Cow, Bullock and Goat numbers before and after dam construction

	Buffalo			Cow			Bullock			Goat		
	Number of buffalo before dam construction	Number of buffalo after dam construction	Difference in ownership	Number of cows before dam construction	Number of cows after dam construction	Difference in ownership	Number of bullocks before dam construction	Number of bullocks after dam construction	Difference in ownership	Number of goats before dam construction	Number of goats after dam construction	Difference in ownership
Bhagwanpur	26	21	-5	15	8	-7				5	5	0
Bharauli	13	18	5	2	6	4				0	4	4
Ibrahimpur	11	6	-5	2	9	7				0	8	8
Kansli	2	0	-2	4	4	0				8	15	7
Kathgarh	38	38	0	12	10	-2				0	12	12
Mirpur	5	6	1	0	0	0				0	0	0
Nayagaon	15	13	-2	11	10	-1	0	4	4	1	7	6
Thaska	22	19	-3	11	19	8	2	2	0	0	2	2
		Net Change	-11		Net Change	9		Net Change	4		Net Change	39

Table 12. Table showing the number of Landless farmers who have Buffalo, Cow, Bullock and Goats before and after Dam Construction

	Buffalo			Cow			Bullock			Goat		
	Number of farmers owning buffalo before dam construction	Number of farmers owning buffalo after dam construction	Difference in ownership	Number of farmers owning cows before dam construction	Number of farmers owning cows after dam construction	Difference in ownership	Number of farmers owning bullock before dam construction	Number of farmers owning bullock after dam construction	Difference in ownership	Number of farmers owning goats before dam construction	Number of farmers owning goats after dam construction	Difference in ownership
Bhagwanpur	12	14	2	10	8	-2				1	1	0
Bharauli	9	9	0	2	1	-1				0	2	2
Ibrahimpur	5	4	-1	1	4	3				0	3	3
Kansli	1	0	-1	1	2	1				1	1	0
Kathgarh	17	20	3	6	7	1				0	2	2
Mirpur	2	2	0	0	0	0				0	0	0
Nayagaon	10	10	0	6	7	1	0	2	2	1	2	1
Thaska	10	11	1	5	6	1	1	1	0	0	1	1
		Net Change	4		Net Change	4		Net Change	2		Net Change	9

Livestock Migration

According to the quantitative survey, before dam construction three landless migrated with their cattle, for 180, 200 and 120 days respectively from Ibrahimpur (2) and Thaska (1). After dam construction, 2 landless migrated for 200 and 120 days, one each from Ibrahimpur and Thaska respectively. One farmer in Ibrahimpur has stopped migrating, because he considered that there was sufficient fodder in the Ibrahimpur area, albeit very expensive. More significantly, the areas where he used to migrate have now been demarcated (unofficially) and populated by other farmers with their crops and livestock. There is barely enough fodder for the resident animals, let alone his herd of cattle, notwithstanding the inevitable disputes over grazing.

No respondent interviewed in the qualitative survey had engaged in migrating with their livestock. The numbers of animals involved did not justify migration, moreover the landless interviewed were strongly focused on developing a milk production business. Fodder availability from the dam catchment, the bunds of farmers' fields and cultivated fodders acted as a strong incentive to focus on village based milk production.

Milk Production

Two data sets were collected that of actual milk production per day, before and after dam construction; and estimates of income from milk production. The estimated milk production income has not been analysed, as the figures are likely to be estimates at best, at worst, mere conjecture. Any questionnaire collected income figures are considered to be unreliable.

Table 13. Estimated daily milk yield before and after dam construction

Village	Total Milk Production before dam construction (in ₹/day)	Total Milk Production after dam construction (in ₹/day)	Difference between before and after
Bhagwanpur	24	33	9.0
Bharauli	8	19	11.0
Ibrahimpur	10	17	7.0
Kansli	4	3	-1.0
Kathgarh	31	26.5	-4.5
Mirpur	4	4	0.0
Nayagaon	25	32	7.0
Thaska	25	28	3.0

Table 13 shows the farmer estimated daily milk production before and after dam construction; of the 8 communities surveyed, 5 communities have seen daily production increases ranging from 3 ₹/day to 11 ₹/day. Two communities (Kansli and Kathgarh) showed a drop in daily milk production. The Kansli figure is credible, given the level of out-migration. The Kathgarh figure is less credible as the village has a significant number of very good livestock farmers,

The largest daily production increase is Bharauli, unsurprising as the village is very market driven. The proximity of Raipur Rani puts the community in a prime location to respond to market demand through the development of a vibrant dairy industry.

