Sustainable livelihood through agriculture intervention in Gunnaur Tehsil

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Contents

I Introduction

The main aim of this report is to identify a new livelihood project for TCSRD, within the framework of the Natural Resource Management programme. Focus group discussions and participatory rural appraisal activities were carried out in six villages to identify problems that TCSRD might try to address.

The questions posed were intended to help develop understanding of the farmers' livelihood strategies and to identify the biggest problems they faced which might be amenable to intervention. The discussions were accompanied by participatory rural appraisal activities to ensure the farmers' priorities were leading the research. The results showed that unreliable rainfall and a falling water table were an important issue to farmers.

Based on these findings, this report recommends that TCSRD start a water management programme to help the villages make the best use of their water. The suggested framework is based on that of TCSRD Mithapur and emphasises the participation of the local people in the design and implementation of the village plan.

The next section discusses the academic literature on the reasons that the productivity of farmers in less economically developed countries lags behind that of farmers in more economically developed countries. Section three explains the methodology. Section four summarises the results. Section five discusses the possibilities for intervention. Section six presents my proposal, and section seven concludes.

II Review of academic literature

A livelihood comprises the capabilities and assets required for a means of living. A livelihood is sustainable if it can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and if it contributes net benefits to other livelihoods at the local and global levels and in the short and long term (Chambers and Conway 1991). Any intervention should aim to make the farmers' livelihoods sustainable. This would mean that farmers could provide adequately for themselves and their families now and in the future.

The sustainable livelihood approach to development focuses on six key principles for intervention to achieve this aim. The first is that interventions should be people-centred: any intervention should target something that matters to the people it is intended to help, following their priorities and aspirations.

The second principle is that the intervention should be responsive and participatory. The local people should be key actors in identifying the scope. Third, the intervention should be multi-level: both micro and macro. It should be conducted in partnership between the public and private sectors. It should be sustainable, economically, institutionally, socially and environmentally. Finally, it should be dynamic, able to respond flexibly to changing circumstances (Carney 2002).

The sustainable livelihood approach requires that any intervention be focused on the needs of the farmers. Farmers in less economically developed countries often have much lower yields and use less technologically advanced methods than their counterparts in more economically developed countries. This does not mean that simply teaching farmers how to use new technologies or giving them new equipment will increase their incomes. There are likely to be underlying factors that prevent farmers from adopting these techniques. Focusing on farmers' needs means finding these underlying factors and designing an intervention to alleviate this constraint. The literature identifies a variety of potential constraints including access to credit, risk aversion, limited information and market failures in the learning process, farm size, labour shortages, and unreliable supplies of inputs.

Further problems to farmers are posed by a changing environment. The monsoon has become more erratic and unreliable over the last few years. This has increased reliance on ground water. Ground water is under stress in 214 of Uttar Pradesh's 820 blocks, mostly in the west of the state, an increase from 138 blocks in 2004 (Tripathi 2010).

II.1 Access to credit

A lack of credit could be a major cause of a failure to invest. A farmer is unlikely to have sufficient savings to make a substantial purchase, so needs to borrow money to make large investments (Feder, Just and Zilberman 1985).

II.2 Lack of information

A lack of information about the potential benefits may also delay adoption of new technology. It takes time for a farmer to learn to use a new technique in the best possible way. A farmer using a new technology for the first time is unlikely to use it efficiently. This means that in the first season of use, the increase in yields may be small. As time progresses, he learns how to use the technology better. Only after a few seasons will he realise the maximum gain (Foster and Rosenzweig 1995).

Farmers may wait for others in their community to adopt the technology first. They can then observe the mistakes their neighbours' make and obtain the full gains from the technology more quickly when they finally invest (Foster and Rosenzweig 1995).

Uncertainty of the potential gains from the technology can also be resolved by observing other farmers. The successful use of the technology by a neighbour may cause a farmer to change his opinion of the profitability of the technology. A farmer may want to wait to see the results his neighbour achieves before adopting the technology himself, if he thinks it may be unprofitable. This causes him to delay his investment (Besley and Case 1994).

Wealthier farmers will be the first to use new technology. They can experiment on a small part of their own land rather than waiting to observe neighbours. A poor farmer may require all his land for subsistence, so aversion to risk may prevent him from experimenting. The rich farmer learns to use the technology effectively on his test plot, and can then use it correctly straight away on the rest of the land. The poor farmer will wait to observe the rich farmer's mistakes and results before adoption (Besley and Case 1994, Foster and Rosenzweig 1995). Giné and Klonner (2005) showed this effect to be present in the adoption of a new type of fishing boat in a village near Tiruchendur in Tamil Nadu.

II.3 Farm size

There are other reasons that arm size has been identified as a major factor affecting adoption of technology (Feder *et al.* 1985).

Wealthier farmers are more likely to have access to credit. They hold more collateral and are likely to have more influence with the local authorities. This will enable them to invest in costly machinery that are beyond smaller farmers' means (Just, Zilberman and Rausser 1980; Feder and O'Mara 1981).

Lack of access to credit need not act as a constraint on poorer farmers if the technology is appropriate. A rental market may develop if there are many farms in the area that are too small to buy their own machine, and if all farmers will not require the machine at the same time (Binswanger 1986). Small farms in Thailand were able to begin using tractors soon after their richer neighbours through a rental market (Greene 1973).

II.4 Labour shortages and unreliable supply of inputs

A technology that increases the need for labour, such as high yielding seed varieties, may not be adopted if there is a shortage of agricultural workers.

Similarly, if the supply of complementary inputs is unreliable, the farmer may choose not to invest, as profitability may be uncertain. For example, high yielding varieties of seed are most likely to be superior to local varieties if fertiliser is available. A farmer may choose not to invest if he may not be able to get fertiliser at the correct time (Binswanger 1986).

