



The Livelihood School

Dawning of a Promising Future(Bandudih Watershed)

Conducted by
Nabarun Sen Gupta
The Livelihood School
Indian Grameen Services (Basix)

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1. Introduction

Agriculture, the mainstay of rural economy depends more or less on factors like land productivity and other associated factors. The productivity of land is a critical issue which if targeted can help in supporting the poor households' livelihoods. Most often, this productivity is affected by combinations of several factors which cumulatively makes or break the conditions of the poor households.

The climatic conditions in semi arid region, which is marked with less rainfall and depleting ground water reserves often is a point of development intervention, also popularly known among most of us as watershed. Less rainfall and the erratic nature of the monsoon is often beyond the control of the farmers. Efforts to conserve each drop of water where it falls and initiating the process of ground water recharge is attempted through a variety of soil and water conservation measures. The efforts are done to ensure that productivity do not vary and also to insure livelihoods of millions of farmers who toil hard on these lands. Wherever this does not happen evidence can be seen particularly soon after the monsoon months when streams of people start moving out in search of some work- a phenomenon known among us as migration. It is in context of these we can conclude saying the major objectives of intervention called watershed is to increase on one hand the land productivity which is likely to initiate the process of halting migration.

Purulia, located in the South west part of Bengal is a blessed land. It does not suffer from the first factor i.e. less rainfall and has very good rainfall (average rainfall of 1200 MM per year). In spite of being a blessed place, one still sees low land productivity, food insecurity and the resultant out migration. The tribals from the far-flung villages' of Purulia migrate out in search of labour (mostly as unskilled construction workers) soon after the Khariff months. This situation demanded an intervention. PRADAN a Development agency took up the challenge to reverse this process and in doing so carried out a variety of innovation on soil and water conservation. The objective for them at that point of time was *"the dawning of a promising future"*.

1.1 Objective of the study

- To understand the intervention process initiated by PRADAN
- To understand how watershed intervention could enhance food security and thereby minimize the distressed migration

- To understand the need of building institution for the sustenance of watershed structures
- To document the tacit knowledge on how the particular intervention made impact not only in Bandudih, but also spreaded to neighbouring areas
- To disseminate the knowledge amongst the livelihood practitioners

1.2 Research methodology

This case research makes a modest attempt to capture what was done and what changes these innovations brought in towards securing livelihoods of rural households. The methodology adopted to document the process included: discussion with the villagers, the village leaders, PRADAN staffs members involved in the process and some key functionaries of government departments and Panchayats (local units of PRI). These discussions provided information on the process and the perspectives behind the interventions. Some secondary data was also looked into. This included the reports generated by PRADAN for the donor agencies, the consultancy reports of the monitoring team which came to assess the work as well as data obtained from the SHGs, The District Gazetteer¹, the IWMI study on SRI,² were also looked at. Some referential work was done and interesting insights were obtained from a Bulletin of the Anthropological Survey of India.³ A set of participatory exercises (Seasonality Mapping, Soil typology mapping, Gradient Mapping, Transect Walk) were also done to gather data. A very rapid round of Household survey was also carried out to see the impact the intervention generated on the livelihoods of some tribal families. The purposive sampling technique was used to draw out these Households. Water sample was taken to a laboratory to see the nature of the ground water. Secondary data collected were also subjected to collations.

2. Context

Economic life, social organisation and institutional arrangements of the people living in the southern portion of Purulia district (the erstwhile Manbhum of Bihar) is woven around the central aspect of tilling the soil for growing paddy – the staple food. A network of artisan's community, which included potters, basket weavers, and blacksmiths, continues to remain involved in a mutually dependent economic relationships with the farming community. They all draw their livelihoods from the agriculture dominated economy. These groups of artisans continue to serve as "jajmans".

Purulia District has a very significant geo-climatic location. The district acts as a funnel, canalizing the tropical monsoon current from the Bay of Bengal to the subtropical parts of northwest India. The highlands of Purulia (Bandudih lies in the immediate foothills of this highlands – The Ajodhya Hills) is a remnant of the spur projecting from the Ranchi plateau to the west and functions as watersheds of the three most important rivers of south Bengal namely the Subernarekha, Kasai and the Damodar.

The watershed of Bandudih has several smaller catchments and as many local drainage lines. They all drain out into the river, '*Sankha*', which finds its origin in the Ajodhya

hills. The ridge of the watershed near the foothills is about 25 metres above the lowest point i.e. the outlet of the river. The watershed together has total catchments of 485.85 hectares. These catchments can be subdivided into various distinctive land categories (see table 1 below).

Table 1
Land Classification in Bandudih

Category	Local name	Area in Ha	Percentage
Uplands	Forest Land	13.26	3
	Taanr	179.40	37
	Homestead	52.38	11
Mid Uplands	Baid	124.26	26
Mid Lowlands	Kanali	15.53	3
Low lands	Bahal	68.15	14
Water Body *	Bandh, Hapa	15.96	3
Others	Roads Etc	16.95	3
		485.85	100

*Pre existing structures constructed by state machineries, individuals.

2.1 *The Terrain*

The surface of the village consists generally of successions of rolling uplands with intervening hollows, along which the drainage run-offs which ultimately join the 'Sankha' stream. The district is very poor in her underground water resources. This is because of its crystalline basement. There is no proper aquifer present in these impervious crystalline substrata. The small localized aquifers tap the localized water bodies which are collected in the cracks and crevices of the impervious rocks and also from the upper weathered zone of the bed rock⁴. The soil is infertile laterite and has a general tendency towards continual detritions. Over the years the cultivators, in this region, have converted the slopes wherever practicable, into terraces of different levels, each with its protective embankment. The rainfall, which is retained on each particular terrace and field, support the cultivation of wet paddy crop- the mainstay of food security.