The daily production increase is corroborated by the number of farmers who have started a milk production enterprise since the dam's construction. Table 14 shows the number of farmers who did not have a milk production enterprise before the dam's construction and the number of farmers who have started a milk production enterprise, since the dam was constructed. Bhagwanpur has seen 8 farmers start a milk production enterprise, with Bharauli (3), Ibrahimpur (3), Nayagaon (1) and Thaska (2); clearly a significant increase.

Table 14. The number of farmers who have developed a milk production enterprise since the dam was constructed

Village	Number of farmers not having a milk production enterprise before dam construction	Number of farmers who have started selling milk since the construction of the dam	Number of farmers who still have yet to invest in a milk production enterprise (at Nov 07)
Bhagwanpur	18	8	10
Bharauli	11	3	8
Ibrahimpur	6	3	3
Kansli	0	0	0
Kathgarh	13	0	13
Mirpur	0	0	0
Nayagaon	3	1	2
Thaska	14	2	12
Totals	65	17	48

Through interview with a selected sample of landless farmers, the drivers for initiation of a livestock enterprise appears to be based on an assured supply of green fodder. Furthermore the number of fodders available has increased. In addition, the access to animal drinking water will also have the affect of at least maintaining milk production, if not increasing milk production.

In spite of bringing 17 farmers to dairy production, 48 landless farmers have yet to decide to risk investing in dairy production. It is possible that the market is saturated, with little opportunity for selling milk. Such a scenario is unlikely, but does require further investigation. As do further investigation of what other livestock enterprises these landless farmers could consider.

Table 15 has been computed on the basis of 3 assumptions. The first assumption; the milk price has been assumed to be IRp 11/ℓ, in reality prices vary throughout the year from IRp 8 - IRp 15/ℓ. The IRp 11/ℓ represents a reasonable midway point. The second assumption: the lactation length, usually considered to be 180 – 200 days. Animal food is scarce, particularly during the June – August period, lactation length has been reduced to 150 days. The third assumption: that animal husbandry practices are more or less the same.

For those farmers, who decided to invest in milk production, Table 15 outlines in gross terms what the annual income is from milk production for households in a before and after dam construction situation. Annual income increase ranges from IRp 75 in Thaska to IRp 3,700 for Ibrahimpur. The figure for Kathgarh shows a reduction in both production and revenue, which given the numbers of buffalo and cow known to be present in Kathgarh, the result is not credible.

Table 15. Table showing the estimated annual household income from milk production, before and after dam construction

	Estimated income per household per year before dam construction	Estimated income per household per year after dam construction	Difference in annual income, per household since dam construction	Percentage increase
Bhagwanpur	3,300	3,889	589	17%
Bharauli	1,467	3,483	2,017	137%
Ibrahimpur	3,300	7,013	3,713	112%
Kansli				
Kathgarh	3,009	2,186	-823	
Mirpur	3,300	4,550	1,250	38%
Nayagaon	4,125	5,280	1,155	28%
Thaska	4,125	4,200	75	1.8%

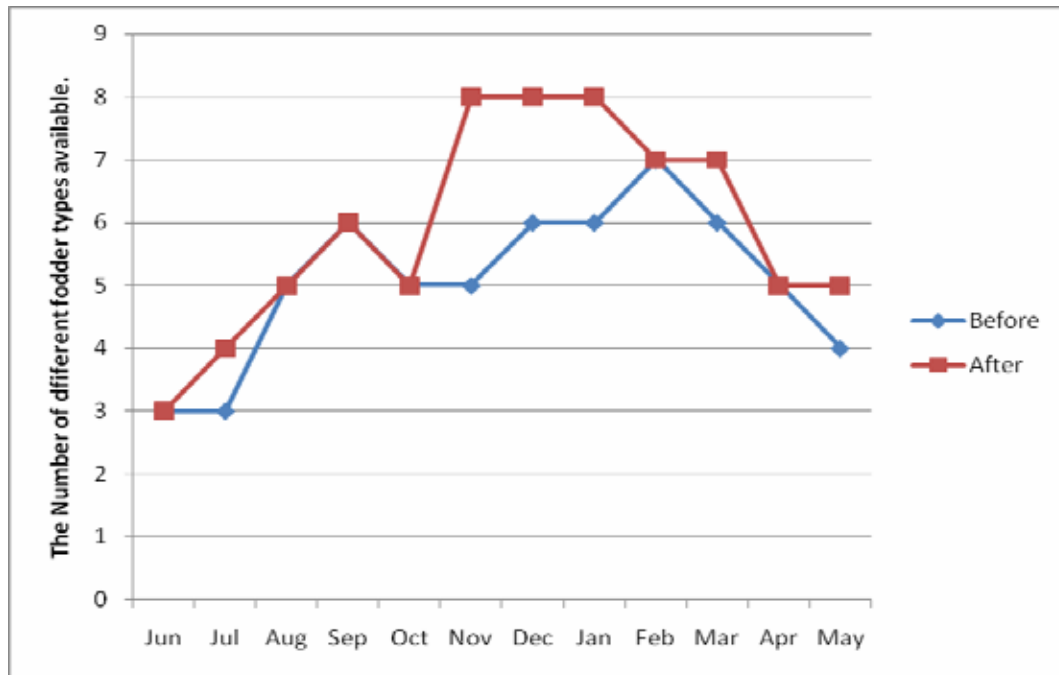
The financial benefit to the landless livestock farmers is significant and tangible. Milk production for those farmers engaged must represent a significant proportion of estimated total income. The sale of 2l milk represents 55% of the \$ 1/day income proscribed under the Millennium Development Goals (MDG). Table 15 shows significant percentage income increases of 137% for Bharauli, 17% for Bhagwanpur and 28% for Nayagaon for buffalo and cow owning landless households. A considerable financial impact, which if aggregated in gross terms adds IRp 19,635 to the Nayagaon economy.

