

**Impact on Livelihoods :
PRADAN's Collaboration Study of the 5% Technology
Purulia, West Bengal, India**

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Poverty – Focused Smallholder Water Management
*Promoting Innovative Water Harvesting and Irrigation Systems
to Support Sustainable Livelihoods in South Asia*

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Table of contents

	Page No	
Definitions of local terms	i	
Definition of technical terms specific to the report and Abbreviations	iv	
Local Units Of Measurement & Their Approximate SI Equivalents	v	
Section1:0 Introduction to the study	01	
1.1 Introduction to the Study of 5% Technology	01	
Section2:0 Introduction to the project and study area	05	
2.1 Factors/ rationale for its selection for IWMI - PRADAN collaboration study	05	05
2.2 Agro-climatic profile of the region	05	
2.3 Vegetation	08	
2.4 Land zones and soil types	08	
2.5 Socio-economic and political profile of the region	09	
2.6 General commentary	15	
2.7 Nature of land tenure	15	
2.8 Prevailing agricultural practices and prices	18	
2.9 Infrastructure	20	
2.10 A brief note on the implementing agencies	21	
2.11 Implementation History	22	
2.12 Introspection	31	
Section3:0 The Study	34	
3.1 Methodology	34	
Section4:0 Research Questions.	38	
Section5:0 Analysis of data.	40	
5.1 Factors considered in agricultural decision making	40	
Section6:0 Coping Strategies in Water Stress Situation.	42	
6.1 The coping strategies evidenced during the study period were	42	
6.2 Regular coping strategies	44	
Section7:0 Findings - Focus On 5%.	47	
7.1 Role of food security in adoption of 5% and impact assessment	47	
7.2 Paddy sale and assessing efficacy of 5%.	48	
7.3 Re-establishing the relevance of irrigation support intervention	49	
7.4 Extent of availability of irrigation	49	
7.5 Land distribution	49	
7.6 Total number of 5% - village wise	50	
7.7 Age of pits	51	
7.8 Reasons for adoption/ acquiescence	51	
7.9 Variable affecting adoption	52	
7.10 Factors conditioning success or failure	53	
Section 8:0 Learning and Implications for replication	54	
8.1 5% pit depth, its range and frequency	54	
8.2 Perception regarding depth of 5%	55	
8.3 Instances of variation of dimension	55	
8.4 After conclusion of implementation within 2-3 years	56	
8.5 Implementation agency wise clustering of 5% pit	56	
8.6 Variation in style across implementation agencies	55	
8.7 Variants to the 5% model	57	

8.8	Manu's ¹ ' <i>Panchta</i> ' (Five) cultivation	58
8.9	Impact on livelihood	60
8.10	Acknowledged benefits	61
8.11	Role of caste and political affiliation in access	63
8.12	Comparison of with and without 5%	65
Section9: 00	Conclusion.	77
Section 10:0	Future Scope For Research..	80
10.1	Additional Research Questions.	80
10.2	Next Course of Action.	82

APPENDIX – I

APPENDIX – II

APPENDIX - III

APPENDIX - IV

Definitions of local terms

<i>Aman</i>	The 'normal' paddy <i>i.e.</i> taken in <i>kharif</i> with the onset of monsoons in June and harvested by December. It has been called normal because all the paddy growers cultivate this crop.
<i>Boro</i>	The Rabi paddy sown in December end to January. This paddy crop can only be taken where assured irrigation is available or there is high probability of winter rains
<i>Aus</i>	Paddy sown in the month of June and harvested in the month of September /October. That is this refers to the traditional short duration <i>Kharif</i> paddy.
<i>Khara</i>	Literally means drought but during the study it has been used by the villagers in the watershed to refer more to the drought like/ drought prone conditions prevailing in the study area due to failure of timely rains.
<i>Bahal</i>	The low lying arable land most suited for paddy as water from uplands collect in this type of plot enabling a good crop of paddy even in rain fed conditions
<i>Baid</i>	The mid uplands where good rainfall or assured source of irrigation is required to harvest paddy
<i>Bigha</i>	A local unit of land measurement. One hectare is approximately 7.5 <i>bigha</i> or 2.5 acres.
<i>Chouka</i>	A measure to assess the extent of excavation in earth works in the area and represents a 100 cubic feet volume. It's the basis for labour payment.
<i>Dabka</i>	It is a bag like swing basket made of leather and now days even of tin. Rope is attached in two sides of the <i>dabka</i> to raise water from a depth of the water source to field level to be transported along channels to the required fields. A <i>dabka</i> is suitable to raise water from a depth of about 10 feet only. It requires at least two people to draw water using a swing basket and is an effort intensive process.
<i>Danga</i>	Local generic term for uplands
<i>Desi</i>	The locally used term for 'local' as opposed to ' <i>videsi</i> ' (literally foreign) meaning improved and both are used in reference to crop variety
<i>Hapa</i>	A water tank larger than a 5%
<i>Jharna</i>	Literally a spring referring to source of water in pit, which does not dry easily.
<i>Kanali</i>	Mid lowlands, lower than <i>baid</i> and higher than <i>bahal</i> . This is the land next best suited for paddy after <i>bahal</i> land.
<i>Katta</i>	Local unit of land measurement. Twenty <i>katta</i> is equal to one <i>bigha</i> in Purulia. However from place to place the relation between <i>katta</i> and <i>bigha</i> varies.
<i>Kharif</i>	There are three seasons in the agriculture calendar. <i>Kharif</i> , <i>rabi</i> and <i>zaid</i> . <i>Kharif</i> refers to the cultivation done with the onset of monsoon in June and harvested latest by December.
<i>Kutchra</i>	Temporary
<i>Mahato</i>	An 'other backward caste' in the Hindu caste hierarchy and the

	numerically most dominant in the study area.
<i>Panchayat</i>	A unit of local self-government under the <i>panchayati</i> system.
<i>Pucca</i>	Permanent used with reference to house made of brick and cement mortar or a metalled tarmac road
<i>Rabi</i>	There are three seasons in the agriculture calendar <i>kharif</i> , <i>rabi</i> and <i>zaid</i> . <i>Rabi</i> refers to the cultivation done in November December and harvested in March.
<i>Samiti</i>	A local euphemism for the <i>panchayat</i> (local unit of self governance) at the block level. Block consists of certain number of villages and is unit for development intervention.
<i>Tarn</i>	Upland. It could consist of a mixture of un-arable waste lands and some cultivable wastes
<i>Kali puja</i>	Rated as the most important to second most important festival of the people of the study area
<i>Durga puja</i>	Probably the most important festival for Bengali Hindus
<i>Seer</i>	A volumetric measure for things like grains, cereals and representing 1/40 th of a <i>mon</i>
<i>Videsi</i>	See <i>desi</i>
<i>Lakh(s)/ lac</i>	1 lakh = 100,000

Definition of technical terms specific to the report

5%	It's a pit, representing 5% of the total area, which is dug in a plot of land to harvest the rainwater and excess run off.
Land zone	This is term used in the report to refer to the <i>height</i> of the land.
Soil type	Refers to the <i>quality</i> of the soil in the report like sandy, gravel
Bund	This refers to the boundary to the plot or around a pit made by piling the excavated earth.

Abbreviation

2'	2 feet	
2"	2 inches	
DAP	Di- ammonium phosphate	A chemical fertilizer
IWMI	International Water Management Institute	
LCS	Local Committee Secretary of the CPI(M) party	A political party post
NGO	Non Governmental Organization	Refers to not for profit Societies, trust and such organizations working for social charitable objective.
PLA	Participatory Learning in Action	
PRADA	Professional Assistance for	
N	Development and Action	
SI	<i>Systeme Internationale</i>	
Kg	Kilogram	

Local units of measurement & their approximate si equivalents

<i>Bigha</i>	A local unit of land measurement. One hectare is approximately 7.5 <i>bigha</i> or 2.5 acres.
<i>chouka</i>	10 cubic foot of excavation, used as unit of measure digging and earthwork
<i>decimal</i>	Unit of land measurement. 33 decimals are equal to one <i>bigha</i>
<i>Katta</i>	This is a unit of land measurement and its relation to <i>bigha</i> varies from place to place. In Purulia 20 <i>katta</i> make a <i>bigha</i> .

Section 1: Introduction to the study

1.1 Introduction to the Study of 5% Technology

5% is a risk reducing technology - an attempt to mitigate the weather related risks that affect paddy crop. It essentially consists of digging a pit representing 5% of the total area of plot at a suitable location as means of harvesting and retaining the rainfall. This 5% area is demarcated by taking 1/5 of length and 1/4 of width. In triangular plots 1/4 of two adjacent arms is marked and the line joined. In either case the pit is dug to a depth of 5 feet. This pit is expected will increase the productivity of the available rainfall.

The purpose of the pit is to *in situ* harvest and collect rainwater, which other wise flows away to the river. An additional purpose is to recharge the seepage zone.

However, according to PRADAN the 5% area meant for pits is not sacrosanct figure. One can make bigger pits depending on land availability. Depth can also be increased. But 5% appears to be the minimum required for maintaining the proper soil moisture regime. Also, while it consists of digging a pit in 5% of the total area it allows them to take 5% of the total area of all the plots belonging to one farmer for making pits. For making pits PRADAN also advocates division of large plots into smaller plots.

At this stage, it appears appropriate to review the rationale of the primary promoting agency first.

1.1.1 Need

The study area and adjoining areas in Purulia of West Bengal and Chhotanagpur in Bihar is a rain fed tract. Paddy is the chief crop and the main crop of paddy is transplanted/ broadcast in July. For transplanting heavy rainfall ensuring 2"-3" deep standing water is required. Further 2"-3" standing water is required till boot leaf initiation and tillering stage.

Total rainfall received is not less. Most of the precipitation is received in four months of monsoon. Even in the four months of rain fall the distribution of precipitation is often erratic. Drought like conditions occurs due to erratic distribution of the precipitation rather than shortage. In absence of vegetation cover – water absorption capacity of soil is low leading to heavy run off and consequent heavy soil erosion.

The land itself is not level but has wide variation in height. Typically upper areas suffer most from water scarcity during the critical growth phase.

Thus it was concluded by PRADAN - “Farmers are not able to cope with situations of heavy rain, nor low rain, delayed rain or early rain. Unless there is rain in the opportune time and of optimum amount, farmers leave everything to fate”. At most farmers attempt to preserve precipitation of successive light showers of rain by successive ploughing just after rain.

Given the agro-climatic realities of the region PRADAN rationalized that -

‘Under the circumstances it is evident that there is a possibility of getting excess rainwater from the rain we receive before we face a dry spell. Thus, the problem is not of drought but our inability to manage the rainwater we receive. ‘In most of these areas there are large areas of uncultivated and

un-terraced lands, which send their water to lower paddy fields. If we take that into consideration the supply becomes more than the demand'².

Fields in upper catchments dry earlier and much faster than the fields at lower catchments because of subsurface flow of water through seepage. The flow line goes down comparatively deeper in upper catchments than that of lower catchment. If the flow line goes down and even upward movement of water through capillary action cannot reach the root zone. Then the crop cannot compensate the loss that occurs due to evapo-transpiration and it starts wilting. If this continues for a long period (till permanent wilting) the yield will get reduced drastically. Additionally longer the dry spell, the seepage line dips lower down. A dry spell in reproductive stage is most harmful to yield.

1.1.2 Evaluation of alternatives

The possible methods of countering the above stated problem could be:

1. Replacement of long duration paddy with shorter duration paddy.
2. Raise paddy nurseries in 2-3 installments to cope with late arrival of monsoons with an interval of two weeks in each to ensure availability of the right age of seedlings even if rain is delayed by a couple of weeks

Each was briefly evaluated by PRADAN and conclusions are summarized below:

1. Replacement of variety with short duration variety could expose the crop to covariant risks from the following causes:

Due to rains in September – October, when the short duration variety is scheduled to mature, the crop may get destroyed due to unexpected showers.

The workload in terms of harvesting etc would rise significantly if all were mature at the same time.

2. Staggering the raising of nursery can obviate to an extent risk due to delay in rains. But the risk of losing crop after transplanting remains.

Traditionally seedlings are raised in dry bed (no standing water at root zone) in these areas. Locally wet bed methods are regarded as leading to weak seedlings. Appropriate wet bed methods can be explored.

Construction of large water harvesting tanks today has low feasibility as the land available is low and there are issues of sharing and management of the resource that has to be dealt with. The likely issues and comparative economics of each option have not been dealt in any available write up.

1.1.3 Selected Action

A micro-water-harvesting tank is made in each and every plot taking 1/5 of length and 1/4th of breadth dug to a depth to 5 feet. (Earlier documents on the concept advocate excavation to a depth

² Possibility of better rain water management by PRADAN undated, after 1990

of 3.5 feet). While the acknowledged position is resources permitting the depth could be more, however, in all cases it is necessary to maintain slope in cutting or the walls of the pit may collapse. Excavated soil is placed along the bunds (if one exists already) on the lower side of the plot to strengthen it or is used to create new bunds.

In its historical evolution PRADAN advocated the use of its *Jaladhar* 34-40 model in un-terraced, un-bunded uplands. The upland is divided into smaller plots of 30 feet x 40 feet with bunds with each plot having 100 – 110 cubic feet pit. There is a necessity of impervious layer below that pit so that when it is reached water shall flow along the soil surface.

Even later its stand as evidenced in various documents is that uplands do not benefit much from the 5% technique unless the land above it (especially uncultivated wastes) has been treated with the *Jaladhar* model.

1.1.4 Purpose

The chief purpose appears to be:

- To maintain the required moisture regime through the *Kharif* season and thus assure one *Kharif* crop harvest both directly and indirectly.
- To have water reserves to avert the dry spell in September when the crop is in the milk (grain filling) stage and a dry spell causes a drastic drop in moisture availability.

1.1.5 Criteria for selecting area for 5%

This method is useful in areas

- With greater proportion of uplands.
- It is useful in areas where upland paddy is sown.
- Suitable for un-bunded un-terraced lands having considerable soil depth (6")

What could be further gathered from the various write-ups prepared by PRADAN is summarised below -

- No critical minimum area required for treatment is stated in any of its write-ups though at places there is mention of at least 10 hectares as the minimum treated area.
- The treated areas should be contiguous. No plot left untreated but plots of area less than 5 decimal may be left untreated
- PRADAN advocates that the area selected should have unidirectional slope unless length along a different slope is more than 500 feet.
- Areas with hard rock within 3 feet of the surface should be excluded
- Un-terraced land with more than 3% slope may be considered but in that case extra provisions needed for levelling.
- Other paddy fields with dry spell in September may also be considered
- In a contiguous area pit location in successive plots should be staggered.

1.1.6 5% package

The entire 5% package when implemented consist of the following

- Reinforcing the yields from the principal paddy crop is the chief purpose of 5%
- Selected tree species planted on freshly prepared bunds provide fuel and fodder. Even permanent *Cajanus cajan* and fruit trees can be planted.
- *Bagui/Sabai* grass (*Eulaliopsis pinnata*) for binding the fresh earth of newly erected bunds. The grass is used for various grass based products chiefly rope making
- Sowing green manure crops with added economic returns in the field like *dhaincha*, *mung*, cow pea, sun hemp, *Lathyrus*, linseed exploiting the residual moisture. The seeds of the last two are introduced 20 days even before paddy is due to be harvested.
- Fish cultivation where water is retained sufficiently long. Local fishes like *lethha* (*Latus punctatus* & *Opesephalus punctatum*) are generally raised.

A part of the concept consists of planting saplings on newly prepared or newly reinforced bunds.

1.1.7 Possible additional effect

When water is stored in upper catchments in the form of a tank then through seepage it perhaps supplies moisture in the root zone of crop of the fields in the down stream. It does not allow the seepage line to go down even during the dry spell through continuous supply of water through seepage.³

After paddy, water remaining in 5% pit is used for a second crop where feasible. This depends on the soil, land zone, and quantity of the precipitation as also its timing to gauge utility in raising second crop.

1.1.8 Tree selection criteria

For bund plantation trees seemed to be identified and selected on following criteria

- Pruning tolerance - Since they are likely to be repeatedly pruned
- Coppicing - ability to generate newer branches from below the cut off point
- Nitrogen fixing ability - It is mentioned in some literatures. This is probably useful where some *bund* cultivation is being done.

Certain other factors appear to influence actual implementation

- Easy availability of seeds/ sapling
- Economic returns
- Potential for increased supplementary income

The tree species advocated by PRADAN are *Glyciridia anceps*, *Sesbania grandiflora*, *Dalbergia sisoo*, *Pongamia pinnata* (*karanj*), *Leucena leucophala* *Terminalian arjuna*.

³ 5% model A measure for assured *Kharif* paddy crop ion Chotanagpur Area

Section 2: Introduction to the project and study area

2.1 Factors/ rationale for its selection for IWMI - PRADAN collaboration study

The study area was delineated by IWMI-PRADAN on certain considerations. The study area consists of the villages Tasarbanki, Tentlo, Hesladih and Choto Mukuru in Barabazar block of Purulia district of West Bengal. The four villages constitute the 'watershed 1' a term frequently used in this report.

Few of the reasons why this particular region was selected as the study area are -

Since 1997 PRADAN has implemented 5% programme in this area in two villages. The local *Panchayat* has also implemented 5% programme in this area. Hence, it would be possible to study two modes of implementation including variation in designs, implementation styles etc. Besides PRADAN has also worked for almost 4 years in this region forming women's micro-credit groups, promoting orchards of various fruit trees. As elsewhere, the PRADAN staffs know several of the more active members by their first names.

The residents have land in two watersheds referred to as no. 1 and 2. Representative from block had identified the watersheds on the basis of the ridgeline. The study is focussed on watershed 1. But for the initial survey, residents of both watersheds have been included. Thus, this report takes the watershed 1 as given.

2.2 Agro-climatic profile of the region

Rainfall data for the study villages is not available. However, the rainfall data collected from the local station of the Meteorological Station at Purulia is being separately obtained by IWMI and may be seen in conjunction. However, it should be cautioned that while the data may be indicative of the broad rainfall trends of the region it will not capture or reflect the micro-level variations of the study area in particular. As per discussion with people the rainfall within a small area does have great variance.

The rainfall intensity as captured through PLA discussions with the farmers is reproduced below

Detail of rains this year	
In Huchukdih in FY 2000 –2001 rains	
<i>Ashar</i> early part <i>i.e.</i> Mid June	Light <i>i.e.</i> only <i>bahal</i> and <i>kanali</i> lands retained water
<i>Bhado</i> last <i>i.e.</i> Mid September	Moderate rain
<i>Ashwin</i> end near <i>Mahalaya</i> (<i>Mid-end September</i>)	Heavy rains – All four grades of land had water standing in them after the rain stopped
In Huchukdih in FY 2000 –2001 rains	

Ashar early part at the time of sowing	Light i.e. only <i>bahal</i> and <i>kanali</i> lands retained water
In Brajarajpur (outside study area but adjoining it) with better harvest	
Ashar early part	Heavy rain. The rain from that direction and its force had been spent by the time it reached Huchukdih

Analysis of rainfall by PRADAN for a block of 10 years in the 1980's⁴			
	Rainfall range (mm)	Average mm	Effect on Paddy
January	0 – 48	11.74	Useful only as moisture conservation measure for nursery raising
February	0 - 41.4	15.8	Useful for ploughing land in readiness for nursery & a few plough field
March	0 – 81.6	27.5	-do-
April	0 – 107.3	42.25	-do-
May	14.1 – 112 daily range 1 – 71 Rain from 2 – 12 days effective rain days 1- 7 days	64.22	May third week (<i>Rohini Nakshatra</i>) sowing of seeds in nursery bed commences hence rains important or a heavy rain is 2 nd week is equally useful. Main field preparation. Heavy rains adversely affect nurseries.
June	20.5 to 894.3 Rain days is 7 – 24	298.5	Rain in 1 st week is not much useful. Rain in 2 nd weeks is critical if 50 – 100 mm received. If this fail they have to await the next heavy shower by which time the seedling may be over mature lose potential for vegetative growth & proper tillering. Transplantation commences if prior rainfall has been favourable.
July	188.4 – 512.9 Rain days is 16 – 27 days	331.6	Generally 2 effective rain spells with 50 mm water occur. If there is a 15 day break in rains transplantation has to stop plus survival rate of ones already transplanted is affected. Transplantation is at peak.
August	213 – 512 rainy days is 16 - 25	320	August rain is maintenance rain. 25 mm rain is effective as the soil moisture content is any way higher than other times. Transplantation concludes. Excessive rain is bad, cloudy weather

⁴ Summarised and adapted from 'An attempt to understand the existing state of *kharif* paddy cultivation and utilisation of rain water as done by the common farmer in Purulia district and in similar other agro-climatic areas of Chotanagpur plateau' - undated.

			causes insect pest attacks.
Sept.	46.2 - 448.2 Rainy days is 5 – 21 days But effective rain day with 25 mm rain is much less	201	Paddy now requires 25 mm of rain at 7 days interval or equivalent amount of cumulative rain in 7 days. <i>Critical in yield determination of upland and midland paddy.</i>
October	0 – 203.9 Rainy days 0 to 12	80.6	Rain at this stage is critical for long duration paddy in most rice growing areas. But given the topography long duration paddy which is sown in Lowlands does not really require this rain as it already has standing water that has collected from the run off from the uplands. Excessive rain causes pre-mature lodging.
Nov- Dec			Rain undesirable as it affects harvesting & post harvesting operations of paddy

Time line of droughts that linger in memory

Information provided by Gurucharan Hembrom with assistance from Phalguni

Gurucharan does not know his age. He says he is probably 60-70 years old. His youngest child is already 30.

The drought that he remembers is one talked about by his parents, which they experienced when they were young children. He remembers them tell him that times were real bad. His fathers family had some paddy left over from the previous year and that had to last them much longer than normal. They tied the grains in cloth and then boiled it in water. The family could only afford to drink the gruel as the rice had to be saved for preparing more gruel in future.

Then, he says the markets were not well developed and there was no opportunity for buying any grains.

The earliest drought that he himself recollects is when his children had not been born. That drought must have occurred 40 years or so back. It went on for 7 years. He remembers only that life was one *big* struggle and hunger a constant feature.

Another occurred when his eldest daughter was about 10 years old. He and his daughter migrated and even did stints at Burdwan. That was their only means of surviving. His wife was unable to work then. During this drought Phalguni remembers getting only wheat roti to eat twice a day. Wheat only could be obtained that too of the worst

2.3 Vegetation

In the entire watershed area there is limited tree cover. There is no pristine or even reasonably dense forest cover barring the stretch of Flame of the forest (*Butea monosperma*) close to Choto Mukuru. Whatever vegetation cover that remains is trees standing on private lands of the villagers and chiefly those raised on bunds either during execution of 5% and other watershed works or previously. At least two farmers took advantage of free saplings being provided by the government in 1996 to raise their own private ‘forest’ on private lands.

2.4 Land zones and soil types

2.4.1 Land zone

Locally the land is graded according to the zone into *tarn*, *baid*, *kanali* and *bahal*.

Soil zone	English equivalent	Suitability for paddy
<i>Tarn</i>	Upland	Highest plot and frequently sloping. Practically no standing water remains at the root zone. Generally not suited for paddy. (Only with good rainfall upland variety of paddy may be grown in the cultivable upland). Generally wastelands would also be of <i>tarn</i> type. A large portion of the upland is often not arable and thus lay waste.
<i>Baid</i>	Mid uplands	These are the mid-uplands where paddy may be cultivated where there is access to assured irrigation or in years of adequate rainfall. Paddy which require less moisture or standing water at root zone and mature early are typically grown in these lands
<i>Kanali</i>	Mid lowlands	These are lowlands that are a little higher than <i>bahal</i> land.
<i>Bahal</i>	Very lowland	Very lowlands most suitable for paddy as even with less rainfall some water stands in the root zone. These lands are often located at the base of the valley of a river basin.

The following chart summarizes the land zone wise distribution of the privately owned land of the study villages as per the forms analyzed.

	<i>Tarn</i> (upland)	<i>Baid</i> (mid upland)	<i>Kanali</i> (mid low land)	<i>Bahal</i> (lowland)
Land in	506	809	340	300

<i>bigha</i>				
Category as proportion of total land	26%	41%	17%	15%

2.4.2 Soil type

The land in this region can be classified in to the following types - sandy, gravel, sandy gravel, clay and clay gravel.

Broadly speaking the soil in study area in general contains more gravel affecting the water retention capability. Clayey soil is best when water retention capability is considered but when dry it is liable to form broad cracks adversely affecting the standing crop.

Land classification in terms of the soil type has not been obtained. Only land classification of the *baid* lands with 5% pits has been collected. This may be seen in the findings section.

2.5 Socio-economic and political profile of the region

2.5.1 Religion and Caste profile

Mahto is the numerically dominant caste group in this region representing over 70 % (in data its around 67%) of the total population. *Mahtos* are classified as other backward castes in India and are part of the Hindu caste system.

The next highest number consists of the *Singh Sardars* representing 20% of the population. The *Singh Sardars* are scheduled tribals. They claim affinity to the *Mundas* of the Chottanagpur plateau; in fact, they call themselves Singh Munda. *Santhals* are another large tribal group. They may have emigrated from Santhal Parganas several generations back. While the *Singh Sardars* have adopted Bengali and do not speak any Mundari the *Santhals* still speak Santhali.

Apart from the above, other tribals like *Sabar* reside in the village. Most of the tribals are concentrated in the Kusum Tikri – Huchukdih tract of the watershed with these two areas consisting of only tribals.

A host of other castes namely Chitrakar, Karmakar, Malakar, Kalindi reside in the village. They rank much lower than the *Mahtos* in the caste hierarchy. They are however numerically very small and along with *Sabar* have been classified as ‘others’.

Caste profile chart ⁵	Mahato	S. Sardar	Santhal	Others
No. of persons	140	43	11	16
%	67%	20%	5%	8%

⁵ As per the data entered till now

2.5.2 The concept of purity hierarchy

Caste system is typical off shoot of the Hindu social system. Please note the term deliberately used here is purity hierarchy rather than caste hierarchy. While a more appropriate term may be selected, this choice adequately captures the following fact.

Strictly speaking, tribals are not part of the Hindu caste system. They have their own distinct social systems. However, they have adopted several Gods from the Hindu pantheon and today identify themselves with the Hindus. By virtue of this fact and the need to create a distinction from tribals who have converted to other faiths (mainly various sects of Christianity) these tribals are described as Hindus. So a concept of hierarchy in relation to the other traditional castes of the region has also developed.

Within the tribals themselves, there are certain factors on the basis of which members of one tribe may socially look down upon others. The tribals themselves said during a group exercise that the distinction occurs largely due to cleanliness and dietary considerations. Some tribals in this area have meat of frogs and lizards that others consider dirty. The *Santhals* and *Singh Sardars* eat meat of rat and pork, (which the caste Hindu's like *Mahto*'s, consider dirty). The *Santhals* here also consume meat derived from larger animals like buffaloes and the poorer *Santhals* consume the flesh of a dead animals etc which *Singh Sardars* (and *Mahato*) consider bad. Thus in the current situation while internally the tribals may have their own system the have some how fitted in to the larger social reality prevailing in their area. Thus the purity hierarchy prevailing in the study area is

Mahto (Other Backward caste Annex 1)
Singh Sardar (tribals)
Santhals (scheduled tribe)
Sabar (scheduled tribe)
Dom/ napit (Scheduled castes)

The term schedule refers to the schedule to the Indian Constitution in which the names of certain tribes/castes meriting special attention from the state is mentioned. However, this hierarchy affects marriages and social eating only. And 'Other backward caste annex I' refers to the caste enumerated in the annex to one government report.

The population consists almost entirely of Hindus and the *de facto* Hindu tribals barring the 1-2 families of Muslim.

2.5.3 Culture and festivals

Kali puja, where a form of Goddess *Shakti* is worshipped, is a major festival of the area and marked by 5 days of eating drinking and merry making. The locals describe *Kali puja* as the poor mans substitute for *Durga puja*, perhaps the biggest festival of Bengal but which requires much greater funds.

Perhaps the biggest festival is *Poush parba* or festival of the month of *Poush* (January 14th or so) marked with fairs, eating dancing etc. Special kind of songs known as *Tusu* are sung during the festivities.

On the cultural side traditional *Chhou* dance is very popular. It is performed in groups traditionally by men wearing masks of the respective character that they portray. The village Tentlo has its own dance troupe that also tours outside the blocks.

The tribals like *Sabar* and *Santhal* have their own traditional dances.

2.5.4 Education

There are primary schools in the villages of Hesladih, Tentlo and near Mukuru housed in buildings constructed by the government. In Huchukdih in addition there is school run by the local *panchayat samiti*. One teacher has been hired from the village to teach in this school which holds its sessions from 8 A.M. in the morning.

The parents of village however do not think too highly of the quality of education. They said the parents own interest and the guidance they could provide was more important. Residents with relatively deeper pockets enrol their wards in missionary schools in villages' 3-5 hours away from the study site and such other institutions like the one in Mudiramdih. These institutions charge Rs 300 per pupil per month, which covers the cost of food and tuition. Parents of the paying students have also to provide for the toiletries, books and other incidentals. However no charges are recovered from Christian students and they are also provided books and toiletries. However, only the relatively well off or people with assured cash income can afford this. My host's children along with kids from another family in the same village study in one such school. These schools offer schooling only till class 4 or 5.

There are government run high schools at Sindri and Sukuhuttu villages, which children from the study area attend. The school at Sindri 4-5 miles away is for both boys and girls but only boys can avail of hostel facility. The school at Sukurhuttu, about 11 kilometres away is for girls and has a girls hostel. Both these schools are viewed as relatively good schools than the high school closer to the village at Bandhowan. In addition there are high schools at Bamundiha. Higher secondary school is at barabazar and college at Balrampur and Manbazar.

In both these high schools no cost is recovered from boarders from Scheduled tribe families. My respondents could not inform whether this facility was also extended to scheduled caste children. Children of castes like Mahato however have to pay a monthly fee of Rs 400 or so. My neighbours in Huchukdih were all scheduled tribals. The son of one was studying at Sindri but was interested in commuting from home despite the distance. The family could not provide him with a cycle hence it was not feasible. However the chief attraction why the family was interested he should stay at Sindri and study was in doing so they saw a double advantage – he would get free food besides getting free education.

The researcher regularly saw 6-8 girls from the project villages commuting by cycle to study at Sukurhuttu High School. For most it meant they would have to cycle 10-11 kilometres each way. These girls are from *Mahato* families and are ineligible for free boarding and lodging. But the better quality of education prompted their families to send them so far. There is another high school at Bandhowan where the office of the *Panchayat* is located.

However, the following could be discerned from the people

1. The primary reason why a family may be reluctant to send a child to school is his / or hers requirement in grazing the cattle. In fact the problem manifest itself more in irregular attendance and in inability in ensuring continuation at school than complete non-enrolment.
2. Schooling has failed to ensure jobs to most of those of the older generation that are educated. People are acutely conscious of the unemployment scene and make repeated references to it in connection to education.
3. Putting a boy through school till the class ten means in practical terms till about the age of 16-17 the boy would have done little agricultural work and would be largely not have done any hard labour. When these boys later remain unemployed and have to revert to the old ways of surviving like practising agriculture, they find the going difficult. Village elders say while they may learn to plough land, yet when the family's land is inadequate they may shy away from tougher options like migrating and working as labourer. Upen & Susanta were two young married men who were also matriculate. Their father said 'educating further (beyond matric) adds little additional benefits, as jobs are rare and education only makes their bodies more 'naram' (soft) also by the time they grow up 'additional help with the farming is always welcome' as the father would have aged to an extent.
4. There is a tradition amongst most of the villagers that they will preferably not go looking for a husband for their daughters. Amongst *Mahatos* and *Singh Sardars* taking initiative and looking for suitable boy would only hike up the dower payable. (Amongst *Santhalis* there is yet little evidence of dower). When the girl is older, the belief is with every passing year the dower, which is any way payable, would also increase. This would be over and above the cost incurred in maintaining the daughter for those many extra years at the father's place. Hence, in the case of girls, the tendency is to accept a suitable offer when it comes. This frequently stops her schooling at class 6, 7 or so even though she may be doing reasonably well at school.