The PRA done on the soil strata (mantle) revealed that the mantle can be vertically classified into three broad categories :

- **A top soil:** The depth of this top soil varies from the uplands to the low lands. It is this soil which is productive and is responsible for crop yield. The entire soil conservation measures initiated in the uplands focuses on conserving this top soil.
- **Regolith:** This represents the denuded products of underlying rocks. Also known locally as 'Muram'. This is exposed in the uplands- a result of the absence of vegetative cover and continues erosion of the soil.

- **Partially weathered rocks fragments or gravel.** At some locations they are in the form of sand and silt and at certain places the layer consist of loose, porous and somewhat granular natured elements. This zone of weathering has the capacity to hold and store water. It acts as a sponge soaking in water that percolates below. The depth of this table varies from 3 meters to 12 meters. The water table is seen to vary depending on factors like precipitation received and the month.

In Bandudih, major part of the land is covered with residual soil formed by the weathering of the bedrock i.e. decomposed and disintegrated rocks. This soil is ecologically old to support plants but with the vegetative cover getting denuded (as had happened in Bandudih some half a century back) these residual soils get severely depleted by mechanical weathering and erosions. The '*Taanr*' lands (uplands) have predominantly this type of soil.

2.2 The Groundwater

Like any other locations, in Bandudih too the quantum of groundwater depends on the rains received during the year which gets recharged through the zone of weathering (uplands in case of Bandudih). Here, previously the precipitation (rain water) would pass as surface run offs. Only a minor proportion of this precipitation would infiltrate and percolate through the zone of weathering- the uplands.

The water table contour has its gradient towards the *Sanka* rivulet which drains along the two sides of the village. The chemical analysis of the ground water revealed that the water is neutral to slightly alkaline, making it fit for paddy cultivation.

2.3 The land

Bandudih has significantly high proportion of lands (37 %) which could be categorized as wasteland (see table 1 above). The undulating lower parts of these wastelands have been converted as agricultural lands, whereas the upper regions are generally covered with gravel (*muram*). This land is less fertile. The recovery of these waste lands is a costly process and can only be realized through growing of grass cover and woody species trees. The rest of the land (43 %) can support interventions around agriculture.

2.4 The forests

Bandudih revenue village has a very small patch of forest land (14 Hectares) which mainly consists of degraded Sal (*Shoera Robusta*). After the initiation of a Forest Protection Samilty under the Joint Forest Management, West Bengal Forest Order the villagers have undertaken the responsibility of protecting this patch. They are to get 25 % of the revenue earned from the harvest which comes every 7-10 years. The forest lies on

one corner of the village and the residential (*bari* lands) are located at the borders of this Forest Patch.

2.5 The Social Fabric

Bandudih village consist of Tribals as well as non tribal population. The village has six small hamlets inhabited mostly by the Santhals- a dominant Scheduled Tribe(ST) group in Eastern India. The Santhals constitute almost 2/3rd of the village's households; the rest include the Singh Sardars (ST); General Caste Hindu and Other Backward caste. The village, falls under two Gram Panchayats, namely Ponra and Bandudih and includes another small hamlet - Dhanudih. The five hamlets namely Dumardih, Basidih, Johpahari, Amtannr and Ibilidih have concentration of the scheduled tribe population whereas the main village, Ponra has inhabitants from the general caste and the Other Backward caste groups.

Bandudih is not just another isolated case. Here too exist the overriding differences among those who control resource and those who do not. A powerful lobby play an over imposing role in all domains of village life. The control over the water bodies (old tanks) are in the hands of this powerful group who inhabit in two hamlets and belong to the non tribal group. Only a few families belonging to the scheduled tribe have some access to these water bodies. The focus of watershed interventions was to generate water bodies for those who had none.

2.6 Sources of livelihood

Farming is the main source of livelihood for most of the inhabitants of Bandudih. In the absence of good productivity from the degraded soil and failure of crops (due to vagaries of monsoon) most families used to migrate out in search of wage employment . Some used to earn living through self destructive ways by lopping the trees from their own land whereas others venture out in the forest illegally for collecting firewood and selling them at Balarampur (a nearby small bazaar). The desperation was so intense that even they would spend the entire night hiding in the forest –lest they get caught by Forest Guards. People recalled of villagers getting killed in encounters with Forest Guards in the past. With the drying up of options at the home front they choose to migrate. Typically the young and able bodied males and females would get into the migration and the middle aged men into the fire wood business. Migration was a predominant means to earn a living for 90% of the tribal families (for about six to eight months every year).. Those who stayed back would get engaged in collecting *Tendu Patta*, rear domestic animals, and collect *lac* from trees in their own homestead lands.

Rearing and collection of *lac* was also once a major source of income. The villagers derived naturally grown *LAC* from the *Kusum* and *Ber* trees. The practice is almost dead in the face of extinction of *LAC* producing trees.

3. The initiation of action

Besides having undulating landscape and crop failures Bandudih suffered from State apathy being located along the borders of Jharkhand State. Development action from the state machinery was almost absent. PRADAN, observed it and began their search for a sustainable solution to this situation. They (PRADAN) wanted the situation of the farming communities to improve. They tried out several soil and water conservation techniques, interlocking them with introduction of innovations like alternative farming systems. Being encouraged by the acceptance of some of these techniques amongst farmers, they initiated watershed based planning as a measure which held the key to sustainable livelihoods. A project was developed for Bandudih to demonstrate the efficacy of this new watershed development approach. The search therefore began for the journey of '*Promising future*'.