Fodder Production and Availability

Overall, the increased fodder availability has had a major impact on both the land owning and the landless. It is very clear from interview that there has been a very significant indirect impact, through the increased fodder availability particularly green fodder (berseem and fodder sorghum).

It is without doubt the availability of these two green fodders in November – March (berseem) and July – November/December (fodder sorghum) that has had most impact on both the landless and the land owners. Figure 8 shows the availability of different fodder types throughout the agricultural year. Prior to the dam, the number of fodders available ranged from 2 – 7 (see Figure 8), after the dam's construction 3 – 8 fodders were available. Critically there are 8 fodder types available from November through January. Prior to the dam 5 – 6 fodder types were available, with a peak of 7 fodder types available in January. May, June and July remain months where animal fodders are in short supply.

Figure 8. The number of different fodders available throughout the year, before and after dam construction



Traditionally farmers used concentrate to supplement dairy cow rations; purchased at IRp 300/bag from the nearest market town, during the “lean fodder period” May, June and July. Depending on the season, August was sometimes included. Furthermore the availability of fodder grasses was short-lived, being grazed off by September/October and leaving farmers to feed dry foods such as paddy straw, (very low nutrition), maize stover and wheat straw. Mustard was the only green fodder crop that was fed during the Rabi season.

Such rations will be low in metabolisable energy (ME) and protein, probably a maintenance ration rather than a milk production ration. A paddy and wheat straw ration is certainly insufficient for high milk production, resulting in the cow milking from her own resources, leading to significant weight loss. To supplement the ration, grazing was undertaken from June to December; the grazed fodder would have been little more than standing dry fodder, again low in ME and protein. Like other fodders it will be heavily lignified, further reducing digestibility. Water to facilitate the digestion process would have been in permanently short supply, further compromising the buffalo’s or cow’s ability to produce milk. In essence the area was borderline for large ruminant dairy production.

The advent of the dam has seen the introduction of two fodder species, berseem and fodder sorghum (juar). Reduction of the dry component of the ration through the introduction of green fodder, with higher ME, higher protein availability and less lignin will result in higher digestibility and improved milk production performance. The green fodder will reduce animal demand for water.

Fodder sorghum is available for a 3 – 5 month period; August – December. Berseem is available November – March. Figure 9 and Figure 10 attempt to describe the availability of the different fodders. The proportions allocated are arbitrary, but based on interview. The increase and variety of fodder is clear to see. Many landless farmers interviewed stated that the concentrate had been

replaced by berseem and fodder sorghum. The quantity of fodder grasses available has increased. The variety in the cattle ration will promote milk production as well as the butterfat content. The different foodstuffs have different ME, protein and dry matter content. Reliance on straw has been significantly reduced. A much richer and diversified ration is now available, which can be directly attributed to the dam construction.

Figure 9. Estimated availability of fodder for landless households, including a concentrate supplement, before dam construction

