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IMPACT EVALUATION

STUDY OF MINOR IRRIGATION: CATHOLIC RELIEF SERVICES
(CALCUTTA ZONE, SOUTH BIHAR)

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THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

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CONDUCTED BY

XAVIER INSTITUTE OF SOCIAL SERVICE, RANCHI

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PREFACE

The United States Agency for International Development, India (USAID), contracted the St. Xavier Institute of Social Service (XISS) to undertake a Sample-survey-based study for assessing the impact of minor irrigation projects (wells, tanks and dams) supported by the Catholic Relief Services' (CRS) PL 480 Title- II Food For Work (FFW) Program in south Bihar. The study covered both the consignees of South Bihar, viz., Ranchi Catholic Charities and Chandwa Catholic Charities. The study years were U.S. fiscal years 1973, 1976 and 1980 for Ranchi and 1978, 1979 and 1980 for Chandwa consignees. The main study findings, contained in Section A, focus on wells under Ranchi consignee area, which accounted for the majority of all minor irrigation projects in the study coverage.

The minor irrigation projects, undertaken by CRS under its FFW program, were intended to improve the land utilisation and thereby increase the productivity, income and employment of the project beneficiaries. In the absence of such irrigation facilities, the marginal, small and medium farmers of this rainfed area were hardly able to grow one sub-optimal crop a year. The present evaluation study aimed at assessing the impact of the irrigation projects on beneficiary's income, employment and productivity. The study revealed a positive impact on all these aspects.

ACKNOWLEDGEMENT

The Institute gratefully acknowledges the contribution of former professor M. Bhowmik and Father L. Francken who together planned and guided the field survey team comprising of 12 members. Burden of the study was shared mostly by professor M. Bhowmik, Mr. P. Bose and Mr. M.L. Singh.

The Institute greatly appreciates the role of Mr. R.K. Verma, Secretary, Centre for Development Strategies (CDS), New Delhi and its senior consultant Dr. Y.P. Kedia who provided outstanding consultancy services by organising and coordinating efforts of CDS consultants and experts, associated with various activities such as scrutiny, editing, compilation, analysis of the field data and who finally prepared a very analytical and precise report.

Lastly and most importantly, the Institute is indebted to USAID, in general, for contracting the study and to Mr. John Paul Chudy and Mr. M.C. Gupta, in particular, who provided continued and sustained guidance at various stages of the work especially in preparing an excellent research design and analysis plan.

SUMMARY

1. The United States Agency for International Development, India (USAID), contracted the Xavier Institute of Social Service (XISS) to conduct an evaluation study to assess the impact of minor irrigation projects viz., wells, tanks and dams on the productivity of land, income and employment of the project beneficiaries, i.e., owners of wells, tanks and dams, assets created as a result of these projects. The universe of the study covered minor irrigation projects undertaken by both the Catholic Relief Services' (CRS) consignees of South Bihar area under its Calcutta zone viz., Ranchi Catholic Charities and Chandwa Catholic Charities. The study years were 1973, 1976 and 1980 for Ranchi and 1978, 1979 and 1980 for Chandwa consignees.

2. The Institute conducted the field survey in 1982-83 wherein the respondents were a representative sample of project beneficiaries of the respective study years. Multi-stage stratified sampling was adopted for selecting the representative samples of project beneficiaries. The universe of the project holders of Ranchi Consignee (each project holder undertook a number of minor irrigation projects) was stratified according to economic, demographic and geographic characteristics of the area and according to project intensity groups of project holders (project intensity was defined by the number of projects under a project holder). From each stratum, allocated number of project holders were selected with equal probability sampling and from each selected project holder, half the projects were selected with systematic sampling. Almost similar design was adopted for the Chandwa Consignee.

3. The selected beneficiaries were primarily the small farmers capable of deriving a stream of benefits from the assets - wells, tanks and dams - created for them.

4. The construction of projects resulted in a stream of benefits to beneficiaries (measured in terms of the change between survey year, i.e. 1981 , and the concerned study year), such as increased cropping intensity and higher yield per acre resulting in a corresponding substantial increase in marketable surplus and increased income and employment. Extent of benefits, however, varied from one project to another - highest for wells and lowest for tanks - and from one area to another-more for Ranchi Consignee

areas than for Chandwa. The cost of construction of the project was in reverse order, i.e., least for wells and highest for tanks. Thus, overall benefits obtained from wells were the highest for each rupee invested followed by dams and tanks. Table below gives the summary of major benefits by project-type:

SUMMARY OF MAJOR BENEFITS

(All figures are range of percentage changes of the survey year (1982-83) averages if beneficiaries over each of the three study years)

	Wells	Tanks	Dams
Increase in Cropping Intensity			
- Ranchi Consignee	9 - 15%	3 - 11%	5 - 24%
- Chandwa Consignee	11 - 36	4 - 28	11 - 27
Intensity of Irrigation			
- Ranchi Consignee	16 - 22	12 - 19	15 - 29
- Chandwa Consignee	7 - 43	10 - 23	26 - 52
Change in Income @			
- Ranchi Consignee	49 - 59	8 - 56	28 - 61
- Chandwa Consignee	29 - 135	24 - 57	27 - 57
Yield per Acre Paddy			
- Ranchi Consignee	8 - 21	(-9)- 14	5 - 30
- Chandwa Consignee	5 - 24	1 - 7	3 - 27

(@) Measured at current prices (approximately) 25% of change is plausibly accruable to price rises, see para 3.37.

5. Increase in the usage of family labour was more in case of females than males, though mandays per worker increased both for men and women. Mandays used per acre also increased.

6. There appears to be a positive interaction of increased income created by assets with education, though slightly more with girls' education.

7. While the organization of the main report is shown under para 1.5, major highlights of the main focus of the report, i.e., wells in Ranchi Consignee area, contained in Section A, are given below:

(a) The project appears to be socially and economically viable on the basis of a preliminary cost-benefit analysis. The rate of return on investment comes around 14%.

(b) The benefit accruing from the project in the first year after its completion seems to replicate over the years. The low level of irrigation utilization (approximately 50%) continued in the absence of any improvement in the pumping method.

(c) The project impact varied significantly from one stratum to another. For instance, additional area irrigaged per beneficiary varied from a low of 0.6 acres to a high of 2.7 acres; additional income per beneficiary ranged between Rs.456 and Rs.3992; and additional income per acre of land holding and per additional irrigated acre fluctuated widely in the ranges of Rs.38 to Rs.1041 and Rs.75 to Rs.5476 respectively. These inter-stratum variations could probably be traced to basic differences in characteristics of various strata, particularly in terms of quality of land and adaptability/entrepreneurship of the beneficiaries. A better understanding and appreciation of the inter-stratum differential impacts would be facilitated by some carefully selected case studies (see para 3.29 to 3.31).

CHAPTER I

INTRODUCTION : THE PROJECT AND THE STUDY

BACKGROUND

1.1 The Catholic Relief Services (CRS), with its Headquarters in New Delhi, 4 zonal offices, supports about twenty types of projects under the PL-480. Title II Food For Work (FFW) Program. CRS implements these programs through over 140 consignees and about 1400 project holders (distributors). The CRS guidelines prescribed a variety of work which could be taken up under the program such as, major and minor irrigation work including construction of wells, tanks and dams, flood protection, drainage, antiwater logging works, soil and water conservation, afforestatation, land levelling, roads, school buildings etc. All the projects are to be of productive nature and create durable assets to build up rural infra-structure.

1.2 These projects, thus, have two broad objectives:

(a) To supplement the diet of unemployed workers and their families by providing them food commodities for the work performed by them on FFW projects; and

(b) to create economic assets for marginal, small and medium farmers, i.e., the project beneficiaries, who become owners of the assets created as a result of FFW activities for the socio-economic development of the village.

The program aims at benefitting directly the persons living below the poverty line in the rural areas by providing them the opportunity of employment making payments in food commodities for their work, thus, raising their incomes and nutritional levels.

1.3 USAID has undertaken to assess the impacts of major FFW activities in different project areas of various CRS zones. The agency assigned the study of assessing the impact on beneficiaries of minor irrigation (wells, tanks and dams) under FFW in the South Bihar of Calcutta Zone to the XAVIER INSTITUTE OF SOCIAL SERVICE (XISS) on Semptember 8, 1981. This study is termed Minor Irrigation Asset Study.

1.4 This evaluation study covered both the Catholic Charities Consignees of the study zone,viz.,

(i) Ranchi Catholic Charities (RCC)

(ii) Chandwa Catholic Charities (CCC)

Ranchi Consignee covered Ranchi district and Chandwa Consignee covered districts of Hazaribagh and Palamau.

1.5 The study findings of the dominant project, viz., wells under Ranchi Consignee area, are contained in Section A, which, for all practical purposes, is the main report. Section B contains study findings on tanks and dams under Ranchi Consignee area and Section C gives findings on wells, tanks and dams under Chandwa Consignee area. Annex 1 provides details about sampling and univerce distribution for the multi-stage stratified design adopted for wells in Ranchi Consignee area. Other annexes contain information about beneficiary and stratum characteristics and a copy of the blank schedules adopted for field survey.

The study components were designed to conduct field surveys of representative samples of the consignee areas and these were complemented by a study of the control groups. The study covered minor irrigation projects undertaken in the Financial Years 1973, 1976 and 1980 for the Ranchi Consignee area and the financial years 1978, 1979 and 1980 for the Chandwa Consignee area.

Objectives of the Study

1.6 The main objectives of the current FFW project evaluation study were to examine:

(i) the increases in crop production, changes in cropping pattern and increases in con- sumption as indicated by crop sales and crop storage of beneficiary farmers;

(ii) the changes in income of beneficiary farmers;

(iii) the amount of increased use of hired labour by beneficiary farmers;

(iv) the increase in the number of mandays, man-month or man-years of employment generated in the project area as a direct result of the project itself as opposed to the completed asset;

(v) the comparison of production between program and control sites; as well as between projects close to markets (and main roads) and those in more remote areas;

(vi) the comparison of increased benefits between projects recently completed and those completed in previous years;

(vii) the comparison of total project benefits and total costs over the life of the asset (benefit-cost analysis).

Instruments of Analysis

1.7 The following analytical methods were used to evaluate the impact :

(i) To assess the impact of FFW program on productivity, cropping pattern, income, employment etc. of the beneficiaries (a) an intertemporal comparison was undertaken involving time periods (i) the year before the commencement of the project and (ii) the year before the survey was conducted, (b) a comparison of study group and control group was undertaken for the projects completed in 1980.

(ii) To assess the continuity of the benefits accruing from the project over years, and study the problems involved in the usage of the project, a comparative analysis of the projects of different years was taken up.

(iii) To highlight the role of economic, demographic and geographical differences in the fuller utilisation of the project, interstratum comparison was undertaken for some of the variables.

(iv) A preliminary excercise on Cost-benefit analysis is carried out to find out the social and economic viability of the projects.

SECTION A : REPORT ON WELLS OF RANCHI CONSIGNEE AREA

CHAPTER 2

ANALYTICAL FRAMEWORK

SAMPLE DESIGN FOR PROJECT BENEFICIARIES

2.1 The field survey design of the Minor Irrigation Asset Study for Ranchi consignee was designed on the basis of a multi-stage stratified sampling.

The total universe for wells, tanks and dams under Ranchi consignee was spread over 66 first stage units (FSU) called Project Holders (centres) covering 6132 second stage units called Project Sites (projects). This universe was truncated to exclude urban areas i.e. greater municipal areas, most urban projects were such that beneficiaries were normally non-agriculturists and the uses of water were also non-agricultural such as drinking and bathing. The relevant universe was then all rural areas of Ranchi Consignees comprising of 56 project holders covering 5555 project sites of which 4014 were irrigation wells.

2.2 Two way stratification of the first stage units was done (i) by areas according to Economic/Demographic and Geographic (EDG) variations and (ii) by the project intensity (PI) classes. From each stratum about half the FSUs, i.e. project holders (with appropriate rounding), were selected with equal probability sampling. Second Stage Units (SSU), i.e. project sites for each selected project holder (FSU) were selected with systematic sampling, sampling fraction being 1/2. The ultimate respondent was the beneficiary i.e. owner of the project site. Distribution of first stage and second stage units in the universe and the sample by stratum is given in Table 1 of Annex - I.

Finally, the survey sample comprised of 948 project sites (SSU). Field data were collected on pre-developed survey instruments. Data were transferred on to magnetic tapes. However, there were numerous data transfer errors. This necessitated going back to the filled in questionnaires and manually re-analyzing the field data based upon a sub-sample of the original sample.

2.3 A sub-sample of 300 project sites was drawn from 948 surveyed units for wells in the Ranchi consignee area, primarily on management considerations. This was based on a presumption that variables within a stratum do not vary greatly. This sample of 300 wells was a representative sample of the relevant universe, viz., 4014 wells, sampling fraction being about 7.5%.

2.4 Allocation of 300 project sites over different strata and years was based upon a combination of three criteria: (i) proportion of the number of project sites in the universe within each stratum to be in the range of 5 to 7½%, larger the stratum, the smaller the proportion; (ii) number of project sites per stratum was to be a minimum of 4. (iii) Modulation of the samle size within a stratum was attempted only in marginal cases so as to be consistant with (i) & (ii) and to generate total sample size of 300 units. (iv) Ultimate sample so determined was utilised to allocate the number of first stage units (F.S.U.) namely project holders to each statum, while so allocating considerations were similar as employed in determining the number of second stage units (S.S.U.) namely wells. Distribution of universe sample and sub-sample units by stratum is given in Table No. 2 of Annex I.

SAMPLE DESIGN FOR THE CONTROL GROUP

2.5 The control group comprised of those FY'82 approved applicants for minor irrigation projects who had not started their projects by the time of interview. The interviews were implemented during December 1981. The project holders selected for the asset study were also selected for the control group. A total of 10 project holders were selected out of 56 project holders in the universe. A pre-determined number of 20 respondents in control group was allocated to each of the selected project holders: actual respondents, however, were 181 instead of 200 because of only partial completion by one field investigator. Systematic sampling was adopted for selected respondents with sampling fractions ranging from $\frac{1}{2}$ to $\frac{1}{7}$, giving an overall average of $\frac{1}{5}$. A sub-sample of 4 respondents per stratum was selected for purposes of analysis.

ESTIMATION PROCEDURE

2.6 For estimating the value of any variable for the economic, demographic and geographic region (stratum), project intensity group (PIG) and the universe from the calculated values of the variable for the respective samples, the following procedure was adopted, the calculation for each year being on similar pattern.

Let the variable be denoted by X

the beneficariy be denoted by k

the stratum be denoted by i

the PIG be denoted by j

the number of sampled beneficiaries in ith stratum and jth PIG be nij

the number of total beneficiaries in ith stratum and jth PIG be Nij

Then

X_{ijk} is the value of the variable for kth beneficiary in ith stratum and jth PIG.

$X_{ij} = \sum_k \frac{X_{ijk}}{n_{ij}}$, gives the value of

the variable per beneficiary in the jth PIG of the ith stratum.

$X_i = \frac{\sum_j n_{ij} X_{ij}}{\sum_j N_{ij}}$, gives the value

of the variable per beneficiary for the ith stratum.