PRADAN initiated the process of planning keeping villagers at the centre of such exercises. This included mapping exercises like vulnerability mapping, land classification and ownership mapping and other mapping exercises. These maps were used to locate the land for interventions, particularly the land of the poor households. Exposure visits were organised to other watershed sites so as to convince people about the efficacy of the suggested interventions. The pro-poor positioning resulted into conflicts with resource rich inhabitants. They too wanted a share of the benefits. The well to-do and influential caste group (Garais) wanted PRADAN to initiate the soil and water conservation efforts on their land. PRADAN managed this situation by keeping its card open. Slowly the resistance died down, paving way for PRADAN to get into action.

The Bandudih watershed has a few small and mini watersheds. These mini watersheds ranged between 50-100 hectares. Together they made up the entire treatment. The benefit was designed to support livelihoods for most of the 357 Households – all belonging to the small and marginal farmer's category.

The detailed plan was submitted to CAPART(supporting agency) at the end of the mapping exercises and it received two installments of funds. These included the work on various entry point activities. The grants were also utilized towards demonstration the efficacy of some interventions. The idea was to get people to see and believe and then join in the action. Monetary support from CAPART came to a halt after these two installments. The work could not be completed, hence the discontinuity came into being. After some persuasion, PRADAN gave up the matter. They soon initiated the process of seeking support from other agencies and in February 2002 (after a gap of five years) Sir Ratan Tata Trust came forward to support.

However, it was not an easy task for PRADAN to reestablish the lost ground. The time lag of five years made many villagers apprehensive and skeptical of PRADAN's intention and capabilities. However the strategy to keep contacts alive through initiation of saving and credit activities came handy. PRADAN succeeded in restoring the confidence of villagers.

The planning process was done again. During this phase another hamlet (Amtannr) got included. Some modifications of the earlier proposal was done. Meetings were the means

to communicate the ‘Tola committee’⁵ and plan out interventions. These meetings went on throughout the intervention phase (till June 2004). The agenda was kept simple and included stock taking of the tasks planned and plans for the forthcoming week. All this brought in transparency and gave opportunities for critical suggestions. The *Tola Committee* took reports from the field level supervisor (called Job worker) and also played a key role in resolving conflicts.

A federated body of the entire village having representatives from all ‘Tola ‘ Committee formed the ultimate decision making body. This federated body had 23 members. These federated body had a few women leaders from the Savings and Credit groups and some members from the landless households. This committee had three office bearers –the President, Secretary and the Cashier. PRADAN helped the committee to take up responsibility for making labour and other related payments .and resolved the disputes if any. This process did help in making the village institution take and implement various decisions –even if some of them were difficult in nature (see box 1)

Box 1

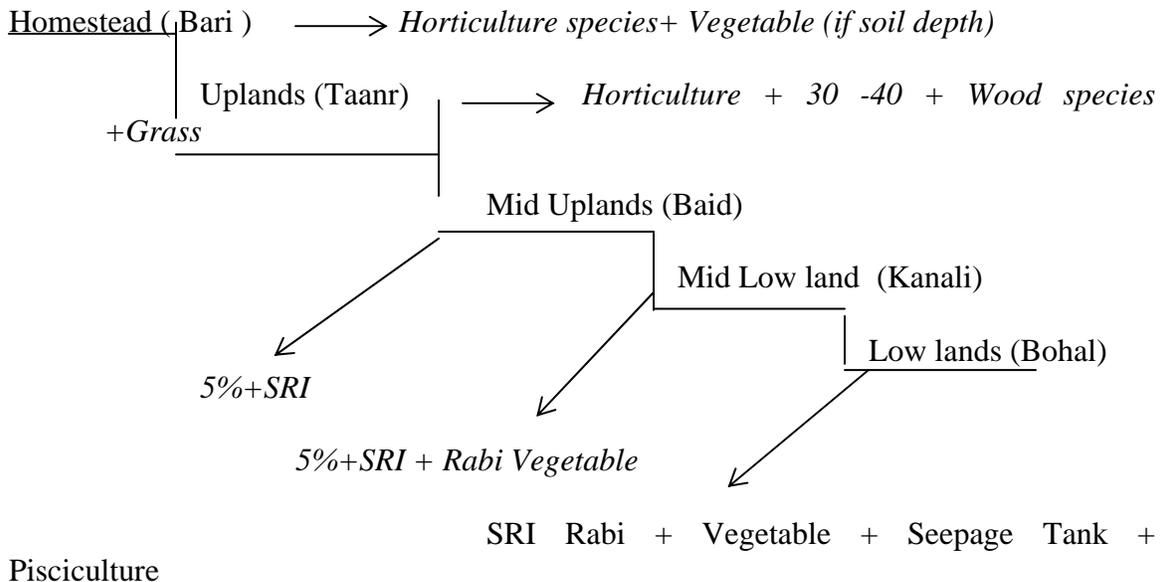
Watershed Committee setting norms for errant members

During two occasions the Tola committee received information that one farmer in whose land laborers were sent for carrying out various watershed activity was diverted for personal purposes. The matter was taken up in the Tola meeting and the errant farmer was fined Rs 3000. The matter was then taken up by the watershed committee who after assessing the gravity of the offence increased the penalty to Rs 5000. The committee president felt that this was necessary as they were handling public funds and they therefore had to be more responsible. The second person who did something very similar was fined Rs 2500. The penal amount is kept with the Watershed committee. The committee took such a harsh decision as they wanted to set precedence and wanted that no one misuses the public funds.

The watershed work was deliberately designed to be labor intensive. As a matter of principle PRADAN kept the all labor displacement machines out. The poor found employment which kept them away from migration. PRADAN also introduced a component of compulsory deduction from the wages being paid to the labourers. This got accumulated in the name of each labourer. The accumulated saving was returned to the labourers as the project concluded. They found this accumulated savings very handy and used them for a variety of purposes, which included repaying old debts; freeing of land kept under mortgage; buying of drought power and tilling equipments; investing in various income generating activities like purchase of domestic animals and birds and the

like. Most of these investments helped the cause of strengthening and supporting livelihoods.