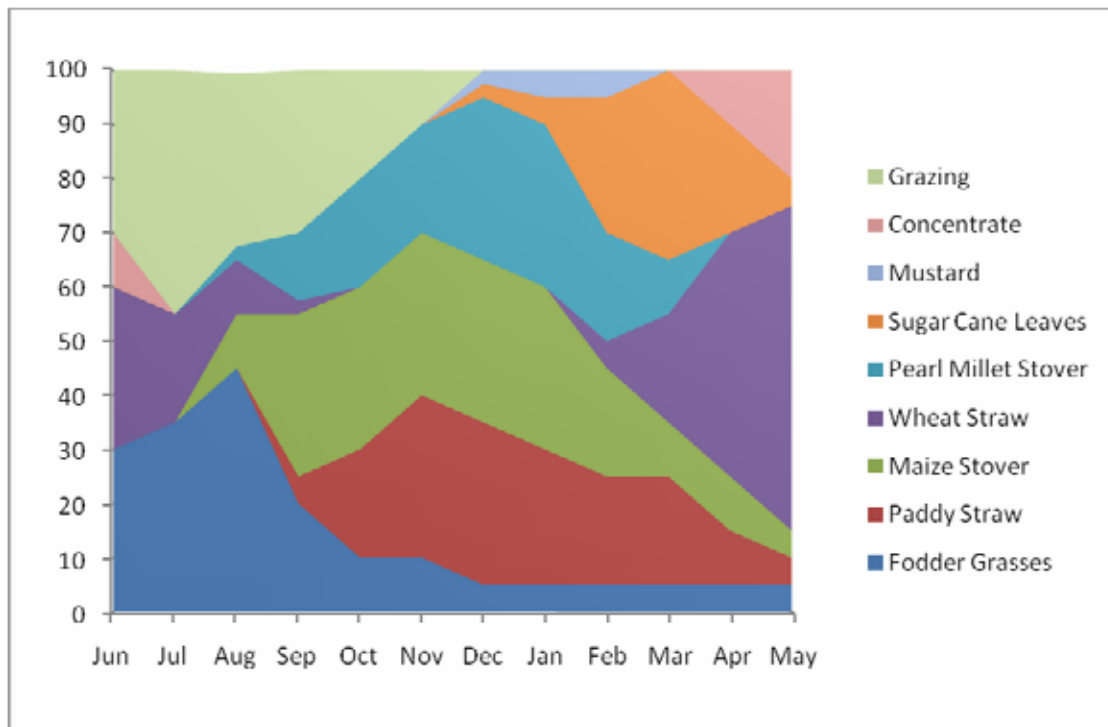
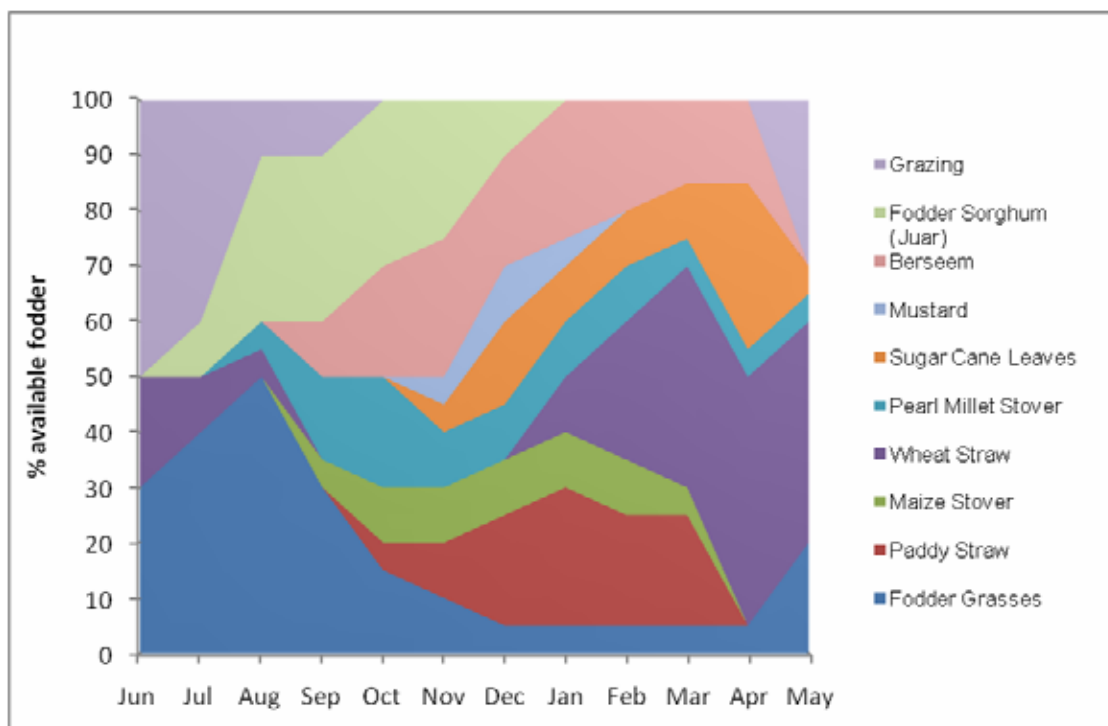


Figure 10. Estimated availability of fodder for landless households after dam construction



As a consequence the grazing period has been reduced to June – September, thereafter most animals are all stall fed. Nevertheless a few herds still forage for grazing.