$X_j = \frac{\sum_i n_{ij} X_{ij}}{\sum_i N_{ij}}$ gives the value of

the variable per beneficiary for the jth PIG

$X = \frac{\sum_i \sum_j N_{ij} X_{ij}}{\sum_i \sum_j N_{ij}}$ gives the value of the raviable per beneficiary for the entire universe.

CHAPTER 3

ANALYTICAL FINDINGS

PROJECT DESCRIPTION

3.1 The typical well, constructed under the FFW scheme, in this region, in all the three years, was of the average of 12 feet diameter and 25 feet depth. The diameter ranged between 10-25 feet and the depth ranged between 15-42 feet. The depth of water in summer averaged 7 feet and in winter 13 feet. It took around 8-12 hours to draw water in the summer by fulcrum (manual) and 19-20 hours for refilling of the well. In winter the time taken to draw water and to refill was around 17 hours. This implies availability of water in 2 out of 3 days in summer and daily in winter, if 8 hour a day drawing is done.

3.2 80% of the wells constructed in 1973 and 1976 and 62% in 1980 were steened. Steening was done with stone in all the cases. Hardly 13% of the wells of 1973 and 1980 and 22% of 1976 were parapeted. Parapets were not constructed even later on. 95% of the wells constructed were working satisfactorily.

SIZE OF LAND HOLDING

3.3 The average size of land holding per beneficiary works out to 6.2 acres in all three years. A little over 50% of the beneficiaries held land between 5 to 10 acres. About 34% held land between 1 and 5 acres and 12 to 17% over 10 acres. The number of beneficiaries with land holding less then 1 acre was negligible. (Table 1)

Table 1

Distribution of Beneficiaries by Size of Land Holding

Year	Farm Size (acres) 0-1	1-5	5-10	10 & above	total
1973	Nil	411 (35)	603 (52)	152 (13)	1166 (100)
1976	11 (1)	385 (34)	538 (48)	189 (17)	1123 (100)
1980	19 (1)	584 (34)	907 (53)	215 (12)	1725 (100)

NOTE: Figures in brackets represent percentages.

3.4 According to the topography of this region a land holding of 5 to 10 acres is a medium land holding and constitutes the group of farmers who may be in a position to utilise the facility provided to them. Around 50% of this land was upland which is acidic in character and the rest of the 50% is low land (Table 2) The soil charactristics are given in detail in the Annex - II.

GROSS CROPPED AREA

3.5 Gross area sown increased by 15% from 5.46 acres per beneficiary before the project to 6.26 acres per beneficiary after the project, for projects undertaken in 1980. For projects undertaken in 1973, the matching increase was 14%. The year wise details of area owned, gross cropped area, and croping intensity per beneficiary are given in Table 2.

Table 2

Land Owned, Gross Cropped Area and Croping Intensity per beneficiary

Year	Land Owned (acres)			Gross Cropped Area (acres)		Cropping Intensity (%) 1/	
	Low	Up	Total	B 2/	A	B	A
1973	3.20	3.02	6.22	5.34	6.09	86	98
1976	3.05	3.22	6.18	5.74	6.24	93	101
1980	2.82	3.23	6.28	5.64	6.26	87	100

1/ Gross cropped area as a percentage of land held.

2/ Throughout the report B refers to the year before the project and A refer to the year after the project, and just beefore the field survey was conducted.

IRRIGATION

3.6 In this region of India (Ranchi area), the small farmers depended solely on rainfall for availability of water for crops. Thus cultivation is confined mainly to the rainy season. With the construction of well, the

farmers are able to extend the cultivation of crops to other seasons and also cover a slightly larger area in the rainy season. The area irrigated per well was 1.25 acres in 1973, 0.91 in 1976 and 1.39 acres in 1980. The inter year differences emerged primarily from the well utilisation in the rainy season. The irrigated area in rainy season was low in 1976, around 0.14, the corresponding figure for 1980 was 0.50 and for 1973 was 0.40 acres. The maximum utilisation of water was during winter season, around 0.52 acres in 1973 and 1980 and 0.57 acres in 1976. In summer this level varied between 0.31 acres in 1976 to 0.37 acres in 1980. (Refer Table 3.) Overall intensity of irrigation was 21% in 1973, 16% in 1976 and 22% in 1980.

Table 3

Season Wise Irrigated Area and Intensity of Irrigation per beneficiary

Year	Area Irrigated (acres)				Intensity of Irrigation (%) 3/
	Summer	Winter	Rainy	Total	
1973	0.33	0.53	0.40	1.26	21
1976	0.31	0.57	0.14	1.02	16
1980	0.37	0.52	0.50	1.39	22

3/ Area irrigated as percentage of gross cropped area.

3.7 The average irrigated area per project for projects completed in different years does not depict any trend over time. The utilisation of the project within one year of completion and after eight years of completion does not seem to show any difference. In case of wells, the average irrigated area for 1980 projects is somewhat higher than those completed in 1973. The difference in the utilisation rates seem to arise because of project/area characteristics rather than the maturity level of the project. The project appears to have reached optimum utilisation level in the very first year of inception, given the pumping method.

3.8 This conclusion is supported by the study of range and inter-quartile range of irrigated area per beneficiary. For stratum I (Baraway), the range for 1973 and 1976 projects is 0.3 - 1.6 acres per beneficiary and for 1980 projects 0.3 to 1.3 acres. The inter-quartile range is 0.4 - 0.7 acres for 1973 and 0.5 - 1.0 acres for pro-

jects completed in 1976 and 1980. For stratum II (Biru), the range is 0.1 to 3.0 acres for all the three years. The inter-quartile range is 0.3 to 1.1 acres (1973) 0.3 - 0.8 acres (1976) and 0.5 - 1.3 acres (1980). The inter-year variations in range and inter- quartile range for other stratums too is very narrow. (See Tables 4 and 5).

TABLE 4

RANGE OF AVERAGE IRRIGATED AREA OVER BENEFICIARIES

(Unit : Acres)

YEAR	STRATUM				
	I	II	III	IV	V
1973	0.3-1.6	0.1-3.0	0.6-4.5	0.3-2.6	0.3-2.9
1976	0.3-1.6	0.1-3.0	0.5-3.0	0.5-2.2	0.6-6.0
1980	0.3-1.3	0.1-3.0	1.0-3.0	1.0-3.1	0.5-3.8

TABLE 5

INTER-QUARTILE RANGE OF AVERAGE IRRIGATED AREA

(Unit : Acres)

YEAR	STRATUM				
	I	II	III	IV	V
1973	0.4-07	0.3-1.1	1.5-2.7	1.0-1.9	1.0-2.4
1976	0.5-1.0	0.3-0.8	1.5-2.25	1.1-1.6	0.7-1.5
1980	0.5-1.0	0.5-1.3	1.5-2.0	1.3-2.4	0.9-2.5

3.9 There are significant inter-stratum variations in the level of irrigation attained. Generally, in all the three years the area irrigated is lower in stratum 1 and stratum 2 i.e. the regions of Darway and Biru. The area

irrigated in these regions is around one acre per well in 1980, and 0.6-0.9 acres in the other two years. However, the level of irrigation reached was higher in the stratum of Lachragarh, Khunti and Lohardaga, which was of the order 1.7 acres to 1.8 acres in 1980, 1.4 to 1.8 acres in 1976 and 1.5 to 2.1 acres in 1973 per beneficiary. The details of stratum-wise area irrigated per beneficiary for the three years are given in Table 6.

Table 6

Stratum (Economic-Demographic Region) wise Irrigated Area per beneficiary

Year	Stratum wise Area Irrigated (acres)				
	Baraway	Biru	Lachragarh	Khunti	Lohardaga
1973	0.61	0.74	2.07	1.53	1.57
1976	0.90	0.64	1.76	1.44	1.69
1980	1.10	1.01	1.84	1.79	1.68

3.10 The variations according to project intensity group (PIG) are also significant. PIG with 1-24 projects seem to have lower irrigation level then the larger groups. The highest irrigation level is for the medium intensity group, i.e. project group holder with 25-49 projects show up the best result with 1.62 acres irrigated area per beneficiary as compared to 0.98 acres per beneficiary for PIG - I and 1.46 acres for PIG - III for projects undertaken in 1980. (Table 7)

Table 7

Irrigated Area by Project Intensity Group per beneficiary

Year	Area Irrigated		
	PIG - I	PIG - II	PIG - III
1973	0.86	1.43	1.22
1976	0.90	1.27	1.28
1980	0.98	1.62	1.46

3.11 The intensity of irrigation like wise is lower in the regions of Baraway and Biru (12%) and significantly higher in Lachragarh, Khunti and Lahardaga (around 30%). The behaviour is similar over the three years under study. Intensity of irrigation for the unviersc varied between 16 to 22%.

3.12 The area brought under irrigation through the project is displayed in the attached graph. The stratum of Lohardaga and Lachragarh attained the best results followed by Khunti in all the three years.

CROPS AND CROPPING PATTERN

3.13 The main crop of the region is paddy. It is grown in rainy season when plenty of water is available. Some of the other crops grown during rainy season before the construction of the project, included millets and pulses like marua, gora, urd etc. The crop composition during rainy season changed in favour of paddy.

3.14 The cropping during winter and summer seasons was quite scanty before the project. After the project, farmers of the area took to growing of vegetables. Winter vegetables were mainly potatos and tomatos. Some others like brinjal and cabbage were also grown. Wheat was grown by a few farmers, but on a very small scale. Summer vegetables were onions, lady finger and chillies.

3.15 The area sown under paddy increased marginally by about 0.1 (3%) acre per beneficiary in 19[illegible]0, from a level of 3.66 acres. The increase in area sown under this crop was slightly more (0.22 acres) in the case of 1976 project beneficiaries. This gain in area under paddy was at the cost of other rainy season crops viz. millets (marua) and pulses (urd). Though the price per kg of urd was significantly higher than that of paddy (Rs. 4: Rs. 1), and that of marua almost the same as paddy, yet there was a shift out of millets and urd to paddy. Paddy was grown primarily for self consumption before as well as after the project. The increased demand of paddy for self-consumption can be one of the prime factor resulting in a switch over from cash crops like pulses to grains. Wherever cultivation of paddy was made possible by irrigation it was taken up. See Table 8.

Irrigated Area by Stratum and Project Intensity Group

```
                EDG 5   EDG3   EDG2   EDG1   EDG4          ------
               i-----------------------------------i  ! \//\ !  Above Average
1973           !//\/\/!//\/\/!       !      !       !  ! /\/\ !
PIG - 3        !/2.04>!\3.23\! 0.55 !  -   !  -    !   ------
               !/\/\/\!/\/\//!       !      !       !
               !------!------!------!------!------!
               !//\\/\!\/\/\/!       !      !//\/\/!
PIG - 2        !/1.50\!\1.62\! 1.24 ! 0.95 !/1.53\!   ------
               !\/\/\\!/\/\/\!       !      !\/\/\/!  !       ! Below Average
               !------!------!------!------!------!  !       !
PIG - 1        !      !/\/\/\!       !      !/\/\/\!   ------
              .! 0.81 !/2.44\! 0.16 ! 0.43 !\1.37/!
               !      !/\/\/\!       !      !/\/\/\!
               !-----------------------------------! Average 1.25


1976           i-----------------------------------i
               !//\/\/!//\/\/!       !      !       !
PIG - 3        !/1.61>!\2.08\! 0.63 !  -   !  -    !
               !/\/\/\!/\/\/1!       !      !       !
               !------!------!------!------!------!
               !      !\/\/\/!       !      !//\/\/!
PIG - 2        !/0.82 !\1.62\! 0.87 ! 0.97 !/1.49\!
               !      !/\/\/\!       !      !\/\/\/!
               !------!------!------!------!------!
PIG - 1        !/\/\/\!/\/\/\!       !      !       !
               !/1.15/!/2.44\! 0.11 ! 0.76 ! 0.94 !
               !/\/\/\!/\/\/\!       !      !       !
               !-----------------------------------!  Average 1.13

1980           i-----------------------------------i
               !//\/\/!//\/\/!       !      !       !
PIG - 3        !/2.01>!\2.11\! 1.13 !  -   !  -    !
               !/\/\/\!/\/\/1!       !      !       !
               !------!------!------!------!------!
               !/\/\/\!/\/\/\!       !/\/\/\!/\/\/\!
PIG - 2        !/1.48/!\1.80\! 1.05 !/1.84/!/1.81\!
               !/\/\/\!/\/\/\!       !/\/\/\!\/\/\/!
               !------!------!------!------!------!
PIG - 1        !/\/\/\!/\/\/\!       !      !/\/\/\!
               !/1.43/!/1.62\! 0.45 ! 0.63 !/1.67/!
               !/\/\/\!/\/\/\!       !      !/\/\/\!
               !-----------------------------------! Average 1.34 acres
```

Table 8

Cropping Pattern - Area sown under main crops per beneficary

Year	Paddy		Millets and Pulses		Vegetables		All Crops	
	B	A	B	A	B	A	B	A
1973	3.75	3.87	1.31	1.26	0.28	0.96	5.34	6.09
1976	3.45	3.67	1.72	0.89	0.57	1.66	5.74	6.22
1980	3.66	3.76	1.52	1.46	0.28	1.04	5.64	6.26
Control Group		2.60		1.70		0.40		4.70

3.16 The area cultivated under millets and pulses declined in respect of beneficiaries of all projects. In case of 1976 beneficiaries, this decline was slightly higher than the area increase under rice cultivation.

3.17 The area cultivated under vegetables during winter and summer seasons increased from a very low level of 0.28 acres to around 1 acre per beneficiary for beneficiaries of 1973 and 1980, and from 0.57 acres to 1.66 acres in respect of 1976 beneficiaries. Around 75% of the output of vegetables was marketed. Likely reasons for preference for vegetables cultivation to wheat cultivation in winter might be (i) Vegetables response is faster, (ii) A number of crops can be raised on the same piece of land. (iii) Vegetable growing requires more frequent irrigation on a piece of land, whereas wheat cultivation requires extensive irrigation three to four times in the season. Manual drawing of water from the well facilitates a smaller area being irrigated over and over rather than an extensive area a few times. So farmers preferred to sow a smaller piece of land under wheat. (iv) Price of vegetables compared very well with wheat prices, generally beig twice as much.

3.18 Vegetables, being perishable commodities, require assured market, which is provided to this area by extensive demand in Calcutta and other industrial areas. There is, however, much greater scope in vegetable cultivation. The land under vegetable cultivation around 1.0 acre per beneficiary for both the seasons together was much less than the land holding of the farmers (around 6 acres, 50% of which is low land) and the irrigation capacity of the project (around 1 acre in one

seasons if animal power is used to draw water). An improvement in pumping method can increase the capacity utilisation of the project and the area under cultivation.

3.19 The cropping pattern of the control group in the year before the survey portrays the characteristics of the study group before the construction of the project. The dependence continues to be on the crops raised in rainy season, viz., paddy supplemented by marua and urd. The summer and winter season cropping is highly scanty.

3.20 The inter-temporal comparison of the cropping pattern before the construction of the project, and the year before the survey and after the projects, for projects constructed in different time periods, and the comparison with the control group clearly projects the benefits derived by the beneficiary farmers from the project in adopting multiple cropping and extending cultivation to seasons other than rainy.