PRADAN’s intervention in Bandudih was based on a well thought out plan that linked the entire set of intervention to a livelihood augmentation strategy. The strategy was primarily to bring in food security, stop distress migration and generate income for farmers. The intervention kept due focus on making the best use of the available land. The figure below gives a diagrammatic overview of the interventions.



The village land as can be seen in the diagram above is classified according to the relative position on the inclined land surface. They also represent series of progressively fertile categories and also represent progressively increasing capacity of the land to hold rain water.

The uplands adjacent to the homestead, which is relatively level and fertile on account of accumulation of cow dung, and other refuse heaps of the domicile is known as the ‘bari’ where maize, oilseeds and various kitchen garden crops are grown. The ‘Taanr’ or ‘Gora’ land is again subdivided into two categories ‘samatal’ or plain ‘Gora’ where rice is sown broadcast) and rugged or ‘Danga Gora’ where various kinds of pulses and millets are grown. The conversion of ‘Gora’ land to cultivable land is a cumbersome process (some efforts are being initiated) and a common saying in the area goes as:

“Baro Mashey baro Chas Tabey Khabey gorar bhat”

(Twelve tillings in twelve months, then only you eat the rice from gora land)

Baid lands is subdivided into ‘Khil’ or ‘painsya baid’ indicating infertile plots whereas ‘chapaitya baid’ is relatively fertile. Similarly kanali has the ‘air-kanali’ and the ‘khanti kanali’ where water will stay even when rice ripens.

4. The intervention

PRADAN intervention in treating the land as shown in the diagram (above) under its watershed treatment varied with the land classification. This section details out the initial problem and the solutions (intervention) that was initiated.

4.1 *The TAANR (Uplands)*

These highlands, locally called *Taanr* in the past had lush green forests. These lands had trees from which the Households collected LAC. The PRA exercise revealed that these lands had more than 12 species; each of them supported some segments of their livelihoods. Poverty and ignorance slowly led to their depletion. Villagers sold of trees to tide over crisis situations and the local landlord removed the Kusum trees. In the absence of the canopy the rains played the spoilsports. The top soil got eroded soon, thereby exposing the land of the rocks. Today this land is more or less without soil, with exposed rocks and ‘muram’ serving no other purposes.

Watershed intervention in this land included the 30-40 model. This model divided the land into rectangular blocks, measuring 30 feet along the slope and 40 feet against the slope. The design prevented further loss of the top soil as it is estimated that rain would require a distance of more than 30 feet before gaining the momentum to carry the soil. The bunding therefore halted this process. The rain water drained into a rectangular pit measuring 5 X 5 X 3 feet which is dug on one corner of this rectangular plot. In addition to this measure these plots also had plantation of Arjun trees- hosts of the ‘Tassar’ Cocoons which was futuristic in promoting livelihood.

The less sloppy and less denuded ‘tannr land’ had plantation of woody species like Eucalyptus and Acacia. In some plots some species of grass used for rope making was also done. These grasses sell at Rs 200-300 per quintal in the local market.

Farmers had carried out growing pumpkins in the treated uplands brought under the woody plantations in the beginning. They had significant income from this activity. As the trees have attained good height, this activity now has come to a halt. The farmers, grow pumpkin on other lands.

4.2 *The BARI(Homestead land)*

The Bari lands are the lands that are adjacent to their home. Farmers would use these lands to grow some seasonal vegetables, lentils and some course grains. Mostly the

products grown were used for Household consumptions. The watershed work in Bari lands included creation of water harvesting tanks. Some horticultural species like lemon and mango also were planted. This intervention was carried out in seven hectares and included 43 households. The survival rate of these plantations had been positive and for the last two years these trees are giving some returns.

PRADAN in 2005 also made an effort to link the farmers with an exhibition in Singapore where these mangoes sold at INR 40 per Kg. Some orders were also obtained which could not be met with in the absence of ready produce. An industry factor was created in the process. It is projected that these trees will yield on an average 75-100 Kgs of fruits from the seventh year onwards. In addition, two small plots were also brought under lemon plantation. The intervention was planned for six families but today only two families, who took due care of the plants, reap some benefit. They sell lemon at Barabazar market (some 12 Kms away) and make a net income of around INR 100 per lemon tree.

Table 2
Plantation of Trees and families benefiting

Plantations type	Area (Ha)	Families
Mango + Lemon	7	43
Arjun	8	45
Gamhar and Teak	15	93
Sabai (Grass)	4	29
Acacia and Eucalyptus	5	36
Total (Area)	39	

4.3 The BAID and KANALI (mid uplands)

The Middle uplands locally called Baid and Kanali were mostly used for paddy cultivation. The same was limited only to Khariff season. Prior to the watershed intervention these lands gave yield which ranged from 0.5 to 1.5 ton/ha of paddy. These lands remained fallow for about seven months (November to May). The production was low as certain dry spells during the monsoon months affected upon the productivity. Two distinct interventions were done in these mid uplands, namely the 5 % model and System of Rice Intensification (SRI).

The 5 % structures are smaller water retention structures each of which measured approximately 5 % of the land size and the size adopted was 10 X 10X 10 feet (L-B-H). These structures are excavated on the top most corner of the already terraced farms. They serve the purpose of collection and storing of water apart from ensuring in-situ moisture level of the plot. The earths excavated from these plots were used in stabilizing the already existing bunds. This soil and water conservation technique was introduced with a view to provide support irrigation to standing paddy crops during periods of stress. This intervention is critical and helped saved crops for most of the farmers, thereby playing a

vital role in securitizing their livelihoods. The cost of these intervention was around INR 620 and the saving of one crop would give returns more than the amount invested.