2.5.6 Health

As is the case with most villages in India there is no qualified allopathic doctor available near by the study villages. The nearest Public Health Centre is little able to handle medical complications. Hence people generally take the patient straight to Purulia Sadar (Government) hospital's emergency ward. For chronic ailments the relatively better off approach private practitioners in Purulia. Some villagers had visited Ranchi in connection with mental ailment of the person they accompanied and admitted the patient at the Central Psychiatric Institution at Ranchi. They however did not rate its services very highly.

Most child births occur at home. However, some do take the expectant mother to the state hospital at Purulia.

For common ailments like running nose, bout of diarrhoea, boils and skin ailments little is done. For fever roots of certain creepers are ground mashed in water, diluted and fed to the patient. For persistent fever the local person dispensing allopathic medicines is called. Technically the person is not authorized to dispense allopathic medicines, and is thus a quack but as there is little alternatives, he is generally their best hope. Such quacks who dispense allopathic medicines are doing well as is apparent from their better houses or use of two wheelers.

The villagers have penchant for injections and drips. The local person liberally administers both and people feel only when injection/drips have been emptied in the patients blood are they assured of a cure.

2.5.7 Food security

Traditionally strategic management of land in a bid to enhance food security appears low. Food security is essentially interpreted as sufficient paddy production.

Generally wherever feasible 100% year round reliance is valued on yields from agriculture lands. A situation where the people will have to depend on rice purchased from the market is difficult situation, as cash purchases require the ready availability of cash. Only purchase of oil, *spices* and condiments is made.

In the study area rice is the staple diet of the people. Rice is consumed by most of the people twice a day for breakfast and lunch. Many of the people consume rice even for dinner. There is apparent preference for wheat *roti* at least in the evening at least part of the year when wheat harvests from own land is available or when there is surplus paddy available so that paddy can be sold and wheat purchased.

Agriculture is generally rain fed thus enabling most to take only one crop of paddy, however very few families have year round paddy sufficiency.

There is a heavy dependence on migration (32%) or on agriculture day labour (nearly 60% depend on this source to make ends meet) and other sources of income. Only 17% of the total 'analyzed' respondents admitted being able to harvest enough from their lands to last them around the year. For most of them in a bad year this may drop drastically to 5-6 months or even lower unless they own low lands.

For further details refer to the relevant section in findings.

2.5.8 Migration

Over 32% of the analysed respondents from amongst the residents of the villagers of the four villages seasonally migrate. Typically the people migrate to Burdwan and the brick kilns located at various places like Bihar, Assam etc.

The people migrating for work to Burdwan typically work in the rural areas of that district, in the field of the better off farm owners. Several of these farm owners are now based in towns and have given up regular agriculture. The migrating villagers have developed relationships with the people on whose farm they work and typically keep returning to the owner each year. The owners send letters well in advance to intimate the villagers on dates when they are required. The people generally go twice in an agriculture season once during the ploughing and transplanting season in June - July and again in December when the crops have to be harvested.

Currently for every person the payment is Rs 30/- per day along with 2 kgs of rice. The owners provide straw as fuel for cooking and heating. They also provide the migrant labors with sheds for the family to live. In all they have to work for 30 to 40 days in Burdwan in one agriculture year.

The reason for attraction for Burdwan is two fold. It's a relatively short duration work and work is comparable to what they are habituated to performing on their own lands. While working there the

family's own paddy stocks at their village is conserved and in addition they get cash to spend during the 'Poush festival' in January.

Till recently many respondents said they were unable to bring the excess rice back to the village and had to sell it off to the shops in Burdwan itself at low prices because transporting the rice was difficult in absence of direct buses and existing buses charges for rice each time the sack was transferred a new connecting bus. One person generally manages to bring back Rs 700 -1000/- from Burdwan in a year with 2-3 months stay. If the number of workers are more the family brings back more. From this year onwards they were hopeful of bringing the excess rice (saved at the rate of at least ½ kg of rice per person per day) as better bus facility is available.

The others who work in brick kilns leave in early December and return only towards early to end of May. The entire family moves to the site. However the elderly who are incapable of traveling or young teenager are left behind to tend the cattle.

Here too most of the villagers have developed relationship with kiln owners. Several of these owners send their own man to give 'his people' with advances during the agriculture season and festivals like *Kali puja*. This serves as advances, which the person has to pay off by working. For the work they stay at the brick kilns itself in sheds provided by the owner. In addition to the advance the owner also provides a daily subsistence allowance that amounts to Rs 15 or so per person.

In the kilns the payment is on a piece rate basis for every brick produced using the brick making mould. If the number of workers per family is less they may manage only to survive six months and barely pay off the advances received earlier. After survival expenses the best 2 person working at the kiln may manage to bring back only Rs 200 to Rs 500. They would have earlier received an advance of Rs 1000-1200 while still at their respective villages. However, if the people are young and can slog it out, making bricks by day and firing kilns by night or there are more workers in the family they may manage to bring back Rs 2000 to 5000. But the life is hard and requires a stay of nearly six month dislocating more regular features of life and aspects like education of the youngsters.

2.5.9 Local work opportunities and wage rates

The prevailing informal wage rate of the area is Rs 30 per person and two to three meals per day has to be provided to the person. This is the payment the neighbors give the villagers who are hired for transplanting, harvesting, ploughing and threshing for one day starting 9 am and ending 5 pm.

The government wage rate for unskilled manual work like digging is Rs 56 person. This rate is paid by the *panchayat* for watershed work implemented by it.

However, the availability of work in the village itself is limited. Additionally the regularity of the little work that is available is also limited. Generally the work availability peaks during the agricultural and harvesting times. However, when agriculture itself fails due to failure of timely rains, as has happened this year the availability of work locally in the villages decreases greatly.

2.5.10 Political environment

Politically the project area is a live wire situation. Every single household has a clear political affiliation. The party with the maximum political following is the Communist Party of India (Marxist) or CPM.

According to the villagers, there are about 30 or so household who are supporters of Trinamul Congress. There is also a small presence of the pro-tribal Jharkhand party but is apparently a politically insignificant. The only evidence during the study period was a minor road blockade and extortion but outside the study area. Congress (I) appears to be more or spent force and according to the villagers its followers having witched allegiance Trinamul party.

Most works today are executed through the watershed committee but funded by the *panchayat samiti*. The watershed committee is almost entirely controlled by the CPI (M). Most of the members are active members of the party. No work is taken up in the lands of people not belonging to the said political party. However, rare exceptions to the rule are there in places like Choto Mukuru where non-party members were allowed in execution of 5%. This reason proffered now by way of explanation is that non-party ones were very diligent in carrying out instructions and block treatment of entire land was seen as a necessity.

2.6 General commentary

In this area land resources are scarce relative to available labor within the household. Very few farmers in the region are able to grow enough food to meet their year round requirement. The area is also not particularly richly endowed in terms of soil quality or irrigation facility. In the study area there is a heightened sense of insecurity with rain fed agriculture and the consequent food scarcity. Even political affiliation appears to be a means of improving chances of access to government schemes, resources. People here are pre-occupied with food security considerations and efforts to earn additional cash.

However, at the same time people here appear quite enfranchised and empowered. The apparent grass root level democracy in terms of people's functionaries does exist. Functionaries of the *panchayat* and/or those so appointed by the party supervise the construction of infrastructure like *hapa*, roads and buildings.

2.7 Nature of land tenure

2.7.1 General

Tenure category typical of these areas is 'owner cultivated' lands. The right of cultivation and the ownership thus vests in the same person. However, the better off get the entire cultivation done through hired labor. Land is typically privately and individually held. Proportion of small holders is more. Typically the land holding is in non-contiguous parcels.

Typical method of entering into ownership is inheritance and to a limited extent accretion of holding has occurred due to purchase. Land devolves on the male offspring in an egalitarian manner with a clear title even to sell. Thus each son gets an equal share of land. This mode of inheritance is thus the chief reason for fragmentation of land and reduction in the sizes of plots. However land records are not updated with each inheritance. Titles to the land are often outdated. Some grown up men still cultivate land registered in their father's name. But almost all were aware of the existence of the formal process of transfer of ownership and that of updating land records.

Incidences of consolidation of holding are rare. The only instances learnt were by purchase of land belonging to another that separated two plots under the same ownership.

Bahal and *kanali* are preferred for purchases but are costly. Alternately such *baid* land is purchased which with some effort can be converted into upper *kanali* land. Land sales are result of the demands of consumption (marriage, death rites, and illness) and a method of liquidating assets for obtaining cash. Thus, land is not merely a productive resource but a liquefiable asset of last resort. This is akin to the situation in most of India.

Tenancy is rare. Incidence of sharecropping was not noted – this is in opposition to other parts of Bengal where sharecropping has been reported to in a bid to mitigate the problem of labor. However, usufruct mortgages are known. The local SHG in one village having successively taken two usufruct mortgages against loans advanced by it.

Coinheritance or joint ownership is rare. Land is jointly cultivated only so long the father is alive. Leaseholders are rare. There is no incidence of squatting on private land. Some state owned land however is cultivated.

On the basis of the data available average farm size is 18.5 *bigha*, but this tells us little as farm sizes vary between 0.5 *bigha* (excluding at least 10 people with no agriculture land holding) to 100 *bigha*. In spite of this big range, the median value is 7 *bigha*. The modal (a number that repeats most often) value is 5 *bigha* and at least 68 families have land less than this figure (will be more as this is only on basis of 215 houses). Land holding appears to be generally inadequate; in addition the quality of land is also not suitable for assured yields given the climate regime of the region.

PLA interview on woman's land rights

When Bilasi of Huchukdih was asked in detail about property right she had the following to say –

'Yes, women have right to land. If a man dies leaving behind a widow, the woman would have right to the produce of the land. The male relatives of her husband are obliged to maintain her from the produce derived from the land earlier owned by the dead man. If she has children she retains traditional right to the land irrespective of the sex of her children. But if her children are very small she can get the land tilled with help of her husbands male relatives like his brother etc. Alternatively she can even hire male people to till the land against payment.

Amongst Santhal – the women (Bilasi is Santhal) have right to the produce of the land belonging to their husbands. Even after the husband expires is she continues to reside in the husbands village she will get share of the produce. Generally she does not have the right to sell the land. The male siblings of her husband or his male cousins have a priority right on the land but they have to undertake maintenance of the widow.

A woman can make a distress sale of land under exceptional situations – the example given by the residents was as under: Say, man dies to pay for his death rite money is borrowed from various people. But after the rites are finished the widow is unlikely to be able to earn money from any source sufficient to repay the debt in a reasonable period of time. She may then sell land to repay the debt.

If a male relative succeeding to the land does not maintain her she has a right to appeal to the *panchayat*.

However if the widow has children – her right to the land owned by husband subsists in spite of counter claims from other male relatives. This right will remain un-contested if she has male offspring.

However, she will have to be either get her other male relatives to plough the lands or be able to hire male workers to plough the land. Amongst all the communities in this region women are forbidden from touching the plough.

Amongst Singh Sardars the land tenurial system are largely similar to the one described earlier

A distinction is made between productive landholding as opposed to the total land holding. The latter includes uncultivable wastelands and the land on which the house stands. In spite of the

common knowledge that court cases just go on, faith is reposed in courts to sort out land disputes and establish a superior title.

2.7.2 Gender analysis of land holding, property right, land tenurial system

In investigating and understanding property rights vis a vis the woman there was considerable confusion on the right a woman could exercise in reality vs what she could legally be expected to exercise. Isolating the traditional practice regarding land vis a vis the women is difficult. Most respondents were aware of the "correct" legal position as to property rights of women.

In the traditional system prevalent here (and several other areas) a woman irrespective of her marital status may not touch the plough. Only a man can do any ploughing operation. Thus, a woman with no adult male relative has to depend on others of the extended family or hire people to do the tilling. Technically she may also go in for sharecropping but such incidences did not come to the fore.

There is no taboo on women participating in any of the other agricultural operations like transplanting, harvesting, transporting the harvest to the threshing floor, applying fertilizers, irrigating the lands by use of *dabka* etc. In fact women are the major participants in these activities.

If ownership is assumed to mean and include the package of rights that include transferability by way of sale, right to rent/ lease out and further if ownership is also gauged through formal land titles then probably no woman really owns land. Even a woman head of her family traditionally and even today for all practical purposes does not have any right to sell the land belonging to her family. At best she only has a 'right' to the produce to the extent of her survival needs. The villagers repeatedly asserted that a woman *might* sell if she so wants. However, they could not come up with any instance of such sale in their immediate environment. It was only after this that the actual social position of women having little right to land was narrated.

However, a woman may sell land under some special circumstances. The example cited was that of having incurred heavy expenditure on the death rites of her deceased husband. If she had taken loans to pay for these expenses and is unlikely to ever be able to repay the loans through her own earnings she may sell the land to pay of such debts.

To be able to claim a share in the produce of the land tilled by her husband or from the husband's family where the land was tilled jointly by them it is socially required that she reside in the same village even if living apart. If she returns to her parent's village such rights do not survive.

In her parents' village too she does not get any right to the land owned by her parents. But the brothers are morally bound to maintain her. Though here too people present tried to convince that she has share equal to that of her brothers in the land.

However, while drawing up list of households prior to the survey at least four such cases came to the light where the wife or the widowed mother was living alone apart from her family. The entire land vested in the male members of the remainder of the family like the son or the husband. According to the others the mainstay of such women was money she earned by working on other people's land. Only in one instance did the people say that her husband was obliged to give a share of the produce.

When asked what would happen if a destitute single women is not at all provided for by the family. The answer was she could either approach the village *panchayat*, failing which the block levels *panchayat samiti*. Alternatively where applicable she could approach the local unit of the communist party. However the researcher personally did not come across any instance of such an approach having been made.

The society across all castes and tribes here follow the patrilineal system (property is inherited along the male line of the family). The woman on marriage moves into the husband's home (patrilocal system) and loses any right to property at natal home.

2.8 Prevailing agricultural practices and prices

2.8.1 Impact of purity hierarchy on agricultural practices:

There is no hierarchy while commencing agricultural operations. The main crop is paddy, which is almost entirely dependent on the rains. A person commences nursery raising or transplantation purely on consideration of availability of water. If some ones low lying land has adequate standing water (about 2") that person would commence agricultural transplantation while a person higher on purity ranking may need to wait.

There is no purity ranking in commencement of harvesting operations. However, the first paddy or the first fruit of any other vegetable crop is given to itinerant *Sadhu* (man devoted to God) or to a beggar who go around signing hymns riding bicycle in between habitations.

2.8.2 Religious aspect of agricultural practices

Locally the 13th of *Jayasti* (May end) month is called *Rohini nakshatra* day. On this day or *Akshay tritiya* day the men folk ceremoniously plough a portion of the land. A woman of the family goes to one of the plots and scatters a few grains of rice. This is symbolic initiation of the paddy nursery. The actual nursery raising operations will be done after that.

Just before when time of paddy transplantation commences one woman of the family goes and symbolically transplants a few saplings. The actual transplantation is done only after this date.

At the time of harvesting, in the last plot to be harvested five 'hills' of paddy are left standing in the plot. On a Thursday following the completion of the harvesting these five 'hills' are ceremoniously brought home in the evening by a man of the family and placed at the base of harvested heap and covered.

On each of the above three days the women bathe, apply vermillion to their foreheads and in the parting in the hair (latter if married). *Alpana* or decorative patterns are made on the floor using ground rice paste.

According to my host family any woman of the family can do the ceremonial broadcasting and transplantation. She does not necessarily have to be a married. Even a widowed woman can and

does do it. This is in sharp contrast to the prevailing taboos against participation of widows in auspicious work in other parts.

On each of these days the children look forward to having *pitha* in the evening. These are thick rice pancakes along with vegetables, meat etc.

As stated earlier traditionally the first fruit or in case a small portion of the harvest is reserved for the beggars/ or holy men who travel from door to door, collecting grains and vegetable.

2.8.3 Irrigation

Most of the agriculture here is dependent on the rains. The access to irrigation is limited. As per the figures reported in the survey only average 12.36% of the total land (on the basis of 217 forms entered) is irrigated and owners of some irrigated land represent only 40.3% of the total land.

The various traditional water harvesting structures used in these areas are *hapa*, large village tanks or *pukur*. Now a day's river or well water is being pumped with diesel pump. But each of these sources suffers from constraints like geographical limitation. Only areas located close to such facilities can be irrigated, with associated inherited right to the water of such structure owned by a common forefather. But only the well to do land owners could afford constructing them in the past. Availability of sufficient land to spare for construction of *hapa* and most importantly availability of money to finance the construction has been important constraint.

Water from these structures is raised to the level of lands using the traditional pump set or swing basket or the diesel powered pump sets.

Large water harvesting structures like tank do not benefit the poor as by its design it excludes small holders. Pooling of land of several small farmers is also not feasible. Also these structures do not benefit the uplands.

2.8.4 Water requirement of paddy

In comparison to other crops with comparable duration the water requirement for paddy will be higher. The water requirement at different stages of paddy summarized below:

Standing water requirement	Stage of transplanted crop
2 to 5 centimetre as per water availability	Till seedlings are well established
5 centimetres	Tillering to flowering (especially during panicle initiation to flowering stage) Most crucial stage when plant cannot withstand any moisture stress.
Any standing water is bad	From dough stage (generally 10 -15 days before harvesting) to enable proper ripening

A standard textbook tends to state that standing water is not necessary so long as effective methods of ensuring weed control can be practiced.

2.8.5 Prevailing paddy prices

During the study period paddy was sold @ Rs 120/ *mon* ie, Rs 3/ *seer*. One *mon* is actually 40 seers and is around 37 kg. But currently *seers* have been introduced which measure one kilogram but are not always as widely used. The prevailing rice prices were Rs 7/ kilogram.

Last year the paddy prices had been Rs. 3/4/4.5 per *seer* depending on the quality and timing. During the lean summer month's prices climb as high as Rs 5/ *seer*. There is little difference in the farm gate price and the price at the local market.

2.9 Infrastructure

2.9.1 Electricity

Most of the villages do not have electricity. The house of LCS and some others in Tentlo has electricity. Others could obtain connection. But the monthly payment of Rs 300 has put off moneys.

2.9.2 Road

Villages are connected by 20 feet wide mud *murum* packed road 10 km from the *pucca* road Purulia – Bamundiha - Barabazar.

2.9.3 Market/ Haat

No *haats* are held in any of the four villages. People generally go to Sindri or to the Bandhowan *haat*. For trading in cattle they generally go to Balarampur. For important purchases people go to Bamundiha, Balarampur, Barabazar.

2.9.4 Post office

The closest post office is at a distance of 30 km from the village.

2.9.5 Police station⁶

Police stations are Barabazar and Sindri.

2.9.6 Panchayat

The villages Tasarbanki, Tentlo, and Hesladih-Huchukdih are part of Barabazar *panchayat* and Choto Mukuru is part of both Barabazar and a portion of it falls under Sukuhuttu *panchayat*.

2.9.7 Bank⁷

Banks are located at Barabazar, Sindri and Bamundiha.

⁶ From watershed 1 plan book

⁷ From watershed 1 plan book

2.9.8 Other facilities

Agriculture Development Office is at Bamundiha and Vet station at Barabazar and Bamundiha. But extent of service not enquired.

2.10 A brief note on the implementing agencies

2.10.1 PRADAN

PRADAN or professional assistance for development action is an Indian charitable organisation (what is called Non-governmental Organisation or NGO in India) registered in 1983 in Delhi under the Society's Registration Act, 1861. It currently operates in six states of India namely - Bihar, Orissa, West Bengal, Madhya Pradesh and Rajasthan. Through its interventions in livelihood (non-farm), micro-finance and natural resource management, it endeavours to enable the poorest and weakest sections of the society in improving the quality of their lives. PRADAN has a staff of 164 primarily consisting of 'development professionals' (term used by PRADAN to refer to its programme staff) trained in agriculture, engineering, veterinary sciences, rural management amongst other fields.

2.10.2 Panchayat

In ancient times *panchayat* was a system for village governance. *Panchayat* today refers to a system of three-tiered institution of local self-governance. The Indian Constitution holds out development of *panchayat raj* institutions as a desirable goal for the government and this intention is enshrined in the chapter on Directive Principles of the Constitution. With 73rd amendment of the Indian Constitution development of such *panchayati raj* institutions received a further thrust by making it obligatory for states to propagate *panchayat raj* institutions. This amendment made specific provisions for reservation of seat for scheduled castes, scheduled tribes and women. In several states of the Indian Union this remained mere pious platitudes, where they were constituted they became defunct due to disinterest of the state government. But West Bengal is the only state where not only modern *panchayati raj* institution were initiated in 1980 but also actually functions till this day with elections being held regularly after every five years. The last election was held in 1998. As a consequence of the 73rd amendment of the constitution Bengal made amendments in its own state *panchayat* act to incorporate provisions for reservation of seats for various categories. West Bengal thus is one state where the local *panchayat* institution has become more powerful than even the local bureaucracy.

The office bearers are elected from candidates who are residents of the local area for a period of 5 years. All adult residents of each village (or a part there of in case of large villages) constitute a gram *panchayat*. Elections are fought on party lines and the Left front dominates at the grass roots.

The village is divided into areas with a population of 500. Each such division is called a 'booth' or *gram sansad*. From each 'booth', one candidate is elected to represent those people in the *gram panchayat*.

The *gram* (meaning village) *panchayat* elects at least one representative from its elected members to represent it at the next higher tier called the *panchayat samiti* at the block level. Block is unit for administering and planning of development activities in India on an average (could be more or less) covering about 100 – 120 villages in Bengal. Block has a special officer called the Block

Development Officer to oversee the executive aspect of development planning and implementation. The block level *panchayat samiti* handles the 'legislative' aspect.

As per figures computed on the basis of the 1991 figures, Ministry of rural development, Government of India states that in West Bengal on an average a *gram panchayat* covers a population of 11,945 adults. Each *panchayat samiti* (2nd tier) covers on average 11.6 villages. The third tier i.e. each *zila parishad* covers on an average 9.4 *panchayat samitis*. Thus on an average the *zila parishad* covers 22.6 *gram panchayat*. The determining factor is the population covered and not the number of villages per blocks.

The *gram panchayat* makes its plan and forwards to the *panchayat samiti* for its approval as per available schemes and discretionary funds. If the scheme is within the financial powers of the *samiti* it may sanction it or it would forward to the *Zila parishad* for approval and fund disbursement as per work plan. The respective level would also ask for accounts.

2.10.3 Watershed Committee

The watershed approach adopted in West Bengal is at variance with the recommended guidelines of the National Watershed Development Programme. In Bengal, the watershed programme has been wedded with the pre-existing *panchayati raj* programme. The *gram panchayats* under one watershed area has been organised into watershed committee. The elected member of the *panchayat samiti* from that watershed area becomes the *ex-officio* chairman of the watershed committee. Thus, the system runs in association with the *panchayat* system. Unlike the national guidelines, which state that ultimately the watershed committee will spin off as an independent organisation registered under the society act. The details on funds and head wise allocation are given towards the end of section 'the history of implementation'. The watershed committee does Planning and execution but the financial approval, disbursements and control are in the hands of the *panchayat* structure.

2.11 Implementation History⁸

This section is devoted to recording the chronology of events, interventions undertaken by PRADAN and *panchayat* in the watershed being studied to set the historical context. Researcher had been given the impression that *panchayat* implementation succeeded the PRADAN's own implementation phase and that all funding was provided by *panchayat*. When pit dates analysed it appeared *panchayat* implementation pre-dates PRADAN. Starting from this it became apparent the outsiders like us would benefit from such documentation. There appears to be no document of PRADAN or IWMI that records the same and clear understanding would perhaps be beneficial. This does not trace the evolution of the 5% technology *per se* except where necessary in conjunction with the narrative, as its evolution has been documented by the IWMI coordinator who is also the on location field person.

PRADAN had initiated loan-based implementation of 5% technology in a village a little way away from the watershed under study in the year 1994. The uniqueness of the programme was that the 5% were made from money raised through loans. Individual farmers also repaid the individual loans. The pits were 3.5 feet in depth and the depth had been determined on the basis of the acre inches of water required to sustain the *aman* paddy (main paddy crop sown in July – August).

⁸ As narrated by Arnab Chkraborty of PRADAN

However, the loan method of digging 5% pits did not have a future. Banks were unwilling to finance this activity. PRADAN provided the loan funds for the implementation at Brajarajpur but this was unlikely to be a sustainable method of financing the 5% activities.

Attempts to mobilize loan funds were made but around this time the national watershed programme was launched with huge amounts of grant funds available. This skewed the environment and a loan-based programme was unlikely to survive in this situation. And hence the loan-based approach was abandoned.

Subsequently, in 1994 a small programme grant of Rs 10000 was mobilised from the District Soil Conservation Department for treating 2 hectares of land with 5%. Work commenced in January 1995. The depth of the pits was maintained at 5 feet. Around 43 pits were dug in the lands of the resident of Brajarajpur on the road toward Choto Mukuru beyond the patch treated earlier. During this implementation the sequence followed was.

The process typically involved the following - Field visit to identify the suitable mid-uplands, meeting with the villagers, and drawing up a list of the eligible persons. The target people were Santhals (a tribe). The Santhals in Brajarajpur had two *samitis* or social bodies existing in the villages namely the Marangbir and Joher Ayub *samiti* with a total membership of 30 men. For its purpose PRADAN requested the two bodies to 'merge' and requesting members to nominate members from each as Secretary and Treasurer. PRADAN transferred 10000 into the bank accounts of the merged body and work commenced. The concerned department was to pay after the work was completed and when money was received PRADAN got back the Rs 10,000 initially provided by it.

In 1994 and 1995 PRADAN while working in Brajarajour conducted various awareness sessions spreading the information on 5%. Its staff visited villages conducted village meetings to introduce the concept. Where electricity was available a slide show was also organized. Gradually the people were attracted to this simple technology but funds proved to be a constraint.

Only a small proportion of people took up 5% without any funding support from any source.

In a local *gram Sansad* (a village community organisation which has been spearheaded by the West Bengal Ministry of Rural Development) the proposal to take up the 5% programme was mooted.

The head of the local self-government, its chairman (*sabhapati*) invited PRADAN⁹ to attend a block level general body meeting of the *panchayat*. Officers from various departments were also there to present their plans.

At the meeting PRADAN shared the concept of 5%, its potential and benefits. At the end of their presentation they were informed that the block *panchayat* had already decided to provide an initial programme cost of Rs 600,000 (Six *lakhs*) for earthwork in 10 *panchayats* under it. Thus about 60000 was available for each *panchayat*. At this meeting the various representatives from individual *panchayats* were informed that they were to approach PRADAN for technical support and guidance during implementation.

⁹ Dina and Arnab attended

In the watershed being studied, under this programme some 3 pits were financed by the Banajora *panchayat* in the village of Huchukdih. The *panchayat* typically commissioned a job-worker from the respective village to get the work done and also supervise it. In all about Rs 5000 was probably invested in Huchukdih. A further Rs 30,000 was provided by Banajora *panchayat* in Tentlo for a

The need for technology plus approach

In Huchukdih the ready availability of water threw up a new set of issues. Now that water was available people did not know how to exploit it to the maximum. PRADAN again started holding weekly meetings at night with members of the village. People proposed the need for providing some agriculture inputs. It was estimated the money required to provide required quantities of fertiliser etc was Rs 19,000. Banks were approached but it was not very enthusiastic to lend to an informal group of 33 members that did not measure up to the standards of a 20 member SHG. Yet after the issue was regularly pursued finally in 1996, Rs 19,000 was obtained as loan. From the bank PRADAN learnt people had repaid the loan on time. But a deeper probing on the source of money for payments it became apparent that people had repaid not from earnings from agriculture but by selling assets like goat or from money brought back from migration. Only few farmers¹ had earned decent profits. Reasons were soon apparent. The input requirement had been computed for that part of the total land owned by the farmer, which had 5%. But while applying the farmer had applied sub-optimal doses on the standing crop in *all* their lands thus affecting returns adversely and was unable to recover the additional costs.

Next year the bank provided Rs 48000 as loan to the *samiti*. PRADAN involved itself intensively in individual plot based planning including details on quantity of fertilizer etc. The recommended doses were publicized through discussion in meetings, posters in various village shops and public places. In addition an agriculture advisory committee was constituted with better agriculturist as members. People were instructed that fertilizer application was to be done in presence of one of the advisory committee members. In 1997 there was a massive yield. The repayments were initially regular but in the period coinciding with cessation of implementation, repayments to the bank started faltering. But the very bank, which in the first time was reluctant to provide any loan, became over enthusiastic. Even when Rs 5000 from the second loan cycle remains unpaid a further loan of Rs 32,000 was provided at its own initiative. While the bank was able to get the Rs 5000 further repayments stopped and till today the bank loan remains unpaid and the men's society divided on who is to blame. Ram Krishna who has not repaid Rs 5000 says if the society is able to recover from other members he is willing to repay his share of principal plus interest at one go. While others hold if a well off farmer does not repay why should they?

similar 5% programme but with a greater outreach. The higher investment at Tentlo was probably due to the fact that an important party functionary lived in the village. A smaller amount was also provided for pits in Kandoya in Watershed 2. PRADAN was consulted in the work undertaken in Kandoya but not at Huchukdih. Yet the execution at Huchukdih was faultless.

The farmers selected in Huchukdih under this programme were enthusiastic early adopters and willing to give up land¹⁰.

In spite of involvement of PRADAN in all the areas how ever the work was always not of a consistent quality due to lackadaisical attitude of job-workers, technical mistakes (too small pit, started from the wrong level).

In this phase of work PRADAN limited itself to providing technical inputs and evaluation of work. To enable greater involvement of people it says it opted out of any role of beneficiary selection, preparation or maintenance of muster roles, nor did it have any drawing and disbursing jobs.

Only in one village Shatshardih on the Purulia - Bamundiha road (out side of study area) PRADAN undertook the entire responsibility right from beneficiary selection to technical input. It was hoped treated patch in this roadside, extremely poor village would have powerful demonstration effect. Not only was the area generally poor, most of the people also were very poor. While the 5% pits were implemented, when it came to exploiting them for better agriculture there was little success. The entire village emigrated *en masse* in the agricultural season to work on the lands of better off farmers in other districts like Burdwan. Wage labor was more important to them than agriculture. In any case the people would still need alternative sources to meet their survival needs even after any increase in production to the maximum potential as the land holding was less. Aware of improved practices they continued with age-old practices of broadcasting on their own lands that they somehow managed to sow on their return. As a general rule in all the ten *panchayats* these pits were scattered over the entire area. In very few places compact block treatment of land was done.

Only 5% or more or less area?

Initially the point person of PRADAN supervising this work in that area was rather rigid (own admission) on the dimensions of the pits. The point person in this area stuck to the dimension arrived at on the basis of computation. It was only in an adjoining village during this implementation phase in village Beradah that forced a review. In June 1995 when implementation was taken up in village Beradah a influential resident holding important positions in institutions like the cooperative bank suggested that dimensions be increased (than what was arrived at on the basis of method for demarcating the 5% area of a plot). He proposed farm ponds instead of tiny 5% pits saying this would be more beneficial. Here lesser number of pits were executed but they were relatively larger and built at an investment of Rs 2000 – 3000 instead of the Rs 500-1000 standard. Arguments of the person had been that in any case with the money available they would not be able to treat the entire land of all the eligible person. Rather than digging pits with sub-optimal utility he proposed changes to make them more useful, especially when people in this place were willing to sacrifice their land. Here design was finally changed, the pits were larger and the pits themselves were bunded on all sides apart from the bunding of the plot itself. PRADAN was able to ensure the poorest were included in areas like Beradah. Later on PRADAN was more willing to accept such variations in other areas. And even allowed one *big* pit in an intermediate area in a large plot rather than 2 or more smaller pits for different areas of the same plot. By December that year the results were apparent. Not only was the yield of paddy excellent. People were able to take a second crop of Beans. People also took up pisciculture. A new variety of fast growing hybrid *magur* (crossed with shark) was introduced. People obtained bumper crops of beans as also fish.