Growth of Paddy

3.21 Paddy output increased by 17.4% (298 kgs) for 1973 project beneficiaries, by 10.6% (173 kgs) for 1976 beneficiaries and 11.5% (201 kgs) for 1980 beneficiaries. Substantial part of this increase (10.4%) came from an increase in the yield per acre and only a minor change from an increase in the area under paddy cultivation. The increase in yield per acre even by 10% is a substantial gain when viewed against the background of almost no response of yield per acre to availability of irrigation facilities in the area (Table 9).

3.22 Yield per hectare of rice in Bihar (705 kg in 1979-80) [4/] is around 61% of average yield per hectare at all India level. In terms of yield per acre of paddy it works out to around 450 kg [5/]. The yield per acre per beneficiary before the construction of project compares very well with the average yield per acre for Bihar state.

4/ Centre for monitoring Indian Economy, Basic Statistics Relating to the Indian Economy, Vol.2. States, Table 8-17.

5/ Ratio of paddy to rice in around 8:5.

Table 9

Growth of Paddy - Output and Yield per acre per Beneficiary

Year	Output (kg) B	Output (kg) A	Output (kg) Change	Yield per acre (kg) B	Yield per acre (kg) A	Yield per acre (kg) Change
1973	1711	2009	298 (17.4)	444	538	94 (21.2)
1976	1631	1804	173 (10.6)	474	513	39 (8.2)
1980	1747	1948	201 (11.5)	474	523	49 (10.4)

3.23 An increase in yield per acre of paddy was achieved by assured water supply through the well. This increase was achieved despite the fact that the farmers of this area did not adopt high yielding variety of seeds. With the availability of assured water, they perhaps can be persuaded to adopt the HYV, thus increasing the yield per acre substantially. (Yield per heactare of HYV rice in Bihar is 30% higher than that of non-HYV) 6/.

3.24 The yield of 471 kg per acre for the control group is similar to that of the study group for wells in pre-project time. So, the gain in yield per acre in the post-project time can be attributed to the construction of the project.

3.25 The farmers of Chota Nagpur require credit facilities, crop management instructions and soil management facilities besides irrgation facilities. The package of inputs developed by Ranchi Experimental Research Station for wheat necessitates an investment of Rs. 1000 per acre at 1979-80 prices, whereas the farmers find it difficult to invest more than Rs. 400 per acre. Thus, for an initial introduction a package of inputs costing around Rs. 400 is required or in turn farmers need to be assisted financially with liberal credit.

6/ Centre for monitoring Indian Economy. Basic Statistics Vol.2 1983.

3.26 Land productivity in the Chota Nagpur region can be increased 5 to 16 times simply by removing the acidity characteristies of the soil (upland soil) through the appropriate liming procedure. Response of fertilizer also increases with liming. 7/

INCOME

3.27 Annual Agricultural income per beneficiary changed significantly after the operation of the project. Income change was 55.97% in 1973, 58.67% in 1976 and 48.75% in 1980. In absolute terms the highest change is for 1973, which was of the order of Rs.1436. The table below presents the yearly income changes per beneficiary.

Table 10

Yearly Agricultural income per beneficiary

Year	Agricultural Income (Rs.) B	Agricultural Income (Rs.) A	Incremental Income (Rs.)	Change %
1973	2565.20	4000.92	1435.72	55.97
1976	2191.70	3477.56	1285.86	58.67
1980	2477.82	3685.83	1208.01	48.75
Control Group		2238.00		

3.28 As compared to the control group, the income of the beneficiary farmers was higher by as much as 67%. This can be regarded as the benefit accruing from the project.

7/ Bhagat, L.N:- New Technology and Agricultural Developennt in Tribal Area : A study of the Chota Nagpur Region in 'Tribal Area Development' by Mishra, S.N. & Singh, Bhupinder.

3.29 On examination of stratum wise agricultural income of the beneficiaries, one finds that Lohardaga region was relatively better to start with, the income of the region before the project being highest in all three years. The percentage increase in income realised was also the highest (1976 and 1980) in this region and hence the absolute increase in rupee terms too works out to be very high. This increase was Rs.2801 in 1980, Rs.2530 in 1976 and Rs. 2681 in 1973. Lachragarh is the 2nd best region in terms of income changes the level being Rs. 1293 in 1980, Rs. 1404 in 1976 and 1491 in 1973 (Tables 11 and 11a).

Table 11

Stratum-wise Agricultural Income per beneficiary

Stratum	1973			1976			1980		
	B	A	Change	B	A	Change	B	A	Change
Baraway	1627.36	3413.88	1786.52 (109.78)	2705.66	3375.94	670.28 (24.77)	1707.88	2616.19	908.61 (53.21)
Biru	2464.68	3542.92	1078.24 (43.75)	1899.73	2630.70	730.97 (38.48)	2575.02	3441.56	866.54 (33.65)
Lachragarh	2872.36	4362.36	1490.00 (51.87)	2997.32	4401.79	1404.47 (46.86)	2775.77	4068.47	1292.70 (46.57)
Khunti	1763.52	2383.06	620.08 (36.16)	1737.41	2560.07	822.66 (47.35)	1255.14	1711.16	456.02 (36.33)
Lohardage	3900.92	6582.44	2681.52 (68.74)	2859.99	5290.33	2350.34 (88.47)	3193.85	5995.00	2801.15 (110.70)

Note : Figures in brackets are percentages.

3.30 Lohardaga (EDG-5) - covers the Northern part of Ranchi District and is the area of riversheds with the water level high making it easy to dig wells. The presence of muslims and other non-tribal people has generated greater flexibility and entrepreneurship amongst the residents. These features of the area enabled the project beneficiaries to obtain a higher level of irrigation utilising over 60% of the capacity of the well as against 45% utilisation on the whole. Additional income derived per acre of gross sown area as well as per acre of irrigated area, is the highest in this region. As such, the flow of benefits from the wells dug is the maximum in this area (Table 11a).

3.31 Lachragarh (EDG-3), like Lohardaga, has a mixed and relatively open and enterprising group of people. Despite the area being a hilly terrain, beneficiaries of the area could achieve a near 60% utilisation of the well, but the matching income per acre of gross sown area or per acre of irrigated area could not be obtained because of poor quality of the soil. Though additional income per beneficiary is substantially higher than achieved in other area. Biru (EDG-2), the most southern part of Ranchi District, is a hilly area and so well utilisation is mostly as low as 30%. But because of the initiative of the people, the additional income generated per acre of irrigated land is relatively higher. Kunti (EDG-4) and Barway (EDG-1) are inhabited by relatively traditional and contended people. The additional income per beneficiary, per acre of irrigated land and per acre of gross sown aeea is the lowest.

Table 11a

ADDITIONAL INCOME PER BENEFICIARY PER ACRE OF GROSS SOWN AREA AND PER ACRE OF IRRIGATED LAND

DG-PIC		ADDITIONAL INCOME								
		1973			1976			1980		
		Per Benefiiciary	Per acre of gross sown area	Per acre of irrigated area	Per Benefiiciary	Per acre of gross sown area	Per acre of irrigated area	Per Benefiiciary	Per acre of gross sown area	Per acre of irrigated area
arway	1	2355	436	5476	860	129	1132	898	1[illegible]8	1425
	2	740	135	779	1005	146	1036	1037	144	564
iru	1	703	117	4393	510	41	4636	459	67	1020
	2	2018	328	1627	849	135	976	620	75	590
	3	583	83	1060	759	119	1205	1074	158	1066
Lachra-garh	1	1622	174	665	1310	179	1323	1351	176	817
	2	1269	195	783	1050	159	640	1183	200	657
	3	2128	338	659	2556	433	1229	1553	210	736

Kunti	1	323	47	236	522	118	555	125	38	75
	2	639	112	418	860	162	577	685	149	378
Lohar-bagh	1	2419	484	2986	1815	395	1578	1442	687	1008
	2	1362	320	908	620	238	756	3980	724	2689
	3	3992	887	1957	4060	1041	2522	1470	262	1255

3.31 A better understanding and appreciation of the inter-stratum differential impacts would be facilitated by some carefully selected case studies.

Marketed Output

3.32 With the expansion of production, particularly in winter and summer season, the marketable surplus increased substantially. A very high proportion of crops grown in these two season, viz. potatoes, tomatoes, onions and other vegitables were marketed. As a result the value of marketed output increased by 115.25% for 1980 projects, 85.78% for 1976 and by 122.9% for 1973 projects. In absolute terms the increases were Rs. 470.68, Rs. 513.78 and Rs. 641.64 respectively. The details are given in Table 12. The project, thus, enabled the farmers to increase the money income besides increasing their consumption of these crops.

Table 12

Value of Marketed Output (per Beneficiary)

Year	Value of Marketed Output (Rs.) B	A	Change (Rs.)	Change (Rs.)
1973	522.08	1163.72	641.64	122.9
1976	598.92	1112.70	513.78	85.78
1980	408.40	879.08	470.68	115.25

3.33 Value of the marketed output of the beneficiary farmers was almost 3 times that of the control group. This indicates the increased marketable potential and money income of the beneficiary farmers obtained as a result of the provision of the project.

VALUE OF THE INCREMENTAL OUTPUT

3.34 Addition to income of the farmers are worked out by substractingg the value of the output before the project in that periods farmers' prices from the value of the output after the project in the corresponding periods farmers' prices. Thus this contains an element of change due to price rise and not eminating from change of real output.

3.35 To calculate the real change in value of output for each beneficiary the procedure adopted is :-

(i) Compute the change in the quantity of output for each commodity.

(ii) Multiply this change by the price of the commodity in the period after the project.

(iii) Sum up for all the commodities.

The price of the commodities after the project had to be considered as many commodities were not being produced in the period before the project and hence their prices were not available. Secondly this period was the common period for the projects constructed in 1973, 1976 and 1980.

Procedure in symbols is :-

Let the output be denoted by	Y
the beneficiary be denoted by	k
the crop be deonoted by	h
the time before the project by	o
the time after the project by	1
the price be denoted by	P
the value of incremental output	V

Then

Y_{kh1} is the output of commodity h of beneficiary k in the after project period.

Y_{kho} is the output of commodity h of beneficiary k in the before project period.

P_{khl} is the price of commodity h of beneficiary k in the after project period.

The value of incremental output per beneficiary in each stratum is:

$$V_{ij} = \frac{\sum_k \sum_h \left(Y_{khl} - Y_{kho} \right) \times P_{khl}}{\sum_k k}$$

$$V = \frac{\sum_i \sum_j V_{ij} N_{ij}}{\sum_i \sum_j N_{ij}}$$

where, N_{ij} is the number of beneficiaries in ith stratum and jth PIG.

3.36 The value of incremental output is about 75% to 81% of the change in value of output in different years. The details are given in the table below :

Table 13

Value of Incremental Output per beneficiary

Year	Value of Incremental output (Rs.)	Value of Incremental value as % of additional income
1973	1081.84	75.35
1976	992.06	77.15
1980	979.67	81.08

3.37 Since the price changes were uniform over the domain of the projects, the ratio of the value of incremental output to change in the value of output is expected to be approximately same, i.e., around 75% for all projects and years.

COST OF THE PROJECT

3.38 The cost of the project is mainly in terms of food units utilised for construction of wells. Valuing bulger at Rs. 1.75 per kg and oil at Rs. 13.0 per kg. [8/] Total cost of construction of wells per beneficiary works out at Rs. 4444.34 in 1980, Rs. 4178.64 in 1976 and Rs. 4570.70 in 1973. The FFW component being 92.45% in 1980, 92.16% in 1976 and 95.03% in 1973. The table below gives the cost of the project.

Table 14

Cost of the Project per Beneficiary

Year	Cost of the Project			
	Total	Beneficiary's contribution	FFW Cost	FFW cost as % of the total cost
1973	4570.70	274.38	4343.78	95.03
1976	4178.64	322.27	3728.96	92.16
1980	4444.34	335.63	4108.71	92.45

EMPLOYMENT

3.39 The major impact of the project in terms of employment was on enhanced usage of family labour in the fields. Additional number of mandays utilized were 79288 for 1973 projects, 117915 for 1976 projects and 151800 for 1980 projects. For comparative picture of the projects undertaken in three respective years, a look at mandays used per beneficiary will be useful. Mandays per beneficiary increased by 114 (27.7%) for 1980 projects. For all the three years a change in mandays was over 20% which is quite significant.

3.40 Impact on usage of female labour was higher with respect to projects of 1973 and 1976 being 32.9 and 55.8%, mainly because of lower participation of woman initialy. This change was much lower for projects of 1980 (15.6%) as woman's participation was on a higher level before the project.

3.41 In case of male labour, the initial level involvement in all the three years was approximately same, and the variations in change are also smaller ranging from 18.2% in 1976 to 25% in 1973.

8/ Rates provided by USAID

3.42 The change in family labour, in majority of the cases meant reduction in under employment of workers. Mandays per male worker increased from 193 to 252, a change of 30.6% for 1973 projects. The corresponding change for 1976 and 1980 projects was 47.0% and 15.6%. The change with respect to female labour was 14.3%, 37.7% and 11.3% respectively.

3.43 A change in mandays per worker higher than change in mandays per family in case of male workers implies relatively higher amount of work undertaken by existing labor. In case of female labor, the reverse was true. Though the mandays per female worker increased, a substantial part of the increase per family came from usage of other female members of the family not working in the fields before the project.

The table below gives same of the details of the family labor.

Table 15

Family Labor Before and After the Project

Family Labour	1973 'B'	1973 'A'	1973 Change	1976 'B'	1976 'A'	1976 Change	1980 'B'	1980 'A'	1980 Change
Man Days per family									
Male Labor	272	340	68 (25.0)	285	338	52 (18.2)	268	332	64 (23.6)
Female Labor	140	186	46 (32.9)	95	148	53 (55.8)	158	182	24 (15.6)
Total	412	526	114 (27.7)	381	486	105 (27.6)	426	514	88 (20.7)
Man Days per Workers									
Male labor	193	252	59 (30.6)	164	241	77 (47.0)	205	236	31 (15.6)
Female labor	161	184	23 (14.3)	114	157	43 (37.7)	146	162	16 (11.3)
Man Days per acre	77	86	9 (11.7)	88	78	12 (18.2)	85	92	7 (8.7)
Total Man Days	480392	613316	79288	427863	545778	117915	734850	886650	151800

3.44 Improvement in utilisation of labor resulted from extention of cropped area because of the project. However, some improvement in usage of labor emerged from increased family labor used per acre of cropped land, which increased by 11.7% for 1973, 18.2% for 1976 and 8.7% for 1980. The increase in the amount of hired labor, was nominal.

3.45 The extra employment created by the usage of the well is of continuos nature. Around the same units of employment are going to be created every year. But the construction of wells, too, created employment equivalant varying between 40,000 to 600,000 mandays for each project worked out on the basis of ration given to each worker at the rate of 3.6 kgs of bulgars and 0.125 kgs of oil per day (Table 16). 9/

3.46 The beneficiaries and their family members had agricultural income as the main source of income. A small percentage of people, approximately 10% were employed outside agriculture. These occupation included soliders in army, postman, teacher, carpenter etc. The monthly income of these people varied between Rs.300 & 500. There was no change in the occupational structure after the project. The persons employed outside agriculture did not turn back to agriculture when irrigation facilities were provided though there was shortage of family labor, in some cases.