The second most critical intervention that was carried out is popularly known as the System for Rice Intensification (SRI). Rice being a staple food crop of the people of the area, any efforts to increase productivity would play an important role in ensuring food security. Though farmers adopted growing high yielding varieties, it involved increased cost in terms of large amount of fertilizers and pesticides required. SRI technique had both the benefits –reduced cost of cultivation and increased net income from higher productions. The table below brings out a comparison between the techniques of SRI and the traditional style.

**Table 3
Comparison between Paddy techniques**

System of Rice Intensification	Traditional Rice Methods
Transplantation done of seedlings which are 7-10 days old.	Transplantation done of seedlings which are 30-35 days old.
One seedling transplanted	At least 8-10 seedlings transplanted
Inter row and inter seedling spacing at 10-12 inches	Spacing not an issue. Planted very close to each other
Irrigation is given to maintain soil moisture	Generally the plots are kept filled with water.

Since these departures were totally opposite to the established views farmers took time to accept. The result of the spread is encouraging (see table 4 below). Farmers even beyond Bandudih have adopted the method.

**Table 4
Growth experienced under SRI method**

Season	Farmers adopting SRI	Area under SRI (ha)	Average yield (tons /ha)	Yield Range (tons /ha)
Khariff 2004	20	3.11	5.71	4.91- 7.2
Rabi 2004	21	2.18		
Khariff 2005	60	7.88	6.87	3.6- 10.96

PRADAN, holds this intervention as the key to reduce the food security related vulnerabilities. It is argued that food insecurity is the primary cause of migration and if farmers attain this security they would stay back and make efforts to try out other income generating avenues within the village thereby making a sustainable impact on their livelihoods. The fall outs can be seen as many villagers have stayed back in Bandudih during Rabi 2004 and even today Rabi 2005- both being years having less rainfall.

Adopting of SRI has a package of benefits. This includes less cost incurred, less labour required and increased productivity and therefore increased net income. A study conducted by CInI in Bandudih highlights these as package of SRI benefits. The table below gives again a comparative analysis of the benefits.

Table 5
Comparative Costing between two methods

	SRI	Traditional Methods
Seed rate /Cost ¹	7 Kgs. (INR 84)	68 Kgs (INR 816)
Labour for Transplantation /Cost ²	378 Hours (INR 2835)	438 hours (INR 3285)
Labour for other operation /cost	497 Hours (INR 3728)	568 hours (INR 4260)

¹ Cost of seeds calculated at INR12 per Kilogram

² Cost of Labour calculated at INR 45 per 6 hours (existing wage rate in Purulia). This labour mostly would come from the Households and women contributing 90 % of this labour.

In addition to this two interventions, with release of funds from CAPART (during 2005-06) three small Lift systems were also placed at three locations. Each lifts have a command area of 25-30 hectares and are diesel run lifting devices. Water is taken to the fields using underground pipelines. These three lifts have created a total potential of 66.74 Hectares of irrigated land in the watershed. .

Table 6
Irrigation Potential created (in hectares)

Hamlet	Gora	BAid	Kanali	Bohal	Total
Ibildih	7.44	4.52	2.98	3.97	18.91
Bandudih	4.68	11.43	3.11	4.00	23.22
Ponra	11.37	7.8	1.44	4.00	24.61
Total	23.49	23.75	7.53	11.97	66.74

PRADAN is presently engaged in demonstrating the potential of the lifts in one location and has invested INR 200000 towards growing vegetables. A group of farmers are involved in day to day management of this operation. This demonstration is done on 10.20 hectares of land belonging to 44 farmers. They have formed a informal cooperative. The profit ,if generated, is to be utilized by the farmer members of these societies for future investments into agriculture. PRADAN involves this group in regular meetings to discuss day to day operational issues. Though a time taking one, the process is likely to help farmers understand the art of doing agriculture together to make it more viable.

Many of these farmers (case below) having land in proximity of this LI (Lift Irrigation) system have invested their savings to carry out vegetable growing. For those who had

less capital initially used other systems to irrigate but with revenue flowing they have started paying for the water charges to the Lift cooperative.

BOX 2

Worried entrepreneur takes a leap into uncertainty

Rudhu, a marginal farmer belonging to tola Ibildih has around 4 bigha (1.33 Acre) land in the command area of the Ibildih lift irrigation command. He has decided to go on his own growing some vegetables during Rabi-summer 2006. With an investment of INR 160 on seeds and another INR100 Rupees on Farm yard manure which he bought from one farmer who did vermin-composting he started. He has sown ridge Guard, Bitter Guard and Cucumber in half a bigha each of his land. He is buying water paying INR 65 per hour towards the same. He requires water every 7-8 days interval and knows it well that as the hot summer season sets in the irrigation rotation will have to be done every 3-4 days. He understands that the returns will start coming from April beginning. However he is worried in case the river runs dry and his crops fail due to lack of irrigation. His investments will be around INR 1500 which he is somewhat sure will be recovered if irrigation continues till April end.

4.4 The BOHALS (Lowlands)

One typical feature of lowlands in this part of the country is the availability of water almost round the year. During good rainfall years due to excessive water seeping out of the soil doing anything on this land is difficult. Though water is growing the second crops often is difficult. Farmers, traditionally, used these lands only for growing Khariff paddy.

Given this peculiarity the watershed intervention carried out was excavating seepage tanks. Along one end of these *Bohals* plots a tank measuring approximately 5 % of the total plot size were excavated. These seepage tanks help drain out excess water from the soil thereby keeping the soil fit for agricultural operations. The costing of these seepage tanks for a plot measuring a bigha (7.5 Bigha makes one hectare) is around INR 3600. The costs were shared by PRADAN (major) and the farmers(minor). Farmers have experienced benefits as these tanks have helped them grow the second crop with ease.