¹⁰ If any follow up is ever contemplated the names of the

According to PRADAN, prior to implementation of 5% in Huchukdih village, most were barely able to raise only one crop of paddy. Subsequently people were able to take up potato and wheat. In peak agriculture season it even looked as if the area was in the command area of some irrigation project.

Phase III

Gradually a thought gained momentum in PRADAN that they were not being able to demonstrate the full potential of the watershed programme. They began toying with the idea of gap filling that is more pits to be provided in the areas treated at low intensity. Negotiations were on with one donor Action Aid for various works at Balrampur. Rs 2.39 lakhs programme funds was mobilized. The indented amount was decided on the basis of the wage required for earthwork. To treat 1 *bigha* of land 3000 CFT of earth needs to be cut. From it the financial commitment for digging one hundred cubic feet (*chua/ chowka*) was determined on the wage rates prevailing then. The objective was to demonstrate potential of programme so as to be able to mobilize more financial resource from the Barabazar *panchayat* for a larger area.

Three villages were selected for the 5% gap filling work – Huchukdih, Tentlo and Rajdih. The last of the villages was in Sukurhuttu *panchayat*. The pits dug earlier by the *panchayat* there were good as some had perchance cut through the underground seepage line.

These three villages had been identified by PRADAN in its internal deliberations on certain considerations. They were selected village should be under the Barabazar *panchayat*, scope for gap filling work, a general feel of the poverty level of the area. There were other strategic considerations of PRADAN namely opportunity for 'show casing' its work in Tentlo, which is a hub of political activity and an opportunity to derive mileage from its work.

Change from 3.5 feet depth to 5 feet depth

The Block *Panchayat* Samiti's chairman while sanctioning 6 lakhs for 10 *panchayat* had suggested that depth of the pits should be increased to 5 feet. According to him a depth of 3.5 feet would ensure survival of one crop of paddy but greater depth may allow many pit owners to raise a second crop in winter.

PRADAN accepted and people were able to take a

However, the actual selection of the village was made by the Chairman in consultation with all members including representatives of PRADAN. By a process of elimination the same set of villages came to be selected.

PRADAN started working in December 1995.

First it visited the fields to identify potential sites with some of the members. The criteria used to evaluate the potential site were – should be a mid-upland, the soil should not be sandy (sandy soils are highly porous which adversely affects its water retention capacity). In addition where available information was collected on the water levels of some well close to the area. If the well did not dry up in summers nor the water level vary greatly across the year it was concluded that the possibility of water retention in such pits would be higher as the percolation rate would not be very high.

Next it held community meetings in each of the villages with the people. The plan of action and potential benefits was shared. The information on potential sites were discussed drawing on the field visit experience.

A list of the people with land in the treated area was drawn up and their consent obtained to such treatment. Initially some backed out due to likely loss of arable land. Eligible people who had given their consent were organised into a committee. In each village a *Jal Sanrakshan Samiti* (water protection society) was with around 30 members in each. Occasionally non-residents of a particular village but with land in that village were also included.

Its members gave the samiti/society. A bank account was opened in its name. Three members were nominated as authorized account operators/ signatories with any two able to conjointly operate the account backed by resolution of the group authorizing any withdrawals.

Generally political machination did not play any role in site selection or in constitution of the committees. Only in one village Raydih¹¹ some creative ways to side-step potential troublemaker who had considerable clout was required. The person concerned was at the onset co-opted in a position of 'advisor' by asking members to nominate a much respected member to this position. Thus others could be nominated as account operators with little trouble as the informal norm was one person one position.

The society met weekly. It was a forum for evaluation of work done thus far, accounts were placed before them and plans for next phase were drawn up. Also planning of activities required to ensure bund plantation was done.

Pit digging commenced in the uplands gradually progressing to the lower lands (mid low lands and low lands). If pit digging is commenced in the low lands progressing upwards then there was chance of heavy damage in case of untimely rain. Thus even if there was a sudden rains pits in up lands would break the force thus reducing chances of damage to pits on the 'downstream' (lower lands).

Generally the landowners dug the pits on their land. The pit digging occurred in phases. All the residents of the village were eligible to work and every willing person was given some work in the earthwork. Membership of the society was not necessary for obtaining work. A criteria considered in deciding number of people to be involved was the fact that the entire work had to be completed before the rains. The entire financial side was managed by PRADAN. There were muster maintainers appointed by the society in each village who maintained the records. PRADAN only checked them.

As regards bund plantation PRADAN has menu of trees recommended for bund plantation (given in a subsequent section 'tree selection criteria'). But these menu were not considered people generally undertook plantations of *arjun* or *gamhar*. Of this *arjun* is recommended but *gamhar* is not specially recommended. But most of the plants proposed need to be protected from grazing cattle where as these two need lesser protection. *Gamhar* is not preferred by animals and *arjun* where eaten is able to regenerate even fast after that. The responsibility for collecting the seeds was that of

¹¹ PRADAN would like a relatively more intensive study of benefits derived to be made at this place. I was interested but not doing due to paucity of time. Already proposed to IWMI point person here. Plan of IG study etc not known.

the people. There was no payment for it. The society only reviewed the extent of seed collection etc in its weekly deliberations.

Most did tree plantations. Till one year from date of implementation the trees were generally well. But few have trees on their bunds today. Some progressive farmers alone still possess the trees. Trees were either eaten away by animals or lopped. Protecting the trees after the paddy crop was harvested was difficult and required concerted effort from the people. Concept of social fencing did not work in spite of village meetings and meetings with cow herds. Even the owner himself/herself lacked the will to fend his saplings.

In one village, Huchukdih *sabai* grass was also planted on the bunds with the objective of earning supplementary income from ropes made from it. This was inspired by a place in Bankura where people are doing a thriving business from the grass grown on bunds. The seeds were obtained from the next *panchayat* and distributed to the farmers.

Cattle however eat this grass, and in absence of protection most was eaten. Again the same farmers¹² who still have the tree plantation still possess the grass and have earned from it.

When the implementation was on the society met on a regular basis but subsequently the meetings petered out. In Huchukdih this decline was accelerated by problem with loans (refer inset box on 'technology plus approach').

In each of the three villages implementation continued till June of 1996.

Phase IV

In only in one village Huchukdih the phase IV was implemented with funding support from Action Aid. The objective of the IV phase was to consolidate the activities done till then and further the impact of 5% technology. In this phase it was decided to treat the headlands so as to reinforce the moisture regimes in the plots liking lower to it.

Two *hapas* (tanks) were dug. For one, Manu Sardar was provided money for a deepening and widening a pit which he had already dug on his homestead land in watershed 2. Another was built a little way away¹³ on other side of road to recharge lands of watershed 1. A large tank financed by *panchayat* already existed behind Anil's house on one side and a further was planned on Ramkrishna's land. In between, the second was dug to ensure large water bodies were there at the head of the entire treated patch.

Two dug wells were dug at an intermediate point lower than the head land tanks. The purpose was to have something to be able to measure the effect on water table. At the suggestion of the villagers one each was built on either sides of the road. One was dug on the land of Chunu and another on the lands of a very poor farmer Luthu. The latter had only 3 *bigha* of land shared between three brothers. It had been hope the family would be able to intensive agriculture on the strength of the water on their lands. It had also been decided that if they did not engage in agriculture the land

¹² Seen with Ram Krishna. But others like Puran and Bhunwar are also likely

¹³ Rati kanta land

would be taken over on lease by the society to be given to a willing farmer on a further lease. But this did not happen nor do the brothers utilise the water.

In addition to the *hapa* and dug wells a further 4 hectares of land was treated with 5% at a cost of Rs 36,000. This phase focused on gap filling in pits.

The owners of the land on which pits were dug were encouraged to engage in digging their own pits. Payments were made for each *chouka* dug after reducing for owner's contribution. In planning of this phase there was generally no provision for the land-less families and were not included. Several other families with no land in the treated area were also excluded. However, wherever the number of pits to be dug was more they participated in the earth works.

Intermediate phase

PRADAN became conscious of the potential for financial resources for land and water management available at the district. The National Watershed programme had also been launched.

PRADAN decided to conduct an exposure trip for important members of the local government to enable them to better appreciate the scope of watershed development. In 1996 June a cross visit was organised to Bihar. The local Chairman of the block office, the then zonal secretary of the communist party¹⁴, and a member of the *zila parishad* went on this exposure. They along with PRADAN team visited Chhota Kocha area in Bihar where under the National Watershed programme had already commenced. Amongst others they saw diversion weir, other watershed structures and people owned and managed lift irrigations. Around this time occasional collaboration with *panchayat* was already occurring but it was not yet a strategy.

In 1997 November, an internal team review meeting of PRADAN was held at Purulia. Amongst other things an evaluation of strength and weaknesses of the PRADAN approach was done. It was felt that staff strength in water shed was any case not enough to anchor a direct implementation programme. If this was to be approach, the concerned staff should immigrate to Bihar and join an established team there active in watersheds. Playing a facilitative role contributing to the process of people managed development appealed to PRADAN Purulia. By attempting to do this through people managed institutions they hoped to pre-empt what future had in store in other places too. When local institutions became functional in other areas other teams of PRADAN working in other locations could learn from Purulia.

Working in association with *panchayat* became an avowed objective of the PRADAN's team at Purulia. Gradually this approach was adopted in all PRADAN Purulia activities here. Apart from 1 block, they have generally been able to collaborate successfully.

Watershed Development Phase

The respective Block's sub-assistant engineers delineated the watersheds after extensive field visits and interaction with the people. Watershed committees were organised in each watershed involving residents of the watershed.

¹⁴ Ibrahim, now a block *panchayat* official

This was the phase after the launch of the watershed programmes. On September 1, 1996, the watershed plan was made at Rupapeta in Sukurhutu block *panchayats* area in a process facilitated by PRADAN. The *Sabhapati* of Barabazar area attended it as a learning exercise for him. This being outside the study area is not covered here.

The second watershed plan was to be done for Tentlo village. PRADAN did not have a hand in deciding for which place the plan should be drawn up next. The *Sabhapati* suggested Tentlo, based on his understanding of the people and their ability to do good work.

In December 1996, the Chairman proposed a one-day fair for sharing of the concept of watershed complete with cultural festival of the popular *Chhou* dance etc. The festivities were to be preceded by seminar on the merits of the watershed and activities to be undertaken there.

Two senior staff of PRADAN attended as subject matter specialist on watershed development. But their proposals of 5%, 30-40, small diversion weirs, plantations and field channels had few takers. It was apparent to them too that they were not being able to take the mass with them. People wanted large tanks, government managed lift irrigation (pump water from river), and deepening and cementing of the irrigation Canal from Urma. Sensing their disenchantment the Chairman suggested they talk about the nuts and bolts of the programme and leave the idea selling to him.

So that's what they did. What they shared is briefly summarised below.

For 100 hectares a budget of Rs. 3 Lacs was provided. Of which 20% was programme fund, 5% community organization cost, 5% training, 10% administrative cost (both at block and administrative level) and the balance for wages for earthwork.

Fund routing path was State Government to the *Zila panchayat* to *panchayat* to respective water shed committee. The watershed committee was responsible for execution in each case. But certain tasks are funded directly by *panchayat samiti* and *panchayat* so the authorized member of the watershed committee has to collect the cheque/ draft from the respective authority. The watershed

PRADAN's general approach to watershed development (outside of Bengal and PURULIA)

The entire programme is financed by grants and people's contribution in the form of labor.

How PRADAN selects the area

Watersheds are generally identified from topographic-sheets. Then the project implementation team makes several field visits to understand the need of people, poverty level, erosion and other soil moisture related problems.

An area is selected where

- Majority of the people are generally dependant on land-based activities;
- A general scarcity of water is experienced – especially for irrigation
- Have denuded soils areas facing the problems of soil erosion and deforestation

Funds are mobilized either before or after this phase or an umbrella funding support for watershed activities is obtained.

Process in village

Through regular visits rapport is built with few villagers from all the hamlets. Community meetings are held to explain about PRADAN and its proposed work.

Concept of watershed and ridgeline is shared with the villagers. The villagers in association with the PRADAN staff identified the ridgeline.

Village based joint planning

Several rounds of community meetings are facilitated by the NGO, PRADAN. In association with the people and in a process facilitated by it, certain activities are undertaken namely like land and other resources mapping, problem identification, ranking of problems and analysis is done. Some of the village people prepared the maps of land and water resources on the revenue maps of their respective villages out of the four villages.

Collecting baseline data

Local villagers both men and women are provided with a basic form to collect basic information of the respective families.

committee then appoints a job worker to execute the planned work, maintain muster etc.

The watershed committee has to have representatives from women, landless and also the farmers from the respective watershed. Small proportion of the funds is set aside to benefit the landless.'

After this PRADAN people left and the chairman took over. Based on his understanding from exposure visits to Bihar and having attended the planning phase of the first watershed plan at Rupapeta. Through his skilful oratory and convincing powers he could convince the people of the benefits.

Through his inspiration a typical diversion weir was made in Choto Mukuru. A compact block of land has been treated with 5%.

PRADAN has not got any specific role in the study watershed area. It has been involved in problem mapping, evaluation, explain concept of 30-40 and has been invited for the occasional joint visit.

Initially two personnel from each watershed was trained in Barabazar by PRADAN in PLA methods of resource mapping and problem identification. Before resource mapping at the village 'xerox' copy of the revenue maps of the village or part thereof falling under one watershed were collected and colored pens provided. The villagers themselves did the resource mapping. An idea of how to do it along with significance of color coding was shared by the former trainees. The residents of respective village prepared maps with people of different hamlets working together. Four sets of maps were produced relating to existing resources, land water based problems, possible remedies.

The various individual maps so produced were joined to produce the map of the entire project village. Today several individuals have blank maps of the watershed being studied.

PRADAN has promoted horticultural gardens of mango and papaya in the village of Huchukdih. Part of the reason was to demonstrate women managed homestead lands through involvement of SHG women.

In other watersheds outside of the area PRADAN is also engaged in direct planning and supervision only *panchayat* funds by choice are not handled by it.

2.12 Introspection

Some of the result of introspection by PRADAN has been:

Selection of leaders
Leaders are selected from village/hamlet in community meetings.

Hamlet volunteers' responsibility
Look after all the works in his hamlet
Computing and presenting bill for passing bill in the village meeting
Maintain accounts of hamlet, preparing muster role
Labor payment

Watershed committee
In respective village meetings the villagers nominate a watershed committee with representatives from the member villagers. Now the villagers select the leaders in the planning workshop. The watershed committee has both leaders and the functionaries.
Continued from previous

1. Responsibility of secretary
a. Purchasing
b. Maintain accounts
c. Maintain meeting register
The secretary withdraws the money on the request from the particular beneficiaries duly approved by

Strategically it is convenient working with the watershed committee but by this PRADAN's extent of interaction is limited to the watershed committee members and not to the actual members in respective hamlets where the work is done. Consequently PRADAN feels the extent of ownership by community is much lesser. Nor can the watershed committee act as an effective platform for the villagers in a large village. Technically all the hamlets have representation in the committee but the extent of sharing/ feedback by the representative with all the residents of the hamlet as also extent of participation of others is limited.

A hamlet-based meeting is more effective in ensuring people's participation and involvement. But carrying this into practice has been difficult given the shortage of staff. Initiation these hamlet meetings require active participation by PRADAN at least in the initial stages and thus are difficult to initiate considering the commitments required. But this has been implemented in some areas as CAPART (Council for Advancement of People's Action and Rural Technology) funded watershed (PRADAN's own project) in Bandudi. However here the watershed is still under implementation. These hamlet based meetings are held every 15 days with PRADAN being duly informed in advance. The hamlet committee reviews the work, draws up plans and budgets and submits it for consideration of PRADAN. In Bandudi there is no watershed committee.

Hamlet-based meetings have been implemented in another block Jhalda in all the newer watersheds. Other watersheds like Bikharichelima has changed hands so often that in the absence of a stable anchor from PRADAN this could not take off.

In other areas where watershed committee's exist, hamlet committees cannot do away with such a central committee. This higher committee is necessary for easier fund routing by the block instead of having separate accounts for each hamlet.

1. Watershed activity is erosion control and effective land water usage methodology. Trying to forcibly marry poverty focus with PRADAN's watershed work has affected results in that in over two years of its implementation of watershed programme it has not been able to demonstrate a fully functional package.

When working with poor income enhancement is an important issue. Yet this intention may prove counter productive. For instance watershed concept says that plantations should be created in uplands. For this it is necessary the trees should be protected in the initial years. For that its necessary the people should not migrate. But the plantation has a long gestation period during which poor need means of survival. They are forced to migrate in search of work and trees cannot be tended and are destroyed due to grazing, destroying all chances of any return at all. So in order to benefit the poor they are forced to work at lower lands where tanks, dug wells can be made to enable water availability in short run for agriculture. By doing this *tarn* uplands cannot be treated, as money is a major constraint. Resources are a constraint and wage rates are periodically revised further reducing the funds availability for treating a given area.

2. Some how PRADAN feels it has not been very successful in promoting plantations on bunds which is an integral part of the watershed programme. The concept of social fencing seen in action in places like Ahmednagar has not been successful here. They have some good plantations but in all these areas fencing has been provided.

3. 5% and watershed requires dedicated staff with no other claim on their time to be truly effective.
4. Hamlet level meeting should not be entirely focused only on managing the implementation. It should also be used as for a for collective action in procuring agriculture inputs, training, looking after bund plantations.
5. In a Purulia kind of region to effectively treat a 500 hectares patch properly, a five years time frame and approximately Rs 45,00,000 is required.
6. When an area is taken for treatment, the promoting agency should have clear idea of timeframes and work to be done to realise the vision for the area. This holistic planning and vision is often not possible due to paucity of funds.
7. The socio-economic profile of beneficiaries that is a pre-condition to success of 5% and water shed programme is
 - At least having > 6 months of food security. With lesser security even after 5% alternative sources of income remain essential for ensuring survival. Thus need to migrate remains. Then the focus on better package of practice is not very high.
 - The people should primarily be dependent on agriculture for their livelihood. Otherwise the intervention may lose its importance and they may be unable to exploit its full potential.
 - Even if the people migrate, entire family should not be migrating or else protection of bund trees and grass would be difficult. Also, agriculture on their lands will not be that effective.

Section 3: The Study

A survey and interactive appraisal through interviews was done to ascertain the evidence of success, livelihood impacts, and spontaneous replication and up scaling.

3.1 Methodology

- Located oneself in the study village to be more intimately able to appreciate the prevailing reality.
- Next a schedule was designed, pre-tested and revised a couple of times. Later a Bengali version was designed and pre-tested - The objective was to obtain more specific information of family and social-economic background of each respondent. A detailed analysis of each pit including soil zone, type, water retention, flows, benefits derived and yields. A set of questions dealing with perceptions regarding 5% was administered to both types - *i.e.* those who possess and do not possess pits.
- Several rounds of Community discussions were held to get broad community observations, identify key informants, discuss cross-reactions, and get perceptions of utility and appropriateness of 5% intervention.
- Semi-structured one to one discussion was held with some key informants to understand issues related to irrigation, 5%, agriculture, time lines etc.
- PLA exercise on land holding and perception of wealth, animal and perception of wealth, PLA ranking.
- Discussion with women on property rights and role in agricultural decision-making.

3.1.1 Tools and methods of data collection:

The baseline data collected during *panchayat* led watershed phase of implementation was not available. Hence, it was not possible to verify whether information like productivity and actual sales of paddy available for each respondent was even available or not. Consequently, in the absence of these data there was an almost total reliance on respondent's ability to recall events 3-4 years back. This becomes even more critical when continuous and incremental changes are to be captured. For instance in the past 2 years the weather has been unfavorable for agriculture yet there has been variation in the yield with previous year being relatively better than the others. Yet only a few respondents highlighted this fact.

A rigorous 'before and after 5%' or a 'longitudinal analysis' has been difficult based only on interviews. The fact that the preceding years have not been normal rainfall years has also probably skewed figures and possible findings. Hence, it was earlier decided to ascribe greater importance to the direction of change rather than the reported quantum of change. But subsequently this too was abandoned with so many gaps in information and complete reliance on farmer's ability to recall quantitative data.

Typically qualitative data collected in semi-structured open-ended conversational style interviews, allows far more iterative and deeper probing revealing their perspectives, rationales and beliefs. At least in the initial stages it was also far less structured. Qualitative study has been very time consuming. Nonetheless, the qualitative discussions held prior to the survey helped to formulate the questions to be asked during survey. Qualitative methods are good for identifying priority issues to be studied. After the survey, the method was used again to re-clarify doubtful information as also to profile in details some key informants on particular aspects like 5% productivity.

Population was defined within the sphere of watershed 1 and 2 as all the families residing in the area to be contacted through head of family.

Researcher personally attempted initially direct door-to-door survey but it was taking a lot of time in terms of introductions, sharing requested details of personal life (marriage plans, family details). As a method of optimal utilization of time, IWMI suggested a rapid appraisal of a sample.

However, finally rather than a rapid structured schedule survey a relatively detailed study of the population was opted. This was because in the initial discussions a variety of reactions were perceived on various aspects of 5%. It became necessary to capture what the entire population thought on these various aspects to clarify whether they were chance impressions of few or more widely subscribed and what bearing such perceptions beliefs have in adoption and utility of 5%. In a sample, it was felt the full range of opinions may not get highlighted. Generally, in early discussions, the people did not seem very enthusiastic about 5%. A need was felt to verify this, as there was concern whether one was reaching only the vocal non-enthusiasts in the population.

The population it self was small about 350 when roughly estimated at the initial period. Also it was felt purposive sampling was bound to introduce biases as some selected respondents views would get highlighted/ captured in the absence of a proper basis of sampling method. Required knowledge itself was missing regarding distribution of pits. Entire village in the watershed had almost no 5%. Stratification of the population seemed important. But stratified sampling was discarded, as the variable(s) for stratifying the population could not be easily evolved – land holding wise, possessors vs. non-possessors, poverty profile, pro and anti 5% etc. There was possibility of omitting variable leading to biases in stratification given my own limited understanding.

As recommended by the host organization the choice of the enumerators was left to the local party representative. In the end all enumerators were male. The local representative of the communist party recommended them. All the people recommended were active members of the party besides being literate. Being active members of the party several found it difficult to devote time to the study yet were unwilling to recommend others in spite of request to nominate literate women and high school students from their families who would be trained.

All the people except one initially recommended were also members of the same caste *Mahato*. The *Mahato*'s are numerically dominant and outnumber others in most committees.

After the sole non-*Mahato* expressed inability to continue due to commitments to political work the number of non-*Mahatos* in the team increased. He recommended three others from his caste and residents of his *tola* to replace him in the survey.

A woman filled only two forms. The researcher was disappointed, as she would have ideally liked employing some women like her hostess but as her or her husbands name was never suggested by the party representatives and going along with the host organization's suggestions to the letter, their names were not broached.

Employing local data gatherers had its advantages as well as disadvantages. When an outsider is employed, the schedule enumerator has to totally rely on the reported words of the respondent. Since several surveys have earlier been conducted in this area as a precursor to some intervention, some people reportedly have the tendency to tailor their responses in the hope of making themselves appear more suitable for selection as beneficiary. It was repeatedly clarified during and before survey that the purpose of this study was only to understand the people's perception, identify extent of adoption and whether benefits if any are being derived.

By employing local data gatherers while a local feel of validity of responses is better, considerable effort has to be invested in communicating a proper understanding of the issues and problems. Not only were the enumerators trained initially in-groups and reviewed in groups. Later each was also reviewed in pairs of two to better communicate as also to appreciate their point of view. Yet, all losses of understanding probably could not be plugged. Hence, a few responses will be eliminated due to difference in understanding.

A special section had to be added in the schedule to enable the enumerators to express their opinion and not editing information provided by the respondents.

Qualitative data was collected both before and after the survey. In the survey yield information did not appear authentic (recall problems). In the interviews after the survey, yield information was collected from 2-3 respondents who through prior interactions had appeared as candidates with better recall.

A set of perception information was also included in the hope that in future when required the respondents could be stratified on the basis of their responses. However, some questions in this section may not be analyzed due to differences in understanding of selected enumerators.

In some cases, the person assigned a particular area refused to collect data from people of other party. Others had to fill in for them.

Two enumerators in Tasarbanki had clearly fudged data. Additionally the survey at one village was given up due to lackadaisical attitude to work and poor pick up as also unwillingness to devote time to learn. Researcher refused to accept these forms. However to obviate any stresses later on the forms from the two enumerators from Tasarbanki was accepted by the point person after requiring them to do some 'corrections' but once doubt was sown the remaining data's validity appeared questionable. The Tentlo survey it had been earlier decided to postpone to a later time convenient to the IWMI point person. But later the IWMI person on similar consideration of politics commissioned a rapid survey at Tentlo. This survey was conducted and completed in the pace of 2 days, with each enumerator filling 40 or more forms, leading to doubts on the veracity, especially where enumerators did not possess required level of skill. However the IWMI point person has faith in the data collected at Tentlo. The Tasarbanki forms have not been included in analysis. From the Tentlo forms the details of only pit owners have been included.

3.1.2 Caveat

In this report, an extensive stakeholder analysis has not been done as it was beyond the scope of the report. Only the users, to an extent their womenfolk have been surveyed and discussion held with *panchayat* representatives resident in the village.

Thus, no attempts were made to contact block officers and other possible stakeholder, as this aspect of stakeholder analysis and external contact was anchored by the IWMI co-ordinator for the project.

Though, the entire study area, both possessors and non-possessors, were surveyed, the entire data entry could not be done due to paucity of time and inability to sub-contract (due to unavailability of 'Bengali reading-computer literate' data operators). Hence, all 5% forms from all the villages have been included. The entire villages/hamlets of Choto Mukuru, Hesladih, Huchukdih (non-migrated ones) and Kusum Tikri has been included covering both possessors and non-possessors. In Tasarbanki with no 5% data of 2 surveyors has been included. Tentlo, which had been dropped from survey due to non-availability of surveyors, was subsequently surveyed, and only data of possessors of 5% has been included. These forms of Tasarbanki and Tentlo were received in mid-February after they were collected from villages by the IWMI person who commissioned them.

As a result the caste profile, perception of non-possessors regarding 5% pit, does not reflect the situation of all the residents of the area, but that of people whose forms that were included in this analysis due to paucity of time.

This report does not purport to be or include a process documentation report. As originally conceived by IWMI, a process document was to be a part as per the contract details assigned.

Process documentation was abandoned due to the following reasons:

- The study commenced in October when a major part of the process (field preparation, nursery raising, transplantation, fertilization etc) with regard to the paddy crop was over.
- Three months time allotted was not enough to understand area, history, pre-test, train surveyors, survey, analyse information, prepare reports, edit etc. In addition trying to track individual respondents through various stages (even assuming point 1 was not a limiting factor) and activities would not be possible.
- Large-scale failure of the paddy crop due to delay in rains. This gave the impression that the 5% would not be able to live up to the original conceived purpose.

The preliminary data was not completely analyzed to enable identification of the ideal groups of people for detailed process documentation. Getting an in-depth understanding of the perceptions with respect to the pit was necessary before engaging in detailed study.

Section 4: Research Questions

Before the study the researcher had little understanding on what was 5% beyond the fact that it was a pit representing 5% of a plot and used to harvest rainwater for irrigation. Even before the first 5% was seen in the area a tentative list of questions, which it was hoped the study would help to answer, was drawn up. This was subsequently revised and the result is reproduced below:

- Understanding the socio-economic political and economic back ground of the study area
- Given the socio-economic situation understanding farmers decision making process in water scarce situation
- With regard to 5% what is the appropriate level of enquiry - is it individual plot, the household, a treated patch, the community as a whole
- Are there groups that are precluded by their circumstances from adopting and deriving benefit from this technology?
- Extent of dependence on rains for agriculture
- Was there sufficient incentive for the people to participate? What could be such sufficient incentive?
- What motivated adoption of 5%?
- What are the particular traits of the technology which could be the rationale for its adoption
- Impact of 5% on the livelihoods of the people
- Is it feasible to propagate it as a specific technology or is it an integrated package of techniques.
- Does it require a complementary package of inputs?
- Identifying traits that make the technology attractive to the farmers
- What are the associated variable of the 5% favouring/ disfavouring adoptions? Have we been able to study all of them?
- What are the environmental constraining and enabling factors to technology adoption?
- Is it merely an experiment for the farmer? Or does he really adopt it?
- What are the associated pay off and risks
- Was it a technology that had been completely researched and developed when it was implemented in the study area or is it still under development?
- Identifying indicators of impact of technology on production and poverty alleviation
- How to establish the gains from the adoption of 5% more certainly and not merely as probable and indicative?
- Various factors that appear to condition the success or failure of 5%, related choices and innovations
- Does large-scale adoption significantly alter the water balance within the basin especially with respect to other upstream and downstream users?
- Is it able to assure more profitable returns on an average?
- Is the technology unsuitable beyond a certain limits as defined by prevailing physical, social and economical condition?
- Does it involve any hidden Common Property Resource (CPR)? Is the underground seepage line a CPR and does it have any good husbanding responsibility for the individual?
- Is there any sharing of water? If yes is there any reciprocity in sharing of water?
- Role of collective action?
- Is there any need for joint investment in purchase construction or maintenance of technologies given the stress on concurrent implementation on a patch of land?

Some additional questions in which IWMI expressed an interest were

- Decision-making at household level
- Gender equations at home
- Property rights of women
- Farmer's decision making process

Responses to some of the above

- With regard to 5% what is the appropriate level of enquiry - is it individual plot, the household, a treated patch, the community as a whole

This remained unresolved. An individual plot and the household are easier to study and relate to. Perhaps collating findings for a patch is also feasible. However, inter-plot linkages are difficult to trace and extent of influence difficult to isolate. This also partly explains the pre-occupation with households and plots. Doing otherwise is difficult. But for future research the patch should be studied to know inter-relations.

- How to establish the gains from the adoption of 5% more certainly and not merely as probable and indicative?
Dealt in scope for future research

Section 5: Analysis of data

5.1 Factors considered in agricultural decision making

As expected farmers are aware of micro-variation in factors such as topography and edaphic factors like soil quality and accordingly vary the variety portfolio and even to an extent the crop.

Land zone - Certain staggering of harvest occurs due to the fact whether *bahal* or *baid* lands have been sown. In *bahal* generally longer duration paddy of improved type is sown.

Crop maturity dates - In addition the farmers' spread out the harvest cycle by sowing paddy with different maturing dates on the land to facilitate harvesting. This is an important factor when harvesting of crop like paddy.

High yield vs ensuring a minimum return - As elsewhere, farmers prefer focusing on attempts to reduce risk of a total crop loss than the chance of maximizing yields. Hence the decision of some farmers who were interviewed to give up cultivation of improved varieties. These improved varieties have the potential of giving higher yields when there is sufficient rainfall. But the yields reduce drastically if there is shortfall in rains at crucial juncture and no alternative irrigation source available leading to extended water stress periods. High risk, higher gain is progressively losing its luster for people who have lost their crop at least once¹⁵.

Availability of water - If the particular plot is close to a stream or a well or close to a tank or has a 5%, which retains water for a longer period the crop portfolio in such a plot, includes

Longer duration or improved varieties of paddy like *Lalswarna*
Frequently a second crop.

Water is easily the most crucial determinants of agriculture here.

Proximity to home - This is an important consideration for crops that only a few farmers in a particular area are likely to take. This is especially important in season like *rabi* (winter) where only few take crops. For instance vegetable cultivation or a *rabi* crop is best done in plots with fencing or near the home where family members can keep a look out for any stray animal.

Alternate plots - Alternate lands suitable for the same crop and their respective quality is considered for crops like the second crop of potato. For instance while a particular plot say potato may be raised in two three plots with different access to water, fertility level, in a 'bad year' people tend to concentrate on the plot with more assured systems of access to moisture.

Availability of family labor - If the farmer has more work hands at home he is able to consider more labor intensive methods of agriculture. But this has a trade off while the agriculture is more intensive its ability to produce enough for all is decreased with increasing size in family. This also determines decision regarding hiring of additional hands for grazing the cattle or doing agricultural operations.

¹⁵ See case studies of Haripada and Ramkrishna

Money power - Landowners with additional / alternate sources of cash other than agriculture typically hire labor for most of the operations. In case of few they too work alongside with the people hired.