TABLE 16

MANDAYS UTILISED IN THE CONSTRUCTION OF THE PROJECT

YEAR	NO. OF MANDAYS
1973	647,352
1976	538,294
1980	582,260

9/ Rates provided by USAID.

EDUCATION

3.47 A relatively higher level of income generated through the provision of irrigation had a positive impact on the level of education of the dependents of the benficiaries. The impact on level of education is likely to be visible after a span of time. A comparison between the literacy levels of the dependents of the beneficiaries of projects of 1973, 1976 and 1980 shows that (Table 17):

(i) The proportion of illiterate dependents declined as the number of years after the construction of the project increased. This percentage was 59% for projects of 1980. 55% for projects of 1976 and 53% for projects of 1973.

(ii) The reduction in illiteracy was stronger in case of daughters where it receded from 63% (1980 project) to 49% (1973 project).

(iii) The proportion of dependents with primary, middle and secondary education increased along with the increase in no. of years after the construction of the project.

(iv) The impact of better income on literacy of boys is less marked than the impact on literacy of girls. The proportion of girls with primary education increased from 17% (1980 projects) to 21% (1976 projects) and 31% (1973 projects). The impact on higher level of education is not very clearly established.

Table 17

Distribution of Dependents by level of Education

Dependents	Level of Education	Year		
		1973	1976	1980
All	Illiterate	53	55	59
	Primary	20	19	18
	Middle	12	12	10
	High School & above	15	14	13
Sons	Illiterate	36	39	36
	Primary	28	25	30
	Middle	14	17	17
	High School & above	22	19	17
Daughters	Illiterate	49	50	63
	Primary	31	21	17
	Middle	11	14	7
	High School & above	9	15	13

COST-BENEFIT ANALYSIS

3.48 The information contained in the schedules do permit a preliminary kind of cost-benefit anaylsis. The elements required for cost benefit analysis.

(i) Initial cost of the project.

(ii) Running or maintenance cost of the project.

(iii) Yearly Benefits accruing because of the project.

a) net additional income generated at constant prices

b) value of the additional employment generated.

c) Value of other social benefit arising because of the project.

(iv) Rate of discount

There is some information available on the following elements.

For projects of 1980

(i) Initial cost of the project was Rs. 4444.34 per beneficiary.

(ii) Running or maintenance cost on the project is negligible and in terms of family labour only, thus, can be ignored.

(iii) a) Value of the net additional income per beneficiary was Rs. 614. Value of the incremental output is Rs. 980 per beneficiary at prices of the survey year. The expenditure on agriculture inputs beside family labour per beneficiary is Rs. 366 for the irrigated part of the land. Therefore net additional income per beneficiary in Rs. 614.

This additional income can be assumed to ba a yearly feature, since the level of generation is equivalent for the projects constructed in 1976 and 1973.

b) Additional employment generated on the farm is mainly family labour, which appears on the cost side as cost of procuring the output and on benefit side as employment generated and thus cancels out.

SOCIAL COST-BENEFIT ANALYSIS

3.49 Value of additional employment generated in construction of wells is equivalent to the FFW component i.e. the cost of food required to pay the workers.

This works out to Rs. 4108.71 per beneficiary.

c) Other social benefits can be ignored as not being quantifiable .

Initial cost of Rs. 4444.34 minus initial benefit of Rs. 4108.71 leave net cost to be recovered equal to Rs. 335.63. Against this we have yearly flow of Rs.613.18 as net income, which starts flowing with a lag of one year. Even at a discount rate of 80% the project pays off in one year.

COMMERCIAL COST-BENEFIT ANALYSIS

3.50 Considering employment in construction activity mainly as a cost, the initial project cost of Rs. 4444.34 is set against a yearly flow of benefits of about Rs. 614. The formulation for calculating the rate of discount and time is as follows.

Let C denote the Initial Cost.

Y " " Yearly additional benefits.

r " " rate of discount.

Then

$$C = \frac{Y}{(1+r)} + \frac{Y}{(1+r)^2} + \frac{Y}{(1+r)^3} + \frac{Y}{} + \ldots\ldots$$

3.51 This equation is satisfied at r = 10% in time period of 14 years. If the life time of the project exceeds 14 years, and the rate of interest is generally around 10% the project is commerically viable. In these type of projects the net additional income, according to World Bank norms, should be minimum of 2% of the project cost. The private benefits, in these projects, being far lower than the social benefit, the norm is kept very low. In this case the additional income is 14% of the project cost.

3.52 Considering the above arguments, the wells constructed in 1980 seem to be ecnomically viable.

CHAPTER 4

CHARACTERISTICS OF THE PROJECT AND ITS BENEFICIARIES

4.1 All the beneficiaries were using the well water for irrigation purposes. A majority of them (74%) used this water for drinking purposes. Around 40% of them used it for bathing etc. as well.

4.2 56% of the beneficiaries marketed part of the additional crops, whereas around 80% used the additional crop for self consumption.

4.3 The additional income was used to increase the standard of living of the family and to send the children to school. Around 60% farmer spent part of the additional income in sendingthe children to school.

4.4 The fuller utilisation of the project faced certain problems. Lack of capital was the biggest costraint faced by the beneficiaries. Though lack of boundary wall, lack of techniques and manpower were also some of the obstacles faced.

4.5 Around 27 to 30% beneficiaries had acres to irrigaton prior to this project. This facility, too, was in the form of a well owned by the beneficiary.

4.6 4 to 5% projects were not working, out of which about 2% were incomplete and the rest were either fully dry or partially dry.

4.7 For majority of beneficiaries the source of information was fellow workers i.e. the other project beneficiaries.

4.8 The agricultural extension workers or supervisors paid half yearly visits in 32%, quarterly in 13% and monthly in 16% cases.

4.9 The average distance of the project site from the centre was 8 to 10 kms. The average no. of families benefiting from the project was 2.

4.10 Though almost every beneficiary (90-100%) used manure, the proportation of beneficiairies using fertilizers varied around 79% for the projects of the three years.

4.11 60 to 65% farmers used improved variety of seeds. In general these were of vegetables particularly potatoes, (Chandermukhi) tomotoes, onions (Patna red) cabbage and cauliflower (puja). A few beneficiaries took to wheat cultivation and also used improved variety of seeds for wheat particularly sonalika. Number of beneficiaires

using to high yielding variety seeds for paddy was almost nil. That is one major reason leading to low yield per acre of paddy.

4.12 Hardly 30% beneficiaries used pesticides.

4.13 All the beneficiaries were male. Around 70% of them being in the age group of 20-50 and quite evently distributed within this range. However, for the projects of 1976 more of elderly people were selected to be the beneficiaries as 50% of the beneficiaries fall in the age group of 40-50.

4.14 Over 99% of the beneficiaries belonged to the scheduled tribes. Out of these around 80% were Christians.

4.15 Average number of dependents was 5 per beneficiary. That makes the size of the household as 6 members. These included dependent parents, brothers, sisters and wives of brothers.

4.16 Around 60% of the dependents were less than 20 years of age, and 3% over 50 years.

4.17 There is no marked difference in the number and type of animals and implements possessed by the beneficiaries of the projects of three years.

4.18 Constancy of personal assets and farm implement held suggest no appreciable change in the rate of acquisition of assets and of savings. Thus, the expected multiplier effect, via savings, on income and imployment seems to be missing.

SECTION B : REPORT ON TANKS AND DAMS OF RANCHI CATHOLIC CONSIGNEE AREA

CHAPTER 5

ANALYTICAL FRAMEWORK AND FINDINGS

SAMPLE DESIGN

5.1 For tanks and dams, the two-way stratification by areas to Economic/Demographic/Geographic regions and the project intensity classes just on the pattern of wells was used for selecting survey units for the field investigation. This resulted in 142 survey units out of 755 units for tanks and 195 survey units out of 786 units for dams.

5.2 For the purposes of selecting sub-sample of tanks and dams, stratification according to economic/demographic/geographic regions was abondoned primarily on statistical considerations, there being too few observations per cell. Otherwise, following a similar criteria as for selecting sub-sample of wells (para 2.3), a sub-sample of 62 tanks and 47 dams was selected. This represented a sampling fraction of 8% for tanks and 6% for dams (Table 1).

TABLE 1

DISTRIBUTION OF PROJECT SITES IN UNIVERSE, SAMPLE AND SUB-SAMPLE FOR RANCHI-CONSIGNEE REGION BY TYPE OF PROJECT AND YEAR

(Units : Number)

PROJECT TYPE	YEAR	UNIVERSE	SAMPLE	SUB-SAMPLE
Tanks	1973	204	49	20
	1976	222	33	22
	1980	329	60	20
Total:		755	142	62
Dams	1973	344	81	15
	1976	170	31	12
	1980	272	83	20
Total:		786	195	47

SIZE OF LAND HOLDING

5.3 In the Ranchi Consignee area, the average size of land holding per beneficiary worked out to be around 6 acres in the case of dams and over 7 acres with respect to tanks. The proportion of beneficiaries holding land between 5 to 10 acres varied between 32 to 60% in case of tanks and between 45 to 80% in case of dams. Around 20 to 30% of beneficiaries held land between 1 to 5 acres for tanks and 13 to 33% for dams. The percentage of beneficiaries holding over 10 acres was between 20 to 45% for tanks and 7 to 35% for dams. The number of beneficiaries holding land between 0 to 1 acre was negligible (Table 2).

TABLE 2

DISTRIBUTION OF BENEFICIARIES BY SIZE OF LAND HOLDING

PROJECT TYPE	YEAR	FARM SIZE (Acres)				
		0-1	1-5	5-10	10 & above	Total
TANK	1973	-	41 (20)	122 (60)	41 (20)	204 (100)
	1976	-	67 (30)	100 (45)	55 (25)	222 (100)
	1980	-	75 (23)	105 (32)	149 (45)	329 (100)
DAM	1973	-	69 (20)	155 (45)	120 (35)	344 (100)
	1976	-	57 (33)	113 (67)	-	170 (100)
	1980	-	36 (13)	218 (80)	18 (7)	272 (100)

NOTE: Figures in brackets represent percentages through out the report.

GROSS CROPPED AREA

5.4 The gross cropped area in the region increased by around 8% for most of the projects. The increase was higher around 25% for dams constructed in 1976. The percentage cropped area, however, increased marginally about 2 to 5% for tanks of 1976 and dams of 1980.

5.5 Cropping intensity of the beneficiaries fluctuated between 91 and 129 for the beneficiaries of dam projects and was far lower, varying around 78 to 95, for the tank owners (Table 3).

TABLE 3

LAND OWNED, GROSS CROPPED AREA AND CROPPING INTENSITY PER BENEFICIARY

PROJECT TYPE	YEAR	LAND OWNED (Acres)			GROSS CROPPED AREA (Acres)		CROPPING INTENSITY (%)	
		LOW	UP	TOTAL	B	A	B	A
TANK	1973	3.4	3.8	7.2	6.1	6.9	85	96
	1976	3.2	3.5	6.7	5.0	5.2	75	78
	1980	4.1	4.8	8.9	7.4	8.0	33	90
DAM	1973	3.2	4.2	7.4	6.2	6.7	84	91
	1976	2.6	3.6	6.2	6.5	8.0	105	129
	1980	2.9	3.2	6.1	5.8	6.1	95	100

SEASON-WISE IRRIGATED AREA AND INTENSITY OF IRRIGATION PER BENEFICIARY

5.6 In case of tanks, the area irrigated ranged between 0.64 acres in 1976 to 1.31 acres in 1973. The inter-year differences emerged in all the three seasons. Similar is the case of dams. The area irrigated by dams averaged 2.33 acres in 1976 and 0.90 in 1980 with the inter-year differences being visible in all the seasons. The maximum utilisation of water, for these two project types, was in the rainy season. The tanks and dams are generally constructed in higher level areas. This level of land requires irrigation during rainy season as well. However, the average area irrigated per project is low as 35% of the tanks and dams were used for purposes other than irrigation. The intensity of irrigation ranged between 12 and 19 for tanks and 15 to 29 for dams (Table 4).

TABLE 4

SEASON-WISE IRRIGATED AREA AND INTENSITY OF IRRIGATION PER BENEFICIARY

PROJECT	YEAR	AREA IRRIGATED (Acres)				INTENSITY OF IRRIGATION
		Summer	Winter	Rainy	Total	%
TANK	1973	0.29	0.47	0.55	1.31	19
	1976	0.04	0.30	0.32	0.64	12
	1980	0.20	0.38	0.35	0.93	12
DAM	1973	0.18	0.20	0.75	1.15	17
	1976	0.39	0.71	1.23	2.33	29
	1980	0.23	0.28	0.39	0.90	15

CROPS AND CROPPING PATTERN

5.7 The area sown under paddy increased by about 0.1 acres (3%) per beneficiary for all project types in RCC region. The area cultivated under vegetables during winter and summer seasons increased from 0.2 acres to 0.7 acres for tanks and dams - a little less than what was achieved for wells.

TABLE 5

CROPPING PATTERN - AREA SOWN UNDER MAIN CROPS PER BENEFICIARY

PROJECT TYPE	YEAR	PADDY		MILLETS & PULSES		VEGETABLES		ALL CROPS	
		B	A	B	A	B	A	B	A
TANK	1973	3.9	4.0	2.0	1.9	0.2	1.0	6.1	6.9
	1976	3.3	2.9	1.5	1.7	0.2	0.6	5.0	5.2
	1980	4.8	5.0	2.4	2.3	0.4	0.7	7.4	8.0
DAM	1973	3.3	3.4	2.7	2.7	0.2	0.6	6.2	6.7
	1976	3.2	3.2	3.0	3.5	0.3	1.3	6.5	8.0
	1980	3.1	3.2	2.5	2.2	0.3	0.7	5.9	6.1

GROWTH OF PADDY

5.8 Paddy output increased in case of dams by 8% (1973) to 30% (1976). There was negligible rise in case of tanks. A significant contribution was from increase in yield per acre increasing from 5 to 30% for dams and 13 to 14% for tanks.