Whilst concentrate has been dropped, a new market has developed; increasingly landless are purchasing berseem and fodder sorghum from land owners. The average rates are:

- Berseem - IRp 1,000/Kanal³
- Fodder Sorghum (Juar) - IRp 1,500/Kanal

These two fodders are sold on a cut and carry basis, further enhancing the land owner's margin in the cultivation of these two crops (estimated to be IRp 7,500/acre for fodder sorghum (juar), with minimal demand for labour (approximately 12 days).

Because of the dams, green fodder is available to the landless, almost all year round, either through collection or purchase. A very significant impact, albeit an indirect one. The economic value of this impact is described in the section on milk production. In some communities like Turon and also Mirpur, where water is available all year round, access to green fodder is available all year round. Conversely communities like Bhagwanpur, which use the majority of its dam water to irrigate paddy, do not have access to green fodder during the period May – July (or whenever the monsoon breaks).

As a consequence of dam catchment practices (where a total grazing ban has been imposed) and the availability of irrigation water, the availability of fodder grasses, babar grass for the manufacture of rope (ban) has increased. All landless interviewed stated that grass fodder was now available from two sources:

- The dam catchment
- Field bunds

The time taken for women from landless families to collect fodder grasses has been approximately halved. Women were stating that before the dam's construction it was taking about 4 – 6 hours to collect a head load of grass, whereas now it was taking 2 – 3 hours; half the time. Moreover, the source of fodder is closer (field bunds), which are harvested at no charge. Women interviewed suggested that the field bund fodder took about 1 hour to collect.

Because of catchment closure, some farmers are travelling further for grazing, a fact negated by the increasing numbers of farmers who are moving to stall feeding for part or all of the season.

Babar grass is collected during October – December, many VRMC's are contracting the process for a fee (IRp 500 per contractor is frequently quoted). It appears that eligible contractors are VRMC members only. These VRMC members, who are often higher caste land owners, then sub-contract the collection of babar grass to anyone who wants to collect babar grass. The sub-

³ 1 Kanal \equiv $\frac{1}{8}$ acre

contractors fees range from IRp 100 – 250. No control on the quantity removed is imposed; payment of the fee gives the landless rights to collect babar.

The closure of the dam catchment has allowed better regeneration of trees, herbs and grasses. All landless interviewed maintained that the availability of babar grass and fodder/grazing had increased in availability. The absence or curtailment of large and small ruminants grazing has promoted the regeneration process, which will accelerate the process of canopy closure. However, canopy closure will reduce fodder and babar grass availability, in which case the Forestry Department may have to consider selective thinning, to maintain an open canopy. The canopy management could be undertaken to reduce the incidence of lantana, whilst promoting fodder species, babar grass and valuable tree species.

In those fodder deficient communities, steps need to be put in place to conserve high quality fodders, by drying. Dry grass or hay has a much higher ME and protein than paddy straw, wheat straw and maize stover.

The increased availability of fodder as a direct consequence of the dam, due to out-of-monsoon (Kharif) season availability of irrigation water, is seemingly unrecognised by the landless. In answer to the question have they benefited from the construction of the dam, the answer is universally “no”; a view that the forestry department needs to address. It is very clear that increased fodder availability has allowed a small increase in large ruminant numbers (buffaloes and cows), which is likely to increase as the more risk averse farmers take advantage of the opportunity offered by green fodder availability. The landless have benefited from the construction of the dam, a fact not universally recognised.

Stall feeding

Table 16 shows the number of landless livestock farmers who are stall feeding and those who are still grazing their animals. The majority of landless livestock owners are moving towards stall feeding. Nevertheless a substantial proportion of this number remains in transition with grazing during the monsoon and immediately after. Stall feeding is commencing in November and/or December, when grazing becomes difficult. But there is a clear trend towards stall feeding based on the cut and carriage of fodder (berseem and fodder sorghum) and the comparatively easy availability of these fodders.

Table 16. The number of landless livestock owners who are stall feeding and grazing

Community	The numbers of landless livestock farmers who have opted to stall feeding for some or part of the year	The number of landless livestock farmers who still graze livestock
Bhagwanpur	20	13
Bharauli	11	6
Ibrahimpur	9	2
Kansli	3	0
Kathgarh	26	9
Mirpur	2	0
Nayagaon	16	1
Thaska	15	12
Total	102	43

ANNEX 1

VILLAGE BHAGWANPUR

There are 34 landless households in Bhagwanpur. They depend on wage labour and livestock rearing for their livelihood. HCFP constructed an earthen dam in the village in 2002-03, but the landless did not get the share of water that was due to them. However they got indirect benefit from wages and also due to the increased availability of fodder, which led to increase in milk production.