5.2 Gender & decision-making

In both tribal and non-tribal homes absolute seclusion and confinement of women to hearth and home alone is not seen. Women participate in all operations of agriculture but not in ploughing. A woman generally does not own any of the family lands independently nor does she have usufruct rights to any other land (unlike say places in Africa).

Agriculture related decisions are generally a man's prerogative. Her influence is limited to proposing things/ practices she has seen. She however does not take the final decision. She does not have titles to any land but works on all the lands.

Chanchala's account

(Excerpts from case given in appendix)

Say you have earned some money how will its use be decided and by whom?

'I would say I want to spend it on this. Generally my husband would honour that unless money is really a problem. In such a case I too would not ask for any thing improbable after all I am also running the house and know the situation. But yes husbands concurrence is necessary for *big* expenditures like clothes.'

Who would work out the priority between competing expenditures?

'We would decide jointly. But yes in some homes the man and in other homes the woman views are more important and accordingly things occur. For instance in my Bhasurs (husband's elder brother) home the wife's views are most important. That led to our families living separately'.

Who is likely to decide about starting of agricultural operations?

'Husband'. Why? 'Because he would be discussing with others and seeing all this happening on a bigger area than I normally do. He is more mobile going to the *haat* every other week on his cycle. Where as I go only when I have to make purchases. The *haat* is very far away at Sindri to walk'.

About sale of assets? 'Both of us could suggest but it would only be sold when my husband consents to it. This will be the case in every home. The woman does not take decision on selling goats or grain etc till her husband is sick or incapacitated and there is no other grown up male adult. But she adds, her concurrence to the sale is important to maintain harmony'.

Who receives the money and who keeps the money?

'He generally always receives the money. Further he could keep or he could give it to me to keep safely in my trunk. But I cannot spend the money at my will'.

Section 6: Coping Strategies in Water Stress Situation

The Bengali year ending April 2001 was held as the worst of the past three years of '*khara*' or drought prone conditions -

6.1 The coping strategies evidenced during the study period were

- **Storing up the farmers own harvest obtained in November – December**

People store the current harvest preferring to purchase paddy for current consumption. Even families who have emigrated have stored away their harvest for use after their return. Where members have been left behind to tend cattle they too buy paddy where feasible and only in the worst case consume the current years harvest immediately.

Rationale: Paddy prices show a rising trend from the time of harvest to the next paddy season. Paddy is relatively cheaper just after harvest than it will be six months hence during coming April - May. Then purchasing the same amount of paddy would take that much more money. Hence when the family has to buy paddy any way it makes sense to buy paddy after harvest. This is a standard coping strategy for the farmers. It also serves to conserve cash for financing important agricultural operations in a cash stress period in June - July.

- **Selling off older bigger bullocks and buying smaller younger ones**

Rationale: A bigger bullock will consume more paddy straw as they have bigger appetites. Hence buying younger ones would mean they would consume less yet the family would still be able to plough the land in the next agricultural season. In some years the younger one would grow and become capable of drawing the bullock cart too or ploughing deep.

The smaller poorer grade bullock would cost less and eat less. It could always be resold again in a better harvest year and bigger, better bullock purchased. The local traders at the Balrampur animal market are always willing to buy cattle for beef export purposes.

- **Selling away the buffalo pair and buying a smaller bullock pair**

Rationale: The reasons are largely similar the ones stated above. The male buffaloes are viewed as workhorses but have a *big* appetite and require better maintenance in terms of regular bathing and more water to drink. A bullock eats less, demands lesser care, can do comparable work except pulling heavily loaded bullock carts, or the plough for long hours through the puddled soil.

- **Use of personal network/relations for saving cattle**

Leaving the bullock pair at the homes of relatives in villages where they have had better harvest. Typically these relatives are the parental homes of the mother and daughter in laws of the respective families

All the animals are not sent, as the 'host' family may not be able to tend all of them in addition to their own family. The bullock pair is viewed as being the most essential as it would be required for ploughing and purchasing it costs a lot of money. Bullock prices peak at the commencement of agriculture season. During agricultural season hiring bullocks not only costs much more in addition the operations cannot be timely completed delaying the sowing time.

- **Second crop**

Apart from one person in Hesladih (Sachi) have not come across any one else in the villages of Choto Mukuru and Hesladih - Huchukdih who has taken a second crop solely on the strength of the water of the 5% pit.

They have taken up a second crop only in such 5% plots where some alternate source of water can be arranged. The first alternate is to draw water from other 5% whose owners do not do any second crop. But in all these areas a second alternate source in the form of *hapa* also exists - the ultimate reliance was placed on it and crops taken. In case of Tentlo most have sown relying on waters of the large tank¹⁶.

- **Sowing lesser area**

This is done considering the water available and is an important consideration for the second crop considering factors like number of irrigation required, water stress-bearing ability of the crop. Generally, only a portion of the land is sown to ensure availability of water.

Anil's case of decision making in water stress: In a plot where the total area is 10 *katta* there is a 5% pit. However after the paddy was harvested he doubted whether the water remaining in the 5% would be adequate for potato is sown on the entire 5% plot. Like last year he then decided to sow potato in only 3 *katta* of the total 10 *katta* area there.

- **Migrating**

Chiefly those people migrated who in any case need to have alternative arrangements for providing for food during part of the year as their own lands at the best of times only provides insufficient yield. The chief reason is less than required level of land ownership. Others have gone to their regular places in Burdwan. The migrated people earn money and are able to save at least 1 kg of rice per person. They thus not only provide for the present but also for another month or so. But this year several seemed determined to bring back the paddy as the rice rather than the money obtained from its sale is more important to them.

¹⁶ Locally called 'Mardal bandh'

- **Shift in varieties**

There is a shift to local varieties in stress years (especially where the preceding year was also a water stress one) or anticipated water stress years. When the people expect a bad rainfall year some have shifted to local varieties. Others who did not are rueing their decision.

6.2 Regular coping strategies

- **Inter-cropping** - not seen much except in case of linseed which is sown in standing crop
- **Plot scattering** - It is held out as a risk reducing strategy in many literatures and is evident here. But in the researcher's opinion it has occurred mainly by default due to the prevailing land inheritance system. Plot scattering allows farmers to exploit the variations in soil and microclimate conditions to the fullest and thus decrease total risk from the full range of crops that will be sown.
- There is little evidence of crop diversification. The chief crop is paddy and in fact the entire agriculture revolves around agriculture.
 - A staggering harvesting time by varying varieties/ strains sown. This way the spurt in labor requirement at harvesting time is staggered. Hiring labor at harvesting time is in any case difficult, as less of it is available and the price too is higher.

6.3 Agricultural practices

- **Fertilizer use in paddy**

Desi variety - Generally fertilizer is not used for *desi* / local varieties. Where used at all the usage is minimum and generally sporadic. Only 17 of the total analyzed respondents actually use any fertilizers in local varieties. And where used its very less the modal value being 5 kg/ *bigha* in the entire cropping season. Of the 17 people only 3 people apply fertilizers between 7-10 kg/ *bigha*.

Improved (*Videsi*) varieties – Fertilizer use is more frequent in case of improved varieties. 69 persons said they use fertilisers on improved varieties. The usage ranges between 0-21 kgs / *bigha* and modal value 10 kg/ *bigha* and most apply between 15-20 kg/ *bigha*.

Thus, fertilizers use is hinged on the variety sown and not related to the presence or absence of 5% on a particular plot - unless of course, a shift in variety is noted and the reason can be ascribed to the 5% and consequently the requirement for fertilizer went up.

- **Compost use in paddy**

Cow dung compost is used for both *desi* and *videsi* paddy. Compost use ranges from 1 to 6 cartloads. One cartload consists of 15-25 biscuit tins depending upon the drawing power of the draught animal harnessed to the cart. Here, in this document for conversion purpose 1

cart load is assumed as 15 tins. Median and modal value both being 3 cartloads/ *bigha* while the range is 0-7 cartloads/ *bigha*.

Cow dung from their own animal or to a lesser extent the droppings collected from public places like grazing grounds frequented by the cattle is the chief source for cow dung. The cattle are almost all sent out to graze on most of the months except the peak summer months of April, May till mid June when often not even a blade of grass is available.

- **Source of power for irrigation**

In case of possessors and non-possessors human power is the chief source as 70% report using *dabka* or swing basket as chief means of water extraction from 5%. *Dabba* or tins are used to cart water from distance sources like well, *hapa* to the desired plot if irrigation channel cannot be made.

Diesel is used as fuel where pumps are used ranging in capacity from 2 to 10 HP. Electricity is not used for pumping as its not available.

36 out of the 87 (41%) possessors who responded to the question felt water extraction will not be difficult from a 'deeper' 5%. Some qualified it by saying that so long the depth does not exceed 10 feet water extraction will not be difficult.

On reviewing perceptions power source appears to be a limiting factor in the eyes of the people – if pits are deepened extraction of water will be difficult.

- **Reasons for low yields**

The following extract captures most of the reason that people feel are responsible for low yields

enumerated below are the reasons to which Ratan and his wife ascribe the low yields, written in the order of their importance -

1. Poor rainfall and inability to save crop due to lack of irrigation.
2. Shortage of money and consequent inability to purchase the motor power to pump the entire irrigation water shortfall.
3. They own a pair of male buffaloes and some cows, goats and sheep but the combined dung generated is not enough to properly manure the entire land to be taken for paddy. There is a preference for using cow dung, as it does not cost money. Rati says apart from *bahal* land he does apply chemical fertilizer to any other field. He says that even there is good rainfall he is rarely able to get sub-optimal yield of not more than 2.5-3 man/ *bigha* and at best 3-4 man/ *bigha* due to this inability to provide adequate compost.
4. Lack of manpower. Only he and his wife are capable of hard labor in his family. His mothers are old and help in operations like transplanting, harvesting to the extent feasible, cooking and fetching water etc. But there is dearth of male members to plough the land in time. He has to depend on hired labor and his resident *baghal* (cow herd) to help with the ploughing. In spite of this they are not able to plough all the land and nor are they able to plough all the land they do plough in time. Thus sowing gets delayed adversely affecting yield.
5. Shortage of money and consequent inability to hire the entire labor required or purchase the required quantities fertilizer/ pesticides. (Shortage of money as a debilitating factor was repeated twice with related two factors water and labor)

Rati grows some vegetables, mustard on land near the Bakar *bandh*. However it is for use at home and small portions he sells in the village markets held nearby. According to him the quantity is not enough to interest the vegetables traders who look for purchase of 20 kg or more each time. Some portions are sold from the village itself the rates are same at the *haat* and the village.

Section 7: Findings - Focus On 5%

In this and subsequent sections the term 5% refers to three types of pits.

- Pits with area representing 5% of the treated plot,
- Pits that were originally 5% and later increased,
- Pits which are recorded on muster books and watershed committee records as 5%

That is the chief point being clarified here is that today even though the actual area of a particular pit in proportion to the treated plot area is much greater than what is dictated by 5% technology they have been studied/ included in this study of 5%.

7.1 Role of food security in adoption of 5% and impact assessment

As per the data of 209 forms, which also includes all 5% pit owners the level of dependency on agriculture as below. However, the survey was not able to directly capture people with more than 12 months food sufficiency. By referring to the paddy sales figures and the type of paddy being sold one can possibly derive this information. People with 12 months sufficiency also stating that the paddy sold is excess of the family's requirement may be assumed to have greater than 12 months food sufficiency (at least 3 people have been so ascertained).

Months →	1 17	2	3	4	5	6	7	8	9	10	11	12
No. of persons	6	10	12	25	21	47	11	20	6	11	2	34
% of people	3 %	5 %	6 %	12 %	10 %	23 %	5 %	10 %	3 %	6 %	1 %	17 %

The above table certainly clarifies one thing that a very small proportion of the population (17%) are able to derive sufficient food from their lands. Even farmers engaging in vegetable crop production can only hope to reduce the gap but probably are not able to bridge it entirely as a main item of consumption paddy has to be purchased for the remaining part of the year entailing a major cash out flow.

Thus when the above information is categorized the food security appears as the following table:

	Proportion of total respondents
Till 3 months	14%
4-6 months	45%
7-9 months	18%
10-12 months	23%

Existing level of food security is important. Need to support with money to pay for effort invested in digging the land may be debated especially where the landowner too is paid for digging pits. But

¹⁷ This does not include people with no land at all (own or leased) and hence no direct dependency on agriculture.

if the land treatment has to be completed in a reasonable period number of people, especially those who are not owners themselves may need to be included.

The pit does not entirely offset cash and survival needs. At most, it generates immediate cash benefits for the people engaged in digging the pits. But the cash generation is not enough to replace the existing assurances and see them through the dry period and the forthcoming agriculture season.

But if yield increase as a consequence of this treatment or when due to an untimely dry spell in a critical period like grain filling stage this helps to assure certain levels of yield then it does increase the food security.

Most of the pits owners' maintain it as it helps to provide 1-2 critical irrigation when rain fails. Thus even without quantitative data to back up the claim one may conclude that 5% is contributing to enhancing food security. However, it may be rightly argued not always 1-2 irrigation alone will be enough to ensure a harvest. 5% helps to offset the effect of untimely rains. But it is not a replacement to rains. Neither was it designed for that situation.

7.2 Paddy sale and assessing efficacy of 5%

As seem in the section on food security most of the households are deficit in paddy. On the basis of the analysis of the data entered, this section is being written. Only few households are reported selling any paddy.

	Curre nt	Last	3 years back	4 year s back	5 year s back
Quantity sold in mon ¹⁸	1.03	81.0	99.27	82.7	98
Number of sellers	3	27	27	27	24

Perhaps the current year figures need some ratiocination. On the surface, it appears the paddy sales have declined sharply. But the sales reported in a particular year are probably not entirely from the current year's produce. Portions from the stored grain in the subsequent months when paddy prices increase or a pressing need arises, rice/ un-husked paddy may still be sold. Yet soon after harvest the propensity is to replenish the depleted cash reserves. Hence perhaps the highest incidence is likely to be immediately on harvest but verification may not be warranted as the sales figures are themselves not important.

At least two grain deficit household reported selling paddy which was not distress sale of grains kept for home consumption but rice brought with them on return from migration and sold to take advantage of price advantages.

Thus any reinforcement in yields due to 5% will not find its way to the market as the household it self will have consumed it. Further sale is not a readily available surrogate variable for assessing impact in such deficit areas with majority grain deficit families.

¹⁸ 37 kilogram to a mon

Relying on baseline data (if available) on productivity and current levels as recorded during process documentation can be the only basis for quantifying the impact. Tracking decline in purchases of grain could be considered but was not included in survey. The disadvantage again will be reliance on memory for gaining a trend of purchases.

7.3 Re-establishing the relevance of irrigation support intervention

The rationale forwarded by PRADAN has already been quoted at the head of this report. Yet in this section we once again ask this question “Is such rain harvesting technique required to improve soil moisture availability for paddy?”

This is a predominantly rain fed area receiving all its precipitation in 4 months. Thus rational set out by PRADAN and quoted in section 1 is relevant consideration for an irrigation source/ supplement intervention as can be seen from the following sections. These points were further investigated.

7.4 Extent of availability of irrigation

As per the subsection on irrigation in the introduction to the study area 15% of the total arable land holding is irrigated land. The distribution is also greatly skewed with only 39.0 % of the farmers owning irrigated lands. Even in case of these irrigated land-owning farmers for 74% of them, this irrigated land constitutes less than 50% of the total landholding of these individuals.

Irrigated land as % of holding	10 %	20 %	30 %	40 %	50 %	60 %	70 %	80 %	90 %	100 %
No. of people	3	7	0	3	1	1	0	1	0	3

Of the four zones of land *bahal* land does not require any irrigation for the main crop of paddy sown coinciding with the monsoons as the topography ensures the run off from uplands accumulate here.

For argument sake even if *bahal* land is treated as equivalent to irrigated land and added to the irrigated land figure (and discounting overlaps in terms of *bahal* land also being the only irrigated land) then % of irrigated land to total land increases to only 27%. Albeit the number of possessors increases significantly as nearly 66% possess some at least a small parcel of *bahal* land. Yet, it’s not correct to treat *bahal* as equivalent to irrigated land because if rains fail the crop cannot be saved if it’s solely dependent on rains. The paddy in the *bahal* land would at most be able to survive for a longer period.

Two days before Kali *puja*, a local resident in a gross inebriated condition had accosted me on the roads in the early afternoons and repeated several times over the following:

'Chupi chupi jal chayi
Prati haate kaaj chayi
Khara niye raj neeti
Chalchhe, chalbe'.

The above is probably a much repeated political slogan which roughly translates as the following –

'Need some inches deep/ adequate water in the fields,
Every hand has to have work
The politics of drought
Has been going on, will be going on'

Due to its rhythmic lines in the original Bangla, it has remained etched in researchers memory. Today away from the area, the significance and pre-occupation with water is doubly apparent. Indian agriculture is primarily dependent on water. But outside of Western India the role and importance of water has never been so oft repeated, in her presence, as during the three months stay in Huchukdih. In most other areas of Bengal, that they are familiar with people are at least able to harvest one rain fed paddy crop and in fact are plagued by problems of excess water like floods. Here even one crop has been difficult over the past few years.

7.5 Land distribution

In the table below percentage of total persons owning each category indicates what percent of the total people surveyed own each category of land. While admitting if the entire data entry was done the figures would change to an extent yet the indicators are clear. Almost every one owns *Baid* lands and marginally lesser number own *tarn* lands. But ownership of *kanali* and *bahal* lands is way less. Also, *kanali* and *bahal* lands together constitute only 32% of the total land area while *baid* lands alone constitute 41%.

Bahal lands do not require moisture conservation techniques as water tends to collect in these plots. Thus focusing on *baid* land has the greatest potential of impacting factors like enhancing food security, poverty reduction etc with the greatest outreach.

		<i>Tarn</i> (upland)	<i>Baid</i> (mid upland)	<i>Kanali</i> (mid low land)	<i>Bahal</i> (lowland)
A	Land area in <i>bigha</i>	506	809	340	300
B	Each category as proportion of total	26%	41%	17%	15%
C	Owners	198	213	157	140
D	% of total persons owning each category	92%	99%	73%	65%

7.6 Total number of 5% - village wise

As on December 2000 the total number of pits was about 180. The ascertained village wise distribution is given below:

Resident of village	No. of 5%	Approximate no of households
Tentlo (Majerdi)	54	150
Tentlo (Kusum Tikri)	15	27
Hesladih	12	38
Huchukdih	47	27
Kandoya	9	Not known. Village is outside study area. These are people with lands in Huchukdih

Choto Mukuru	19	40 + 3 of village Dumardih
Tasarbaki	3	125

7.7 Age of pits

Majority of the pits were implemented in the period 1996 to 1998. Since the commencement of the Watershed programme the implementation of 5% has considerably slowed down. The two possible reasons are no suitable land left for treatment and what is being implemented are the gap filling pits. The other possibility is focus on other water bodies in preference to 5% pits. Perhaps once a person is benefited through a particular water body like *hapa*, schemes for implementation of 5% on his land are not considered. This can be better clarified by IWMI point person who was interacting with other stakeholder / or on basis of the reasons presented in his reports. Also a review of the watershed plan and the structures proposed for the area may be enlightening as this acts as master plan. From the interaction with the people it appears land suitable for 5% is still available. Below the year of implementation is provided based on the recall of the members.

Year	No. of 5%
1994	0
1995	9
1996	43
1997	45
1998	39
1999	5
2000	2

At least on the first instance from the petering of implementation evident above it appears the particular watershed committee members have not adopted the ideas of 5%. This information on year and the financier prompted greater delving into the history of implementation in the area.

7.8 Reasons for adoption/ acquiescence

Reasons for adoption acquiescence were

- Land fell in treated area
- Hoped for some benefits (of what nature unspecified)
- Attracted to the possibility of having own structure to store water
- Crops were dying due to inability to provide 1-2 irrigation in the critical stage. The prospect of saving did seem attractive.
- Concepts of prospective utility seeded in their mind. They felt they would be able to increase paddy yield.
- Compelled by others – to ensure treatment of entire patch
- In the short run at least some one was willing to pay for digging earth, which was good enough reason to take it up.

The payment of wage for digging - can it be treated as an incentive to try/ experiment with the new technology. This was going to be at its worse an experiment for which they suffered no loss and in addition got compensated for digging pits on ones own land.

Security of the tenure has had no special role to play in the adoption of the pits. A clear causality after eliminating the interplay of factors is difficult if not impossible. Just having a yes no method of tracking adoption could lead to considerable loss of information. Mere possession as on date of contact during study is not equivalent to adoption.

Perhaps the motivation of at least some may not depend merely on quantifiable economic costs and benefits. At least in the case of one the eagerness to adopt was perhaps the prestige derived from regular visits from the implementing team. With the decrease in visits the enchantment with the technology has decreased

Lalmohan's case

He was urged to dig at least 2 pits. He was told he would be paid @ Rs. 40/ *chouka* after deducting for owners contribution. On one plot of land about 10 *katta* in size he was told to dig a pit of 10'x10'x5'. He refused to dig 2 pits, as significant proportion of the land would be thus wasted.

He decided to start on the digging of one on the 10 *katta* plot but gave up after digging till a depth of 1.5 feet. He started because every one else in his vicinity was doing and confesses the money for digging seemed attractive though apparently not the 5% concept itself. His agricultural land is inadequate and needs to migrate for 5-6 months a year. He decided to migrate again that year with his family in preference to digging the soil and spoiling his own lands.

Any regrets today for not having dug a 5%? No as the money paid for digging would not have seen him through that year and would have affected long-standing relations with *bhatta* owner. And digging a 5% would only have further limited his arable land and any way the 5% is not useful enough to justify that destruction.

(However in other interviews it became apparent that he was using water from an adjoining 5% pit for his own lands)

Hardly any instances of opposition to pits at the time of implementation came to the fore during the study.

This is different from disenchantment after adoption.

7.9 Variable affecting adoption

In fact this section is related to the previous one. The following are the necessary conditions

- Plot characteristics
- Size of plot – plots less than 5 decimal are excluded or one pit built in proportion to the sum of such small plots
- Slope of land – not very steep slope generally less than 5% (preferred being less than 3%).
- Relative location of the plot – this was more the rational for treating all plot in an area to better spread the benefits.
- Zone of land – owners of *baid* land alone were targeted for the implementation
- Political affiliation
- Staying power – two people at least aborted 5% digging due to migration demands.

Size of family labor force was expected to affect adoption but actually does not as where more than one pits is being dug on one owners land and his family labor does not suffice other residents of the village take up the work.

For additional investments for alteration, deepening of pits some of the factors appear to be

- Closeness to the representative local Water Shed Board, which is a euphemism for standing in political 'party'. Recognition by others of the diligence as Communist Party members appears to be the most important criteria
- Benefits already received like already has a *hapa* built from *panchayat* funds, it could be criteria for less preference
- Quality of the existing pit *i.e.* proof of better water retention
- Access to the benefits by greater numbers is considered but not always.
- Availability of land and willingness to sacrifice its productivity for making water harvesting structures or enlargement of an existing one is an important consideration.

7.10 Factors conditioning success or failure

Various factors that appear to condition the success or failure of this particular technological innovations

- Soil quality or more importantly its water holding capacity
- Soil zone and within a zone relative position (upper or lower *baid*)
- Relative position of individual pit within zone
- Seepage line (*jharna*) in relation to the depth

Handling of the excavated soil is a factor according to PRADAN that has contributed to returns being less than optimal. When a pit is dug, the soil as per design has to be used in strengthening the bunds. Several of these plots already have certain level of bunds. So, the excavated earth is used to strengthen it or make new bund. But some farmers used the initial better soil obtained after digging first 6-12 inches for strengthening bunds and with no other place to put the soil they have spread on the entire plot. Soil in the deeper layers has a lot of *murum* (earth that hardens on contact with air and turns into pebbles) affected soil productivity greatly. Such farmer could only at best hope for poor returns on paddy taken with varieties like Bankura 1.

Section 8: Learning and Implications for replication

We deliberately make a distinction between testers vs. adopters. Expanded level of use or increased number of pits especially at ones own expense over a number of years is regarded (by researcher) as one of the proofs of adoption.

A question being probed is 'that need for 5% was instilled (made to realise its potential utility) to that extent was it demand driven or reward driven (reward for adopting/ testing it)?'

The fact of prior expansion or willingness to expand in future is used as surrogate for adoption in this case as no one has built 5% pits at own cost after implementation. (There are 2 cases, prior to PRADAN's II (included as phase IV in implementation history) implementation phase at Huchukdih of which one was later co-opted into 5%¹⁹).

The pits that are being regularly de-silted (dealt in referenced section) could be treated as adopters as they are investing effort in maintaining its utility. A question was included in survey on instances of deepening of pits at own cost/ labour. Five such instances were reported.

Certain surrogates for adoption have been used. One question asked of both possessors and non-possessors was 'Is there any need for 5% pit'. 87.1 % of possessors said yes and only 12.4% said no.

8.1 5% pit depth, its range and frequency

A frequency table of the depth is presented below:

Depth	No. of pits
< 5	0
5 feet	150
6 feet	13
7 feet	3
8 feet	0
9 feet	1
10 feet	1
>10 feet	0

Village wise the median value of depth of 5% in each case is 5 feet as pits of this dimension predominate. The 5% pits range in depth from 5 feet to as deep as 10 feet. Generally, most of the pits are 5 feet in depth. Pits that have been specially deepened through additional finances are deeper than the more frequent 5 to 6 feet depth.

¹⁹ refers to Upendra Mahato pit in *bahal* and co-option refers to Ram Krishna Mahato 25' deep pit. for money at par with 5% was paid

Number of pits with reported period of water retention greater than 4 months in relation to depth of pit							
Depth	4 month s	5 month s	6 month s	7 month s	8 month s	9 month s	10 months
4 feet	-	-	-	-	-	1	-
5 feet	13	7	-	1	-	5	-
6 feet	2	1	1	-	1	-	-
7 feet	-	-	1	-	1	-	-
8 feet							
9 feet	-	-	-	-	-	1	-
10 feet	Only 3 month s	--	-	-	-	-	-

The majority of pits with five feet depth retain water for 3 months as will be seen in the section on depth. The table above demonstrates one fact that contrary to popular perceptions deeper pits do not automatically appear to be retaining water for longer period. This is surprising as several pits were deepened after a few years with additional funds from *panchayat*. The reason commonly forwarded for deepening was longer retention. Thus it was assumed that investments would have been made in pits with greater potential for retention. But the reality appears different unless there has been under-reporting of retention period in survey - however there do not appear to be any reason for doing the same.

8.2 Perception regarding depth of 5%

Nearly every one considers the 5 feet implemented by PRADAN as inadequate depth. The generally desired depth is between 7-10 feet. People feel this would ensure better water retention. In fact the pits financed by *panchayat* are 6 feet deep. However they are at a loss when posed the question that several larger *hapa*, which are 10- 15 feet in depth do not retain water.

Those who do not consider deep as better gave the following reason

Water extraction by existing methods (using swing basket) will be difficult
Pit will have greater propensity to cave in

While the second point on caving in may need greater investigation, the first does not pose any problem at all.

8.3 Instances of variation of dimension

8.3.1 At time of implementation

All pit owners received payment for the effort invested in digging the pits. A portion (10%) of the payment was reduced towards owner's contribution. In addition to this, 6 people report varying dimensions at implementation chiefly deepening with own labor (apart from that which was required as owners contribution).

8.3.2 'Merged pits' at time of implementation

14 pit owners' state that at time of implementation instead of implementing several pits in different plots as determined by plot measurement they consolidated the total area and dug one large merged pit. This was done to save arable land in each plot from getting destroyed.

5%, mergers and Sunil

Sunil owns about 97 decimals (nearly 3 *bigha*) of land. He has only one 5% pit visible to the eye. Actually given its dimension of 60' x 50' x 6' it is much larger than a 'normal' 5%. But on paper he was to have eight 5%. No, this is not any example of unethical alteration of records post planning. In plot no. 291 on his one-acre of land there are 8 smaller plots and he was suggested to make at least 8 5% pits. However he preferred to consolidate the area of all the proposed pits and build one larger pit in one area. The place selected by him is at a higher elevation and the other proposed plots lie lower to it. The land selected for the pit is *baid* land with almost *tarn* like quality. Given this reality he thought it was preferable to 'destroy' one poor quality plot by converting into water reservoir than loose arable area in each of the other plots which had relatively better soil. Also he felt as the plots were along a slope each would benefit from the recharge of subsurface flow line from the 5% at the head and thus retaining most of the sub-surface flow within his own land.

8.4 After conclusion of implementation within 2-3 years

Only 10 pit owners report alteration within 2-3 years of implementation. This generally involves broadening and deepening against additional funds made available by the *panchayat*. The implementation was frequently on the funds provided by *panchayat* for making the pits wider. The question included '2-3 years' to indicate changes after implementation. Its hoped however occasions of changes even 3-5 years have not got excluded because of the close-ended question.

In a subsequent research - increment in the benefits could be quantified for such bigger pits to derive a relation between dimension and benefit in terms of assured irrigation for paddy and effect on second crop in terms of comparable unit area.

8.5 Implementation agency wise clustering of 5% pit

The total number of pits implemented by PRADAN and *panchayat* is over 171 (some forms do not mention financier). However the financing agency has not been cross verified from any source. The response has been entirely relied upon. The variation in the two is more in terms of depth and is covered in a separate section devoted to pit depth.

Financing agency ²⁰	No. of pits
PRADAN	109
<i>Panchayat</i>	62

8.6 Variation in style across implementation agencies

According to the survey in Tentlo, the pits financed by *panchayat* in later years (1999) are 6 feet in depth while the others are 5 feet in depth. PRADAN funded pits are 5' deep only, unless deepened as described below.

²⁰ Some forms do not have financiers name

Also, *panchayat* has provided additional funds to convert an existing 5% (financed whether by it or PRADAN) to a larger *hapa* with a capacity to irrigate more land. But this has mainly been done for people with more land to spare for such expansion. PRADAN did not do such funding.

Criteria for additional funds being provided for further changing the existing 5% is not clear but has been dealt with in a preceding section.

In other areas, (other than the study area) there is a distinct difference in implementation by PRADAN and by *panchayat*. PRADAN treats an entire patch but *panchayat* regards 5% as just one component of water shed development programme included on recommendation from the West Bengal government. Thus, the concept of treating an entire patch has not received equal weightage. It has been used more as a low cost mean to treat the land owned by a large number of people especially those not benefited by schemes for construction of *hapa* etc

8.7 Variants to the 5% model

The chief variants located during the study are:

- Digging of pits in *bahal* land, which was not originally intended for 5%. At least **three** instances were noted of which one predates the actual commencement of 5% technique in the project area.
- 14 respondents said that they had executed a merged 5% - this has been dealt earlier.
- Increasing the depth of 5%. This has been done:
 1. At time of implementation itself when the owner may have contributed additional labour or have hired extra hands at ones own cost to dig a deeper 5%.
 2. When a particular pit which retains water for longer duration and has proved to be useful the owner invests time and effort in deepening it.
 3. Or in the alternate invest money and effort in maintaining the original depth of a useful pit in summer months.
 4. Getting the *panchayat* to invest further to deepen and broaden a 5% pit which retains water for longer duration and therefore has potential for being better exploited if further deepened and broadened. As stated elsewhere there are some pits originally financed by PRADAN, which were deepened at *Panchayat's* expense.
- By widening pits. The incidence of widening alone is much lesser than deepening. Only one pit belonging to Phalguni Singh Sardar's father has been exclusively widened though the owner wanted to deepen. In most cases, widening was done in conjunction with deepening when land holding of the owner of the 5% pit was large or he had un-arable wastelands close by.

Biru owns five 5% pits, which were financed by PRADAN. They were all dug in 1996 -1997. One of the pits on plot number 2517 was deepened with additional Rs. 9000/- obtained from *Panchayat*. If deepened this pit had the potential to retain water for a longer period. However, in spite of wanting to deepen the pit the money was spent in widening the existing pit maintaining the existing 5' depth. According to Phalguni the reason was '*Panchayat* typically takes up such work in lean agricultural months. 1998 was first of the recent spell of bad year. That year food reserves were low and people were desperate for work. When work was taken up on their pit several people wanted to work. If the pit was to be deepened due to less available area only a few people could have been involved in digging and excavation work. Since more people got involved the digging and excavation the pit was spatially increased. There was no money left for its deepening.