TABLE 6

GROWTH OF PADDY : OUTPUT AND YIELD PER ACRE PER BENEFICIARY (RCC)

PROJECT	YEAR	OUTPUT (KG.)			YIELD PER ACRE (KG.)		
		B	A	CHANGE	B	A	CHANGE
TANK	1973	1898	2209	311 (16.4)	487	552	652 (13.4)
	1976	1370	1372	2 (0.1)	415	473	58 (14.0)
	1980	1860	1847	-13 (-0.6)	404	369	-35 (-8.6)
DAM	1973	1475	1596	121 (8.4)	447	469	22 (5.0)
	1976	1270	1649	349 (30.0)	397	515	118 (30.0)
	1980	1434	1574	140 (10.0)	463	492	29 (6.2)

INCOME

5.9 Annual agricultural income per beneficiary changed significantly with the usage of the project facility. In the RCC region, income change ranged between 28 to 61 percent for dams. However, the change was much smaller for tanks constructed in 1976 and 1980, being of the order of 15 and 8 percent respectively. For 1980 tanks, the output of paddy as well as yield per acre of paddy declined, and for 1976 tanks, they were almost constant. The area irrigated and intensity of irrigation, too, were lowest for the tanks of 1976 and 1980. A relatively slow income rise in this area is explained, to some extent, by lower utilisation of the project for irrigation purposes. In absolute terms, highest change in income per beneficiary was Rs.1807 (tank 1973) and lowest was Rs.237 (tank 1980). (Table 7)

TABLE 7

YEARLY AGRICULTURAL INCOME PER BENEFICIARY (RCC)

PROJECT TYPE	YEAR	AGRICULTURAL INCOME (Rs.) B	AGRICULTURAL INCOME (Rs.) A	INCREMENTAL INCOME (Rs.)	CHANGE %
TANK	1973	3250	5057	1807	56
	1976	2027	2326	299	15
	1980	2970	3207	237	8
DAM	1973	2429	3248	819	34
	1976	2337	3771	1434	61
	1980	2296	2943	647	28

MARKETED OUTPUT

5.10 In the RCC area, the addition in the value of marketed surplus was in the range of 28% to 97% for tanks and 66% to 85% for dams. In absolute terms, the variation of the value of marketed output was from Rs.495 (tank 1976) to Rs.1381 (tanks 1973). (Table 8)

TABLE 8

VALUE OF MARKETED OUTPUT PER BENEFICIARY

PROJECT	YEAR	VALUE OF MARKETED OUTPUT (Rs.) B	VALUE OF MARKETED OUTPUT (Rs.) A	CHANGE (Rs.)	CHANGE (%)
TANK	1973	702	1381	679	97
	1976	271	495	224	83
	1980	495	635	140	28
DAM	1973	368	609	241	66
	1976	512	949	437	85
	1980	324	586	262	81

COST OF THE PROJECT

5.11 The cost of the project is mainly in terms of food units utilised for construction of wells. Bulger is valued at Rs.1.75 per Kg. and oil at Rs.13.0 per kg. In the RCC region, the cost of tanks varied between Rs.5006 to Rs.5699 and that of dam between Rs.4200 to Rs.5782. The FFW component ranges between 92% and 95% (Table 9).

TABLE 9

COST OF THE PROJECT PER BENEFICIARY

PROJECT	YEAR	COST OF THE PROJECT (Rs.)		TOTAL COST (Rs.)	FFW COST AS % OF THE TOTAL COST
		BENEFICIARY'S CONTRIBUTION	FFW COST		
TANK	1973	305	4702	5006	94
	1976	317	5171	5488	94
	1980	358	5341	5699	94
DAM	1973	330	4875	5205	94
	1976	338	3862	4200	92
	1980	280	5502	5782	95

EMPLOYMENT

5.12 The major impact of the project in terms of employment was on enhanced usage of family labour in the fields. In the RCC region, additional number of mandays utilized for tanks constructed during 1973, 1976 and 1980 were 24072, 4884 and 38822 respectively. For dams, the additional number of mandays utilized ranged between 28050 and 47128. For tanks and dams, the addition to total number of mandays is of lower order because of less number of tanks and dams being constructed. However, a clearer comparative picture of the various projects and time periods emerges by a look at mandays used per beneficiary (family). Mandays per beneficiary increased in the range of 8 to 32% for tanks and 10 to 40% for dams in the RCC area.

5.13 Impact on employment resulting from usage of the project was similar to that of wells in this area. Mandays per worker, family and per acre increased substantially (Table 10 & 11).

TABLE 10

FAMILY LABOUR BEFORE AND AFTER THE PROJECT (RCC)

Project Type : Tank

	1973			1976			1980		
	B	A	Change	B	A	Change	B	A	Change
Mandays per family									
Male	254	331	77(30)	191	204	13(7)	252	323	70(28)
Female	126	167	41(33)	86	95	9(10)	121	169	48(40)
Total:	380	498	118(31)	277	299	22(8)	374	492	118(32)
Mandays per worker									
Male	203	255	52(26)	175	187	12(7)	186	237	51(27)
Female	180	208	28(16)	158	189	31(20)	190	247	57(30)
Mandays per acre	80	73	-7(-9)	56	57	1(2)	54	74	20(37)
Total Mandays	77520	101592	24072	61494	66378	4484	123046	161860	38822

FAMILY LABOUR BEFORE AND AFTER THE PROJECT (RCC)

Project Type : Dams

	1973			1976			1980		
	B	A	Change	B	A	Change	B	A	Change
Mandays per family									
Male	262	332	170(65)	235	330	95(40)	229	300	71(31)
Female	173	240	67(39)	173	243	70(40)	106	169	63(59)
Total	435	572	137(32)	408	573	165(40)	335	469	34(10)
Mandays per worker									
Male	194	229	35(18)	177	247	70(40)	178	234	56(32)
Female	164	192	28(17)	149	208	59(40)	149	236	87(58)
Mandays per acre	70	91	21(30)	57	74	17(30)	58	84	26(45)
Total Mandays	149640	196768	47128	69360	97410	28050	91120	127568	36448

5.14 The extra employment created by the usage of the well is of continuous nature creating around the same units of employment every year. But the construction of projects, too, creaeed employment varying between 40,000 to 600,000 mandays for each project, worked out on the basis of ration given to each worker at the rate of 3.6 kgs. of bulgars and 0.125 kgs. of oil per day. (Table 12).

TABLE 12

MANDAYS UTILISED IN THE CONSTRUCTION OF THE PROJEC.

PROJECT TYPE	NO. OF MANDAYS UTILISED IN CONSTRUCTION		
	1973	1976	1980
TANKS	121036	144853	221727
DAMS	211609	82844	188838

SECTION C : REPORT ON WELLS, TANKS AND DAMS IN CHANDWA CONSIGNEE AREA

CHAPTER 6

ANALYTICAL FRAMEWORK AND FINDINGS

SAMPLE DESIGN

6.1 As mentioned earlier, there are two administrative districts, viz., Hazaribagh and Palamau under the Chandwa consignee area. Each of these districts formed a separate stratum compared to five economic/demographic/ geographic regions of Ranchi Consignee Area. The universe comprised of 2266 project sites. For each district, the survey units (project sites) were selected on the basis of multi-stage stratified sampling scheme. All first stage units (project holders) were selected unlike 50% in the case of Ranchi. The second stage units were selected with a sampling fraction 1/3 resulting into 614 sites.

6.2 Following the same approach as set out for selecting dams and tanks under Ranchi consignee area, a sub-sample of 38 wells, 36 tanks and 36 dams was drawn for the purposes of analysis. This implied merging of the two districts in one group, but maintaining inter-temporal feature of the study (Table 1).

TABLE 1

DISTRIBUTION OF PROJECT SITES IN UNIVERSE, SAMPLE AND SUB-SAMPLE IN CHANDWA CONSIGNEE AREA BY TYPE OF PROJECT AND YEAR

PROJECT TYPE/YEAR	HAZARIBAGH		PALAMAU		TOTAL		
	Universe/Sample		Universe/Sample		Universe	Sample	Sub-Sample
Wells							
1978	278	125	304	100	582	225	12
1979	103	45	117	39	220	84	12
1980	247	110	207	69	454	179	12
Tanks							
1978	91	40	67	22	158	62	12
1979	10	4	16	5	26	9	12
1980	47	20	14	5	61	25	12
Dams							
1978	97	44	344	115	441	159	12
1979	35	15	69	21	104	119	12
1980	34	15	186	60	220	235	12
Total:	942	418	1324	196	2266	614	108

SIZE OF LAND HOLDING

6.3 In the Chandwa Catholic Consignee area the average land holding was around 6 acres for most of the projects However, for wells constructed in 1979 and 1980, the average size of land held was 3 acres and 2.4 acres respectively, and for tanks constructed in 1978, the average size of the holding worked out to 9 acres. The percentage of beneficiaries holding land between 5 to 10 acres varied between 8 to 75% for wells, 42 to 58% for tanks and 42 to 50% for dams over the years. The percentage of beneficiaries holding land between 1 to 5 acres was very high in the Chandwa area for wells constructed in 1979 (92) and 1980 (86). Relatively smaller percentage of beneficiaries held land more than 10 acres, generally being around 8% (Table 2).

TABLE 2

DISTRIBUTION OF BENEFICIARIES BY SIZE OF LAND HOLDING (CCC)

PROJECT TYPE	YEAR	FARM SIZE (Acres)				
		0-1	1-5	5-10	10 & above	Total
Wells	1978	-	146 (25)	436 (75)	-	582 (100)
	1979	-	110 (92)	10 (8)	-	120 (100)
	1980	-	389 (86)	65 (14)	-	454 (100)
Tanks	1978	-	13 (8)	79 (50)	66 (42)	158 (100)
	1979	-	13 (50)	11 (42)	2 (8)	26 (100)
	1980	-	15 (25)	36 (58)	10 (17)	61 (100)
Dams	1978	-	220 (50)	184 (42)	37 (8)	441 (100)
	1979	-	43 (42)	52 (50)	9 (8)	104 (100)
	1980	-	110 (50)	92 (42)	18 (8)	220 (100)

GROSS CROPPED AREA

6.4 In the Chandwa Consignee region, the gross cropped area increased by over 30% for the project type well constructed during 1979 and 1980. The same, however, for the wells of 1978 was around 12%. For tanks constructed during 1978 and 1979 and dams constructed during 1978 and 1980, the increase in gross cropped area was over 30% and for others around 12%.

6.5 Cropping intensity attained after the project in CCC area fluctuated in a larger range than the same in RCC area. These ranges were 94 to 133 for wells, 73 to 115 for tanks and 97 to 125 for dams (Table 3).

TABLE 3

LAND OWNED, GROSS CROPPED AREA AND CROPPING INTENSITY PER BENEFICIARY (CCC)

PROJECT TYPE	YEAR	LAND OWNED (Acres)			GROSS CROPPED AREA (Acres)		CROPPING INTENSITY %	
		Low	UP	Total	B	A	B	A
Well	1978	3.1	3.2	6.3	5.2	5.9	83	94
	1979	2.0	1.0	3.0	2.9	4.0	97	133
	1980	0.8	1.6	2.4	1.7	2.3	71	96
Tanks	1978	4.6	4.6	9.4	6.7	7.9	71	84
	1979	2.8	2.6	5.4	4.7	6.2	87	115
	1980	2.3	4.5	6.8	4.7	5.0	69	73
Dam	1978	1.9	4.1	6.0	4.3	5.8	72	97
	1979	3.0	3.1	6.1	5.3	6.0	87	98
	1980	3.3	1.9	5.2	5.1	6.5	98	125

SEASON-WISE IRRIGATED AREA AND INTENSITY OF IRRIGATION PER BENEFICIARY

6.6 In the CCC region, the inter-year and inter-season variations in the area irrigated per project are more pronounced than in the Ranchi Catholic Consignee region. For wells and tanks, utilisation of water for irrigation was negligible during rainy season in most of the years. The total area irrigated ranged between 0.5 acres in 1980 to 1.7 acres in 1979 for wells, 0.6 acres in 1980 to 1.4 acres in 1979 for tanks and 1.6 acres in 1979 to 3.0 acres in 1978 for dams. The level of intensity of irrigation, too, was higher for dams varying between 26 and 52 than for wells and tanks where the variation was 7 to 43 and 10 to 23 respectively (Table 4).

TABLE 4

SEASON-WISE IRRIGATED AREA AND INTENSITY OF IRRIGATION PER BENEFICIARY (CCC)

PROJECT TYPE	YEAR	AREA IRRIGATED (Acres)				INTENSITY OF IRRIGATION
		Summer	Winter	Rainy	Total	
Well	1978	0.3	0.6	-	0.9	7
	1979	0.6	0.6	0.5	1.7	43
	1980	0.2	0.3	-	0.5	22
Tank	1978	0.5	0.7	-	1.2	15
	1979	0.3	0.9	0.2	1.4	23
	1980	0.1	0.2	0.2	0.5	10
Dam	1978	0.5	1.7	0.8	3.0	52
	1979	0.1	0.7	0.8	1.6	27
	1980	0.6	0.7	0.4	1.7	26

CROPS AND CROPPING PATTERN

6.7 In the CCC region, no change was affected in the area under paddy and millets and pulses (Table 5). The increase in the area cultivated under vegetables was more pronounced in this area as compared to RCC. It increased from almost nil level to 1.2 acres per beneficiary.

TABLE 5

CROPPING PATTERN - AREA SOWN UNDER MAIN CROPS PER BENEFICIARY

PROJECT	YEAR	PADDY		MILLETS & PULSES		VEGETABLES		ALL CROPS	
		B	A	B	A	B	A	B	A
Well	1978	3.5	3.2	1.7	1.7	0.0	1.0	5.2	5.9
	1979	1.9	1.8	1.0	1.0	-	1.2	2.9	4.0
	1980	0.9	0.9	0.8	0.8	-	0.6	1.7	2.3
Tank	1978	4.4	4.4	2.2	2.2	0.1	1.3	6.7	7.9
	1979	3.2	3.4	1.5	1.5	-	1.3	4.7	6.2
	1980	3.4	3.4	1.3	1.3	-	0.3	4.7	5.0
Dam	1978	2.4	2.4	1.8	1.8	0.1	1.6	4.3	5.8
	1979	2.7	2.7	2.4	2.5	0.2	0.8	5.3	6.0
	1980	3.1	3.0	1.9	1.9	0.1	1.7	5.1	6.6

GROWTH OF PADDY

6.8 Increase in both paddy output and yield per acre was much less in the CCC region. The percentage increase in paddy output and yield/acre being less than 7 percent in most of the cases (Table 6).

TABLE 6

GROWTH OF PADDY : OUTPUT AND YIELD PER ACRE PER BENEFICIARY (CCC)

PROJECT TYPE	YEAR	OUTPUT (KG.)			YIELD PER ACRE (KG.)		
		B	A	Change	B	A	Change
Well	1978	1577	1792	215(14)	451	560	109(24)
	1979	958	958	0(0)	504	532	28(6)
	1980	345	362	17(5)	383	402	19(5)
Tank	1978	1533	1633	100(7)	348	371	23(7)
	1979	1433	1545	102(7)	451	454	3(1)
	1980	1836	1896	60(3)	540	558	18(3)
Dam	1978	912	1050	138(15)	388	447	59(15)
	1979	955	1072	117(12)	354	449	95(27)
	1980	1392	1392	0(0)	449	464	15(3)

INCOME

6.9 In the Chandwa Catholic Consignee region, the variation in percentage change of income per beneficiary is much more uniform. For wells (1979), tanks (1978, 1979) and dams (1980), the income change was around 55% and for wells (1978), tanks (1980) and dams (1978, 1979), the change varied between 24 to 36 percent. For wells (1980) the percentage change was very high, of the order of 135%, mainly because of a relatively smaller income base before the project. In absolute terms, the highest income change per beneficiary was Rs.1742 (dams 1980) and lowest was Rs.558 (tanks 1980). (Table 7)

TABLE 7

YEARLY AGRICULTURAL INCOME PER BENEFICIARY (CCC)

PROJECT	YEAR	AGRICULTURAL INCOME (Rs.)		INCREMENTAL INCOME (Rs.)	CHANGE %
		B	A		
Well	1978	2225	2875	650	29
	1979	2652	4151	1499	57
	1980	539	1269	729	135
Tank	1978	2030	3191	1161	57
	1979	1568	2408	840	54
	1980	2343	2901	558	24
Dam	1978	1870	2544	674	36
	1979	2366	3001	635	27
	1980	3080	4822	1742	57

MARKETED OUTPUT

6.10 In the CCC region, the percentage change in the value of marketed output was much higher, particularly in cases where the initial level of marketed output was very low, i.e., a change of 907% (well 1980) from an initial level of Rs.3, 533% (tank 1978) from an initial level of Rs.103, 1082% (dams 1978) from a base level of Rs.11 and 828% (dam 1980) from an initial level of Rs.217. In other cases, the variation was from 36% to 226% (Table 8).