Fodder

Before dam construction these households had to bring fodder from the jungles of Himachal Pradesh paying IRp. 125/- per year as fees. However, the fodder quality was not good and the milk yield was low. Now fodder is available in the village in the form of sugar cane waste, berseem (Egyptian clover), straw of wheat and rice, etc. These are available free of cost from the landowners for which they work. Due to availability of good fodder, productivity per animal has increased by 2 litres per day on an average.

Wages

Before dam construction most land could not be cultivated due to delayed rains. Farmers used to raise only those groups in which labour requirement were very low. Thus the landless households had very little wage earnings. Now there has been a 20 percent increase in agricultural activities and wage earning has also improved substantially.

Table 17. Changes in agricultural activities due to dam construction

Name of Crop	<u>Before Construction</u>			<u>After Construction</u>		
	Production per acre (in Qu)	Land use (Acre)	Labour days	Production per acre (in Qu)	Land use (Acre)	Labour days
Wheat	5 or 6	50	150	10 or 12	150	Not given
Taramira (oilseed for cattle fodder)	1 to 1½	20	No labour required			
Bharsari	1 to 1½	20				
Sugar Cane	125	35	440	250	60	Not given
Gram	7	5	No labour required			
Berseem		2	No labour required		10	No labour required
Onion				50	2	90

VILLAGE MIRPUR

A dam was constructed in 2002-03. There are only 2 landless households in this village. (Neb Singh S/o Surat Ram and Mandra S/o Barkha Ram). Neb Singh worked as a loader for a truck-owner before dam construction earning IRp. 100 per day. When loading work was not available he sold vegetables. It was difficult for him to meet his expenses. After dam construction Neb Singh borrowed IRp. 10,000 from another villager and took 1/3 acre of land on lease. He sold vegetables from that land and was able to fully repay the loan. 11 months ago he purchased the same land from the original owner. He is cultivating radish, onion, garlic, etc. He is earning IRp. 1500 per month selling the vegetable grown on his land. He raises crops three times in a year – rice in Kharif, wheat in winter and vegetables in summer. Earlier fodder used to be brought from Raipur Rani and other places. Now fodder is available in abundance in the village.

Before dam construction, Mahender Singh was cultivating land on lease from 2001 but was dependent on monsoons and cultivated only sugarcane and gram. After dam construction he took another piece of land on lease for IRp. 5000/- per year and now he is raising three crops. He is able to meet all household expenditure from cultivation. He supplements his income from wages. He owned livestock earlier too but was not able to sell any milk. He gave only dry fodder to the animals because green fodder had to be purchased from Raipur Rani. Now green fodder is available in the village itself. Milk production has substantially increased. Earlier the milk cattle yielded milk for 6 to 8 months, now they are yielding for about 8-10 months. Mahindra Singh sold milk for 9 months valued at IRp. 7200/- in the last one year.

Earlier employment was available for only 5 days in a month; this has increased to 24 days in a month. He used to go outside the village for work during 7 months in a year. Now work is available throughout the year in the village itself.

TORUN AND BHEDIWALA

The dam constructed in this village irrigates 150 acres of land. 210 landless people in Bhediwala cultivate encroached land using the water from the dam. 13.5 acres of shamlat land has been occupied by landless households from Mehra caste (since 100 years).

These households had to purchase food grains from the market before dam construction. Fodder had to be brought from outside. The dam helped the landless households to irrigate their occupied holdings. Now they are able to produce food grains for their domestic consumption. Green fodder is also growing in these fields. Milk production has increased due to availability of good quality fodder. Earlier they were rearing cows, goats and poultry. Now they plan to take up buffalo rearing. Stall-feeding is also coming into vogue and this has stopped degradation of forests.

1 acre of land can support one household through livestock rearing. Such a household does not need to do any other work. They are also able to grow vegetables for domestic use, improving nutrition. The vegetables include garlic, onion, chilli, potato, tomato, etc.

Earlier landless households used to travel to other villages up to 15 kms to take part in harvesting operations. Now such work is available within the village itself. Only a few people go out now for such jobs as construction work, cutting of babar grass etc.

All the landless households enthusiastically participated in dam construction.

THASKA

The dam was constructed in 2003-04. Only very little water could be stored the first two years and it was auctioned for IRp. 800/-. In 2004-05 the monsoon water could not be stored, as the pipeline had broken down. In 2005-06 only half the dam could be filled due to problems with the safety valve.

The VRMC has put fingerlings worth IRp. 10,500 in the reservoir (in September 2006).