Incidence of deepening and widening of 5% pits are that of Sagar and Rasbehari both party stalwarts. To be fair Rasbehari is also making good use of the pit doing an intensive crop of cauliflower after paddy as a cash crop.

8.8 Manu's²¹ '*Panchta*' (Five) cultivation"

8.8.1 Paddy

This is separately attempted in subsequent sections but nothing conclusive can be stated on the strength of interactions with people or on putting entire reliance on data recall.

8.8.2 Second crop

Owners of only 27 pits state they do a second crop on the land with 5%. Typically the second crops is potato (maximum) and to a lesser extent wheat and mustard. Some also take a crop of cauliflower and/ or tomato and/ or aubergine. While potatoes are frequently for home consumption, the vegetables are for the markets.

This year other than one or two instance of mustard cultivation, 2nd crop raised is *not* using residual moisture. The water collected in the pit is being used to irrigate the *rabi* crop.

Current year (December 2000) details of some people with second crop is given in the table below

²¹ See case study of Manu Singh Sardar who discourses on '*Panchta chas*'

Sitanath	Chotomukuru	No
Asharai	Chotomukuru (Sitanath's information)	Yes. But not on strength of 5%. Some 21 families (he and his extended clan that has separated out as independent families) have sown wheat around what is called Ashari's <i>hapa</i>
Others	Choto Mukuru	No
Sachi	Hesladih	Yes. He has sown mustard in 1/4 th area of one plot containing 5%. They had to reduce the sown area, as the water available would not be adequate if the entire plot were sown. He has been able to provide the standing crop with 3 irrigations but will not manage a fourth irrigation. He is thus unsure of the yield, if any that he will be able to harvest.
Bhunwar	Huchukdih resident but land is in watershed 2 i.e. not exactly in study watershed	Has sown wheat in plots with 5% but to harvest a yield will have to depend on the <i>pukur</i> close to Hesladih turning. In his case the sowing and first irrigation has been done from the water from the 5%. Infact the decision to sow was the proximity to the <i>hapa</i> . But about 7-8 others have also sown wheat in the same patch. But for providing the fourth irrigation necessary to harvest the wheat all depend on the same <i>hapa</i> . Seeing the status of the <i>hapa</i> with water line receded and barely 2 feet water it is doubtful whether all will be able to draw two irrigation.
Mansaram	Hesladih	No water in pits
Another	Hesladih	Has sown wheat and vegetables
Others	Hesladih	No
Phalguni	Hucukdih	Not on land with 5%. Has sown but relying on water in well
Anil	Hucukdih	

One person in Tentlo reports growing a second crop on land with 5% relying entirely on its water but that land is *kanali* not *baid*.

Interestingly enough two persons with pits in *bahal* land say the pit is good for retention but not for *rabi* crop of wheat or mustard as the land does not dry adequately for it. However a late crops of vegetables is feasible on such land.

8.8.3 Incidence of bund plantation done at time of implementation

55 pit owners (representing 57.2%) have trees on bunds. Some 5 farmers reported having done the bund plantation that they own before the 5% implementers initiated such work. This also means that during implementation they either did not do any plantation or did not take care of it.

8.8.4 Sabai (*Eulaliopsis pinnata*) grass

This is not visible in any village today barring two pit owners in Huchukdih²². That it could be a programme intervention was realized a little late. It was not specifically asked in survey, as it did

²² It has been implemented only in one village ie Huchukdih

not figure in discussion excepting one interview. It has in fact been implemented by PRADAN in one village - Huchukdih. *Sabai* is not very readily seen on bunds. However, in Huchukdih/Hesladih, it was seen as the bunds of only one farmer and he has actually still been selling ropes made from this grass. In most other areas, while the grass was planted at some point of time nothing of it remains today for want of care.

8.8.5 Incidence of pisciculture

It was initially assumed that pits that retained water for longer period would be used for fish rearing. It is a fact that as reported earlier people who are able to use the water for a second crop generally also go in for pisciculture.

In the study area, pisciculture is being practiced in 32 pits belonging to as many owners. For those 27 pits that information was available, 8 were doing fish cultivation where water retention was between 1-2 months only. This was not really fish rearing but only fish harboring of ones that come with the water when the near by river is in spate. The remaining 17 did fish cultivation in pits with water retention between 3-9 months. Therefore, it's not entirely hinged on the period of water retention. Where the water retention was only 1-2 month, fish harvest amounted to 2-3 kilogram (kg) but with water being retained for longer period, fish harvest was only as high as 8-10 kgs. Generally, special varieties of fish fries are not introduced. Local fishes that abound in rice fields in rainy season find their way into the pits and remain there. Only one person said he introduced *rohu* / *catla* in his 5% 'so that even if size is small they can at least enjoy some good fish at home'.

It appears more people can be encouraged to take up fish culture.

8.8.6 Perceived benefits/ impact

While this section documents people's perception yet for a complete picture its recommended the inset boxes in the section on 'implementation history' should have at least been read regarding the changes observed. Also, it should be kept in mind that in the year of survey paddy crop failed entirely in large parts of Barabazar, Manbazar area of Purulia district.

Questions trying to gauge people's perception of the impact elicited interesting responses. People tended to make a distinction in what they regarded as impact. As gathered during interviews, it seemed an easily perceptible up-front impact was valued rather than enhanced security of yield. Also, the demand for water is so high that what is available from the 5% is viewed as pittance. The pit cannot satiate their need. Perhaps the availability of water in the pit it self has fuelled this demand.

8.9 Impact on livelihood

This is probably the acid test for any livelihood intervention. At the onset it should be clarified that 5% probably does not create livelihoods it strengthens existing ones. It is an intervention focused on *arable baid* lands, which was any way, being cultivated. The relevant question is not creation of new livelihoods but reinforcement of existing ones and the quality of this reinforcement. Assuming it helps a shift to a better yielding variety or a more intensive cropping then what is the consequent increase in return to the farmer.

Extensive yield data was collected yet impact of intervention on livelihood and food security could not be captured with any certainty. No direct quantitative impacts could be identified as ascribable to 5% as no difference can be established. Admittedly relying on people's perception is not the best method to study impacts given the inability to eliminate the interplay of various factors like variety, inter-culture operations, fertilizer, time of sowing, method of sowing etc. It was felt that these random noise factors should be eliminated to assess the real impacts. Please see section on 'future scope for research' for suggestions on methods to study the same.

In discussions (probably given the rainfall distribution and land availability) impact of 5% on changes in migration pattern was not found to be significant as a determinant of impact.

8.10 Acknowledged benefits

Some of the benefits described are

- 5% enables timely sowing of paddy when a heavy shower does not occur.
- Allows the farmer to give 1-2 life saving irrigations in water stress period
- Farmers in Choto Mukuru especially point to the benefit of privately owned trees on bunds
- Provides some water for the second crop in case of few
- Water source is under ones own control
- Water can be extracted by no cost local means

Panu Chitrakar's view

Panu admits that the 5% enables timely transplantation provided rains have already occurred and the land is already wet (*i.e.* the pit water is not sufficient to puddle a dry land). Also the pits have allowed him to ensure 1 or 2 timely irrigation to the standing crop.

At least one person with seven pits has converted one into a cow dung composting pit. Such a case was reported for two others too. This gives rise to question whether 6-7 pits are one to many for one farmer. Unless the water retention period is long they may disenchant the farmer. Indraneel narrates a case where the farmer abandoned the pit and reduced the plot level to the floor level of the erstwhile pit.

8.10.1 Access to benefits across gender lines

Women's perception closely tags that of the men. 100% of the women (possessor and non-possessors) contacted during the survey and direct interactions concede usefulness of 5%

A woman who is part of her family benefits from 5% if the water collected in it helps to protect the family's crops in situations of dry spell. However, the man retains money obtained from sale of the second crop is like vegetable or even paddy. A widow or separated woman derives benefit only if she gets a share of the total produce of her family's land.

Three instances of woman headed households are known.

8.10.2 Variety shifts

Some of the local varieties traditionally sown in the mid uplands are *Asanlowa*, *Thupisal*, *Bhutmudi*, *Jhulur* etc. Of these *Asanlowa* and *Thupisal* are quite popular even today. The improved varieties sown in the mid-upland areas with similar agro-climatic situations are *Lalat*, *Lalswarna* and *Bankura 1*. These have been especially developed for these mid-uplands by various research stations/ institutes Barring *Lalswarna* others are typically shorter duration varieties requiring about 90 days for growth period with an yield capacity of 4 tons per hectare. *Lalswarna* is a longer duration variety of 150 days.

In case of 47 pits, which possess 5%, respondents report a variety shift from *desi* to improved variety. Interestingly enough barring 7 instances of 2 months water availability this shift is in plots with reported water retention of 3-9 months.

If the shift has been in the same category of paddy – that is shift from local *baid* varieties to improved *baid* varieties the reason for this shift cannot always be directly ascribed to 5% and may need further investigation. But if the shift has been from a shorter duration variety like *Thupisal* to a longer duration variety like *Lalswarna* (150 days), IR 36 (longer duration for *bahal* lands) and *Kerela* (longer than normal improved *baid* paddy but shorter duration than *Lalswarna* and sown in *Kanali*) contribution of the existence of this pit in the decision making is important. Of this 47, 14 have moved to longer duration variety like *Lalswarna* and *Lalat*. Two are also sowing IR-36 which in this area meant for *bahal* lands. Additional 5 have maintained sowing of a longer duration variety and have been excluded.

Some say it was 2-3 years back that newer *baid* varieties like *Lalat*, *Lalswarna* have been available and so have been adopted. It has been difficult to identify and separate the influence of various factors. Like where shift in variety is detected, it is not entirely due to availability of 5% but due to timing of availability of new seeds.

There is also a reverse shift evident in the last two years that is reversion to traditional varieties in case of 6 plots with pits. The reason forwarded are unreliable monsoons / losing crops last year. These 6 are also probably cases of shift only bad monsoons and fixed investment cost in improved varieties they have presently abandoned improved varieties.

8.10.3 Incidences of sharing

There is a small community of farmers who may not own any pits but are able to draw water from the 5% pits of other farmers. Thus non- possessor is not synonymous to non-user. Probably the giver feels that he too may need to tap others resources under crisis condition and therefore allows others to use their resource under similar condition

8.10.4 Non-possessors reporting

Of the forms analyzed and where this information is provided 5 says they use pits of other people. But this could increase with more forms being analyzed especially in the Majherdih area of Tentlo.

8.11.5 Possessors reporting

20 pit owners say that others use their pit for irrigating their crop after duly seeking their permission.

Sharing and its considerations

On what basis does a farmer select the area for a second crop? When one farmer draws water from others pits, what prevents the others from doing the same the next year? Whose claim will remain? To know this I asked Rati why he does not take potato in the plot from which Anil draws water and then he could utilise the water himself and also draw on others 5%

Rati said in a good year he takes potato on two plots both of which are suitable for it. One of the suitable plots was the one Anil obtained water this year. But as the water was less and he was not sure that he could really harvest potato in that plot he preferred to focus on the other plot, which was closer to a hapa, from which he could provide timely irrigations. If the water of his 5% dried up in the former area irrigating the crop would have required intense effort. Besides Anil has only this land where he can take potato. No other land is suitable for the same. As he had an alternative he moved out so that Anil could try his luck.

Anil says that as earlier too he has been able to harvest potato from that plot he persists with the practice of taking potato in that plot.

8.11 Role of caste and political affiliation in access

8.11.1 Caste

Caste has not directly been a factor in access and distribution in case of *panchayat*. In case of PRADAN during its direct implementation phase in Huchukdih, the decision to select and subsequently to focus on the area for further development was based, amongst others on the consideration of caste. Scheduled tribals dominate this tract. Overall, in the area as Mahatos are numerically dominate, they have got most benefits. Within a patch, PRADAN too advocated treatment of all lands that fell in a particular patch.

This approach to land treatment however cannot ensure that only the poorest and the most vulnerable sections of the population are only selectively reached or at least reached first. So, if this is an important criterion then a wealth ranking of the people in each of the patches likely to be benefited has to be done. Alternatively, as per approach adopted by PRADAN, it enters only such areas where the general poverty level is higher than that of other areas.

8.11.2 Political affiliations

Political leaning has probably been a consideration in leaving out lands of non-party supporters. The fact that a section of 8-10 houses along the road to Tentlo were extremely polite but declined any knowledge of 5% and suggested researcher talk to 'Tarani and others' hinted at this possibility. This belief got further confirmed during informal interactions with the data gatherers during repeat training.

In a bid to capture extent of exclusion due to political reasons questions like 'did you want a 5%?' and 'reasons why it was not done even though you wanted 5%?' was included for all non-possessors. It had been hoped that apart from regular reasons like area not included in the treated *baid* etc other factors would be highlighted. But as per the 215 forms entered and analysed till date this hope has been belied (data has not yielded any admissions from respondent or any comment

from enumerator on exclusion on grounds of politics). Perhaps the fact that the data gatherers themselves were workers of the dominant party, may have been an influencing factor but this can not be established.

While PRADAN did not follow any political considerations in its implementation in 1996 – 1997, the *Panchayat* water shed work in 5% and others was implemented strictly on political party (as per information provided by schedule enumerators) loyalty lines. The *panchayat* and the watershed committee have only communist (CPIM) cadre as members. Thus, other people affiliated to Congress/ Trinamul were (and still are) refused even when they desired and their land fell in the land being treated. However, the only incidence of departure from this practice appears to be in Choto Mukuru where non-CPIM members including those hailing from another village with lands in the area were included in the implementation. The resident says that they were no question of eliminating them as they followed all instructions to the letter - like contributing 2% of the labour before their area was considered for funding by *panchayat*.

Further, according to two residents Phalguni and Mansa it's only from the past two year and half or so that PRADAN has started giving weightage to the local representatives of the communist parties. During the implementation phase, here the situation was not the same. PRADAN's sole focus then was on treating land belonging primarily to the poor irrespective of the person's political affiliation so that general moisture regime improves. Today in most of the areas in its area of operation in Purulia, PRADAN works with and through the *panchayat* supporting the latter's work. This perhaps has necessitated greater involvement with the local political parties and at least token obeisance to them political leaders²³.

All data gatherers are members of the local communist party. The LCS in association with party representative from each village had handpicked them. Thus, any inhibition in respondent answering the enumerators' dues to difference in party membership is in fact further heightened.

8.11.3 Details of extraction of water

Eleven pit owners report they generally need to extract the entire water to irrigate the land while 50 say generally extracting part of the water suffices.

Number of times water is drawn/ year

This following deals with number of times people are able to extract water after which the quantity declines to level below economic use or the pit dries up entirely.

Drawn/ year	No of pits	% of pits ²⁴
Once	34	29%
Twice	75	64%
Thrice	5	4%
Four times	3	3%
> Four time	1	1%

²³ accepted as the leading reason by PRADAN too
²⁴ It's a % of the pits where this information was provided

Thus a majority of the pits are not useful beyond the *kharif* paddy season if the water has to be used for paddy. To an extent if rains are timely then pits from which water can be drawn twice or thrice for irrigating the respective plot would have water saved up but at best only an irrigation can be provided to the ensuing second crop provided water is retained long enough.

Perhaps to be able to relate better the period of water retention should also be referred to.

Number of hours for which water is extracted each time

Number of hours required would of course depend on the extent of the need and the plot area to be irrigated. If human power has to be relied upon, as is the case the number of hours required would be greater. But may be important to assess usability of water for second crop.

Hours/ drawl	No of pits	% of pits ²⁵
Once	27	22%
Twice	59	48%
Thrice	16	13%
Four times	13	10%
Five time	9	7%

According to women with a swing basket two people are able to irrigate about 10 *katta* of land in 2-3 hours but when a *bigha* has to be irrigated 4-6 hours may be required. This is especially so if the people drawing water have also to ensure the water is properly distributed across the fields. In fact they even disputed the time stated by their husbands and said they were probably telling you the time required by using a pump, but the men themselves clarified later it was time using *dabka*. Interestingly men have typically reported 1-2 hours as being adequate to irrigate most of the plot generally. While assuming that an already wet plot requires less water the fact remains that the men seem to have 'under-reported' the time required for extracting water even where entire water is extracted (as has been the case in the last 2-3 years). In fact in some of the later interactions it was pointedly asked whether 1-2 hours was not too less and generally men denied it.

Why are women more aware of the time? Are women more conscious of the time devoted to this work that constrains time available for other work with a pre-fixed periodicity and time demand (e.g. cooking)? Or are men trying to under report the water potential of a pit? Intriguing but cannot say.

8.12 Comparison of with and without 5%

Difficult to say anything at all as all other variables like fertiliser application, maintenance, sowing time, variety etc are not held constant.

8.12.1 Extent and incidence of maintenance

²⁵ It's a % of the pits where this information was provided

General maintenance

Practice of maintaining pits is practically non-existent for most pits. Only if the pit retains water for longer duration making feasible a *rabi* crop or on '*boro*' paddy is it regularly dug/ de-silted both to deepen as also to maintain its water holding capacity.

Only 1 pit owner reports carrying out any maintenance of the pits when de-silting or *panchayat* funded deepening is excluded from its purview.

Other factors like security of the tenure has had no special role to play in enhancing the maintenance of the pits. Even those who report that the pits are caving in have done apparently little to slow the process.

De-silting

Only 21 pits out of the total pits have even been de-silted. Of these 4 do de-silting each year, 5 say they de-silt once in a while and 4 admit to doing it at least once. In case of the other 8 details are not known.

Its apparent the extent of de-silting is very low. Probably the sense of ownership is not strong enough to justify own effort in maintaining it.

The water retention of the pits that have been de-silted at least once is reproduced below:

Period of water retention in months	2	3	4	5	6
Number of cases of de-silting	2	1 0	4	1	3

Generally the pits that are being de-silted retain water equal to or more than 3 months barring only two pits which have been reported as retaining water only for 2 months yet is being de-silted. Was the actual retention more and was wrongly reported. Apparently, the pit should have 'proven' its worth to merit any maintenance. But not all pits with retention 4 months and more have been de-silted. Probably therefore personal drive may be an additional factor.

Generally 2-3 days with 5 working hours each are invested to de-silt pits.

Location in land zone

PRADAN advocates construction of pits in the mid-uplands (*baid*). *Panchayat* too has advocated making of 5% in such mid uplands (or *baid*) lands. Therefore, as the funds came from these sources the pits have been made mainly in *baid*.

On the basis of the survey, the following depicts the land zone wise location

Land zone	Number of pits	%
Tarn (upland)	2	1%
Baid (mid upland)	136	96%

Kanali (mid lowland)	3	2%
Bahal (lowland)	0 ²⁶	0%

As seen above some 3 pits financed by PRADAN or *panchayat* have been made in mid lowlands when such land fell in the treated patch.

But as the design and location of pits is 'given' this is probably not a useful variable for studying *i.e.* the beneficiary does not decide the location of the pit. This information at most could be used to see whether the *extent of yield increase* in % terms is greater in *kanali* (than in *baid*) in main paddy. Its likely that in case of second crop the difference in pits in *baid* and *bahal* will be more pronounced if the issue of crop protection is not the limiting factor to cultivation in *kanali* in winter.

Perception on location of pit in land zone

In the survey both possessors and non-possessors were asked where pits should be made. Had experience taught some thing different?

Almost all non-possessors say pits should be made in mid uplands (*baid*). Most possessors echo this as well (in spite of all the negative stand in interviews, '5% ought not be *on baid*' does not appear to be widely accepted idea). However some residents who have made pits in other lands namely mid lowlands to lowlands hold these as better pits.

Land zone	No. of person	% of respondent (who are also possessors)
<i>Tarn</i>	6	See note
<i>Baid</i>	88	93%
<i>Kanali</i>	8	7% See note
<i>Bahal</i>	0	

Note: People who have said *tarn* have actually said pits should be made in *tarn* and *baid* lands. In case of *kanali* one person has said pits should be made in *kanali* and *baid* lands and accordingly the % has been reduced downwards

In direct interaction, at least 4 people advocated 5% pits should be made in *bahal* (lowest) land. (That it would not be 5% but a seepage well etc is covered elsewhere) As alleged by the LCS Tarani (see case in appendix), those who have advocated other lands be used for digging 5% themselves are members of the privileged (relatively speaking) land owning class possessing low land of these nature and can think of improving the return from agriculture.

Location of 5% within a plot

Long back, when the concept was being developed in the field area of an NGO Sevabrata, PRADAN was not particular on the location of the pit in the plot. But at that time the farmers did tell that the pit should be located at the head of the plot at its highest point with an expanse of the pit owner's field lying along the pits seepage line. This would ensure that the moisture generated by

²⁶ I know of 3 pits in *bahal*, through interactions – 1 each belonging to Ratikanta (but he calls its called *kanali* with *bahal* nature whatever it means and funded by PRADAN, Upendra of Tentlo who made it at own cost, and another of Padma Lochan Mahato

seepage from the pit benefits the owner most. Secondly, in Sevabrata area it was found locating pit anywhere else in the plot at times results in its excessive damage and caving in.

At that time, PRADAN may not have appreciated its relevance but having learnt, subsequently PRADAN became particular that the pit should be made at the headland of the plot.

To understand this and other dis-satisfaction with the location of the pit a question was asked whether they are happy with its location. Generally, most of the possessors (85% of those whose response is available) have responded in the affirmative. Out of the six who have differed, two said they feel today the pit should be lower and the remaining 4 said pits should be higher. Only one person rues the fact that water collects in his pit first and hence does not naturally spread on the plot surface thus natural regeneration of plot by the layer of silt has reduced.

Plot size per 5% pit

This is included more as a trivia. Plot sizes in other areas can be larger/ smaller depending on the land availability of each participant. But just in case some one needs to know what are the plots sizes being treated in India.

Minimum	.12 <i>bigha</i>
Maximum	10-12 <i>bigha</i>
Median	1 <i>bigha</i>
Mode	1 <i>bigha</i>
Average	1.39 <i>bigha</i>

However the possibility of one treated plot with 5% being as large as 12 bigha needs to be verified to ensure this is not data entry or data recording error.

Period of water retention

Majority of the pits retain water between 3-4 months only and this become significant when seen in relation to depth (covered earlier).

Months retained	No of pits
1	3
2	14
3	70
4	30
5	11
6	5
7	1
8	2
9	7
>9	0

The mean retention period is 3.7 months and the mode is 3 months but the range extends from 1 month to as high as 9 months. Three four people said if the water is not used at all for agricultural purposes water is available for even full 12 months.

Phalguni's rationcination

Reason for water flowing away - Phalguni and her husband feel of the five 5% that they possess, all are not useful. They feel 2 are useful as they retain water for a longer while. However they are certain they do not want to close any of the pits as at times it has helped to provide the odd irrigation in a water stress period and helped to save crop. They do not want to fore go this advantage.

Phalguni also has a theory if pits in water shed had been dug till 10-15 feet depth they would certainly have retained water. (Incidentally all the land of the family is in watershed 1). She says watershed 1 has a '*taan*' i.e. a pull from the river as result water drains away to the river. In watershed 2 the river is further away and seasonal.

8.12.2 Perceptions on 5%

Based on interviews/ group discussions

Interestingly some people have insisted that pits are useful as a concept but in their own lands they are wrongly located. They feel to exploit their full utility they should have been made in *bahal* and in lower *kanali* (the lower lands best suited for paddy due to the greater amount of water that they normally hold). These people said that when rains are bad its any way difficult to save paddy. The little water available through pits does not help much. But if they were made in *bahal*, they could go in for a second crop in the *Rabi* (winter season) after having already got some paddy. When referring to this in yet another discussion the people in the second group said that people with good quality land only could think of better yields and second crop. When saving the principal crop paddy was an issue 5% helped - as in the alternative they had no means of even *trying* to save the crop with any source of irrigation in *baid*.

Generally during in-depth interviews to gauge perceptions on 5% variety of responses were received. But the refrain seemed to be that while 5% is useful it is not good enough.

People generally seemed to be expecting the benefits of irrigation well from a seasonal water storage device. Most of the people seemed to hold 5% as inadequate and some even said they were out right useless. Deliberate closed ended questions had to be asked to gauge the reasons why they continued to retain them. The responses varied from labor required to close it, problem of finding earth to fill it as the excavated mud was used for levelling the plots or reinforcing the bunds. However, this question also brought forth the grudging explanation from several that *kicchu kaje laage* (it is useful to an extent) and so will not close. However, this is in almost direct contrast to the responses recorded during the survey to questions related to the perception.

Certain perceptions have been dealt with in the foregoing discussion. The remainder are included below as part of the survey.

Ratikant's allegory

'His typical statement on 5% was 'Even in a normal year at best 5% can ensure we live but it cannot ensure we thrive well. In other years it fails entirely'. He used an allegory to illustrate his point - 'What if you are allowed only a quarter of your daily ration for months together, will you die?' Researcher considered the issue and replied in the negative. He said 'that's exactly what 5% does, just as eating only a quarter of the ration will not kill you but it will end your strength and make you vulnerable to various diseases, the 5% is able to raise expectations by irrigating once or twice. But it cannot ensure that the three - four post sowing irrigation (especially in the grain filling stage) needed to harvest crop are available. Given this reality, when the weather gods are not obliging you will have invested a lot of effort but got no returns'.

Yet these people and others sharing a similar profile prior to 5% would typically say that for want of just one irrigation in September we are unable to save the paddy. This was the response PRADAN professionals remember from the early days.

Based on survey

77.5 % of possessors absolutely agreed to the usefulness of 5%. An additional 13% accept 5% is mostly useful. 3.4% says its not useful at all while the balance feel its occasionally useful.

There was not much difference in alternative location, potential improvement etc than the non-possessor. The non-possessors how ever ventured opinions on utility in force choice selection.

Based on users perceptions

Some deliberately close-ended questions were asked.

To the question 'whenever crop shows signs of drying due to water scarcity one should be able to extract water from 5% and save the crop' 93.5% responded in the affirmative. Thus, perhaps rather than tiding over September stress or one particular stress on the growing period it's expected to be able to tide over every water stress period and also explain some part of the frustration with it.

A further question in another part asked 3-4 weeks prior to harvest if there is no rain, 5% is not useful. This question was included after reading a brochure on 5% printed by PRADAN which says that often people lose out heavily due to a dry spell at the initiation of grain filling stage, to confirm what people think. Framing it in the negative form (not useful) seemed the natural thing to do at least then (that is there are no other profound explanations for it). 45% of the users feel it's useful at this point. A further 27.5% agree to a great deal with this. 14.3% feel if rains are erratic the pits don't help. Reasons proffered are 'at that time pit is any way empty in such a situation' or 'if the time gap between two rain spells is great the pits are dry'. Some of these constituting the 14.3% and a further 13.2 % who feel pits are of limited use in this period differed with the question itself? They held water is not critical 3-4 weeks earlier but 5-6 weeks prior to grain harvesting which is the grain filling stage. Researcher is not in a position to comment on this though.

A question asked at time of paddy transplantation there is no rain, 5% is not useful. This is a reaction (my reaction) question to the earlier refrain of 5% is not useful. It was decided to include specific questions based on my understanding on purpose, for 5% is being used. This happened to be one such question. 42.4 % disagree *i.e.* they feel 5% is *useful* at the time of transplantation. 27.5% give a qualified mostly agree response.

In the area 5% is viewed as a container of rainwater, which is fair enough. But the problem appears to be also in the nature of the container. 5% is not meant to be an impermeable container. It is actually meant to be dank soggy container from which the water imperceptibly keeps oozing out. The most sought after improvement was lining it, making it impermeable.

5% vs. other sources

There is a marked preference for lift irrigation in these areas. Just one case with some unique reasoning is quoted.

Ram Krishna on lifts

The Kumari is perennial. It's a crime to suffer from water scarcity when so much water is just flowing away. Rather than having spent *lakhs* of rupees thinly over so much of land digging pits, PRADAN should have spent the money at some selected points and set up lifts.

He says ' if lift is provided the rich and the poor both will survive'. The rich will be able to take a second crop. The poor who have less land will be assured of optimum yield and will get work right at the village to work on the field of other relatively better off farmer. This way their quality of life will improve – they will not have to migrate every year. If they stay in the village they can build assets in the form of animal wealth, their children can attend school more regularly. They will thus get an opportunity to improve their situation in life'. Short of a lift nothing will be as useful.

Yet in the survey several people have rated it lower than expected. The modal reason appears to be issues of managing it and cost of installation. While they would be happy to avail the facility someone else *i.e.* govt. should pay for it. While there is a proprietary ownership of the water source and consequently the water, however the water is not a sellable commodity as seen in place like Gujarat (However the machine horsepower is a sellable commodity). With permission water may be extracted for free.

Tarani Mahato or the LCS owns one and half (a share with his brother) 5% pits. In spite of the fact that he could not sow any paddy this year (2000 AD) even in plots with 5% he still regards 5% as a useful intervention mainly because of its low cost and inherent egalitarianism. At the same cost several farmers can be benefited, while *hapa* would concentrate the benefits in the hands of few with excess lands to spare. Lift, he said most people in the village would say was the best because any time water could be pumped. Yet the costs are prohibitively high for one lift and to benefit every farmer the costs would be even higher. He was the first person to be surveyed in demo round with most of the schedule enumerators present. His reasoning seemed to have deeply impressed some of them. In their own areas whenever people spoke of the benefits of lift during the survey they highlighted the cost and maintenance angle and perhaps affected the 'raw reactions'.

In spite of his responses Tarani was the inspiration in an experiment undertaken by the residents of his village Tentlo. They repaired and refurbished a 10 HP pump of their village association, purchased almost 1400 metres of cloth pipe, diesel and mobile from contributions pooled in @ rate of Rs 200 per person. They attempted to pump water from River Jor to a dry pukur called Maral bandh. Their rationale was the maral bandh was dry and the river was seasonal. It contained water now, which was uselessly flowing away and would not be available when water was required for the second crop of paddy.

This experiment was not initially successful probably because the gradient was steep and the water tended to back flow from the joints. He had spearheaded this experience partly to obviate the water scarcity and ensure a second crop and secondly as proof of initiative of the villagers. He hoped this way they could strengthen their case for the installation of a Lift Irrigation.

A month hence a rather agitated resident of Huchukdih returned one night shouting under the influence of drink – 'Are not we party workers? Are not we in need of water?' His grudge was that Tarani and others were again pumping water to fill the Maral bandh and had apparently been successful this time. They were able to half fill the reservoir before the seasonal river Jor dried up in January. Some differences on the right to use this water had already cropped up. It was insinuated that Tarani had got all the villagers to contribute but he himself stood to benefit the most as he had maximum land in the command area of the Maral bandh.

He had already started lobbying for the installation for government funded lift irrigation. Deeds and words at cross-purpose?

Only these three were included as these are the means of irrigation widely available and people are aware of them with definite opinions on it. Large tracts of the study area appear to be text book case for the installation of lift irrigations. Two rivers Jor and Kumari bind the area. Watershed 1 terminates in Kumari, which is a perennial river. Since the start of watershed activities people are clamouring for installation of lifts. However, they are unwilling to take responsibility for its management. They want government managed lifts with 10HP pumps to be installed.

PRADAN itself could not obtain funds for installing lift irrigation and so went ahead with 5% and watershed for which funds were mobilised. In another area in Balrampur Action Aid provided funds for a lift which however was not used by the people for cultivation. Thus funds were a problem for lifts and relatively easily available for watershed work. Attempts at mobilising funds from other sources for installing LI at Huchukdih was not considered.

Reasons for preferring a particular source/ method of irrigation of water ranking of lift, *hapa*, 5% are delineated below. Of the three lift is actually a method of extracting the water from a near perennial water source. 5% and *hapa* in contrast are containers for the collected rainwater.

51% rated lift absolutely better than *hapa*. A further 11 % were generally in agreement. 31.5 % however rated *hapa* as better to lift on grounds of control on irrigation timings. Another aspect was lift irrigation requires ability to pay cash in a time when cash is generally already constrained and months to go before crops can be harvested. Problems of sharing a common resource do not seem to plague them.