TABLE 8

VALUE OF MARKETED OUTPUT PER BENEFICIARY (CCC)

PROJECT	YEAR	VALUE OF MARKETED OUTPUT (Rs.)		CHANGE (Rs.)	CHANGE (%)
		B	A		
Well	1978	253	417	164	65
	1979	798	1984	1186	149
	1980	3	275	272	907
Tank	1978	103	652	543	533
	1979	173	564	391	226
	1980	338	458	120	36
Dam	1978	11	130	119	1082
	1979	775	1133	358	46
	1980	217	2013	1796	828

COST OF THE PROJECT

6.11 In the CCC region, the inter-year variations in the cost of projects are much higher. The cost of the well varies between Rs.2370 to Rs.8366, that of tank between Rs.5456 to Rs.12208 and that of dam between Rs.6395 to Rs.8254. The FFW component likewise has a greater variation ranging between 85% to 97% (Table 9).

TABLE 9

COST OF THE PROJECT FOR BENEFICIARY (CCC)

PROJECT	YEAR	COST OF THE PROJECT (Rs.)		TOTAL COST (Rs.)	FFW COST AS % OF THE TOTAL COST
		Beneficiary's contribution	FFW Cost		
Well	1978	333	5609	5942	94
	1979	625	7741	8366	93
	1980	346	2025	2370	85
Tank	1978	530	6971	7501	93
	1979	521	11687	12208	96
	1980	177	5279	5456	97
Dam	1978	492	7762	8254	94
	1979	350	6045	6395	95
	1980	492	7292	7764	94

EMPLOYMENT

6.12 The increase in total number of mandays by the usage of the project ranged between 5448 to 118146 for wells, 2002 to 13488 for tanks and 7904 to 98784 for dams. Increase in mandays used per project were in the range of 2 to 51% for wells, 27 to 47% for tanks and 14 to 70% for dams.

6.13 Impact on employment resulting from the usage of the project was of similar nature as in case of Ranchi. Mandays used per worker (more in case of females) per family and per acre substantially increased (Tables 11-13).

6.14 The construction of projects created employment varying between 40,000 to 600,000 mandays (Table 13).

TABLE 10

FAMILY LABOUR BEFORE AND AFTER THE PROJECT (CCC)

PROJECT TYPE : WELL

	1978			1979			1980		
	B	A	Change	B	A	Change	B	A	Change
Mandays per family									
Male	301	418	117(39)	315	470	155(49)	279	287	8(3)
Female	100	186	86(86)	30	50	20(67)	233	237	4(2)
Total:	401	604	203(51)	345	520	175(51)	512	524	12(2)
Mandays per worker									
Male	181	226	45(25)	189	282	93(49)	230	251	21(9)
Female	120	223	103(86)	180	300	120(67)	251	255	4(2)
Mandays per acre	77	102	25(33)	119	130	11(90)	301	228	-73(-24)
Total Mandays	233382	351528	118146	41400	62400	21000	232448	237896	5448

TABLE 11

FAMILY LABOUR BEFORE AND AFTER THE PROJECT (CCC)

PROJECT TYPE : TANK

	1978			1979			1980		
	B	A	Change	B	A	Change	B	A	Change
ndays per family									
le	155	231	76(49)	186	218	32(17)	205	265	60(29)
male	30	40	10(33)	100	145	45(45)	163	240	77(47)
tal:	185	271	86(47)	286	363	77(27)	368	505	137(37)
ndays per worker									
le	155	231	76(49)	186	218	32(17)	189	245	56(30)
male	90	120	30(33)	150	218	68845)	159	222	72(48)
ndays per acre	28	34	6(21)	61	59	-2(-3)	78	101	23(30)
tal Mandays	29230	42818	13588	7436	9438	2002	22440	30805	8357

TABLE 12

FAMILY LABOUR BEFORE AND AFTER THE PROJECT (CCC)

PROJECT TYPE : DAM

	1978			1979			1980		
	B	A	Change	B	A	Change	B	A	Change
ndays per family									
le	203	300	97(48)	347	372	25(7)	250	394	144(58)
male	116	243	127(109)	190	241	51(27)	-	-	-
tal:	319	543	224(70)	537	613	74(14)	250	394	144(58)
ndays per worker									
le	203	300	97(48)	231	248	17(7)	176	278	102(58)
male	139	291	152(109)	190	241	51(27)	-	-	-
ndays per acre	74	94	20(27)	101	102	4(4)	49	61	12(24)
tal Mandays	140679	239463	98784	55848	63752	7904	55000	86690	31680

TABLE 13

MANDAYS UTILISED IN THE CONSTRUCTION OF THE PROJECTS

PROJECT TYPE	NO.OF MANDAYS UTILISED IN CONSTRUCTION		
	1978	1979	1980
WELLS	411916	117214	116006
TANKS	138980	38342	40633
DAMS	431930	79329	202428

Annex-1

Table 1

DISTRIBUTION OF PROJECT SITES AND PROJECT HOLDERS BY AREA AND YEAR OF INSPECTION AND BY THE TYPE OF THE PROJECT

PROJECT		A 15-24									B 25-49									C 50 & Above									Total									Grand Total No of Proj.	Grand Total No of Project Sites
		No. of Sites	1975			1976			1980			No. of Sites	1973			1976			1980			No. of Sites	1973			1976			1980			1973			1976			1980				
			W	T	P	W	T	P	W	T	P		W	T	P	W	T	P	W	T	P		W	T	P	W	T	P	W	T	P	W	T	P	W	T	P	W	T	P		
1. BARWAY	S_2	4	26	11	37	24	6	31	35	9	44	1	3	5	8	12	3	5	14	4	3											31	15	47	31	9	21	52	13	39	5	265
	S_1		55	20	75	55	13	55	16	24	15		5	12	16	21	6	9	38	1	6											63	32	103	74	19	44	146	31	71	8	535
	U	8	81	35	112	87	30	45	111	39	85	3	46	21	62	12	16	28	76	32	30											125	46	172	142	48	73	207	71	122	11	998
2. BIRU	S_2	2	7	1	8	7	2	9	12	16	15	2	9	8	16	32	4	4	63	8	17	1	41	-	-	11	3	1	32	6	2	102	9	18	55	9	7	150	42	40		358
	S_1		24	2	32	13	3	8	46	14	35		44	14	20	11	7	7	87	17	31		84	-	-	35	5	4	57	13	4	207	16	32	114	15	19	142	35	56	5	705
	U	5	33	5	38	48	13	18	89	30	72	4	55	18	25	115	16	17	150	28	61	5	218	46	13	244	68	22	352	58	14	442	59	64	442	97	57	447	99	117	14	2025
3. LAKHERASAI	S_2	1	12	3	7	5	-	-	5	-	4	4	26	7	2	19	7	1	64	11	-	1	51	2	-	23	-	-	42	2	-	61	12	9	47	7	1	127	13	4		275
	S_1		22	7	13	19	2	4	21	7	9		54	16	23	51	15	1	128	27	1		41	3	-	46	-	-	83	4	-	127	26	36	114	17	5	322	38	7	6	596
	U	3	46	7	25	44	4	23	58	15	12	7	106	26	33	134	20	3	227	46	3	1	41	3	-	46	-	-	83	4	-	235	32	58	214	34	26	468	65	15	11	1042
4 KHONTI	S_2		6	-	-	4	1	-	7	1	-	3	49	5	2	33	3	-	44	7	1											55	5	2	37	4	-	91	8	1		163
	S_1	1	11	-	1	5	2	2	16	4	2		94	15	6	73	9	1	97	14	2											98	15	7	78	11	3	173	18	4	4	354
	U	2	11	-	1	15	3	2	35	20	3	6	137	29	15	111	26	5	223	46	2	1	18	3	-	21	9	3	56	21	5	192	32	16	157	38	6	348	56	10	9	875
5 LOHARGA	S_2	2	8	3	2	7	4	1	8	-	-	2	17	1	-	20	-	1	39	2	2	1	13	4	3	19	-	-	23	-	-	38	8	5	46	4	2	70	2	2		177
	S_1		17	6	2	14	8	3	23	2	4		44	4	6	32	1	2	70	4	4		23	7	7	35	-	-	56	-	-	80	17	15	85	9	5	157	6	8	5	372
	U	6	37	11	7	29	8	4	54	10	8	3	71	5	6	54	5	3	128	13	6	2	79	7	7	81	2	1	97	4	-	187	31	24	164	15	8	279	27	12	11	749
TOTALS	S_2		65	17	52	47	13	19	87	20	58		142	31	32	114	17	11	209	33	23	3	75	6	1	58	3	1	117	8	2	287	49	31	241	31	31	297	60	83		1238
	S_1	10	132	35	114	142	32	43	124	51	114		246	41	77	246	38	20	409	69	44		118	10	7	114	5	4	244	17	4	532	101	194	480	79	76	716	107	162	25	3557
	U	22	233	48	195	234	42	92	245	106	183	13	538	107	109	526	81	52	874	131	70	9	256	47	29	412	79	26	348	81	19	1041	206	346	1066	322	170	1512	327	332	56	5556

Notes:

S_1 = Samples at the first stage

S_2 = Second stage sample or samples surveyed.

U = Universe

TABLE 2

Distribution of Project Sites in Universe Sample and Sub-Sample by Stratum

(Units: Absolute Number)

Year	EDC (Economic Demographic Region)	Project Intensity Group (PIG) (No. of projects i.e. wells per projects holder) 1 - 24			25 - 49			50 & above			Total		
		Universe	Sample	Sub-Sample	Universe	Sample	Sub-Sample	Universe	Sample	Sub-Sample	Universe	Sample	Sub-Sample
1975	Saraway	81	28	6	44	5	5	-	-	-	125	33	11
	Biru	63	11	6	156	50	11	218	41	10	437	102	27
	Lachragarh	48	12	5	146	23	10	41	21	4	235	61	19
	Khunti	11	6	4	171	49	13	-	-	-	181	55	17
	Lohardaga	37	8	4	71	17	6	79	13	6	187	16	16
	Total	240	65	25	588	149	45	338	75	20	1166	289	90
1976	Sarawary	80	24	12	62	12	6	-	-	-	142	36	18
	Biru	48	7	5	148	32	11	266	16	13	462	55	29
	Lachragarh	44	5	4	131	19	9	44	23	5	219	47	18
	Khunti	15	5	4	121	33	8	-	-	-	136	38	12
	Lohardaga	29	7	4	54	20	5	81	19	6	164	46	15
	Total	216	48	29	516	116	39	391	58	24	1123	222	92
1980	Sarawary	111	35	10	96	19	10	-	-	-	207	54	20
	Biru	89	22	7	150	87	11	352	32	16	591	141	34
	Lachragarh	58	15	6	227	64	11	83	42	7	368	121	24
	Khunti	35	7	4	223	44	11	-	-	-	258	51	15
	Lohardaga	56	8	5	128	39	10	117	23	10	301	70	25
	Sub Total	349	87	32	824	253	53	552	97	33	1125	437	118
	Total	805	200	86	1928	518	137	1281	230	77	4014	948	300

ANNEX-2

TARGET POPULATION

1.1 PEOPLE OF CHOTANAGPUR:

Historically Chotanagpur provides a meeting place for three major cultural traditions - the Austrict, Dravidian and Aryan. Consequently the area is linguistically and culturally among the richest in the country, seven tribal and regional languages in addition to Hindi, English and Bengali languages which also used as medium of communication and instruction, are spoken in this area. Each ethnic group has developed its own musical cultural in accordance with its genius. This has become so isolated because of geographical segregation which each ethnic group has suffered from for a long period of time.

But beneath this diversity, there is an underlying unity because of the fact that each several cultural elements lead themselves to all ethnic group of the area. Sarhul and Karma (festivals of spring and Rain respectively) are celebrated equally among all the people of the plateau.

In recent years, the area has undergone a tremendous change. With the begining of the present century, the plateau, has been subjected to industrialisation and the consequential urbanisation. The Chotanagpur has the most mineral wealth of the country and with the exploitation of this wealth came the exploitation of the local people as well. The incoming population has increased to such an extent that tribals are no longer a majority population in the area. Tribal people now have to find out ways and means to align themselves in conformity with other groups. This has created a new ground for the revival of the past. A new beginning has set in for the development of tribal and local linguistic and cultural traditions of the tribal Bihar. A new sense of local identify is in the making.

1.2 ECONOMIC LANDSCAPE OF CHOTANAGPUR

The State of Bihar is divided into two main divisions. The northern division is formed by the Indo-Gangetic plain and the southern division is comprised extensively of forested uplands and is known as the Chotanagpur Plateau consisting of six districts, viz, Palamau, Ranchi, Singhbhum, Hazaribagh and Dhanbad,

and Santhal Parganas and what is called tribal Bihar. The Chotanagpur division consists of elevated table lands dotted over with numerous hills and jungles interested by a number of small and shallow streams forming two rivers the south Koel and Subaranrekha. The surface of the Plateau is diversified in appearance by expenses of arid land, naked rocks and ranges of wooded hills. There are a series of plateau of different heights ranging from 2500 feet to 3600′ above sea level covering north-west corner of Ranchi district and the southern edge of Palamau district. The other plateau comprises Ranchi district and ranges from 2000 to 3000 feet. Hazaribagh district constitute the third plateau lying at a height of 1000 to 2000 feet.

Chotanagpur was one time covered with dense forests but the Mundas and Oraons opened up the land by clearing jungles and establishing villages. More recently with the rapid deforestation, the central and eastern parts of the plateau have been practically denuded of junlges.