There are two more dams in this village, being managed by HRMS. The water of these two dams has been auctioned for IRp. 85,000 for one year. If the HCFP dam also becomes fully operational, green fodder will be available from March to July, according to the landless households, 20 of whom participated in the discussion.

The village Panchayat has distributed village common land among the landless. They are raising crops on this land.

The villagers admitted that ground water level has increased due to the three dams.

ANNEX 2

CHECKLIST FOR LANDLESS STUDY

Semi-structured interviews based on a purposive sample; systematically selected from the previous landless survey.

Select for interview 3 – 4 topics/respondent, plus opening question.

The word “you” refers to the respondent, but means both the respondent and his/her partner.

Refer to, but do not mention, the household data already collected.

Can interview any adult family member; father, mother, farmer or farmer’s wife.

Opening Question

- How have you benefited from the dam presence?
 - Describe.
 - List the benefits that the dam has brought.
 - To the respondent’s family
 - To the community as a whole (their perception)
- Describe what life was like before the construction of the dam. Compare that with your life now.
 - What have been the most significant changes?
 - How have the changes you described affected you?

Income and Employment

Income

- Before the dam was constructed was your monthly cash flow even throughout the year? (Use time line methodology)
 - Where there peaks and troughs throughout the year?
 - If so when and Why?
 - Why was income difficult?
 - Give reasons.

- Were employment opportunities difficult to find at certain times of the year?
- How did you overcome these cash constrained periods?
- After the construction of the dam, do you have a better or improved yearly cash flow?
 - Are there any periods of the year where cash flow is a problem?
 - When are the times of the year when cash flow is a problem? Why?
 - What do you do to overcome these periods of low cash flow?
- What effect (or impact) has the dam had on your cash flow (or monthly income)?

Employment and subsidiary occupation

- What primary employment were you and your wife/husband undertaking before the dam was constructed?
- What primary employment were you and your wife/husband undertaking after the dam was constructed?
 - Comparing these two periods, what changes have you seen?
 - Can you explain or give reasons for these changes?
 - Has any particular employment opportunity significantly increased or decreased in value since the construction of the dam?
 - What are these employment opportunities?
 - Can you give reasons why they have increased or decreased?

Subsidiary occupation

- Before the dam was constructed, how many subsidiary (or multiple) occupations (e.g. agricultural labourer, housewife and milk sales) did you and your wife/husband have?
 - After the dam was constructed, did the number of subsidiary (or multiple) occupations undertaken by yourself and wife/husband increase or decrease?
 - Please explain why the number of subsidiary occupations have increased or decreased?

- Give reasons.
 - What has been the impact on your livelihood?
 - If increased – what impact and why?
 - If decreased – what impact and why?
 - Agricultural labouring work: How much agricultural labour work do you undertake?
 - When? (periods of the year)
 - How are you paid? (in cash or kind)
 - If paid in grain (or other agricultural produce) how many Kilograms (or units) do you consume in a day?
 - How long does the grain payment last for?
- Has the type of subsidiary occupation been changed through the introduction of the dam?
 - Why? Give reasons.
- Has the frequency of practicing different subsidiary occupations been changed after the dam was constructed?
 - Why? Give reasons.
- Of the subsidiary occupations you and your wife are engaged in, rank them in terms of time and frequency engaged?
 - Explain the different time periods.
 - What cash income do you earn from the different subsidiary occupations?
 - Has any subsidiary occupation increased since the dam was constructed? Why?

Migration and Debt

Migration (This is NOT livestock migration – dealt with separately)

- Before the dam was constructed did you migrate?
 - What was the pattern of migration?
 - Where did you go?
 - When did you leave?

- Why? (give reasons)
- After the dam was constructed, do you still migrate?
 - To where?
 - For what reason (distress migration or skills migration)?
 - Describe the pattern of migration, when do you leave to migrate?
 - Why? (give reasons)
 - Does your wife and children go with you?
 - Who looks after your house in your absence?
 - When do you return from migration?
- In comparison with the before situation, has the migration pattern changed?
 - If yes, describe.
- What changes are significant?
 - Why? (give reasons)
 - What benefits (or disadvantages) have they brought?
 - Frequency and/or time.

Debt

- What changes have there been in the level of your household's level of indebtedness, before the construction of the dam and the present.
 - With who are the debts held? (e.g. local store keeper, mini bank or local land owner)
 - Has there been any change in where the debts are held (with whom)?
 - Which particular debts have increased?
 - Why? Is there any particular reason?
- What plan do you have to decrease these debt levels?
- How effective is migration in reducing debt levels?