52% regard lift better than 5%. A further 13% generally agree to it. However 29.5% regard 5% as better to lift. The reasons for preferring 5% are similar to that of rejecting lift. However benefits like each plot having own water body was not given as reason.

79.3% rate *hapa* better than 5%. A further 5.4% generally accept it. Only 13% of the respondents disagree rating 5% better.

The last part on *hapa* being preferred probably takes care of water retention problem as also quantity retained and this preference. 13% who disagree say they don't have enough land to spare for *hapa* and prefer 5%. Some even said in interactions that in bad year even *hapa* dry up.

Lift

Lift is preferred due to the following reasons

Greater area irrigated

Lesser time required for irrigating the same area

Less effort is required to obtain water

Where water is drawn from a suitable source, water is available all year round.

The demerits of LI pointed out by the people are

Money required to buy fuel

Cash requirement whenever land is to be irrigated.

One farmer alone cannot get water. A group of farmers have to be willing to take water on particular day justifying the starting of the irrigation pump.

Hapa

The reasons it's preferred over other source are

Only a one-time start up cost is required to be invested. Little recurrent cost

Extraction of water and timing of extraction as per preferences of individual farmers.

Demerits

- Generally water is shared amongst a group of farmers.
- Staggering use of water is difficult and usage intensity of all the farmers peak at the same time.
- Extraction can be by pump or human power as per the preference of the individual farmer.

Merits of 5%

- Individual ownership of pits
- Each farmer has ones own 5% pit and can irrigate at will.
- Low cost can be benefited by water body

Demerits

- Dries up
- Limited water holding capacity

Ashari's analysis

Given a choice where land is not constraint Ashari feels a *hapa* is better. His arguments are summarised in the table below –

	<i>Hapa</i>	5%
Unit cost	Rs. 12000/- (including labour contribution)	Rs. 1000/- per pit
		At cost of one <i>hapa</i> , twelve 5% can be built
Benefit	5-8 people with about 20 <i>bigha</i> of land	These twelve 5% would benefit 5-6 people assuming most will have two 5% as is the case now or about 20 <i>bigha</i> of land
	<i>Hapa</i> is good for every kind of land	For upper parts of the uplands 5% is not good as the water collects in one place and readily drains away to lower lands ¹
	The water stays longer and proper stocking and fish rearing can be done. Tending one <i>hapa</i> is easier than several pits. Better crop planning can be done around water in the 5%	Pits dry up fast. Fish rearing even if done, the size attained is not good nor is it economical to stock the pit.

Ashari, researcher and other members of his family then had discussion round the issue of availability of land and sharing of a common resource like water across different users. But this did not appear to be a major issue for Ashari as he is willing and able to spare land for another *hapa* and being made exclusively on his land sharing of water is not an issue.

Perception on width

The common refrain in interactions used to be the 5% pits are inadequate being too small hence this question.

47% felt broader is always better and a further 19% are mostly in agreement with this. However 24.7 % disagree entirely. The reasons are more arable land is lost in widening. Some of the users who say wide is better on follow up appear to have relatively more land or un-arable wastes near the plot with 5% for expansion. A further 8.6% agree broad is better but feel land is a problem.

Perception on depth

66.5% feel deeper is always better due to its greater water retention as also longer period of retention. Some have even preferred deeper to wider as additional land is not destroyed. Some of qualified what they mean by 'deeper'. They are happy with pits up to 10 feet not beyond. 25%

oppose deeper pits the reason being deepening would make water extraction difficult. Many of them plus people setting a qualifying limit to depth say beyond 10 feet the propensity to cave in will increase tremendously and additional cost incurred in deepening will not be recovered through benefit derived.

Perception on relation between increasing depth and water extraction

Thirty six, 5% possessors said with increasing depth water extraction will be difficult. 51 said it will not be difficult as alternative means like *tera*, swing basket in two steps could be used. These latter people gave depth more importance and that too deepening funded by some one else.

Perception on usefulness

To gauge perception on usefulness certain associated questions were asked. A pointed question was asked that some hold 5% is useless are they right? The reason of including this was to avoid a direct question on utility to the owner and instead seek answers in reaction to others statement. It was initially felt people would feel hesitant to outright say useful or not as concept to party appointed data gatherers for fear it would reduce chance for future benefits through watershed etc. 58% are absolutely certain those who say pits are useless are wrong. A further 16% are mostly certain the others are wrong. 15.1% of the users feel those who say pits are useless are correct.

A question like in case of erratic rains 5% is not useful elicited erratic response with no clear trend identifiable. 23.9% agree in such situation 5% is not useful. 27% feel its at such a time of erratic rains that 5% is most useful. Additional 32.6% have tendency to support the people who feel its useful but have generally set a condition like if its rained previously and sufficient water in the pit is already there then its useful.

A further confirmatory question asked was time with no 5% was better. 69% disagree and say after 5% situation is better. Reasons advanced are – at least one irrigation can be given, 1-2 critical dry spells can be tided over,

Another question on whether 5% is relevant work was also asked. 77.5% of the user's support, a further 13.5% generally support only a minority of 3.4% out right oppose it.

8.11 Improvements proposed

In the survey the question pertaining to possible improvements was asked to the women contacted by the surveyor partly to elicit responses of woman to certain exclusive questions and partly to counter any idea of the men folk that the survey would result in some project being taken in their area. Also most other questions were generally responded by the men folk so certain questions were 'reserved' for women. By this it was hoped it would not be necessary to lose out on opportunity to know the improvements that strike the residents as most required –

The improvements proposed by the people area

- Lining: The responses in Tentlo village have highlighted the need for lining of pits to ensure that the water lasts for a longer while. Some have even proposed a brick and cement lining.

However doing this would disturb and distort the seepage line maintenance function of the 5%.

- Deepening: The improvement proposed by the most number of people was deepening of pits so that more water can be held and it could possibly cut across some *jharna*. The belief of most was that their pit at its existing depth did not cut through any seepage line. Some respondents have even proposed pits with at least 25' depth.

However doing this would violate the meticulous calculations that have gone into deriving the volume required to provide the required acre-inches of irrigation. This may also not maintain the seepage line at a useful level, which the growing plant could use.

And more important reasons pointed out by PRADAN are digging real deep pits would cease to be a rainwater management technique but just another method of ground water exploitation. 5% by its nature can benefit larger number but if all were to dig such irrigation wells then an assessment of the level and adequacy of the existing ground water needs to be worked.

- Generally widening of pits was not preferred. More prefer deepening pits to widening it to prevent further loss of arable land. However as is evident in the perception section people opposed to either deepening or widening are numerically of nearly same strength.

Answers to additional research questions based on people's perception:

Does it warrant associated improvements to the design or the associated activities such as water lifting and distribution to further enhance the returns to land water and labour

Not a real factor as local water drawing system called *tera* (pole lift) *i.e.* a bucket attached to a bamboo weight for drawing water could be used according to several respondents of respondent for drawing out the water. The area to be irrigated is just one plot so management of the distribution channel of the water is not an issue.

Does large-scale adoption significantly alter the water balance within the basin especially with respect to other upstream and downstream users?

- Cannot respond but yes the water is getting drained away. However one person Ashari Mahato and his clan of Choto Mukuru mention that this phenomenon is clearly visible in his plots. Claim remains unverified even visually. Boundary as also water table could be investigated for with and without for long and shorter retention periods

Ashan's doubt

He says in the plot no. 17 he is generally able to irrigate only once from the 5%, after that it dries. His pit is 20'x20' in dimension. The person with land lower than his has a smaller pit probably only 10'x10' but is able to irrigate generally twice and even thrice. The pit lying further lower than this is about 5'x5' and they are able to irrigate almost thrice. He feels his large pit only helps the people in lower lands. Ashari's son added that when we irrigate our crop in the next day or two the water level in the lower pit increases. Both felt that 5% should be dug only in such uplands where the plots on the lower side along the slope also belong to the same person.

Section 9: Conclusion

In deeper interviews faced with food insecurity people recalled what 5% did not do more readily. In all the interviews, even allowing for the fact that no rigorous method of sampling was used while selecting the interviewees, it remains that even the 'supporters' pointed out its failings or presenting their views on how to make it useful. This disenchantment is apparently because it does not have a major *perceptible* impact on food security, in terms of economic return, or in favourably impacting edaphic factors. The emphasis on the term perceptible is deliberate. The return does not appear to be very visually captivating any more. Pronounced benefits are important especially also because arable land has to be sacrificed.

An additional issue of concern appears to be that there is fair amount of confusion on the purpose of the intervention. A review of PRADAN literature gives one the impression that the purpose of 5% is to secure paddy yields in a particular rain stress period occurring at a particular time of the year rather than ensure yields under all circumstances. People expect the 5% to provide water at any and every period of water stress (see perception section). Even PRADAN staff view it similarly. When it was discussed that paddy crops had failed on a large scale in vast areas probably making an effective study of the 5% difficult, they advocated the study of a second crop to know impact of 5%. Irrigation for a second crop can be additional benefit provided by the 5%. And very few farmers undertake it. Perhaps 5% was not originally designed to secure the *rabi* yields. The whole computation of 5% area is based on acre-inches of water required for saving the *aman* 'paddy' crop.

5% is not a mere technical endeavour from which the economic and financial benefits will immediately and automatically flow.

While accepting water management cannot be confined to individual plots as it transcends boundaries of land ownership, yet the role and importance of collective action is not immediately apparent (to me). The committees formed at each village were more for overseeing implementation by people than a forum of collective action. They constitute a nodal body decreasing the time and energy required for contacting/ interacting with each farmer. Role of the collective ceases apparently on conclusions of implementation. The watershed committee still meets each week but some active members attend. Women do not attend though presumably (considering the specific reservations for them) at least some women are members too. The very poor also did not attend having already emigrated. Even in this committee the above observation holds true, its important as watershed work is still on in the area. It has powers to recommend activities on lands of individual farmers.

There have been gaps in implementation. Apparently the sole criterion for implementation has not been hydrological boundaries. Political affiliations were a at least a small factor in implementation by *Panchayat*.

If weather is bad (meaning inadequate or untimely precipitation) the option of validating the technology will be difficult. Its true that all the people having been exposed to a co-variate risk induced (term used by me to indicate risk, which affects all with a common magnitude) by the

environment. Hence it may be argued the positive effect of 5% technology should still be evident as its equally affecting the entire area. But it's not just the quantity but also the *timing* that is important to rain fed agriculture. Say the, pits that retain water for about 3 months received the rain later. The water was not useful for paddy as most could not sow. The water will not remain long enough for doing *rabi* crop when its season for it for most of the pit owners. Thus farmers that can be studied have already reduced then what can be said of the technique and its primary purpose.

During interactions in the study area it appears the technology would deserve their unqualified support if it were able to assure superior returns than what can be expected in a situation without it - no matter what happens to the weather. If it's not superior under all possible eventualities and situations they cannot applaud it.

Perhaps the 5% by its success may be working against itself. PRADAN says that in the year implementation itself there was a marked improvement in agriculture yields. People for the first time even took a second crop. To be able to ascribe the change entirely to 5% of course we would also need to know what was the general agriculture year like and what were the returns from other lands without 5%. This is not captured through historical data recall.

Even allowing for all this if a benefit like increase in production is acceptable as ascribable to it. Then what has happened is that after having known the benefits to agriculture of water available in winter, *it has driven up the appetite for more water*, and itself fuelled disenchantment with itself. This is probably especially true of active pioneer farmers or farmers for whom growing the basic paddy is not already a problem, who now want dug wells.

The twin purposes of 5% - harvesting water for use in dry period and maintaining the seepage line and moisture regime on the down side appear to work at cross purposes at least in the eyes of the people.

Thus the question that remains - 'if individual plots cannot be treated and impacting the seepage line not important then why not treat all the mid-lowlands (*baid*) at least'.

Additionally advantages/ disadvantage over patch implementation vs. piece meal implementation in other areas is not immediately clear. From the people's reaction in fact the disadvantage is clear in that water tends to be soaked away to the low lying areas. But researcher is not in a position to comment on the validity of their observation.

As is obvious this cannot help the non-land owning poor who frequently own no land at all. The only benefit accruing to them is wage labour when earthwork at the time of implementation was taken up.

Technology is definitely low cost. Greater area can be covered than most other areas. It is simple in conception and should endear any new promoter or adopter. However some methods for low cost methods for enhancement of water retention and the appropriate depth for each pit to meet expectation of poor ideally could be explored.

Perhaps this observation is inappropriate and even premature but its all the same being expressed. The 5% study appears to have been pre-maturely initiated in the particular study area. Enough time has not lapsed for averaging out of impact/ effect.

Also PRADAN implemented in 1996 and study commenced in October 2000, after four years. And as gathered from the villagers the last few years have had less than normal precipitation. Perhaps a sufficient time span of normal years has not lapsed for the salubrious effect on the entire treated area to be evident. Have we given the technology time to root?

Sevebrata, an NGO with whom PRADAN's Dinabandhu Karmakar originally worked and developed the concept of 5% has one treated village Sirajdih (also in Purulia district). This was one of the original patches treated during the collaboration with PRADAN. Sirajdih represents and integrated treated area with 30-40 at the head for raising forest cover and 5% on the arable land. According to the residents the land at the very end of the treated stretch is now so water enriched that they have been able to raise a second crop of paddy in December. Prior to land treatment this was not feasible. But this has occurred in about 10 years time with both good and bad rain years. At the time of visit the area had received practically no rains yet in the land referred above they had paddy nurseries ready in expectation of raising a *second* paddy crop. Such distinctive long term changes is not apparent here.

Lastly, the most important question is further enquiry into the 5% technology warranted?

Yes, further research is warranted to establish gains from adoption, especially when residents have defended it in a survey conducted in year when the technology could not "deliver as promised".

Section 10: Future Scope For Research

10. 1 Additional Research Questions

Before recommending it as a package some additional research questions should be established

1. Establishing the gains from the adoption of 5% by actually studying yields obtained in with and with out plot but having other factors same, like fertiliser application, varieties, other irrigation, available manpower, number of ploughing, water retention period. For this appropriate experiment will have to be designed with provision for compensation to the participating farmers if yields obtained are less than normal for adhering to a particular package of practice²⁷.

This would prove invaluable in scientifically proving the effects. Doing this directly from the farmer's data itself is difficult, as two farmers with and without 5% will have to be found who will have all other factors identical. This can become the basis for computing return on land labour and capital.

2. Does the pit offset the yield loss due to the sacrificed land? This is the primary block in adoption by farmer and merits a proper answer. Does the extent of offsetting really vary with the zone in which pit is located.
3. It's clear some pits do not retain any water. The correlation between the soil composition and water retention could be explored. With increase in sand, gravel, *murum* in the first few feet how is the water retention ability affected. This would probably help implementers to identify and exclude unsuitable areas at the onset itself.
4. Isolating reasons why certain pits are retaining water for longer duration than the average retention period or associated matters. Each such pits possible reasons can be explored and factors enhancing water retention identified.
5. Should all categories of land especially the *kanali* and *bahal* be also included in 5% treatment

Probably PRADAN has no problem with all land being treated. But faced with a resource limitation they advocate treating *baid* as its one category of land used for paddy cultivation and generally suffers most from water stress situation. According to PRADAN creating similar pits in low lands (*bahal*) is not 5% technique but called seepage tanks which they already make. Purpose of pits in *baid* and *bahal* is different. In *baid* it is to save the main crop of paddy. In *Bahal* it is to sustain a second crop.

6. What is the length of treated area required (akin to the run length required to achieve the proper pitch) for general improvement in soil water regime? Would any width of treated

²⁷ A version of this suggested later by PRADAN too. To know impact Arnab suggested that actual yields should be measured of with and without 5%. But given my misgivings about doing only he agreed to designing proper experiments to account for each variable. It was he who suggested compensation for those whose yields decline due to the 'curfew' on owner initiated agriculture interventions.

area and any slope (with in the recommended limit) show improvements? What is the time frame required to achieve this?

7. Special focus on one factor i.e. the relation of slope in water retention - How steep is too steep.²⁸
8. In cases where variety shift is noted a deeper enquiry into it to gauge why any shift has occurred could be made. Also why the same farmer does not sow improved variety in other *baid* lands. Why have others persisted with the local varieties? Perhaps in the ensuing year of the project individual farmers can be contacted and reasons documented for a particular variety in each plot.
9. The role and need for payment for digging 5%. Is it necessary component to include this cost of land treatment? Payment does act as an incentive when the people are not aware, convinced of the potential benefits. But should it be the recommended methodology for replication in areas not having such competing grant-based programmes.
10. Methods to enhance the water retention capability of the 5% pits could be explored. This is provided having 'seepage prone' pits is not seen as a necessity. Alternate methods could be explored like
 - Lining of pits with impervious layer of plastic as is being done in case of tanks in some areas of Rajasthan²⁹. The effectiveness of lining with betonite clay could be studied - it has been already experimented with by PRADAN.
 - Covering the pit with a layer of suitable material to prevent evaporation loss in cases where people hold evaporation as the sole cause for loss of water.
 - The depth of 5' has been evolved on the basis of the standing water requirement of paddy. Deepening of pits to about 10' was widely reported during survey as a means of improving the pits in a round about way. Deepening pits would not affect current methods of water extraction if the depth were maintained at 10 feet. Further deepening according to the community could result to greater caving of pits. Since the community is proposing it, it could be considered.
 - A combination of the above
11. Until which depth of pit, caving in is not an issue.
12. Once the first question has been sorted out this could be tried. Even if the soil of the plot as a whole may not be of a kind that can retain water, is it feasible to micro-treat the pit to enhance its water retention. Mulching it, as part of the excavation process or annually plastering it with some combination of lime cow dung to enhance its water retention. Villagers have even proposed cement plaster, which would cause costs to significantly jump.
13. Should an exclusion distance be evolved? For instance does water really get soaked away from the upland pits? On pursuing PRADAN literature it seems treated uplands at least helps to recharge the lands lower than it by maintaining the seepage. *But are we doing a*

²⁸ Question proposed by Kallol, DA with PRADAN

²⁹ This was proposed to villagers based on discussions at home with my father a civil engineer but the villagers found the idea very strange. However while I dithered on including this as a research proposal I read in a project proposal which Manas was co-editing with Dina and where I was asked to help out I found this had already been proposed. From Arnab I learnt this was also tried at..... But ultimate effect not studied

disservice by locating pits in anywhere and accelerating the seepage? Should a region close to a river and large water bodies be excluded? Some villagers have held the water is soaked to the river without benefiting any landowner.

14. Since IWMI's consideration is assessing 'replicability' (apart from scientifically proving its utility) is the technology useful in level land areas having a comparable weather regime? In that case is there any need to treat an entire area? Being at the same level re-enforcing seepage line may not be important. PRADAN says it would still maintain moisture regime of at least that plot/ area.
15. PRADAN and watershed programme of *panchayat* have implemented this programme on grant funds (apart from PRADAN's Brajrajpur implementation). Since wide spread replication is a concern – in all areas grant funds for this purpose may not be readily available. Unit costs for implementation of 5% could be evolved complete with pay back periods, periodicity of repayments. This may help mobilising loan funds in some case at least.
16. What is the annual contribution of one pit to recharge of the water table.
17. What are the suitable fish for rearing in 5% pits assuming water retention of 3,4 or more months? Should fish rearing be considered or people focus on rearing egg to fry to fingerlings. This is an important trade already in Bengal³⁰. Its earlier experiments with magur x shark cross breeds was probably not available in the market. In this regard PRADAN has one case documented where over a period of 4 months Rs 312 investment in pisciculture generated a return of Rs 1160. This is in spite of introduction of the fry at a very late stage. Details may be obtained from PRADAN.
18. When trees are planted on the bunds what are the phytopathic effect of the roots on the bunds and what is the likely effect on the standing crop, soil quality. Also how deep the roots penetrate, can they tap the water table³¹.
19. As agriculture is a yearlong phenomenon, process documentation of selected farmers should be carried out for at least one entire year. Perhaps the project person could document a few of the selected farmers while some others could be encouraged to maintain their own diaries.

10.2 Next Course of Action

If nothing else, this report perhaps prepares the ground for future course of action. Of the questions mentioned above the one dealing with impact on yields is perhaps the most crucial to justifying the 5%. Questions of replicability and improvement can only follow it. The researcher feels 10 days should be invested in designing the research paper detailing each point of enquiry and methodology to be adopted for its enquiry. This methodology has also to be able to account for all other possible influencing factors – various alternative uses etc. Plans of tracking water level in 30 wells etc seem impracticable. This paper should detail out all aspects like timing, frequency, field day required per

³⁰ Question proposed by PRADAN - A

³¹ Question proposed by PRADAN - A

month, period of on location stay for the next one year starting April 1, 2001 etc, with support from IWMI.

Methods to be adopted for analyzing each kind of data etc should also be discussed. This would perhaps ensure collection of information in relatively easy to analyze form. A person with appropriate training/skills in mathematical and statistical analysis could be involved from IWMI. This would help in appropriate aggregation of information. This paper should be shared with people in PRADAN and IWMI and perhaps some other institutions.

In absence of such plan of action time available is likely to be frittered away. The *big* picture and methodologies unclear and project contributions suspect.

APPENDIX - I

1.2 Family relationships

This was studied through interaction with three married women ranging in age between 22 to about 25 in the village who were researchers friends and a young girl aged about 13 who was being tutored by her in English/ maths. Of the three women one was the researchers hostess Phalguni, another was Chanchala and lived just opposite, third was Bilasi who too lived close by. All the three women were scheduled tribals. The young girl Bharati was a *Mahato* by caste, which is a backward caste in the so-called caste hierarchy.

1.2.1 Chanchala's account

Who decides when some thing needs to be purchased? Both of us decide.

But who would say some food or condiment has to be bought? Generally it's me as I know better what is left at home. But husband is likely to propose purchase of meat or fish. The children also demand a particular food item and we humor their wishes when we can afford it.

Say you have earned some money how will its use be decided and by whom?

'I would say I want to spend it on this. Generally my husband would honor that unless money is really a problem. In such a case I too would not ask for any thing improbable after all I am also running the house and know the situation. But yes husbands concurrence is necessary for big expenditures like clothes.'

Who would work out the priority between competing expenditures?

We would decide jointly. But yes in some homes the man and in other homes the woman views are more important and accordingly things occur. For instance in my Bhasur's (husbands elder brother) home the wife's views are most important. That led to our families living separately.

Who is likely to decide about starting of agricultural operations?

'Husband'. Why? 'Because he would be discussing with others and seeing all this happening on a bigger area than I normally do. He is more mobile going to the *haat* every other week. Where as I go only when I have to make purchases. The *haat* is very far away'.

About sale of assets? 'Both of us could suggest but it would only be sold when my husband consents to it. This will be the case in every home. The woman does not take decision on selling goats, a grain etc till her husband is sick or incapacitated and there is no other grown up adult. But she adds, her concurrence to the sale is important to maintain harmony'.

Who receives the money and who keeps the money?

He generally always receives the money. Further he could keep or he could give it to me to keep safely in my trunk. But I cannot spend the money at my will.

When you both work as a wage earner who gets to keep the money?

'Generally my husband gets the money. If both of us have worked he would be paid both our wages at one time. I would generally not get it in my hands. The paymasters would generally give it to my husband. If in some place I have only been working yet on the wage days there is fair probability

my husband will too have gone and he will be called and given the money. I get the money in my hand generally in two cases –

If both of us have been absent on the payment day then some other village person would collect it and bring it. When he comes to pay and he (husband) is out then he would give it to me. My husband is out of station.

I also prefer it that on payment days he should be present. After all we are only two adults at home. He has to be there to ensure all is well on payment day. I would also feel uncomfortable coming back alone with the money’.

Is the relation between you and your husband typical of most homes here? Are their differences? What are the reasons for difference?

Yes relations our relations are typical for most homes. (Keeps quite for some time). Actually it may be a little different from the normal in some aspects. My husband is an active member of the CPM. So am I. We frequently attend meetings. He is exposed to modern ways of thought and relationships. He has changed. Yes he helps me with cooking, grinding *masala* normally. He doesn’t object when I have to attend party meetings. When I was a panchayat representative he supported me. On days we have to go out he helps with the general cooking. But still all has not changed much from traditional ways.

How is it different and at the same time not different?

For instance our eldest daughter is only 9 years old. He proposes to get her married by the time she is 11 or 12 years old. Yes I agree to the proposal. We are poor. In this things haven’t changed. I was married when young. I have studied till class VI but I don’t know how far she will be able to study. An early marriage provided we get a groom will save considerable dower. She doesn’t show a lot of enthusiasm for study and has to be pushed to study. I know my younger daughter will study. She is barely 6 but shows aptitude.

Chanchala is taking birth control pills. One day she showed them to me and asked whether they are O.K. The pills were of Bangladesh and being purchased from Balarampur by her husband. They had not consulted any one. As a result she was not having the pills as per the sequence indicated on the reverse through hand signs. She knew about the pills and had herself proposed to her husband that now as they already had two sons and two daughters they did not need more children. He too agreed and she has been on pills since a year. She says if her husband had not conceded she could never have gone in for the pills. After all he would have to regularly buy them.

Why not go in for birth control operations, would not they be saved this recurrent cost? No birth control operation is bad. The woman is excluded from all religious and marriage functions when it gets known. The very fact that she is not getting pregnant would prompt people to think what has she done. The men refuse to get it done because its widely believed they will become weak and incapable of hard physical labor. She does not want her husband to get operated as he is the only man in the house and cannot afford to lose his strength.

Phalguni Singh Sardar

About taking up new varieties?.

Both of us could propose the idea. Generally the seed dealers publish and distribute pamphlets. Who ever reads the pamphlet or has heard of some actual users favorable experience would raise the matter at home.

Who would buy the seeds?

Generally in most homes the man would buy as he is more mobile. But in my case I too can buy if it is available at Bandhowan where I have to several times a month as part of my agricultural work.

Are you happy with your family size?

Yes, I do not want any more children. In fact when my first born was a son I thought I will not have any other children but I have had two dear daughters. But I don't want any more and my husband concurs.

When did you father marry a second time?

When I was about seven years old. I remember that because my front milk teeth (incisors) were broken then. That is about 14 years have passed since the marriage.

Why did he re-marry?

Because, I was the only child and that too only a girl. He wanted sons. My mother was taken ill and it was said she was unlikely to bear another child. She had tumour like out growth on the body, which later had to be operated upon. But after that she was continuously on medicines and ultimately lost her mental balance. She died some four years back.

'Here people are mad for sons. They do not consider a good daughter as any thing no matter what she does. Even today if a man marries again for the sake of having a son people would not say anything if he has already waited long enough for having one and does not drive away his first wife'.

Researchers Observation

Relations between husband and wife are companionable. Phalguni has been a co-*pradhan* in the local *panchayat* for the past ten years. She is also active women member of the local chapter of the CPI (M) party. She has to go to frequent meetings at the panchayat office at Bandhowan. She is often late. Her husband lights the *chulha* in the evening and puts the rice pot on fire.

There are days when he assists his wife in pounding and de-husking paddy – a very typically womanly occupation. He used to say 'When only two persons at home, you have to do all kinds of work'. 'Unless you have a lot of paddy there is no point going all the way to the power threshers'.

When she needs to go to attend meeting in places further away her husband drops her at the bus stop. In some he has accompanied her. Just the last month she went to town leaving her two younger daughters under his care for two days.

The two generally discuss various matters at home. If the husband has gone to town to attend court he would come back and narrate the events. She does the same for her visits. There are meetings where she is not comfortable attending due to home responsibility or the topic under discussion then

her husband substitutes for her to ensure that people later do not say that she is neglecting her duties.

They dote over their children and daily provide them with snacks, biscuits, sweets etc. Its also the way that they placate their children when they throw tantrums. In fact they are excessively liberal with them in matter of junk food – the milk teeth of the elder daughter aged only three is completely destroyed by cavities. They also set of trouble amongst other children in the vicinity as other children clamour for similar goods from their parents.

Both do not appear to make any distinction between their boy and girl children. Their son is a resident scholar at a local residential primary school. Phalguni says she would like to send her daughters too to such a school, resources permitting. Even otherwise she says she will educate them and not become the reason for the stoppage in their study. Phalguni herself has studied till class IX at Sukurhuttu School but was withdrawn to get married and nurse her mother. She wants nothing.

APPENDIX II

2.1 Related to 5%

People profiled here were not selected on the basis of any sampling technique. Only such cases have been developed in which deeper delving was feasible or the profile / pit of the interviewee has some uniqueness. All of the farmers who were interviewed in depth are male, the women folk did not want to talk alone on land and agriculture related matters - not even good friends of the researcher.

2.1.1 Sunil Singh Sardar

Sunil filled in as a surveyor when the original person selected for that area was unable to deliver.

Sunil owns about 97 decimals of land. He has only one 5% pit visible to the eye. Actually given its dimension of 60' x 50' x 6' it is much larger than a 'normal' 5%. But on paper he was to have eight 5%. No, this is not any example of unethical alteration of records post planning. In plot no. 291 on his one-acre of land there are 8 smaller plots and he was suggested to make at least 8 5% pits. However he preferred to consolidate the area of all the proposed pits and build one larger pit in one area. The place selected by him is at a higher elevation and the other proposed plots lie lower to it. The land selected for the pit is *baid* land with almost *tarn* like quality. Given this reality he thought it was preferable to 'destroy' one poor quality plot by converting into water reservoir than loose arable area in each of the other plots which had relatively better soil. Also he felt as the plots were along a slope each would benefit from the recharge of subsurface flow line from the 5% at the head and thus retaining most of the sub-surface flow within his own land.

This 5% generally retains some water in a normal rainfall year from *Ashar* to about *Poush* (till Mid January). However for the water to be useful the pit should be full at crucial points. This year the pit filled around End of September thus it did not help in sowing of crops.

He is one of those people who changed the design of the 5% at the time of implementation. Instead of the recommended 5 feet he with the help of his own family's labour deepened the pit by that extra one foot. Thus at the time of construction the depth of his pit was 6 feet.

His family consists of 5 adults and one child. During this interview few others had gathered and while discussing the *per capita*/ per day grain requirement the people said 1 kg/ day/ adult person. Was the figure on the higher side? Sunil and the others were vociferous in their support of the figure. The final figure put forward was 4 kg rice/ day for a family of five adults. Rice is consumed in his family thrice a day and in the families of other people assembled there at least twice a day and for several thrice a day once the wheat harvest runs out in 2-3 months.

He de-silted his pits once. But the primary purpose according to him was to use the accumulated soil as fertile addition to the existing topsoil.

If there has been good rainfall following which there is a long dry spell he says digging may help he once dug up about 4" of soil after having given one irrigation. This digging ensured that an additional one feet of water got collected over the next few days. This additional feet depth of water plus the feet of water already standing could ensure a second watering. However if there is another

rainfall following the first irrigation and the pit fills up at least to a depth of feet or two then such digging is not required.

Their land is not adequate and can ensure at best 6 months survival. They generally have to migrate for part of the year. Along with him and his wife, his brother and his wife also migrate with their family – however to different locations. Each couple is able to get Rs 1500 –2000 in all during festivals in the remaining part of the year.

2.1.2 Ram Krishno Mahato

Researcher decided to profile him because researcher found him intriguing. Also my data gatherers assigned to his area expressed their inability to include him in their survey. They felt certain they would not be able to answer his many questions. He was widely billed by residents of my tola (Huchukdih) as being intelligent and shrewd. When researcher asked why they had this perception the common refrain was he does not go out of his way to help others even though he is in a position to help them.

The other reason the researcher decide to profile him was that he would be a good source of data on yield etc.

Ram Krishna is man with long hair and sports a beard both of which are more white than black. He runs small grocery shop in the village and researcher had met him off and on when purchasing grocery for the host family. When researcher broached the topic of having session with her, he cryptically informed me researcher would have to solicit an appointment thrice from him before he granted me one.