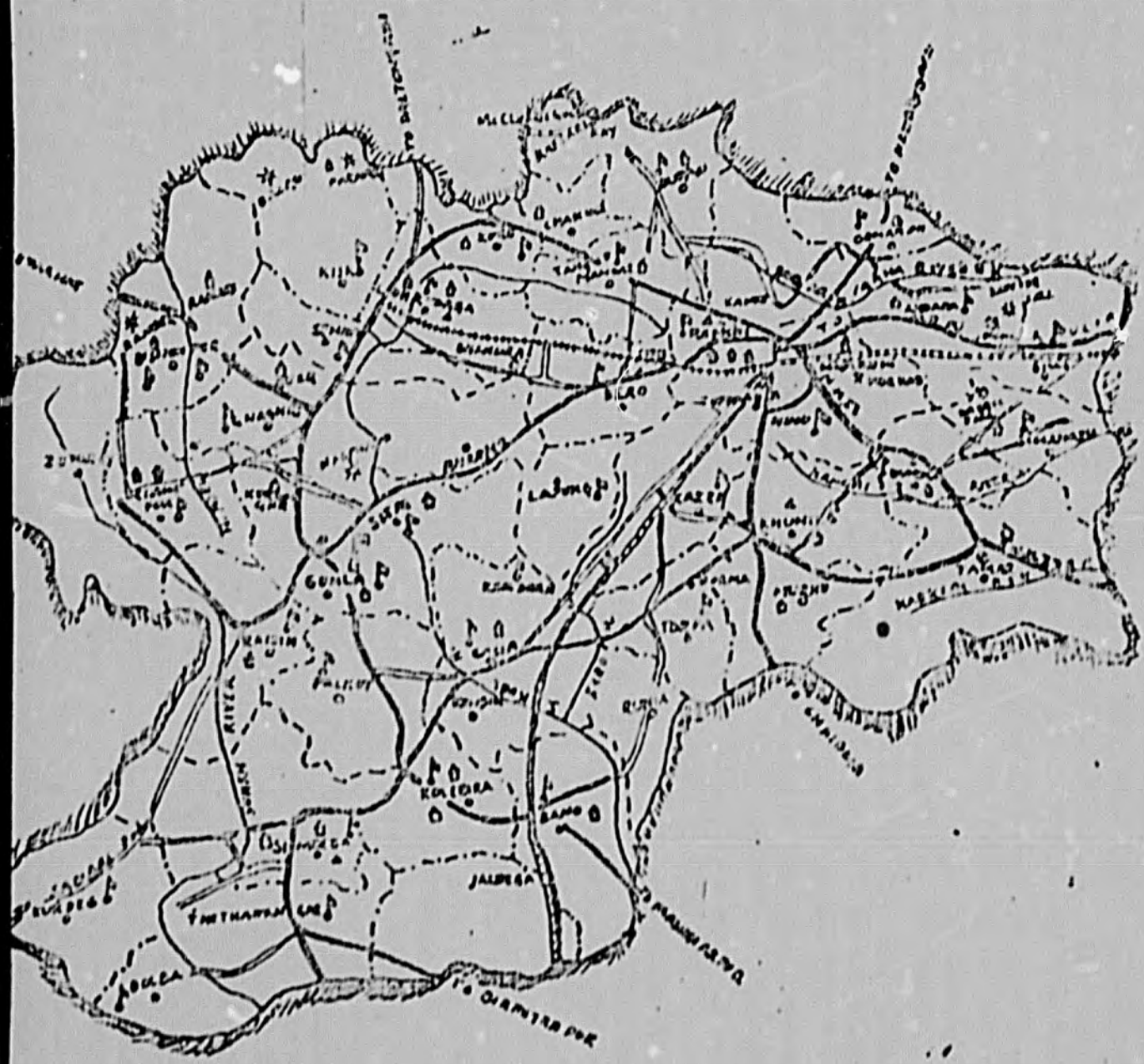
1.3 RAINFALL AND TEMPERATURE

The normal rainfall of the plateau varies from 40 inches to 65 inches. The precipitation is uncertain and the distribution generally uneven. The success or failure of crop production depends entirely on the mosoon rains. If these are delayed or untimely, crop prospects are at stake. Palamau is usually recorded as a draught district and the monsoon trucks out there late in July-August while in other districts towards the end of May or usually by the middle of June. The trend of rainfall is such and that out of every five years, normally two or three years only produce a favourable monsoon.

Temperature and humidity effect the germination, growth, grain formation and ripening of different crops sown. The maximum annual temerature varies between 43 oC, the minimum between 35 oC to 39 oC and the mean at about 24 oC. The temperature rises considerably during the summer months hitting 58 oC to 55 oC mark. The land is purchased and all vegetation usually dries up. The hot wind cause erosion on upland sandy soils and make them infertile all well, tanks and dams, rivers and streams dry to most places during that time of the year.

ADMINISTRATIVE MAP OF THE RANCHI DISTRICT

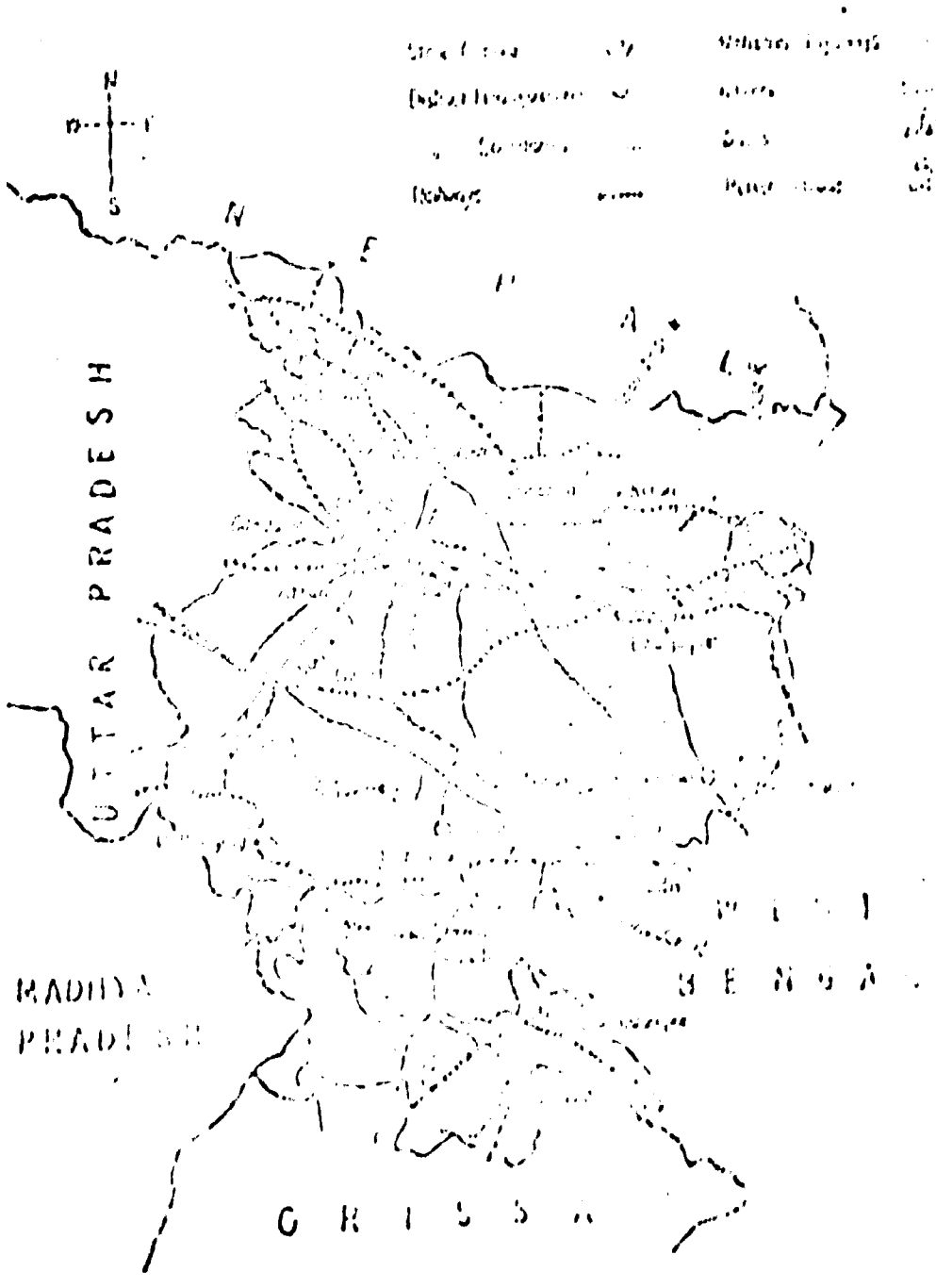
SCALE = 1" = 16 MILE



REFERENCE

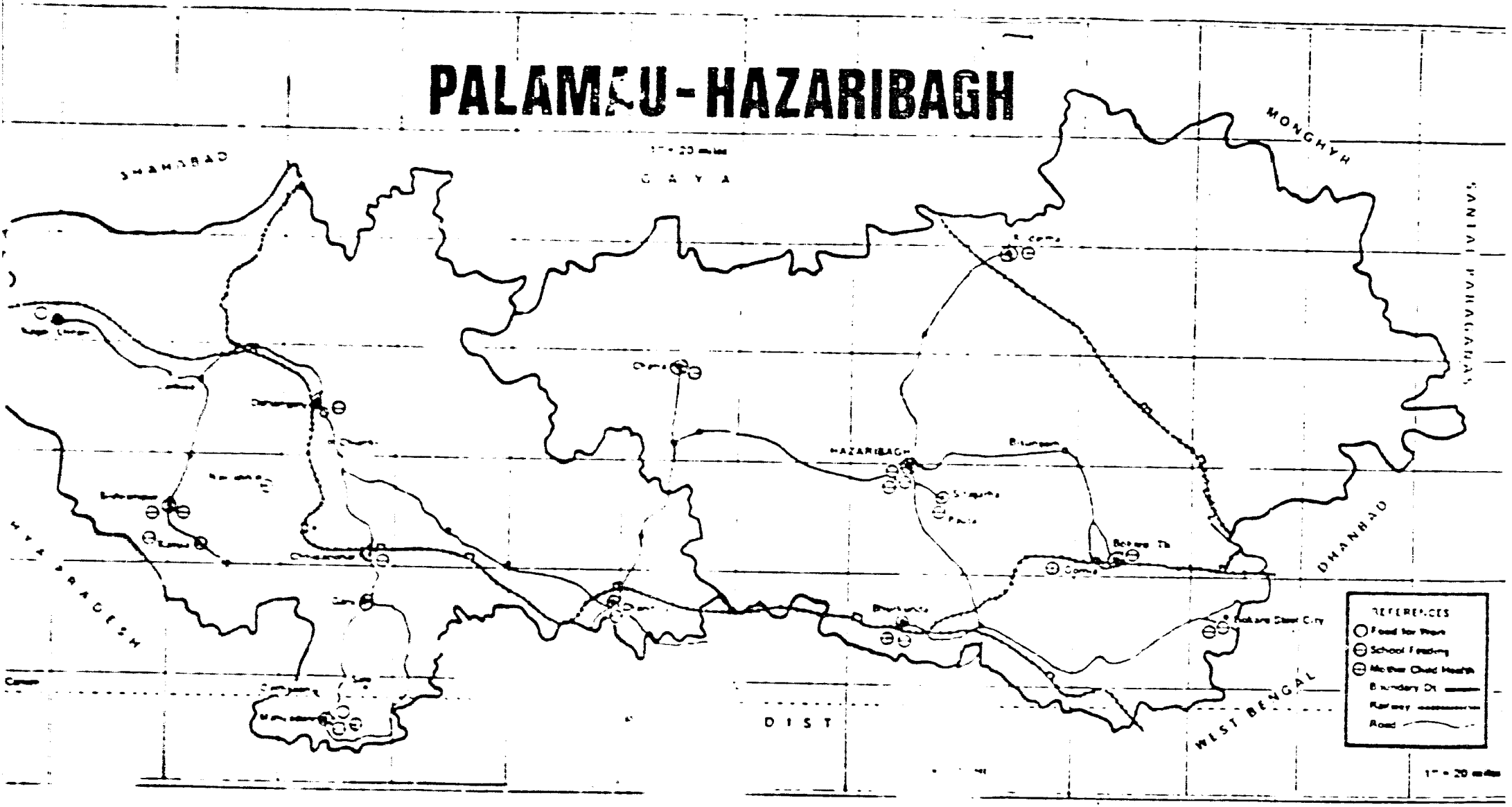
1. P.W.D ROAD ... ...
2. Z.P. ROAD ... ...
3. SUCHYVISION BOUNDARY LINE ... ...
4. DIST. BOUNDARY LINE ... ...
5. IMPORTANT TOWNS ... ...
6. RAILWAY LINE ... ...
7. AERODROME ... ...
8. RIVER ... ...
9. POLICE STATION ... ...
10. BLOCK BOUNDARY LINE ...
11. BLOCK HQS ... ...
12. BEAUTY SPOTS ... ...

INFRASTRUCTURE OF [illegible]



Best Available Document

PALAMAU-HAZARIBAGH



1.4 SOIL

Local names given to different types of land by the tribal people vary considerably depending, upon the location, type of soil, colour and composition. The uplands are called Tanr which the lowlands are called Dones. The uplands (Tanr) are usually sandy in texture and red, brown, yellow oan admixture of all these color. The lowlands (Bones) are dark grey or greyish brown in color and contain more clayey materials. The receive a considerable blacking from the washings they get annually during each successive monsoons from the uplands. Due to the undulating topography of the land, the rainfall runs off rapidly from the top surface eroding fertile portions of the upland soils. The upland (Tanr) are the poor and acidic in reaction. The PH content varies from 4.7 to 7.2. These soils are also pornos and do not retain mositure. Crops therefore cannot be grown satisfactorily without the application of organic manures in generous quantities.

FERTILITY OF SOIL

Analysis of soil samples shows the following fertility status of the land in RANCHI : Soil shows on an average 0.040 percent of nitrogen, 0.002 percent of P2 O5, 0.010 percent K2 O and PH content ranging from 5.0 to 6.5. The maximum value of the nitrogen has been found to be 0.112 percent and the minimum as 0.019 percent.

HAZARIBAGH

Soils indicate 0.05 percent of nitrogen, 0.001 percent of P2 O5 and 0.010 of K2O. The PH content ranges from 5.5 to 6.8. The maximum value of nitrogen has been found to be 0.106 percent and the minimum as 0.027 percent.

PALAMAU

Soils contain on an average 0.060 percent of nitrogen, 0.005 percent P2 O5 and 0.010 pecent K2 O. The PH content varies from 5.0 to 6.6. The maximum nitrogen content has been found to be 0.125 percent and the minimum as 0.056 percent.

1.7 IRRIGATION

Wells, tanks and dams are the principal sources of irrigation on the plateau. The construction of various types of irrigation schemes has created some irrigation potential but most of the irrigation schemes function as a stand by and supply irrigation water merely when the rains fall. The construction of wells, though much useful, is still considered as a very minor measure since one well can hardly irrigate more than an acre of land properly. There is no scope, for tube wells due to rocks, stones, and the nature of the subsoil. Tanks also serve us useful reservoirs of water but there construction is a costly affair. However, presently more wells, tanks and small dams are being constructed by both the Govt. and voluntary organisations to help small farmers for producing vegetables and a small fraction of rabi crops in Ranchi, Palamau and Hazaribagh districts.

1.8 FOOD PRODUCTION

Despite all that is done in the field of development, the plateau remains still a deficit area. The main reasons attributed to are :

1) The poor fertility status and the low productivity of the upland soils.

2) The absense of assured irrigation facilities.

3) The low yields per acre.

With the provision of minor irrigation facilities, the yield per acre can easily be doubled. There is a need also for a shift in cropping patterns from uneconomical crops like gondli, gora and other small millets to high yielding varieties jowar in the draught affected areas. More unfortunate fact is that agriculture is still regarded as a subsistance occupation and has not be treated as industry. The lack of capital for farming, for providing irrigation facilities, improved seeds, fertilizers and plant protection measures stand in the way of increased production. Judged by the per acre yield, Chotanagpur plateau still shows a very low level of productivity in comparison with North Bihar.

1.9 CROPPING PATTERN

Where double cropping is practiced, generally on the uplands, a second crop like mustard and other oilseeds is cultivated after the Kharif. The low lands are rarely cultivated for double cropping except small fraction of lands for vegetables or summer paddy.