PRADAN also tried out Pisciculture in these seepage tanks which however did not succeed.

Thus one can note the innovations that were initiated by PRADAN keeping in mind the hydro-geological context. The uplands which were getting eroded had interventions on soil conservation. These uplands also acted as the zone for recharging. The mid lands which had only one crop had structures which facilitated the storage of water for support

irrigation and the low lands having its own peculiarity had the seepage tanks which now supports the second crop. The uniqueness of the approach also was by and large closer to the conventional practices of the farmers. Paddy was not replaced by other crop. On the other hand a modified technique was introduced. The farmers were also supported with some infrastructure e.g. the Lifting devices. PRADAN also focused on making the best use of the lands e.g. growing of woody species on lands with poor soil cover (the Uplands) and the Horticultural plantations on the *BARI* lands. The following section elaborates how these unique and context specific interventions have augmented the livelihoods of the poor in Bandudih.

5. The augmentation of livelihoods

The watershed interventions have augmented livelihood of the poor inhabitants of Bandudih. The interventions carried under the watershed treatment of the village as discussed above shows a combination of strategies. Apart from the soil and water conservation measures, the organization also carried out interventions like horticulture, irrigation infrastructure creation, and agricultural practice modifications at the farm level. The organization had also initiated formation of Savings and Credit groups (SHGs) with women members which was also seen as a strategy to carry forward the augmentation part further. In order to measure the impact at the farm as well as household level an attempt was made to collate primary data with secondary. The narration below captures these augmentation aspects. This section also follows the same top-bottom intervention as carried out.

5.1 Soil Conservation: The top soils that would have got washed down and further degraded the uplands have been halted. The deposition in the pits of the 30-40 models is an indication of the conservation.

5.2 Water conservation: This could not be quantified. However one indication of increased recharge can be seen in the Seepage Tanks. The rainfall had been lower than the normal for the last two years. Recall techniques revealed that the last rainfall during the monsoon months happened in the first week of September. One can see even water oozing out of the seepage tanks in most part of the villages. During this year with development of some 30 such structures a total of 13 Acres of Land was brought under summer rice cultivation. This was done by 16 farmers.

The security of water has helped farmers make use the *BARI* lands for growing vegetables. This has happened both during the monsoon and late monsoon months. Farmers have invested their own savings in purchasing of assets like pump machines to lift water from seepage tanks adjacent to their *BARI* lands. In Bandudih alone five such pump sets have been purchased by farmers.

Box 3

Growing Vegetables to fetch additional Income

Nepal Baski, had used some 10 decimal i.e. 400 sq meters of his Bari lands investing INR 1000 in seeds and fertilizers. He grew Tomatoes in this land and fetched a net profit of INR 8000. Previously this land was used for growing maize and lentils and other minor crops. Nepal mentions, ' Water availability in 'Hapa' (seepage tanks) made him go for growing vegetables.

He also had got a Kirlosker pump machine and some pipelines to get water from the HAPA. This investment decision was taken as he saw the security of water. He also saw an opportunity in this investment decision. The INR 13000 invested in this machine and pipelines came from the compulsory savings. He has plans to hire out his machines to others and fetch some additional income. In his words, "Jal acche bole etota karcha kormal' (I have invested this big amount only because now there is water available).

The conservation of water in the 5 % models in the mid uplands has benefited farmers. During group discussions with farmers they mentioned that at least two times during Khariff 2005 these small water retention structures came to their rescue. Their food crops could be saved through support irrigation.

The soil and water conservation measures namely the 30 X 40 model, the 5 % model and the seepage tanks are interventions that rotated around strengthening the livelihoods of the poor families. These interventions helped in increasing the in-situ moisture regime, helped in prevention soil erosion, harvested water in tanks thereby increasing the soil moisture. They cumulatively securitized the livelihood of the farmers. The farmers are pretty sure to tide over the crisis they experience because of errant monsoon. These have contributed to increased food security.

Introduction of SRI method in paddy cultivation has brought a lot of hope for increasing the productivity.

The seepage tanks, have given the best returns on investments. With an investment of INR 3600 for a *bigha* (a plot measuring 1333 Sq. meters) one extra crop could be taken. With 13 Acres of land under paddy cultivation during summer 2006, a net income of approximately INR 30000 can come (this is a conservative figure where a Hectare under Traditional Variety would yield a net income of INR 6000 approximately). The net income would have been higher if these lands were brought under SRI paddy.

Ensuring food security being one of the mainstay reasons to introduce SRI, it brought tremendous impact. Not only there is an increased area brought under SRI cultivation (table above) but also there has been an increased income too. A study carried out by CInI revealed that gross return was to the tune of INR 8353 which is 88 % higher than the conventional methods. In terms of yield a net increase of 1300 Kgs would mean around

500 Kgs of rice which on an average would bring in an additional 5 months of food security for a family of five adults. The table below compares the benefit that a farmer gets by adopting SRI.

Table 7
Showing Comparative Cost-Benefit /ha under two models

	SRI	Conventional
Paddy yield / hectare	5329	4042
Straw yield /hectare	5127	3407
Value of Paddy (INR/ha)	21916	16169
Value of Straw (INR/ha)	2563	1703
Expense on seeds	86	815
Labour Cost	6563	7545
Cost of fertilizer	973	848
Net return	16257	8664

Obtained from CInI study

5.3 Horticulture: The plantation of Mango trees would bring in a net return to the tune of INR. 1000 per Mango tree from the seventh year. It is understood that a full grown tree will give a yield of 75-100 Kgs which would fetch a price of INR 10-14 per Kg at Balarampur market. A quick estimation by a group of farmers revealed that around 500 trees are surviving in two plots thereby bringing in an additional net income of INR 500000 into the village among 43 farmers.