House Quality

- What modifications or improvements have you made to your house, before the dam construction and the present?
 - Why have you made these modifications?
 - Did you hire builders to make these modifications? Or did you do it yourself?
 - How did you pay for these modifications?
- Describe the time scale over which the house improvements or modifications were made. (Need to cross reference with income and employment).
 - How did you decide on the timing of these modifications

Power and Water

Electricity

- Did you have electricity installed and water installed before the dam? Or after the dam construction?
 - When did you gain access to electricity?
 - How did you gain access to electricity (through which government scheme)? Or did you pay for it yourself?
 - How?
 - What appliances does your electricity run?
 - Was gaining access to electricity anything to do with the dam construction?
 - Or was it unrelated?
- How much did you pay for the electricity to be installed?
- What is your monthly electricity charge?
 - Where do you find the money to pay for it?
 - What happens if you cannot pay for a month?

Water (including Irrigation water)

Irrigation water

- Do you have anything to do with the management of the dam?

- Do you have anything to do with the management and distribution of irrigation water?
 - If yes, explain. If no, explain.
 - Is there anything of interest for you in the dam and its water?
 - Do you receive any benefit from the dam?
 - If so, how?
- Do you have an allocation (or share) of irrigation water, which you can sell?
 - Have you sold any of your irrigation water allocation?
 - To whom, for how much?
 - Do you work for this land owner?
- Are you a dam shareholder?
- Did you work on the dam construction?
 - As a labourer, where you paid?
 - Have you been engaged to undertake dam maintenance work?

Drinking Water

- What type of drinking water access do you have?
 - Tap, hand pump etc.....
- Did you have drinking water before the dam was constructed?
 - When was drinking water delivered to your community?
- How far did you have to travel to fetch drinking water?
 - How often did you go to fetch drinking water?
- After the dam was constructed, did access to drinking water change?
 - When did the drinking water access change?
 - Was it funded by the Panchayat, VRMC or another institution?
 - Or was it funded by contributions of all users?
 - Is everyone in the village allowed to use the drinking water access that you use?

- Or are there drinking water facilities for different castes in the village?
- Does everyone have equal access to drinking water?
- What happens if there is a breakage?
 - Who repairs it?
 - What is the role of the VRMC in the repair process?
 - What is the role of the Panchayat in the repair process?
 - How is the repair paid for?
 - Do you have to contribute towards the repair?
- Do you pay drinking water use charges?
 - How much are they per month?
 - Do you ever miss paying water charges?
 - What happens then?

Livestock

- Has there been any change in livestock numbers (buffalo, bullock, cow, goat, sheep and chickens) between 1 year before the dam was built and the present?
 - Why has there been a change?
 - What has caused the change?
- Have the livestock numbers changed up or down (increased or decreased)?
- Which species and explain why?
- How have individuals financed the purchase of buffalo, cow and bullock?
- Has the dam had any influence on the livestock numbers?
 - If so, How?

Livestock Migration

- Did you engage in migrating with livestock 1 year before the dam was constructed?

- If yes, has this changed after the dam was constructed?
 - Why has it changed?
 - What was the role of the dam in effecting the change?
 - Has the timing (when – time of year) of the migrating with livestock changed?
 - If yes, Why?
 - Has the time period (duration – number of months/days away) for migrating with livestock changed?
 - Why?
 - What affect has that had on your livestock?

Where you migrate with your livestock, has that changed?

- How has the change in livestock migration affected your lives (or livelihoods)?

Milk Production

- Has the quantity of milk production changed between before the dam was constructed and after the dam construction?
 - Has milk production increased or decreased?
 - What is the reason for the production increase or decrease?
 - Has the change in milk production (increase or decrease) affected your livelihoods?
 - What impact has that had on your livelihoods?
 - Has there been an overall increase or decrease in milk production within the village?
- Before the dam was constructed, where did you sell your milk?
 - Since the dam was constructed, has this changed?
 - Why has it changed? Give reasons.

Fodder Production and Stall feeding

- Describe the fodder production 1-2 years before the dam was constructed. Compared with fodder production after the dam was constructed.
 - Is there any difference?

- Why? What is the reason(s) for the difference?
- Has fodder production increased or decreased?
 - Why? Give reasons.
- What species (type) of fodder were produced before the dam was constructed?
- What species (type) of fodder were produced and/or used after the dam was constructed?
 - Has there been a species change?
 - Why? Give reasons.
- Has the quantity and quality of fodder changed?
- Has the location, from where the fodder is collected changed?
 - Has the time required to collect fodder changed?
 - Has the dam catchment area been closed?
 - If yes, what affect has that had?
- What affect has the changes in fodder production (increase, decreased production, improved or poorer quality) had on your livelihoods?
 - Has it changed the income earned and/or the milk production?
 - What affect have any changes in fodder production had on your wife and children?
 - What affect has any changes in fodder production had on animal productivity (buffalo, cow or goat)?