The rotation of crops and various crop combinations are prevalent in almost all the districts of Chotanagpur. Different crops are grown in a particular sequence rather than the same crops on the same land year after year. It may actually result in a gain of nutrients in the top layer as nutrients are pumped up by roots feeding in the deep layers. When these plants mature and die, the nutrients, the roots and whatever fading stems are left behind in the soil contribute to enrich the top soil. In Chotanagpur broadcast paddy and wheat are deep rooted while transplanted paddy, ragi are horizontally rooted crops. In the low lands, transplantation and broadcasting are adopted, alternatively. In the uplands, black gram is generally followed by gora paddy or ragi.

Mixed cropping has the same benefited effect on soil fertility as that of crop rotation because soil nutrients are more evenly distributed and the soil is not depleted of any single nutrrent. It also checks soil erosion considerably. One particular advantage of mixed cropping is that it works as a kind of crop insurance for the farmer. In the case of mixed cropping of ragi (Marua) and urad for instance, if ragi is attacked by pests, the pulse crop remains. Similarly, if there is an attack of black rust on urad, the farmer may at least get ragi. Another advantage of mixed cropping is that the farmer gets his requirements of cereal, pulse, oil seeds and fodder simultaneously. Mixed cropping has the advantage of controlling the total failure of a crop. The mixture of maize and arhar, maize and urad wheat and gram are generally practiced by many farmers in Chotanagpur.

1.10 AGRICULTURAL ECONOMY

Barter economy, that is, one kind of grain is exchanged for another or sometimes daily labourers, blacksmiths and potters are paid in grain, can still be seen among the farmers of Chotanagpur, Earlier farmers were self-sufficient mainly because their needs were few. As social, cultural and industrial changes have reached them, their daily requirements have gone up. Besides food, they now require millmade clothes, sugar, tea and many other modern items of daily consumption.

A class of middleman traders, generally non-tribals are commerically dominating the local market. More and more weekly and daily markets or hats are coming up throughput the region. Moreover, industrialization and urbanization are gradually changing the land scape and the vary life of Chotanagpur.

The various agricultural schemes under taken by the church or church-related organisations or by many other voluntary organisations are trying to bring-changes in all directions, particularly by teaching new farming methods, be letter use of organic manures and chemical fertilizers, high yielding varieties of seeds, by constructing wells, tanks, dams for irrigational purposes, by introducing double cropping system and other intensive farming systems. Besides some demonstration-cum-production farms are run by the Govt. as well as by the church to teach people in a practical and direct way new methods of cultivation. The main crops produced are Gora paddy (autumn rice), maize, maruwa (Ragi), winter paddy oilseeds, jowar, groundnuts,wheat, etc. Attempts are being made also to grow cash crops like, ptotato, groundnut and vegetables.

There are limitations for extensive cultivation in Chotanagpur due to the topography of the land. The production of food has to be increased, therefore, mainly by enhancing the yields per acre by intensive methods of cultivations.

ANNEX - 3

SOCIO-ECONOMIC FEATURES OF STRATA OF RANCHI CATHOLIC CHARITIES (RCC) CONSIGNEE

For the basis of the sample, Ranchi district was divided into 6 areas :

1.	Barway	4.	Khunti
2.	Biru	5.	Lohardaga
3.	Lachragarh	6.	Ranchi

The Ranchi area (No.6) was excluded from the sample.

The main characterstics of the areas are given below : -

Socio-economic characteristics of RCC (1971 Census)

Area	Block Covered	Tribal Population as % of total	Level of literacy %	Density of population per Sq. ft.
1. Barway:	Dumri Chainpur	82.07%	28.2%	84.55
2. Biru:	Kurdeg Bolba Thetaintanagar Simdega Rangarih	70.00%	24.43%	87.38
3. Lachragarh:	Palkot Kolabira Jaldega Bano Basia Gumla	75.35%	20.38%	113.41
4. Khunti :	Kamdara Torpa Rania Murha Karra Khunti Lapung	62.65%	20.64%	121.63

Area	Block Covered	Tribal Population as % of total	Level of literacy %	Density of population per Sq. ft.
5. Lohardaga:				
	Senha Ghargra Sisai Verno Mandar Burmu Chanho Kuru Kisko Lohardaga	60.83%	16.76%	139.2

Ref. Administrative Atlas (Bhagalpur and Chotanagpur Subdivisions Census of India 1971 Series 4 Bihar Part - IX - A (ii).

Usaid Evaluation of : F. F. W. Projects
Random Sample Survey
Questionnaire for Project Study

Date of interview.....

Name of data collector.....

Checked by.....

A. IDENTIFICATION

1. Consignee .....
2. Centre.....
3. Village .....
4. Distance from Centre.... .....Kms.
5. Project approved in the name of.....
6. Number of families who are benefiting from the project.....
7. Year of completion.....
   (1973 1976 1980)

B. PROJECT DESCRIPTION

1. Type.....
   (well, tank, dam)

2. Dimensions in ft. —Well :.....(dia).....(depth)
   Tank :.....(L).....(B).....(D)
   Dam :.....(L).....(H).....(Base)
   .....(Top)

3. Brief description of the project
   (for Wells : Steened ? Bricks or stones ?.....
   Parrapet made ? etc.
   Tanks : Turfing done ? How much raised ?.....
   Catchment area ?
   Dams : Earthen, Stones, Pucca, etc.....
   Source of water.

4. Was any expert consulted ?..... No..... Yes
   (Specify)

15

5. Cost of project, FFW inputs.....(kgs) Grain.....(Kgs) Oil

Funds from.....(Rs) for.....(Purpose)

Consignee/Centre

Commodity.....(Name).....(Qty)

from Consignee/Centre

Beneficiary's.....(Value).....(Purpose)

Contribution

.....(Value).....(Purpose)

.....(Value .....(Purpose)

.....(Value).....(Purpose)

.....

(others) .....(Value).....(Purpose)

6. Quantity of water available : Well/Tanks.....Summer.....Winter

(How many ft. of water)

Dam.....Summer.....Winter

(area & depth) (area & depth)

7. Pumping Methods : Fulcrum (Manual) : Nos.....

Persian Wheel : Nos.....

Power Pump : Nos .....

8. In how many hours can water be drawn out under present pumping method — — Winter ..... hrs

Summer .....hrs.

Winter .....hrs.

9. How many hours does it take to refill Summer.....hrs.

10. Work done after project activity to improve or maintain the project .....

.....

.....

.....

.....

11. Present condition of the Project : (Specify) .....

.....

.....

12. Total area irrigated by the project Summer.....Acres

Winter.....Acres

Monsoons.....Acres

C. BENEFICIARY CHARACTERISTICS

1. Name : .....
2. : .....
3. Age : .....
4. Caste/Tribe : .....
5. Religion : .....
6. Marital Status : .....
7. Number of dependents : .....

Name	Relationship	Sex	Age	Education* completed/Continuing
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

*Primary, Middle, High School, College, Etc.

8. Landholding

	Lowland (acres)	Upland (acres)	Total	Irrigated land (acres)	Source of Irrigation (well, tank, dam, river)
Owned	.....	.....	.....	.....	.....
Rented	.....	.....	.....	.....	.....
Share-cropped	.....	.....	.....	.....	.....

9. Farm Animals :

Type	Number
.....	.....
.....	.....
.....	.....
.....	.....

10. Farm implements owned : Type ..... Number .....

....

....

....

....

11. Other things owned :

Tpye	( ) Yes
Bicycle	( )
Wristwatch	( )
Radio	( )
Sewing Machiue	( )
Stove	( )
Table	( )
Chair	( )
Bed	( )
Brass/Steel Vessels	( )
.....	( )
.....	( )

12. Beneficiary's main source of income :

Source	( ) Main source
Agriculture	( )
Labour	( )
..... (specify)	( )

13. Employment activity during the last 12 months of Beneficiary and family members

Name	Period (Months)	Type of work	No. of days	Daily wage if not self-employed
..... (Beneficiary)	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

14. Employment activity before the project of Beneficiary & Family members

Name	Period (Months)	Type of work	No. of days	Daily wage
..... (Beneficiary)	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

15 Hired Labour employed : (for Cultivation)

Season	No. of workers	Total days	Daily wage M	F	C
Rainy	.....	.....	.....	.....	.....
Summer	.....	.....	.....	.....	.....
Winter	.....	.....	.....	.....	.....

16 Food grain storage facilities : ( ) No

Yes : Describe, material, size or volumes .....

.....

.....

D. CROPPING AND IRRIGATION PATTERN

1. Crops of Beneficiary before the project

Season	Crop	Area Planted (acres)	Yield (Kgs)	Total (Rs)	% Marketed
Rainy	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
Winter	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
Summer	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....

2. Crops of the Beneficiary after project (1980-81)

Season	Crop	Area planted (acres)	Yield (Kgs)	Total Value (Rs)	% Marketed
Rainy	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
Winter	..	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
Summer	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....

3. Additional New crops since the project :

Name of crop	Area Planted
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

4. Which new crops replaced the old crops :

Old crops	replaced by New Crops
.....	.....
.....	.....
.....	.....
.....	.....
.....	.....

5. Does Beneficiary use : (a) Manure ( ) No. Yes ( )
(b) Chemical Fertilizer ( ) Yes then Names

.....
.....
.....
.....

Year when use adopted.....

(c) Improved Seeds ( ) No. Yes then Names

.....
.....
.....
.....

Year when use adopted.....

(d) Insecticides ( ) No. Yes then Names

.....

.....

.....

.....

Year when use adopted .....

6. Of Beneficiary's total land holding, indicate total area irrigated for each season with CRS/F. F. W assisted scheme.

Season	Crops	Area Irrigated (acres)
Rainy	.....	.....
	.....	.....
	.....	.....
Winter	.....	.....
	.....	.....
	.....	.....
Summer	.....	.....
	.....	.....
	.....	.....
	.....	.....

7. Yearly input amounts for each irrigated acre :

(a) Family labour : .....

(b) Hired labour : .....

(c) Bullocks if hired : .....

(d) On pumpsets : .....

(e) Manure : .....

(f) Fertilizers : .....

(g) Seeds : .....

(h) Insecticides : .....

8 From whom did Beneficiory learn to make use of the project :

(a) Extension worker : ( )

(b) Supervisor : ( )

(c) Other project beneficiaries ( )

(d) Through acquired experience ( )

(e) ..... ( )
(Specify)

(f) ..... ( )
(Specify)

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9. Visits by agricultural extension worker or supervisor to instruct the Beneficiary :

Once a month ( )
Once a quarter ( )
Once a half year ( )
Once year ( )
Never ( )
Only once ( )
Only twice ( )
Only thrice ( )

10. Is Beneficiary a member of a Co-operative ?

Yes ( )
No ( )

11. Does the beneficiary have other irrigation facilities

Well ( ) Before/after the project..... .....(Source)
Tank ( ) Before/after the project..... .....(Source)
Dam ( ) Before/after the project..... .....(Source)
..... ( ) Before/after the project ..... (Source)
(Specify)

12. Give your comments regarding the Social/Economic changes and benefits which have occured from the project :—

a. main use of the well/tank dam :
(drinking water, bathing, animals, irrigation) :

.....
.....
.....

b. increase in cultivation : (for self-consumption or for market)

.....
.....
.....

c. Indirect effects : (increased employment, change in cloths, children going to school etc.)

.....
.....
.....

d. Main problems : (Why is the scheme not fully utilised ?
Main obstacles : lack boundary wall etc.)

... ...
... ...
... ...
... ...

Usaid Evaluation of F. F. W. Projects
Random Sample Survey
Questionnaire For Control Group Study

Date of interview :

Name of date collector :

Checked by :

A. IDENTIFICATION

1. Consignee :
2. Centre :
3. Village :
4. Distance from Centre :
5. Whether project has been approved but not started ( ) Yes
   Applied for implementation during 82 ( ) Yes
   Others :
   (Specify)
5. Type of project applied or approved :
   (well, tank dam)

B. RESPONDENT'S CHARACTERISTICS

1. Name :
2. Sex : (M) (F)
3. Age :
4. Caste/Tribe :
5. Religion :
6. Marital Status :
7. Number of dependents :

Name	Relationship	Sex	Age	Education* completed/Continuing

*Primary, Middle, High School, College, Etc.

8. Landholding

Lowland (acres)	Upland (acres)	Total Irrigatad land (acres)
Owned :		
Rented :		
Share-cropped		

9. Farm Animals :

Type	Number

10. Farm implements owned :

Type	Number

11. Other things owned :

Type	( ) Yes
Bicycle	( )
Wristwatch	( )
Sewing achine	( )
Radio	( )
Stove	( )
Chair	( )
Table	( )
Bed	( )
Brass/Steel Vessels	( )
.....	( )
.....	( )

12. Respondent's main source of income :

Source	( ) main source
Agriculture	( )
Labour	( )
..... (specify)	( )

13 Employment activity during the last 12 months of respondent and family members

Name	Period (Months)	Type of work	No. of days	Daily wage if not self-employed
(Respondent)				

14. Hired Labour employed : (for Cultivation)

Season	No. of workers	Total days	Daily wage M	F	C
Rainy					
Summer					
Winter					

15 Food grain storage facilities : ( ) No

Yes : Describe, materials, size of volumes

C DESCRIPTION OF THE PRESENT SOURCE OF IRRIGATION, IF ANY

1. Type

Well		( ) Yes
Tanks		( )
Dams		( )

2. Dimension in ft.

Well	(Dia)	(depth)	Kacha/Pucca	
Tank	(L)	(B)	(D)	
Dam	(L)	(H)	(Base)	(Top) Earthen/pucca

3. Present condition of this source (Describe)

4. Number of other farmers using this same source for irrigation

5. Who owns this source :

(specify) (on whose land)

6. If the source is not on his land does he pay for its use. ( ) No.

Yes : Describe to who, rate and amount in appropriate terms and also if pumset is provided

7. If the source is on his land does he change the other farmers for its use : ( ) No.

Yes : Describe rate and amount in appropriate terms and also if pumpset is provided :

8 How was this source of irrigation made ?

CRS F.F.W. Project	( ) Yes	(Year made)
Govt. Project	( ) Yes	(Year made)
Farmers own expense	( ) Yes	(amount)
		(specify)

(Others)

D. CROPPING AND IRRIGATION PATTERN

1. Crops of Respondent :

Season	Crop	Area Planted (acres)	Yield (Kgs)	Total (Rs)	% Marketed
Rainy					
Summer					
Winter					

2. Does respondent use : (a) Manure ( ) No Yes ( )
   (b) Chemical Fertilizer : ( ) No. Yes ( )
   (c) Improved Seeds ( ) No. Yes ( )
   (d) Insecticides ( ) No Yes ( )

3. Of respondents total land holding indicate total area irrigated for each season with the present source of irrigation :

Season	Crops	Area Irrigated (acres)
Rainy		
Winter		
Summer		

4 Yearly input amounts for the total land of the respondent :

(a) Family labour

(b) Hired labour

(c) Bullocks if hired :

(d) On pumpsets :

(e) Manure :

(f) Fertilizers :

(g) Seeds :

(h) Insecticides :

5 Visits by agricultural extension worker or supervisor to instruct the respondent :

Once a month ( )

Once a quarter ( )

Once a half year ( )

Once year ( )

Never ( )

Only once ( )

Only twice ( )

Only thrice ( )

6. Is respondent a member of a Co-operative ?

Yes ( )

No ( )

7. Why has the respondent applied for project of CRS ?