The Lemon trees are giving returns of INR 100 and among two farmers there are 350 such trees therefore fetching an additional income of INR 35000 per year and the process it strengthens farmers' fall back mechanism.

5.4 Woody species :The intervention has planted four different trees in approximately 32 Hectares of the Uplands. This intervention has potential for future spin offs. The Arjun trees planted in the 30-40 models can have Tassar cultivation- however villagers have no exposure to it. Similarly possibilities are there for LAC cultivation with Eucalyptus and Acacia. Some investments need to be made by farmers. The villagers have exposure and skill in LAC rearing and harvesting. Some families even today are involved with LAC harvesting from the existing mulberry trees and Kusum trees.

The future earnings from selling of Eucalyptus and Acacia sometime during the 10th and 15th year (depending on the growth of the logs (8-10inch girth size) is likely to fetch for some 36 families significant income. At a present market price poles sell at INR. 150-200 for a pole size of 15 feet. Similarly the Gamhar and Teak plantations is expected to bring in significant revenue for 93 families. As these trees and on private lands it is understood

that once they are harvested it would create sudden disparities between families who have these plants and who do not. This is more a source of problem than solace.

5.5 Fiber Grass :The farmers of Bandudih watershed had less idea of growing, harvesting and primary processing of this grass. This activity has therefore not helped in strengthening livelihoods directly. Indirectly they have resulted in stabilizing the soil.

6. Other spin offs

In order to capture the spin offs which is the logical fall out of the intervention, a rapid survey was carried out amongst 10 families. The following table illustrates how the interventions in the village have brought in major changes to peoples livelihoods.

Table 8
Cumulative Impact on Livelihoods
(Frequency out of 10)

Nature of Impact	5 % + Seepage Tanks (A)	(A) + SRI (B)	Remarks
Food security	8	9	The food security has further increased. However it shows that one person has not been able to get food security because of illness and related expenditure. Considerable expenditure on health was incurred.
Purchase of Assets	2	5	This includes reconstruction of the house , extinction of the dwelling units, other assets like cycles, utensils etc
Purchase of tools and agricultural assets	7	7	This includes traditional as well as modern implements like pump machines, sprayers etc.
Freeing old debts	3	4	Some farmers had no debts whereas some continue to have the same. The freeing of debts is from mahajans. Some (2) have also freed land that they had mortgaged.
Increasing land under cultivation	10	10	All the farmers mentioned that they have increased either cropping intensity (more

			number of crops on same land) as well as increased area under cultivation
Taking fresh loans	8	10	This have happened as borrowing from SHGs and other formal sources
Do not migrate	9	9	One of them go out as he finds lucrative to go out. This is not a forced situation for the family. Some members of the rest would have otherwise go out for labour work either in government relief work, or to nearby cities.

6.1 Land Reclamation for Agriculture: During the transact walk with villagers it was noticed that efforts were being made by some farmers on their own to convert their fallow lands for agricultural purposes. The discussions revealed that at least 25 farmers who had less lands initiated this process. These lands though are less productive and will marginally increase the income of the families, but are one major indication of the impact. This initiative is a fall out of the security (water and food) that farmers are experiencing and is likely to strengthen their economic conditions in days to come.

6.2 Impact of Intervention on Women: As discussed earlier the watershed committee had women as representatives. However, incorporating them and their needs (practical and strategic) in the livelihood augmentation did not happen. Positive fall out If any was not incorporated as part of any design. An illustration of the customary practices as regards to agriculture shows the existence of subordinate position of women. The customary practices in paddy growing continue even today. It is understood that women would not be involved with activities like ploughing, leveling , preparing dikes and channels with the how and the pick, sing, making coiled straw bins and some others whereas some operations are solely done by women. They include uprooting and transplanting seedlings and husking of paddy. Some operations are done by both. This includes threshing, winnowing, reaping, carrying harvest to the threshing floors. These are culturally rooted and are associated with certain superstitious belief. Except the strategy to strengthen house hold position through the women run SHGs if any impact had happened then it was not a part of the overall watershed design. Some training were provided to women through exposure visits for SRI but rest of the intervention did not have this as a part of design.

In spite of this, women in Bandudih have come up strong. The SHGs had been instrumental in giving them both access and control over various aspects within the households to begin with. Some of these women groups are instrumental in taking up larger issues-stopping alcohol sale.

Women SHG groups (149 members representing equal number of HH) have accumulated a total savings of INR 190000 (March 2006). They have also advanced loans (many as 307 times to its 149 members). The total amount advanced is INR 166531. In most cases the borrowings were made for agricultural purposes. Many families have used credits obtained from these SHGs to free themselves of their old debts, many of them have freed their mortgaged lands and many of the families have invested in Animal husbandry related ventures. This is also indicative of how families, particularly the less wellbeing ones are making their own efforts to better their livelihoods.

Table 9
Showing Purpose wise borrowings made

Sr. no	Purposes of borrowing	Number of loans	Amount advanced	Percentage
1	Agriculture	130	48041	28.85
2	Animal Purchase	10	10400	6.25
3	Services	17	9200	5.52
4	Housing	4	6100	3.66
5	Purchase of Household Assets	6	4300	2.58
6	House repair	20	14550	8.74
7	Debt Redemption	4	2500	1.50
8	Health	47	18025	10.82
9	Social	50	38465	23.10
10	Consumption loan	4	4750	2.85
11	Education	15	10200	6.12

The effort initiated by the women SHG group in organizing a cattle camp in the village is commendable. PRADAN though provided the structural support this issue was first discussed in the SHGs. The vaccination camp was self financed wherein the villagers came with their own cattle and paid the cost of vaccination. The camp provided vaccination to Milch & Draft Animals (421), Sheep and Goat (12), Poultry (155) Ducks (27) and Pigs (12). PRADAN had initiated the dialogue with the department and very soon women SHG members will receive some barefoot AH training particularly for vaccination and identification of simple diseases. There is a demand of such services and it is expected that some income would get generated for women members of these SHGs. In addition it would also provide these women with additional knowledge and skill thereby challenging the subordinate position otherwise accorded to women.