His self stated age was 76 but looks younger. He has four grown up sons who are each married. He has married off his daughters too. Three of his sons along with their wives and children live with him. One son lives in Burdwan along with his family. He used to work as an *ad hoc* electrician with the electricity department there and few months' back was given permanent employment. This son lives of his own earnings and does not contribute any amount monthly/ or yearly towards the larger family's expenses. However he also does not rely on the family to provide for his and his small family. Ram Krishna's wife died some 25 years back.

He is literate and has 'numeracy' skills but has never had any formal schooling. His parents did not send him to school, as he had to take the cattle to graze. However his three younger brothers did attend school till class eight or further. He learnt his *Bangla* alphabets while grazing the cattle out of his own interest and with the help of a senior 'friend' who also grazed the cattle who had attended school was several years and then had to give up. He passed on his own books, and slates to young Ram Krishna. Thus over the next 2-3 years he not only learnt the alphabets but also consolidated his learning.

Apart from agriculture and the grocery shop - today the family owns a foot operated tailoring machine, which is operated by any of his sons who is available and meets the stitching needs of residents of Hesladih, Huchukdih and Kusumtikri tola of village Tentlo. They also run 100 bird broiler farm. The men's society in Huchukdih-Hesladih village owns a 2.5 HP irrigation pump obtained from the government. But due to various disputes it lay un-repaired for some years. Seeing an opportunity he then invested Rs 5000 and purchased a second hand 5 HP water pump which since its purchase he was hiring out at Rs 50 hour. (But as now the 2.5 HP pump has been repaired

and available at Rs 15 hour he may have to consider reducing the charge). In addition he has trained his sons as skilled carpenters and masons. They hire out their services when contacted. He himself learnt these trades in his youth observing masons and carpenters. In his youth he had saved money for purchasing his first set of tools nearly 40-45 years back.

Ram Krishan himself also dispenses medicine and offers his services for driving away evil spirits, which purportedly was troubling the afflicted person. Today he chiefly manages the shop and runs the family.

He owns 17 *bigha* of land. Of this 5 *bigha* has been inherited by him about 25 years back. The remaining 12 *bighas* he has bought from his own money. All his lands are *baid*. Thus according to him he has even lesser certainty of yield than others who own some *bahal* and *kanali*. This was the reason he assigns today to agreeing to 5% pits in the hope of ensuring yield.

In a very good agricultural year the family's entire 12 month requirement of food can be met from the harvest. But normally they manage only about 6-7 months.

The family owns a pair of bullocks, 3 cows/ heifer of varying age and 5 goats. Another pair of bullocks they have recently sold of due to acute shortage of straw this year.

Interestingly enough this man possesses about eight 5% pits but today is considerably vocal about the fact that they are of no use. Over our several interactions researcher was to hear this following statement several times - '*Jakhun akash theke jal hoi takhuni oi guli kaj daye*' (literally translated as "when there is water from the skies only then they are of any use). Also he was wont to repeat 'the 5% cannot ensure survival it only manages to post pone the inevitable death (.. However my house lady used to stay, if one person who has benefited from the 5%, it is him.) The researcher was thus curious to resolve the apparent contradiction.

Within a year or two of construction the dimensions of most of the 5% were altered. The UB Neeche plot has been deepened and widened by 2-3'. The KG Uttar pit has been doubled in dimension and deepened by a further 3'. For this deepening work his family had to invest 7-8 days of labour. Two others he regularly de-silts.

With the help of his four sons he has dug a pit with dimensions of 25'x25'x25 (approximately) feet pit. On inspection of the pit it was apparent after the first five feet or so they had to cut continuously through hard rock though others say they were able to take advantage of some vertical faults in the rock. They had commenced work on it two years before PRADAN took up implementation of 5% programme in his village - Hesladih. This pit is technically (because the actual dimensions are much in variance from the 5% pit that would be recommended for the area of the plot on which it stands) recorded as 5% as 'Arnab has paid only the amount payable on 5% given the dimensions of the plot'. He selected the place opposite his own house for digging this *hapa/5%* as he and his family would be able to superintend the vegetable cultivation and it would also solve problems of bathing and washing of utensil for his family. When researcher visited the plot cauliflower, cabbages, tomatoes and aborigines were growing. Since about 15th of November he said his family was living off the earnings of mainly the sale of vegetable. He expects this would continue till middle of January. He has also managed to harvest paddy from this plot this year. (They were able to obtain paddy from only two plots and unable to sow in all other plots).

Productivity details

	Name of the plot and respective productivity details					
	Gharer samne	UB neeche	Kumar gorha uttar	UB upar	KG Dakhin	KG paschhim
Current year	Not sown	5-7 seer	5-7 seer	Not sown	5- 7 seer	5-7 seer
		Local	Videsi	Local	Videsi	Videsi
Last year	Not sown	3 man/bigha	8 man/bigha	2.5 mon/bigha	8 man	8 man/bigha
		Local	Local	Local	Local	Local
2 years back	Not sown	3 mon/bigha	1 mon/bigha	3 mon/bigha	1 mon/bigha	1 mon/bigha
		Local	Videsi	Local	Videsi	Videsi
3 years back	6-7 mon/bigh	7 mon/bigh	10 mon/bigh	7 mon/bigh	10 mon/bigh	10 mon/bigh
4 years back	Best year of the above 5. Doesn't remember the productivity details but that year he had got his optimal yield of 200 mon from his total land					

Productivity of the past years in other baidis with no source of irrigation or even 5%		
	Namo baid	Shirrihh baid
	1.5 bigha area	6 bigha area
Current year	Not sown	.4 mon/ bigha
Last year	10 mon/ bigha	3 mon/ bigha
2 years back	3.3 mon/ bigha	1 mon/ bigha
3 years back	10 mon/ bigha	4 mon/ bigha
4 years back	10 mon/ bigha	Did not own the land that year

According to Ram krishna of the three past years 1998 – 1999 was the best year.

Below the total yield (from all land suited for paddy) is given:

	1.2.1.1 TOTAL PRODUCTION
Current year	4.5 mon
Last year	50 mon
2 years back	30 mon
3 years back	150 mon (lost some due to untimely rains)
4 years back	200 mon

He uses fertilisers for *Videsi* (improved variety) paddy only @ 20 kg/ bigha. But he announced that he would never sow *Videsi* paddy ever again. According to him, *Videsi* paddy requires timely waterings. If there is any delay in the transplanting time, the yield drops substantially. Here the chief problem is that the rains are extremely unpredictable. There is very limited alternative arrangement for providing irrigation. Thus, if rains fail there is practically no arrangement for

irrigation. In such a situation not only does the yield reduce drastically 'we also do not get any straw'. He says 'in this year if I had taken *desi* paddy at least I would have got some straw to feed our domestic cattle.

The higher yields obtained from *Videsi* are according to him equalised by the higher cost of fertiliser and pesticides. Even in a good year the straw obtained from improved paddy is higher in number but less in weight than what is obtained from local races of paddy.

On water sharing, he says he does take water from 5% pits belonging to others but not in the paddy season. During the paddy season, the owner fears that the rain may fail and the water just might be needed to save crop. Alternatively, during the paddy season the owner of the 5% is hopeful that there will be good rainfall and his pit will retain water after the season sufficient for some other crop. When the paddy season is over almost the entire precipitation due that year will have been received. If the rains are inadequate, the farmer may not be very interested in what water remains.

Even the locally prevalent custom has been to prevent access to standing water in the field when there has been a water stress for some days. Normally the farmers with land on lower side draw water from the higher plots by cutting through the bunds. But once the rains fail the farmers with some standing water do not allow others to cut bunds and divert water to their own plot. To prevent surreptitious bund cutting the farmers even mount all night vigils on their plots in real scarce periods.

Future plans? 'If no arrangement for water is made we will not be able to survive' So what does he propose to do? 'If my sons stay together and impishly smiling he adds and they do not drive me out and if we manage to get a good harvest in next 2-3 years and I am fit enough to instruct the sons then I propose to make another 25 foot deep pond to enable all year cropping'. They cannot be dug in a year. And if one is not assured of food and if one needs to struggle to keep the plate full then one cannot dig in such a year. You can think long term only if your short term is secure'

Ram Krishna has an interesting observation. He says the 5% are not useful primarily because they tend to draw away all the moisture into the pit. Say if one were to draw the water from the 5% and irrigate the plot yet all the water will be sucked into the pit –own or some one else's. It, according to him thus accelerates the drying of the plots.

He is one of the vociferous votaries of the lift irrigation scheme. According to him his village is a textbook case for installation of lifts. The Kumari is perennial. It's a crime to suffer from water scarcity when so much water is just flowing away. Rather than having spent *lakhs* of rupees thinly over so much of land digging pits, PRADAN should have spent the money at some selected points and set up lifts.

He says 'if lift is provided the rich and the poor both will survive'. The rich will be able to take a second crop. The poor who have less land will be assured of optimum yield and will get work right at the village to work on the field of other relatively better off farmer. This way their quality of life will improve – they will not have to migrate every year. If they stay in the village they can build assets in the form of animal wealth, their children can attend school more regularly. They will thus get an opportunity to improve their situation in life'. Short of a lift nothing will be as useful.

Should 5% be dug at all? Normally no. Any pit should be at least 25' deep. However, 5% can be dug in low lands with an assured spring whether seasonal or perennial, to recharge the pit.

However he consents that if the land is wet already and the 5% contains water then it at least allows the farmer to do timely sowing. The bit about saving the standing crop is useless talk. When there is even 10-15 days break in rainfall the pit itself starts dries much before the next irrigation will be required.

He is one of the rare people who annually de-silts and deepens the 5% pit in Krishna Gora plot. He wants to level the plot as it has potential to become a good plot once completely leveled. Every year for 5-6 days, 4-5 people work or about 5 hours each day digging the pit and the women help to cart away the mud.

2.1.3 Ratikanta Murmu

Ratikanta is in his mid to late thirties. He is literate. He owns about the largest land holding of about 52 *bigha*. This is far higher than that owned by most other landowners. Probably as a consequence of high land holding he also has probably the highest number of 5% pits - numbering twelve.

He has two mothers both of whom live with him in harmony. His father married twice in his desire to have a son. But some years after the second marriage Ratikanta was born but of the first wife. In addition to his mothers, his wife Bilasi and one son (aged around four) and one daughter (aged about 9 months) live with him. His eldest son aged about 6 is enrolled in a residential middle school run by the missionaries located some distance away from the village.

He is in the estimate of the other villages well endowed in terms of land wealth. But yet the villagers were not willing to accept him as well off. The rationale was that a person is well off when the person is able to harvest more than two year's paddy requirement of his entire family during one agriculture year. Any thing less and they emphatically stated the person is *not* well off.

Enumerated below are the reasons to which Ratikanta and his wife ascribe the low yields, written in the order of their importance -

1. Poor rainfall and inability to save crop due to lack of irrigation.
2. Shortage of money and consequent inability to purchase the motor power to pump the entire irrigation water shortfall.
3. They own a pair of male buffaloes and some cows, goats and sheep but the combined dung generated is not enough to properly manure the entire land to be taken for paddy. There is a preference for using cow dung, as it does not cost money. Rati says apart from *bahal* land he does apply chemical fertiliser to any other field. He says that even there is good rainfall he is rarely able to get sub-optimal yield of not more than 2.5-3 man/ *bigha* and at best 3-4 man/ *bigha* due to this inability to provide adequate compost.
4. Lack of manpower. Only he and his wife are capable of hard labour in his family. His mothers are old and help in operations like transplanting, harvesting to the extent feasible, cooking and fetching water etc. But there is dearth of male members to plough the land in time. He has to depend on hired labour and his resident *baghal* (cow herd) to help with the ploughing. In spite of this they are not able to plough all the land and nor are they able to plough all the land they do plough in time. Thus sowing gets delayed adversely affecting yield.

5. Shortage of money and consequent inability to hire the entire labour required or purchase the required quantities fertiliser/ pesticides. (Shortage of money as a debilitating factor was repeated twice with related two factors water and labour)

Rati grows some vegetables, mustard on land near the Bakar *bandh*. However it is for use at home and small portions he sells in the village markets held nearby. According to him the quantity is not enough to interest the vegetables traders who look for purchase of 20 kg or more each time. Some portions are sold from the village itself the rates are same at the *haat* and the village.

In normal years he sells at least some paddy. But for the past two three years he has not sold any paddy

Current year	0
Last year	0
2 years back	0
3 years back	60 kg
4 years back	50-60 kg

The paddy he sells is typically that which is excess produce over and above the family's own requirement.

Ratikanta's views on 5% were -

'Not that it is entirely useless, in a normal rainfall year during dry spells the water is useful to save the paddy crop. In his experience the primary usefulness has been in being able to use the water from 5% pits to adequately puddle the soil at the time of transplanting'. However he was quick to emphasize that even in puddling its is useful only if their has already been some rain on time and the soil is already damp. Then drawing water from the 5% one can make up the deficit in moisture.

However, in such a case the transplanting needs to be done immediately. Any delay and the 5% water may seep down reducing the water availability in the plot. Once this is allowed to happen the water will be over and yet no transplantaion done.

His typical statement on 5% was 'Even in a normal year at best 5% can ensure we live but it cannot ensure we thrive well. In other years it fails entirely'. He used an allegory to illustrate his point - 'What if you are allowed only a quarter of your daily ration for months together, will you die?' The researcher considered the issue and replied in the negative. He said ' that's exactly what 5% does, just as eating only a quarter of the ration will not kill you but it will end your strength and make you vulnerable to various diseases, the 5% is able to raise expectations by irrigating once or twice. But it cannot ensure that the three - four post sowing irrigation (especially in the grain filling stage) needed to harvest crop are available. Given this reality, when the weather gods are not obliging you will have spent your effort but got no returns'.

During one of our casual meetings he himself was to state 'I am certain if a similar opportunity comes up as in the past with PRADAN, I will not agree to constructing any more 5%'.

Following this and once again while officially interviewing he was asked whether he would consider closing the pits. His response was 'I won't close any of my 5%'. The reasons proffered were - It will require effort and money to close them.

When asked what if, by way of argument 'someone was to compensate you to enable closure?' Rati's wife responded with 'While the pits themselves may not be useful but where will we now find the earth to fill them up. We will have to disturb the *bunds* to fill the pits. But barring 2-3 we will not exert any effort to keep rest of the 5% open'.

He favours construction of 5% on *bahal* and *kanali* lands in preference over *baid* land. However he says 5% should also be made in *baid* lands as all landholders do not possess *bahal* and *kanali* lands but do own *baid* lands. Hence limiting to only *bahal* and *kanali* landowners would deprive the others of an opportunity to built pits in *baid* land with potential springs.

He does *boro* paddy in January (There are three types of paddy cultivation *aman*, *bodo* and *aus* practiced in these areas) in plot number 157 (*Phakir di*h plot). This land is *bahal* type (5% are generally made in *baid* lands) and the total area is 3 *bigha* but he does the second crop of paddy only in 1 *bigha* of land due to inadequacy of water. He generally is able to provide two irrigations from the 5% pit on the plot and has to depend for further 2 irrigations on water pumped from the river.

According to Rati's wife the *Phakirdih* plot will contain water till nearly April. Even if the rains were quite erratic it would still contain water as there is a *jharna* (spring) in this 5%.

In December the pit had 5 feet depth of water. But the water is available only during the time of transplantation. During March when life saving irrigation will be required for paddy then there is generally no water in the pit. He does not do paddy on this land because the land does not adequately dry by the time it is December and time for sowing wheat or potato.

According to Rati the pit in *bahal* thus is more useful than the ones made on *baid* land. At least on the strength of it he is able to take another crop. Every year in *Kartik* they de-silt this pit and this way the pit is recharged and a further 2 feet of water is accumulated after the first use. For de-silting 3-4 people work for 4-5 hours each day for 3 days in all.

The varieties sown in 6 out of 12 plots with 5%:

Water retention in 5%	Till Mid May to mid June	Till December	Till December	Till August	Till August	Till August
Variety sown now	1030 (its improved bahal paddy)/ 1444/ or Fifty	1001 (its improved baid paddy)	1001	<i>Desi</i>	<i>Desi</i>	<i>Desi</i>
Variety sown prior to 5%	Local	Local	Local	Local	Local	Local
Second crop	Yes	No	No	No	No	No

What second crop	Boro (second crop of paddy) paddy	No	No	No	No	No
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Fish	Yes, local varieties comes with flood waters during paddy season and remains in the pit. Gets about 5-6 kg of fish in one year	No	No	No	No	No
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Location	This does not have any 5% or <i>hapa</i> close to it or lower than it. But it is close to the river.	Not close to river but has <i>hapa</i>	Not close to river but has <i>hapa</i> and 5% on lower side	Not close to river but has <i>hapa</i> and 5% on lower side	Not close to river but has 5% on lower side	Not close to river. Has 5% close to it, lying along side it but not on the lower side
Desilting	Done every year in this pit. But it is not getting deepened. There is hard rock at the base which cannot be cut. Dynamite is the only option. But not only would that cost money the <i>jharna</i> (spring) may get disturbed. It is done by 2 men (himself and the cowherd)& 2 women folk.	No	No	No	No	No

Other s Use	No	No	No	No	Yes Anil takes for potato. Rati & Anils brother have land there but do potato on other lands	
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Productivity per bigha						
Current year	13 mon/ bigha	Not sown	Not sown	Not sown	Not sown	Not sown
Last year	12 mon/ bigha	3-4 mon/big	3-4 mon/big	2-3 mon/big	2-3 mon/big	0
Year before last	11 mon	Same as above				0 (sown late hence got no yield)
Four years back	Yields have generally been consistent through out the years					

2.1.4 Anil Hembrom

Village – Huchukdih

He is a Santhal and has studied till class VIII. He lives in Huchukdih wife and 3 younger children. His eldest child, a boy, is a boarder at the government boy's school studying in class VI.

His own land is able to provide him yields for 4-6 months. The remaining part of the year they have to migrate or work on mud cutting project undertaken in the village. The past year they did not migrate, as they were able to get work round the village. This year they hope for the same.

Anil owns about 8 *bigha* of land. Almost the entire is suitable for paddy. Of this 1 *bigha* is irrigated from a well constructed by the *panchayat*.

It was decided to profile his second crop details for this year:

In a plot where the total area is 10 *katta* there is a 5% pit. However after the paddy was harvested he doubted whether the water remaining in the 5% would be adequate for potato is sown on the entire 5% plot. Like last yea he then decided to sow potato in only 3 *katta* of the total 10 *katta* area there.

He has sown about 20 kgs of potato and if he manages to get optimal yield he will get 200 kgs of potatoes on harvesting. Last year too he had sown 20 kgs and had obtained 200 kgs of potato. However last year the water in the 5% was adequate for 3 irrigations and only for the last irrigation he had to draw water from the 5% belonging to another person.

This year he has been able to use the water from his own 5% in that plot to wet the soil at sowing and later for another irrigation. He and his wife used the *dabka* to draw water for about 3-4 hours. However after that the 5% dried up. For his third irrigation he and his wife had to use the water of another 5% belonging to his neighbours Ratikanta. That 5% is about 200 foot (rough estimate) away from his plot. There are several other plots separating that 5% from their own land. These plots do have 5%. But the 5% in these plots contained water when his had water. When his was exhausted, the other 5% near his own land had also dried though the water from these had not been extracted. For his third irrigation, he and his wife drew the water in tins. Edible oil is generally sold in the market in these standard sized 15 kg tins. He carried two such tins on his shoulders filled with water from Rati's 5% to his own land for irrigation. His wife carried one such tin load of water on her head. It took them 4-5 hours to irrigate the entire three *katta* land along the furrows. He expects that he will be able to harvest the crop with no further irrigation. But he frowned, did some calculation and said he will probably require another irrigation before the potato is ready for harvest. But the last irrigation would be difficult. By that time if Rati's pit dries up he will have to carry water from even farther away he say from the *hapa* located some 400feet away, which contains some water.

He is determined to harvest 200 kgs and will not allow water shortage to reduce the harvest. He says potato is one basic item of food - if they have to buy it too, the going will really be difficult.

On what basis does a farmer select the area for a second crop? When one farmer draws water from others pits, what prevents the others from doing the same the next year? Whose claim will remain? To know this I asked Rati why he does not take potato in the plot from which Anil draws water and then he could utilise the water himself and also draw on others 5%

Rati said in a good year he takes potato on two plots both of which are suitable for it. One of the suitable plots was the one Anil obtained water this year. But as the water was less and he was not sure that he could really harvest potato in that plot he preferred to focus on the other plot, which was closer to a *hapa*, from which he could provide timely irrigations. If the water of his 5% dried up in the former area, irrigating the crop would have required intense effort. Besides Anil has only this land where he can take potato. No other land is suitable for the same. As he had an alternative he moved out so that Anil could try his luck.

Anil says that as earlier too he has been able to harvest potato from that plot he persists with the practice of taking potato in that plot.

2.1.5 Manu Singh Sardar

Village – Huchukdih

Manu is about 50 years old. For the past few year he does no work. His sons aged 20 and 13 and a daughter aged 14 do all the work related to agriculture and at home. Today his family consists of 5 people including him. Two of his daughters are married.

They own only a pair of bullock and one goat. In terms of other assets he has only one cycle. They own 5 acres of land and 2 acres of wasteland. Of the total land 2 acre *baid* land is suitable for paddy. In one acre of *baid* land vegetables are also cultivated relying on water from *hapa*. He received Rs 8000/- from PRADAN for digging the 50'x50'x10' *hapa*.

They have four 5% pits. He says he agreed to pits in the hope of saving paddy. From each pit water is available 2-3 times. If potato were to be sown all four irrigation could be obtained *if* the pit fills up. In one plot where there is water for almost 7 months a year he also does potato and other winter vegetables after harvesting the paddy. One pit does not serve any purpose as it contains water only for a month or two.

He came up with an interesting interpretation of the name 5%. 'Do you know why is it called 5%? Because *panch* in Bengali is five in English. Its called 5% because it facilitates 5 crops – paddy, trees on bunds for fuel and fodder, *bagui* grass, fish and a second *rabi* crop.'

He is also one of the rare farmers who admit to regular de-silting of the pits.

2.1.6 Ashari Mahato

Village – Choto Mukuru

Aged about 50. He is matriculate. His family resident in the house consists of him, his wife, 2 sons their wives and one daughter.

He lives in a mud house with tiled roof and owns cycles and transistor. He is also the only person the study village who own a '*gobar*' (cow dung) gas unit with which currently he is able light a bulb. Since the cow dung is less he is not able to obtain enough gas to operate the cooking stove. He owns both a pair of bullocks as also a pair of male buffaloes for ploughing and drawing the bullock cart. Besides he owns two cows, 20 hens and ducks. He rues the fact that only a month back about 25 more hens died due to some mysterious illness.

He is an enterprising person. Through *panchayat* funds he built what is locally called an *Aari bandh* or a water diversion. In this the water flowing from upper fields to the lower fields is diverted across the fields to other uplands along which the water did not flow earlier. To do this he got *panchayat* to finance the lowering level of his own plot. His land became conduit to transfer water to the other lands and in the bargain he obtained a *kanali* plot.

He owns about 17 *bigha* of land of which 15 *bigha* are suitable for paddy. His family is fully dependent on farming for the family's sustenance and has no other means of livelihood. He normally sells some paddy almost every year. Last year (FY 1999) he sold some 12 *mon* of paddy at a rate of Rs 100/- per *mon*.

Of his total land about 3 *bigha* is irrigated from a *pukur* located on plot 157, which is shared between his kin who have land close to it. In addition he owns three 5%.

He built his first 5% some eight years ago when according to him Dinabandhu and Pakhiraj from Hindustan Fertiliser approached him³². They told him to dig one, as it would enable him to save his paddy. Also they confessed that if he dug one, others might learn from his experience and decide to adopt. The others were distrustful of these outsiders and their intentions and thus had not dug any pits. He went ahead because he rationalised that even at its very worse he would be paid for the digging. Besides these people could not any way tamper with his rights to the land - the land was his and he had proper titles to it which he did not have to hand over. However within one year he closed that pit. Other villagers had not dug any 5%. Rains were good that year and other people taunted him for the yield that he had to forgo as the pit had destroyed some of his arable land.

Then again in 1997 PRADAN approached him and he agreed to dig the pits. By that time people had already seen similar pits in a nearby village of Brajarajpur and felt it would be useful.

Details of the 5% Pits			
Plot no.	17	17	73
Area	43 decimal i.e. 1.3 <i>bigha</i>		
Land zone	Baid		Baid
Soil type	Clayey – stony soil		

The pits were all 5% of the total area and were 5% deep. He has never increased or altered the dimensions of any of the pits. In all the pits the sides have caved in reducing the original dimensions by 1 foot on each side. Yet he has not de-silted any of the pits. Interestingly enough the reason given was that he is waiting for more silt to accumulate in the pits. Then in one go he would dig the pits and spread out the silt and mud on the plot to level it. The soil layer would also rejuvenate his soil. To do that de-silting 3-4 people will have to work for one whole day.

The pits retain water generally for 8 months till early December. In these plots he cannot do vegetables in winter as the water is not enough and there is no way of irrigating from the river, the plots being located at a distance from the river.

He is generally able to extract water twice from the pit but the second one is with some difficulty. According to him about one and half to two hours suffice for ensuring standing water 2" at the root zone.

He continues to grow local varieties like *Thupisal* in the plots with 5%. He has taken *Lalswarna* an improved *baid* paddy also in plot no. 73 with 5%. He finds *Lalswarna* attractive as it has a potential to yield 15-20 *mon* per *bigha* while the traditional strains of paddy yield only 4-5 *mon* per *bigha*. But while the returns can be good in a good year, in a bad year even though the yield is higher than that obtained from local strains the additional cost in terms of cash investment in fertiliser generally equates the returns in real terms from both crops.

He applies fertilisers at the rate of 5 k.g. DAP and 2 applications of urea at 21 day intervals on *Lalswarna*. Which itself comes to about Rs 300/- or so in addition anywhere between Rs 400 – 600/- has to be invested towards. He does not apply any fertiliser to local varieties.

³² Could not independently corroborate this and hence identify even the organisation. There is probably some confusion on identify of the people

He expects to harvest about 8-10 *mon* per *bigha* while his neighbour who has also sown 5% but has no 5% will probably be able to harvest about 4 *mon/ bigha* though upkeep has been same in both cases.

This year after the initial rains there was a gap of almost 2 months in rainfall as a result the harvest may not be enough to meet his family's needs.

Earlier in all these plots he only did traditional *baid* varieties like *Thupisal*, *Akshay rani*, *Lolat* and *Assam ous*.

Generally he takes a second crop of *Tisi* (linseed) on these plots. It's broadcast even before harvesting paddy and is able to grow on the residual moisture available. But that was feasible even before having 5%.

Ashari says that the pits in his plot no. 17 have not been correctly located. Since the 5% was constructed silt flowing along with the runoff does not spread on the plot and nor does the plot automatically have water standing. The runoff water has a propensity

In his views the factors limiting his land productivity is –

- Wrong location of the 5% in two cases, which has affected the natural re-generation of soils.
- Shortage of cow dung to manure his lands. Some 5 cartloads should be optimally applied in his view but he is able to apply on 2-3 cartloads.
- Since the agriculture is dependent on rainfall the entire agriculture operations needs to be done in a short time after the rains. This drive ups the labour cost, as the family labour alone is not sufficient to manage the entire 15 *bigha* of paddy land.

Typically the cost, which is incurred in terms of paddy, is

For transplanting and fertilising	20 <i>mon</i> @ 3 <i>seer</i> per woman
For weeding	7-8 <i>mon</i>
For harvesting	30 <i>mon</i>

Thus in the absence of optimal yield he is not able to recover the labour cost. This year he expects to get a total yield of 80 *mon* while in 1997 and earlier he got between 150 – 170 *mon* of paddy.

In his opinion, if the existing pits can be deepened by a further 2-3 feet they would be more useful.

Given a choice where land is not constraint he feels a *hapa* is better. His arguments are summarised in the table below –

	<i>Hapa</i>	5%
Unit cost	Rs. 12000/- (including labour contribution)	Rs. 1000/-
		At cost of one <i>hapa</i> , twelve 5% can be built
Benefit	5-8 people with about 20	These twelve 5% would

	<i>bigha</i> of land	benefit 5-6 people assuming most will have two 5% as is the case now or about 20 <i>bigha</i> of land
	<i>Hapa</i> is good for every kind of land	For upper parts of the uplands 5% is not good as the water collects in one place and readily drains away to lower lands ³³
	The water stays longer and proper stocking and fish rearing can be done. Tending one <i>hapa</i> is easier than several pits. Better crop planning can be done around water in the 5%	Pits dry up fast. Fish rearing even if done, the size attained is not good nor is it economical to stock the pit.

Ashari, researcher and other members of his family then had discussion round the issue of availability of land and sharing of a common resource like water across different users. But this did not appear to be a major issue for Ashari as he is willing and able to spare land for another *hapa* and being made exclusively on his land sharing of water is not an issue.

Ashari was rather concerned that the researcher properly understands all the nuances of 5%. Since the people in Sri Lanka and other places wanted to learn from their experience it was necessary all aspects should be highlighted.

Ashari continues to believe in efficacy of the 5%. He says he has benefited immensely from it, as he was able to take improved paddy in some plots and harvest more from traditional varieties. Today there is an abundance of fuel trees hence incidence of theft of wood has reduced.

He believes some design improvements like deepening would make it more effective.

2.1.7 Abhiram Sabar

with Sudhir and Sraban Sabar

Village Huchukdih

Abhiram and his male siblings and the children of his uncle live in the same building. All of them cook separately but as the land has not been formally divided and they continue to jointly cultivate they have been treated as one family in the study. There are in all 12 adults and 11 children in the extended family.

³³ He says in the plot no. 17 he is generally able to irrigate only once from the 5%, after that it dries. His pit is 20'x20' in dimension. The person with land lower than his has a smaller pit probably only 10'x10' but is able to irrigate generally twice and even thrice. The pit lying further lower than this is about 5'x5' and they are able to irrigate almost thrice. He feels his large pit only helps the people in lower lands. Ashari's son added that when we irrigate our crop in the next day or two the water level in the lower pit increases. Both felt that 5% should be dug only in such uplands where the plots on the lower side along the slope also belong to the same person.

In all they own 2.5 *bigha* of land. In addition the family also cultivate a further 4 *bigha* of forestland to which they have no title and were fearful of official reprisals when Sraban told me about it. The forestland is separately cultivated but the details are not available.

At best they are able to harvest 20 *mon* of paddy in all. Last year they obtained 12 *mon* and year previous to that they got 10 *mon*. The paddy that they are able to obtain from the land at best lasts them only for 2 months.

The family is primarily dependent on migration for its survival. For instance in Abhiram's family everyone except the father and mother migrates each year for about 6 months. Abhiram with his spouse is able to bring back a saving of Rs. 2500/- over and above the six months survival and repayment of festival loans taken earlier. His brother Sudhir goes to Burdwan for approximately 40 days a year – once at the time of harvesting and again at the time of ploughing and transplanting. He is able to bring back about 20 kgs of rice and some Rs. 2000/-.

The extended family owns two pair of bullocks, one hen and half share in one goat.

They own in all four 5% pits dug some three years ago in 1997 with the financial support of the NGO, PRADAN. According to them all the pits are located in the same plot 2425 which is divided into approximately 4 plots each of about 10 *katta*. The soil of all the pits is sandy.

They have never considered increasing the dimensions of the pits as they have little land spare to afford further submergence. They have never been able to consider de-silting or deepening, as they are generally not in the village in dry months just before the rains and when they return its time for agricultural operations.

In a normal rain year from each of the pits they are able to extract water once comfortably and second time with considerable difficulty, each time for 2-3 hours at a stretch. Only from one pit they are able to comfortably obtain two irrigation using the *dabka*.

Three out of the four pits retain water till January, while one retains water till February. From the time before they had any 5% pits they continue to sow only *Thupisal* the *desi* variety which according to Abhiram only requires damp soil to give decent yield. According to Sraban Sabar the improved varieties require greater care as also higher inputs and 1 inches of standing water.

From the plots with 5% they are generally able to harvest 5-6 *mon/ bigha*. Earlier prior to the 5% they were able to harvest around 6 *mon* but frequently it was lesser, around 4-5 *mon*. The necessity of migration for survival still remains.