The womens groups during the last few months have also taken up the issue of restricting the sale of liquor within the village. This was initiated through a petition to the local Police station –which however did not yield any results. The women than took up the issue and went ahead to convince fellow villagers who were involved in the trade and asked them to stop doing so. Interestingly this action by the women was never prompted by PRADAN. It was a self initiated action as women realized that the hard earned

resources often get siphoned from them through this process and some of the liquor outlets selling spurious liquor had negative impact on health of those who took to drinking.

The compulsory savings generated from the labor (women constituted majority) have been used for purchase of assets and the notable among them had been the draft power. A survey conducted by PRADAN depicted that around 60 % of the families in Bandudih did not have draft power before the intervention. The initiation of watershed and the savings it generated out of the watershed work helped many families to buy animals for draft power.

7. Analysis of the process and strategy for interventions

A few aspects which one could draw out from the case are as under:

7.1 Pro poor positioning

PRADAN has an ideological leaning which one can categorize as pro-poor. In all its intervention the pro poor positioning was evident. The poor had fewer assets (land) and also had assets which also yielded less. These poor households encountered food insecurity and resultant migration. Reversing this situation was the major focus of the intervention. It required supporting the households particularly to insure that their land gave them enough return so that their food security is ensured. In spite of the pressure PRADAN encountered from the dominant groups the organization kept its focus on the poor and on poor (quality) land.

7.2 Innovation justifying the land types and the hydrogeology

PRADAN's watershed intervention was designed as per the hydro geology. As a result these interventions suited well to the area and gave impacts soon. The interventions were also quite innovative- clear departure from the normative watershed treatment approach. The impounding of water in the uplands and the drainage of excess water through seepage tanks in the low lands, the introduction of local species as horticulture and others are innovations which justified well with the context. These interventions also resulted in giving good returns on the investments made.

Another prominent feature of these innovations was technologies which were simple to operate and adopt. At no point PRADAN brought in or introduced technologies which were alien.

7.3 Creating spin offs

Every action had a convincing purpose. The deduction of a part from the wages resulted into creation of a saving base. These were later used by the households for a variety of

purposes. Many of them resulted into spin offs. Similarly the initiation of Savings activity with Women members of the Households gave enough scope to expand the possibilities of Livelihood augmentation further. All the interventions initiated (Orchards, Woody Species, LAC bearing trees, Tassar Host Plants, Grass plantation etc) have an inherent possibility to generate further spin offs. Some of the spin offs like Households investing into Water Lifting devices, Animals, growing of vegetables were noticed as results of these interventions. Future seems to be bright for such spin offs.

7.4 Integrative nature of the interventions

One also can see that efforts initiated had the element of being integrative. The uplands treatment had integration with the low lands. The entire gamut of intervention gelled together.

7.5 The unfinished and not targeted tasks

It is seen that PRADAN's intervention had somewhat ignored the gender dimension. Women representatives in watershed had no specific role. The same could be said for the landless too. The understanding that the issues of these two groups will be addressed without targeting at them is not correct. It has not happened elsewhere and here to such is likely to happen.

The second aspect is the result that some of these interventions are likely to have in future. The harvest of woody species will bring in revenue for some families and is likely to create difference among the groups who are economically homogenous before the interventions were made.

One does also see that institutions created for the intervention have no specific role to play in the post treatment phase. They were formed for a purpose and with the purpose not being there these institutions have been dissolved. One can see the role of such institutions in maintenance of the structures and ensuring that an egalitarian sharing of benefits. Many of the 5 % structures require desilting and maintenance and it is here that these institutions can surely play some definite role.

8 Conclusion

The livelihoods of the farmers are expected to stabilize further as more and more farmers get into the SRI paddy cultivation. Food security once ensured will have further spiraling effects. It will reduce migration and would then make farmers get into vegetable growing. Support of PRADAN in agriculture and institutional aspects would be required to make things get stabilised. How long it will take so that the institutional mechanism takes care of itself to carry forward the activities without support from the intervening agency, only the time can say. However, as the SHGs also get into higher cycles of savings and credits, sustainable livelihoods will become a reality in near future. Things may not always happen as desired. Some factors can act as deterrents. They are successive droughts;

sudden changes in the market and failure of the institutions that has been established. The last two years have been near to drought situation and some poor families had to resort to migration. The watershed interventions at Bandudih have made significant impacts – much more are in the process of being realized. An effort to initiate the process has resulted in showing the dawn.

Reference

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4. Coupland (see 1 above)
5. Coupland (see 1 above)
6. Tola is the local word for Hamlets. Villages in tribal areas are seen to be spread all round. Many of the Households in the Tola have common decent.

Glossary

- CAPART : Council for Advancement of People's Action and Rural Technology
- CInI : Central India Initiative
- HH : House hold
- INR : Indian National Rupee
- IWMI : International Water Management Institute
- Jajmans : People to whom land is leased out in lieu of the service they provide.
- Khariif : Summer crop
- KVK : Krishi Vigyan Kendra (Agricultural Science Center)
- L-B-H : Length-Breadth-Height
- LI : Lift Irrigation
- NABARD : National Bank for Agriculture and Rural Development
- PRADAN : Professional Assistance for Development Action
- PRI : Panchayati Raj Institution (Local Self Government)
- Rabi : Winter crop
- SHG : Self Help Group
- SRI : System of Rice Intensification