As a part of a food for work programme the *panchayat* built a mud and brick house with tile roofing for the family under the condition that they would have to provide one room for meetings and the children's school. They had to contribute labour. According to them they were selected because they were poor and their earlier house was in a bad shape caving in from all sides. In spite of school running in their house their own children have to suffer from dislocation in studies due to the annual migration.

They are able to use only 1-2 basket loads of cowdung per *bigha* where most others in the villages use at least 20-30 tins or 3-4 cartloads or even more basket loads per *bigha*.

Generally they do not do much of vegetable cultivation but this year one brother who would stay behind was considering vegetable cultivation in the plot whose pit retains some water till February. Rains were late and he was hopeful if sufficient water remained he could consider some vegetable cultivation but a decision could only be taken in December.

2.1.8 Lal Mohan Mahato

Village - Tasarbanki

His family consists of 2 adults apart from his old and incapacitated mother and 2 young sons. He has not attended school but is literate. He was urged to dig at least 2 pits. He refused to dig 2 pits, as significant proportion of the land would be thus wasted. He was told he would be paid @ Rs. 40/*chouka* after deducting for owners contribution. On one plot of land about 10 *katta* in size he was told to dig a pit of 10'x10'x5'.

He decided to start on the digging of this one but gave up after digging till a depth of 1.5 feet. He started because every one else in his vicinity was doing and confesses the money for digging seemed attractive though apparently not the 5% concept itself. His agricultural land is inadequate and needs to migrate for 5-6 months a year. He decided to migrate again that year with his family in preference to digging the soil and spoiling his own lands.

Any regrets today for not having dug a 5%? No as the money paid for digging would not have seen him through that year and would have affected long-standing relations with *bhatta* owner. And digging a 5% would only have further limited his arable land and any way the 5% is not useful enough to justify that destruction.

(However, in other interviews it became apparent that he was using water from an adjoining 5% pit for his own lands)

2.1.9 Upendra Mahato

Village - Tasarbanki

He is a teacher of the government local primary school at Tasarbanki. His family apart from him consists of his wife, two grown up sons, wife of one son and their two children (*i.e.* 5 adults and 2 children in all). In all he owns about 13 *bigha* of lands of this 2.5 *bigha* are can be irrigated from a *hapa*. At the time of interview owned 2 pairs of bullocks and had only recently sold of the pair of male buffaloes also kept for ploughing as method to cope with reduced straw availability. He still retains the 2 cows that he owns.

He possesses four 5% pits. Of this one pit he has dug on *kanali* land some five years back from his own funds. He had seen pits being dug in other places (probably Brajarajpur village where PRADAN had initiated its first 5% in that area but he did not mention so). He dug a 25'x20'x5' deep pit in *kanali* plot 1.5 *bigha* in size. In this pit water remains till as later as April – May. He is able to take 1010 variety or Lalswarna paddy as *kharif* crop and is able to harvest 20 mans from this plot @ 13 man per *bigha* which is very good according to the others assembled there for *kanali* paddy.

After harvesting paddy he takes potato in the same plot and 'gets good yield' – since he was in a hurry to get to school and I had to meet the LCS, details of potato were not collected.

From this pit he is able to give 2 light sprinkling on the paddy when needed to ensure optimum yields and at least 3 other irrigation for the potato crop that follows the *kharif* paddy.

He uses 150 kg of DAP and a total of 15 kg of urea (in two applications) in this 1.5 *bigha* plot. He also uses thimate etc.

According to him of the 4 pits the one he dug from his own resources before the implementation of the 5% in his area serves him best. He says by way of supporting his statement that not only is he able to harvest a good yield of paddy he is also able to get a crop of potato. If pits are made in *danga* (uplands, a generic term for *tarn* and *baid*) as advocated by the NGO the water harvested is not enough even for one crop of paddy. Besides if there is less rainfall the *kanali* pits at least fill up faster and allow a second crop. In a similar situation the 5% in uplands does not even fill up and what little does collect soon drains away to lower lands. Even if it does not drain away the water is far less than the critical amount required for one proper irrigation. If rains are delayed but good the water is of less use as in the water is inadequate for a *rabi* crop. And if the rains are good the 5% is not required at all. Apparently by way of conclusion he said this was only wastage of land and of money'. '*Danga jamin te kore ki labh ?*' ('What's the use of making on uplands?').

By way of contrast, he told about his 5% plot near plot no. 1154 (??). In late October there was 3 feet depth of water still left. But when its time for potato hardly any water would remain. This year he was able to sow only in one of the three plots with 5%. In these plots he can only sow local strains like *thupi* and *lalat*. At its best, the yield would be 4-5 *mon/ bigha*.

2.1.10 Panu Chitrakar

Village – Hesladih

He was a regular visitor to a nearby house to obtain his regular dose of an intoxicant. He originally hails from a large adjoining village called Bardah. His wife is dead and he has three sons of whom 2 are married. His elder son has 5 children of whom one daughter has been married. His own daughters have been married.

According to him under the influence of intoxicant he had fatally injured a milkman in his original native village after which he had fled and settled here. In Hesladih, he owns about 1 *bigha* and 5 *katta* of land. In Bardah with 8 other kith, he owns 130 *bigha* of land. He owns no animals or livestock.

All the three sons are sweet meat makers in town working for some trader. Every month they send him Rs 800-1000 with which he and their families survive.

He owns one 5% pit. He uses a pipe to irrigate the paddy crop when required provided the pit is full. He normally does not use *dabka* for paddy. However, the *dabka* has to be used when he needs to irrigate the potato/ tomato crop which follows the paddy as by then the water table has considerably lowered. The water in this pit after being extracted for successive crops dries in January.

In a good year, he is able to harvest 8-10 *mon* of paddy. However, in year 2000 he has not been able to sow.

Apart from agriculture, he also has taken to money lending business. However details of turnover, returns not probed seeing his hesitation to divulge.

2.1.11 Amar Singh Sardar

Village - Huchukdih

Aged about 60 years he owns about 9 *bigha* land. He is Panu's companion in smoking intoxicants. Most of this land is reasonably suited for paddy. He owns about 3 pits but the water in each dries up by early December. He takes water from the 5% pits of his brother Haripada whose lands lie along side his, to irrigate his second crop of vegetable on one plot. When questioned he emphatically asserted that, 'every member of the *samiti* has right to water in another's pit and his need does not follow that of the owner',³⁴.

According to him, the yields obtained by him are comparable to that harvested by his brother Haripada who has been separately interviewed earlier. This year he had actively discouraged his brother from sowing Lalawarna (an improved strain) but disregarding his advice Haripada still sowed. Now Amar says due to his folly Haripada was unable to harvest any crop as in the same circumstances his *desi* still gave some yield and straw.

In spite of repeated clarifications, he persisted with the impression that after the survey and interviews 5% pit deepening/ broadening exercise would be undertaken 'surveys are conducted as precursor to determining suitable clients'. He begged me to include in my 'report to the authorities' that one of his 5% (he took me to the field to show) should be increased in dimension as there was abundant wastelands just surrounding it and it would thus increase its water holding capacity. Deepening by a further 5 foot would also be extremely beneficial to him and his brother Haripada he reminded me just days before my departure.

2.1.12 Haripada Singh Sardar

Village – Kandoya

During his interview, his brother Amar was also present. However the brother was interviewed at a different time about 20 days hence. I met Haripada when soon after commencing my village stay I visited one of the sites where *panchayat* was implementing some watershed structures. It was a *hapa*, which was being dug in land owned by Haripada and Amar Singh Sardar at a total cost of

³⁴ A This statement of his supported by two others present during this discussion led to considerable confusion in my understanding on the norms governing sharing of water. It was later verified that people do not magnanimously allow others to use water from their own pits. Only when there is excess water that the owner will not require or he believes by the time he will require the pits will fill up again due to subsequent rainfall that others are allowed to use. In this particular case probably two reasons could contribute to sharing – one Amar's brother lives some way off in another village. Tending a vegetable crop in Huchukdih at such distance would not be feasible. Vegetable is typically grown on homestead land, which can be relatively conveniently tended. The other reason could be good family relationships. But according to others even then such requests are honoured when one does not need it or the owner of the 5% is away then other relatives stake a priority claim on the water in another's 5%. Thus this is only a conceded right and not an absolute right.

about Rs. 10000/- and would reportedly benefit 4-5 farmers in drought proofing their crops. We fixed up a meeting in the evening after he had dug the days *chouka* and was free.

Hari is aged about 40 years. He lives in Kandoya, which is outside the study area in watershed no. 2, but almost his entire arable land is in Huchukdih. His family consists of his three children and his mother who is incapable of any work. His wife died some months back.

In all, he owns about 9 *bigha* of land. Of this 6 *bigha* is suitable for paddy. Three *bigha* is lowland (*kanali*) and 3 *bigha baid*. As of now, he does not have any source of irrigating the lands. When the *hapa* (that was under execution) is built, from next year he hopes to be able to irrigate some of the lands.

In terms of animal wealth, he owns 3 hens/ pullets. The only other animal wealth consisting of his bullock and 2 goats he had to sell to meet the expenses of the last rites of his wife. He considers himself fortunate in comparisons to others that he did not have to sell the land to pay for the last rites.

In a good year his agricultural produce sees his family through 6 months and the remaining 6 months he and his wife (when alive) had to migrate to Burdwan. They were able to bring back about Rs. 1500/- provided they or the children were not taken ill.

He possesses three 5% pits. He agreed to dig pits because the NGO personnel from PRADAN 'convinced' him of their utility and he was hopeful of securing his paddy harvest.

He has never de-silted any of the pits. In one of his pits water remains till March. It gets water both from rain as also by seepage. From this pit, he is generally able to extract water for 3 irrigation. The other two pits only receive rainfall. There is also no run off as the slope runs counter to the location of the pit. In these two pits, water remains only till December.

He has sown hybrids in the land with pit this year. Earlier, when there was no 5% he sowed *desi* paddy in these plots.

He has never taken a second crop in any of the plots. Even in the plot that retains water till March, he is not able to raise a second crop. These lands are *baid* with a *kanali* character (*i.e.* lower than most mid-uplands). After harvest of paddy, the land does not dry sufficiently to enable a crop of wheat or even potato. And the water in the pit is not enough to ensure a crop of second crop of paddy sown in December.

In the other lands without 5% he continues to sow *desi* varieties of paddy.

According to him, now days he is able to harvest 7 *mon/ bigha* from the plots with 5%. Earlier in these plots when he sowed *desi* varieties, he was able to harvest 4-5 *mon/ bigha*. Today in land with comparable quality but with no 5% he is able to harvest 4-5 *mon/ bigha*. However in the past 3 years he has not been able to harvest any crop/ or very obtained very poor harvest from these other plots due to failure of rains at strategically important times. But the varieties taken in each of the two types of plots is different. However, he emphatically maintains the fact that even if the paddy is an improved variety it does not ensure any greater return in terms of yield as the costs also increases.

He admits that the 5% enables timely transplantation provided rains have already occurred and the land is already wet (*i.e.* the pit water is not sufficient to puddle a dry land). Also, the pits have allowed him to ensure 1 or 2 timely irrigation to the standing crop.

He is happy with his pit locations. At the time of implementation, he was interested in digging a pit larger than as per the dimensions of the 5% but the implementing agency PRADAN did not agree.

According to him deeper and wider 5% pits would be more useful. The extension should not be made on the farmer's arable land but on any wasteland etc that adjoins the 5% pit.

According to him the biggest limiting factor in improving paddy yields is hiring cost effective watering pump, getting good seed and the high ploughing and other operations cost. He is the only male member in his family capable of ploughing and he has to hire plough, as he sold his own. He also has to hire labour for transplanting etc which makes agriculture very costly as not even woman folk is there to do it. To reduce the labour cost for other operations he hopes to re-marry. For buying another pair bullock he thinks he will have to wait for some more time.

2.1.13 Tarani Mahato

Village – Tentlo

He is the local committee secretary of the communist party for the past 2 decades. He is a source of immense counter power. He owns about 15 *bigha* of land. He is one of those villagers who own a *pucca* house, complete with grills and RCC roof without being in any regular job. In FY 2000 he was not able to sow any *kharif* paddy. However he hopes to sow boro paddy and potato in December utilising the water accumulated in the 5% pits.

In connection with his role he visits the *panchayat* office 2-3 times a week. His family consisting of 3 sons and wife work in the fields. But for the major work others say he hires labourers to work in his field.

He generally sells some paddy every year.

He owns one and half (a share with his brother) 5% pits. In spite of the fact that he could not sow any paddy this year he still regards 5% as a useful intervention mainly because of its low cost and inherent egalitarianism. At the same cost several farmers can be benefited, while *hapa* would concentrate the benefits in the hands of few with excess lands to spare. Lift, he said most people in the village would say was the best because any time water could be pumped. Yet, the costs are prohibitively high for one lift and to benefit every farmer the costs would be even higher. He was the first person to be surveyed in demo round with most of the schedule enumerators present. His reasoning seemed to have deeply impressed some of them. In their own areas, whenever people spoke of the benefits of lift during the survey they highlighted the cost and maintenance angle and perhaps affected the 'raw reactions'.

In one of earliest meetings, he took us on a guided tour of the lands of one farmer, Rasbehari who was in his words benefiting from these pits. He was doing extensive cultivation of cauliflower on the strength of one 5% which had been further increased to a *hapa* using additional funds from the *panchayat*.

In spite of his responses, Tarani was the inspiration in an experiment undertaken by the residents of his village Tentlo. They repaired and refurbished a 10 HP pump of their village association, purchased almost 1400 metres of cloth pipe, diesel and mobile from contributions pooled in @ rate of Rs 200 per person. They attempted to pump water from River Jor to a dry pukur called Máral bandh. Their rationale was the *maral bandh* was dry and the river was seasonal. It contained water now, which was uselessly flowing away and would not be available when water was required for the second crop of paddy.

This experiment was not initially successful probably because the gradient was steep and the water tended to back flow from the joints. He had spearheaded this experience partly to obviate the water scarcity and ensure a second crop and secondly as proof of initiative of the villagers. He hoped this way they could strengthen their case for the installation of Lift Irrigation.

A month hence a rather agitated resident of Huchukdih returned one night shouting under the influence of drink – ‘Are not we party workers? Are not we in need of water?’ His grudge was that Tarani and others were again pumping water to fill the *Maral bandh* and had apparently met success. They were able to half fill the reservoir before the seasonal river Jor dried up in January. Some differences on the right to use this water had already cropped up. It was insinuated that Tarani had got all the villagers to contribute but he himself stood to benefit the most as he had maximum land in the command area of the

Maral bandh.

He had already started lobbying for the installation for government funded lift irrigation. Deeds and words at cross-purpose

2.1.14 Bharati's family

Village – Hesladih

Bharati's fathers name is Manindra Singh Sardar. He is a teacher at the primary school and is a matriculate. All members of his family consisting of 3 adults and 2 children are literate.

He owns in all 11.5 *bigha* of land of which 2 *bigha* is *kanali* and 1 *bigha bahal* land. He does not have any source of irrigation nor does he possess any 5%. He is one of the rare families owning as many as 4 cycles and also a *pucca* house. His land is able to provide his family with food for about 6 months. For the daily requirement of oil, toiletries and the balance 6 months he has to rely on his salary.

He has never sold any paddy. He had wanted 5% when their implementation was underway but he says he was excluded and he did not understand the reason for his exclusion.

Though a non-possessor he feels 5% pits should be made. However, while he regards a lift to be useful but adds that depending entirely on machines for agriculture is not very good. He does not regard a wider 5% is useful as the land in his area are coarse and have pebbles and no matter how wide they are, they will not be able to retain water. However, he felt deep 5% are useful as the water table in this area is low and digging deeper is the only way to ensure availability of water.

If there are dry-spells between rains the gravel soil does not retain water for long hence when there are sporadic rains with dry spells 5% are not particularly useful. He feels 5% are useful because they allow people to harvest rain water that earlier only flowed away along the gradient right in to the river benefiting no one.

However 4 weeks prior to harvest if rains fail he feels 5% cannot help much because by that time the water level in the pits would also have fallen low thus a drop in production is certain.

Interestingly enough he feels 5% should be made in low lands – *kanali* rather than the mid uplands. He uses 5-7 kg fertilisers in *baid* land where he sows *desi* varieties. In *kanali* and *bahal* where he sows IR 36 he applies about 10-15 kg of fertiliser (DAP & urea). In addition, he also applies about 2-3 cartloads of cow dung.

This year he has not been able to do any sowing in *baid* lands. In the previous 2-3 years he was able to harvest about 8 *mon* per *bigha*.

His wife Kanaklata feels that 5% is a useful intervention and feels their utility can be maintained by annual maintenance and deepening of the pit.

2.1.15 Ambuj Mahato

Village - Tasarbanki

His family consists of 4 adults and 2 sons. He himself has studied till class X. He owns about 3 *bigha* paddy land. 5 *katta* is in *bahal* and remainder *baid*.

He has share in four 5% pits held in *common* with 4 of his brothers. Of these 4, they use 3 only for paddy while one is used for cultivation of vegetables. The fourth one (*murda baid*, plot no. 1800+) is also used for vegetables. However doesn't regard it as useful as can only take a crop of tomatoes and after that the pit dries by the time it is Early January.

He feels if this pit were deepened till 25 feet and lined with bricks then it would retain more water as also benefit at least 10 people. According to them this pit has a seasonal *jharna* (spring) at about 5' depth.

He plans to convert in association with others 2 of the 5% into *hapas* as they have seen Ras Behari and Sagar (two other residents of the village whose pits were deepened at *panchayat*'s cost. If no money is forthcoming from any side he plans to do so relying on family labour in a fair year. Will first embark on one 5%, if successful will take up the deepening of another.

Another farmer Lalmohan uses his water on *Kanali* lands. Once had tried to use the water for *baid* lands but was not very successful. Will deepen

2.1.17 Biru Singh Sardar (My host family)

Today the family consists of 4 adults and six children as his eldest daughter is married and lives with her family at her father's home. They are *Singh Sardars* - a tribe. He owns 3 *bigha baid*, 3 *bigha kanali* and a *bigha* of *tarn*. In addition they cultivate some 3 *bigha* of *tarn*.

For the past thirty years Biru has been working in a mine in Ukhra in Burdwan district of Bengal. Earlier he was a miner but subsequently for the past twenty five years he has been working as mason in the mines reinforcing tunnels as the miners forge ahead digging mines. Earlier he worked for a private concern but when the mines were nationalised he has been a government employee. He draws about Rs. 5000/- per month as wages.

Some fourteen years back Biru married a second time, as his first wife was unable to bear him a son and later fell sick. He says his first wife insisted that he remarry. After the marriage progressively her health worsened and she ultimately went mad. With no man at home to do the required running around, he got his daughter Phalguni married to Kartik on condition that he would stay in his house.

Today Biru is one of the few persons with a regular supply of cash and this is evident in from facts like they own one *pucca* (brick and cement) house. Even this family is heavily reliant on external sources of cash for survival. In a good year their own produce sees them through about 8 months only.

Biru owns five 5% pits, which were financed by PRADAN. They were all dug in 1996 -1997. One of the pits on plot number 2517 was deepened with additional Rs. 9000/- obtained from *Panchayat*. If deepened this pit had the potential to retain water for a longer period. However, in spite of wanting to deepen the pit the money was spent in widening the existing pit maintaining the existing 5' depth. According to Phalguni the reason was '*Panchayat* typically takes up such work in lean agricultural months. 1998 was first of the recent spell of bad year. That year food reserves were low and people were desperate for work. When work was taken up on their pit several people wanted to work. If the pit was to be deepened due to less available area only a few people could have been involved in digging and excavation work. Since more people got involved the digging and excavation the pit was spatially increased. There was no money left for deepening. Hence, the pit is not as useful as it retains water only from June to September provided rains have occurred at required intervals'.

They have another pit in plot number 2529. This retains water from June to January. However, like their other plots this land is situated at a distance from their home hence vegetable cultivation is unlikely to be remunerative to difficulty of watching over the crop. Generally they sow 'fifty' in this plot which leaves sufficient time to sow wheat in 1 *bigha* out of the total two *bigha*. But this year as they had taken 1030 paddy, by the time paddy is harvested a second crop of mustard could not be contemplated as the appropriate time for sowing is well past by the time the standing paddy is harvested. The water that remains is not sufficient for potato. There being no other source of water nearby saving that crop would be difficult.

Generally from all the pits they are able to extract water only once. Only if it rains enabling the pit to fill up there is a possibility of extracting water a second time. When the pits fill up the land also is saturated with water.

Phalguni and her husband feel of the five 5% that they possess, all are not useful. They feel 2 are useful as they retain water for a longer while. Nonetheless, they are certain they do not want to close any of the pits as at times it has helped to provide the odd irrigation in a water stress period and helped to save crop. They do not want to fore go this advantage.

Phalguni also has a theory if pits in water shed had been dug till 10-15 feet depth they would certainly have retained water. (Incidentally, all the land of the family is in watershed 1). She says watershed 1 has a 'taan' i.e. a pull from the river as result water drains away to the river. In watershed 2 the river is further away.

When asked which mode of irrigation cost more Kartik said using a pump is difficult as it costs money. Phalguni however said that actually using *dabka* would cost more if one had to hire labour. It takes about 4-5 hours to irrigate a *bigha* and at least two people are required. Only a little over a *bigha* can be irrigated using hired labour and a *dabka* and it would cost Rs 60/- plus 4-6 meals. The farmers do not realise the cost involved because generally the family members work and no cash payment is involved. Besides one can comfortably use *dabka* only to extract from a depth of 5-6 feet. As the depth increases the effort required increases.

The yield details of the past few years as recalled by Phalguni, are reproduced below:

Plot no.	2517	2528	2525	2529	2525
Soil type	Gravel	Gravel	Gravel	Gravel – clay	
Soil zone	Midupland	midupland	midupland	(Kanali) midlowland	(Kanali) midlowland
Water retention	3-4 month	3-4 month	3-4 month	7 month	3-4 month
Paddy variety now	Fifty	Lalswarn	Lalswarn	Thupi	1030 bahal imp.
Paddy variety earlier	Fifty (improved)	Thupi	Thupi	Fifty (improved)	Lalswarna (improved)
Per bigha productivity					
Current year	0	10 kilo gm	0	7 mon	1 mon
Previous year	1 mon	2 mon	2 mon	10 mon	1 mon
Three years back	1 mon	2 mon	2 mon	10 mon	NS
Four years back	5 mon	7 mon	7 mon	10 mon	5 mon

Intra-owner (i.e. with out 5% of the same owner) comparison not feasible as they do not own any *baid* land without 5% pit.

2.1.16 Birsa Bir Mahila Mandal

Birsa Bir mahila mandal is Self Help Group in Huchukdih *tola*. It has 16 women of the village as its members. This case documents the yields from a plot of land jointly cultivated by the group. They have taken 1.5 *bigha* land as repayment in kind from a member, Tulsi Sing Sardar for a loan of Rs. 3500 given to her³⁵.

The land will be in possession of the Birsa Bir Mahila Mandal for 6 years during which they will cultivate it. Irrespective of the fact whether the loan is repaid or not with each passing year Rs. 500 will reduce from the loan outstanding. The member who has pledged this land has the option of taking back the plot on repayment of the balance amount at the end of each agricultural year.

³⁵ Fact that taking land as collateral violates the principle of SHG of peer pressure based lending was not enquired into

In 1.5 *bigha* land 1030 variety had been sown this year, which was the first year that the SHG cultivated it. The effort invested is as below

One day in the month of *Shraban* 16 women members, 7 men with plough and men from the remaining home gathered at the plot. The portion to be readied for seed sowing was repeatedly ploughed. The others removed grass from the portion. Each woman brought two basket loads of cow dung from her own house. The paddy seeds were broadcast. The whole operation took about 3 hours.

One day in the month of *Jayasta* from 7 AM in the morning again 7 ploughs were brought and the plot repeatedly ploughed to puddle it. The other 9 men removed grass. Meanwhile the women pulled out the rice plants and tied them in bundles. From 12 AM the women started sowing. The entire 1.5 *bigha* was sown in four hours.

At the time of sowing 15 Kg of DAP and 5 kg of urea was applied. The total cost for fertiliser was Rs 200. The men have taken Rs. 100/- from the women for the help they provided the women with ploughing etc.

In *Aghrayan* (December) the same 16 women went to harvest the paddy for about 5 hours. After the harvested paddy dried, the women carried it in head loads to a threshing area after some consultation it was decided to thresh the paddy immediately. Leaving it on the threshing floor would be difficult. The 16 women spent 5 hours threshing, winnowing and measuring the paddy.

A total yield of 13 *mon* was obtained. It was collected in 12 sacks and left on the threshing area. However the common consensus this time around was to sell the paddy immediately. In previous years when they had taken other land once they had converted the paddy to rice and hold in all 400 kgs., of rice from previous two such cultivations. They were undecided on how to dispose the rice. However week back that rice kept at the treasurer's home was measured and was found to be 75 kg short. The husband and wife said they had lent the rice to another person from the adjoining village as the person was short of food and they were unable to deny him. Last year the same person had been given a loan in the lean season, which he had duly returned when he had managed to harvest some paddy. This time round however the agricultural scene was especially bad and there was no hope of getting back immediately. Hence it was decided to sell of this new paddy and hold the cash instead. Although selling at harvest time would fetch lower prices.

2.3 MALL GROUP DISCUSSION

1. Discussion at Huchukdih with Tarani, Gorachak, Sagar, Kartik, Sitakant, Upen, Anil, Mansa and three others (within 2 days of taking up residence)
 - Sharing my agenda.
 - Clarifying study would not result in improvement of their pit but is focussed on assessing efficacy of this 5% intervention.
 - Developing the work plan
 - 5% useful but not as much in this year when rains failed at the onset

2. Small group at Majherdih

With Gorachak Mahato (Chairman of the Watershed no. 2 committee), Sagar Mahato (an important member of the local party and a person originally recommended for the survey), Sagar's father, Upa and three other residents of village Tentlo.

A 5% is able to capture mainly rainwater only and only if there is an over flow from higher lands. Some pits located on the lower side may be getting some water through subsurface flow but this cannot be significant. Only a few with *jharna* really rely heavily on the subsurface flow.

Is 5% useful? Yes its useful for harvesting and storing rainwater. But they are not suited for all kinds of plots.

Is the water in 5% shared? Yes people do take water from others 5%. Water is shared however no one shares the harvested grains.

What should be optimal depth of 5% in your area? Depth should not be fixed. Pits should be dug with reference to the 'water table' (used in English) of that area.

But would not the water-storing device then become a well? Yes, but that's the need. At least some 5% should be so converted.

Its location too could be considered as per farmers preference. Upa lives opposite Tarani's (the LCS) house. Upa's father Padma Lochan Mahato has made a 5% on *Bahal* land for using the water for raising winter vegetables.

3. Small group Choto Mukuru with 11 people and 5 women

Yes its useful. But only few were benefited, as the others did not have land in the treated Bamun *Baid*.

We want to set up SHG can you help

4. Small group at Tasarbanki with Lal Mohan, Upendra, Tarbuz

- Useful concept but differed on purpose

5. Small group Huchukdih with Rati, Anil, Phalguni, Mansa, Bhunwar's brother

- Watershed 1 pits will drain away to river, there is a '*tan*'
- *Baid* land pits are not fully useful because the additional water is generally wasted unless the plot is close to your home.

6. Kartik, Sunil, Ramkrishna, Abhiram Sabar

Lift irrigation is the only means for surviving, 5% soaks away the water to lower lands faster than normal seepage rates.

APPENDIX III

3.1 POSSESSION-BASED WEALTH RANKING OF RESPONDENTS

For in-depth in case its necessary to identify the poorest, the better offs and the middle level farmers the following can be the basis for identifying them.

Through discussion the following determinants of wealth were included in the study.

3.2 House and especially the roofing material is a differentiator.

The straw roofs are the poorest roofing material prone to leaks in the rainy season. Baked roof tiles, that too what is known as Manglorean (square) tiles indicate a better position. Even though the investment in the roofing material may not have been done in the immediate past it indicates the family was able to spend for the same at some point of time and is an indicator of converted wealth.

Tin sheets with or without tiles counter the water better as also escape the heat build up (if only tin sheets were used). A brick and cement house of course the most expensive house.

The wall material has not been used as a differentiator because walls are generally made of clay and well maintained even amongst the poorest provided they live in the house. Brick is rarely used as a building material. Where used its combined with tiles - tin sheet combination roof or a concrete roof.

3.3 Food availability

According to the people number of days of food availability is a measure of vulnerability not a measure of wealth as they are living below the subsistence level.

Even families with able to grow enough for the entire year are not better off as according to them they are barely able to meet the survival needs.

Land per se is not an asset that could be used as an indicator of immediate well being. That is the same could be sold to tide over crises but till that time other factors have to be considered

- Quality of land
- The availability of required number of household members to cultivate the lands properly or money power to pay for hired labour in the alternative.
- The number of dependants on the land

Ratikanta's case

He is in the estimate of the other villages well endowed in terms of land wealth owning about 52 *bigha* of land. But yet the villagers were not willing to accept him as well off. The rationale was that a person is well off when the person is able to harvest more than two year's paddy requirement of his entire family during one agriculture year. Any thing less and they emphatically stated the person in is not well off.

Thus within a category of people with 12 months food sufficiency generally land holding is used a determinant. If this yields a tie or where a person with more inferior quality land is rated higher then it would be resolved by referring to the quality of land.

3.4 Animal wealth

Through discussions with people animals that are wealth differentiators was identified. Hens and goats are commonly found in almost any household. Mere possession of either is not a differentiator. The following are clear determinants:

Possession of a pair of male buffaloes for ploughing – These are animals with greater drought power than bullocks what ever their build. People with larger land holding or greater land holding of *bahal* (lowland) tend to own them. Buffaloes need a much more food than a bullock of the same power and greater care in terms of regular bathing.

Owning of more than one pair of bullock is a differentiator – they possess more land or engage in intensive agriculture.

Possession of sheep – Sheep need greater care and a separate room with sloping dry floor. Goats can thrive in any place. Also sheep have to be taken out for grazing necessitating the services of a cowherd. Goats can be tethered in any place and can be fed with branches lopped from trees without being let out to graze.

Cow – This is a traditional determinant of wealth. Only the people with more straw production than what is required to feed their draught animals can afford to keep cows.

Buffaloes for milk - They produce more milk than the local cows yet are heavy feeders.

Ducks – Unlike which need not be fed at all and still would survive and lay eggs a duck needs to be fed daily. Thus only those people who can afford to feed them at least once a day are able to keep ducks.

Non-possession of even one pair of bullock – This is proof of poverty or impoverishment necessitating sale to generate cash.

3.5 Other income

Apart from assets a regular (available the whole or a greater part of the years) source of cash income through service or trading have been taken as measures of wealth. However, cash income through annual/ seasonal migration is not taken as determinant of wealth. But a member working at some trade outside the village has been treated differently.

Weightages assigned are

Food security	
>12	4
>8-12	3
4-8	2
<4	1

Asset

House Roof	
<i>Pucca</i>	2
Tin	1.5
Tile	1
Straw	0

Other income

Cycle	1
Bull	1
Male buffalo	2
Sheep	.5
Duck	.1
Irrigation pump	2

Govt service	2
Trade	1
Remittances	1

Discarded PRA's

Very small farmer	< 3 <i>bigha</i>
Small	Till 15 <i>bigha</i>
Medium farmer	16-50
Big farmer	50-80 <i>bigha</i>
Rich farmer	80 <i>bigha</i> land and is able to hire labour for all his agricultural operations, grow food for two years

APPENDIX IV

Harvesting schedule of paddy

Local	
Bhuturi	Kartik (Mid October)
<i>Thupisall/ asanlowa</i>	
Majhi	
Juiya kathi, Durgashal	Kartik end (Mid November)
Kalamkathi	Mid Aghrayan (early December)
Improved variety	
50	Kartik (Mid October)
1001, Lalswana, <i>Lalat</i>	October end
1030	Mid December

Varieties of paddy based on dates of maturity	
Early maturing (matures in September)	Majhi, Asanlowa,,

Improved varieties	
Early maturing (matures in September)	<i>Lalat</i>