II.5 Other factors

Farmers may take factors into account other than the effect on yields when making investment decisions. For example, labourers may prefer to work on a farm with machinery, making it easier to employ the required number of workers (Blyn 1983).

Ownership ensures that the farm has access to the machinery exactly at the time it is needed, rather than being subject to the hire market, labour market and the weather (Blyn 1983). The machinery may also be rented to other farmers.

Secondary effects are also important. Mechanisation may increase yields, but also reduces the need to grow fodder crops, freeing up land for subsistence and cash crops (Blyn 1983).

Pure economic reasons may not be the only factors affecting mechanisation decisions. A farmer may buy a tractor as a status symbol (Blyn 1983).

II.6 Counterarguments

It may be the case that none of these constraints are in fact important. Farmers may be maximising their welfare by not mechanising or adopting new technologies.

Ruttan (1977) found that, during the Green Revolution, there was only a lag of two or three years between the adoption of high yielding varieties of seeds by large and small farms, and there was no substantial difference in productivity between small and large farms. This indicates that farm size may not be important in reality.

Suri (2009) found that there was substantial variation in the return to fertiliser across farms in Kenya. Farmers who did not use fertiliser were doing so because the conditions on their farm were not appropriate for it. Farmers who switched back and forth each season were responding to changing meteorological and market conditions.

Similarly, Jodha and Singh (1990) found that an apparent lack of systematic crop rotation in six villages in Maharashtra and Andhra Pradesh was in fact a mix of deliberate efforts to rotate crops whilst also taking account of changing external forces such as the weather and the labour market.

Jayasuriya, Te and Herdt (1986) found that in Asia, mechanisation of crop threshing and land preparation had had no positive impact on yields, and tractors had only increased yields by at most ten percent and only under certain conditions. Farmers who do not mechanise now may still be maximising their profits, as the machinery may not be profitable.

Many processes that can be mechanised can also be done by hand or using animal power. If wages are low, the machine must replace a large amount of labour to be viable. This is only likely to occur on large farms where many people are employed. But many farms in less economically developed countries are small. For a machine to be viable it must operate over a large area, so the time taken to complete the activity may not be much quicker than if it had been completed by hand or animal. There is therefore also no gain in more appropriate timing of activities (Jayasuriya *et al.* 1986).

Mechanisation is most likely to be profitable if labour is leaving the land, causing labour shortages, or if the wages are rising rapidly, leading to machinery becoming relatively cheap. Mechanisation driven by subsidies may lead to increased rural unemployment (Binswanger 1986).

Use of less technologically advanced techniques on farms in less economically developed countries may reflect underlying constraints or market failures that prevent farmers from modernising, but may equally reflect an economically rational response to circumstances. Modernisation may not always be profitable.

III Method

This project aims to identify an area for future intervention for TCSRD. The academic literature suggests that an intervention will have the greatest effect if it is possible to identify what constraints or market failures are preventing the farmers from investing to improve their productivity.

A series of focus groups were held to try to find what constraints farmers face. Seven groups were interviewed in six villages: Kail ki Madhiyan, Baghau, Mehua Hasanganj, Kail, Panwari (two groups) and Noorpur. A participatory rural appraisal (PRA) approach was used to encourage the farmers to reveal their thoughts on the problems facing them.

Chambers (1994a, 1994b) defines PRA as a set of practices designed to utilise the analytical capabilities of local people, such that they produce and own the information used by the researcher. This helps to ensure that the research follows the priorities of the local people, rather than those of the researcher. This gives the community greater empowerment as they have a greater stake in the knowledge being produced. PRA should ideally be characterised by a relaxed rapport between analyst and local community.

Three different approaches were used, though not all with each focus group. The first is the semi-structured interview. The questions were based on those used by the IDL Group (2001) for their sustainable livelihood reports. The questions are designed to help gain an understanding of farmers' livelihood strategies and the problems they face. A matrix scoring and ranking exercise of the

farmers' problems was also carried out. These exercises are designed to reveal how the farmers see the severity of the problems both absolutely and relatively. Seasonality exercises were used. These aim to further the understanding of the farmers' livelihood strategies by showing what activities the farmers undertake in each season and which times of year farmers are most stretched.

III.1 Criticism of methodology

In most villages, only one group was interviewed. These groups were usually the Yadavs of the village, which is the dominant caste in the area. In Mehua Hasanganj, the seasonality exercise was carried out with a different group to the interview and matrix exercises, but they were still Yadavs. Only in Panwari was a group of Muslims also interviewed.

Another criticism is that the groups did not represent random samples of farmers even within a community. Instead interviews were conducted with groups who were already sitting together in the village when we arrived, so members are likely to be part of the same social group.

The limited time scale meant that not much of a rapport could be built with the farmers.

IV Results from interviews

This section summarises the findings from each focus group in chronological order. The full notes can be found in the appendices.

IV.1 Kail ki Madhiyan

The discussion revealed that a falling water table, unreliable rainfall, and the destruction of crops by nilgai were important problems. Access to high quality, fairly priced fertiliser was also an issue. In the matrix scoring exercise, nilgai and a lack of organisation among the farmers were identified as the most important problems, followed by drought and lack of awareness. Similarly, the matrix ranking exercise found the most severe problem to be nilgai, followed by lack of awareness, then drought and problems selling output.

Kail ki Madhiyan focus group

IV.2 Baghau

The discussion here also demonstrated that water is an important issue for farmers. They said that because the water table is falling,

some farmers' borewells failed here. Some farmers here have lost land to the expansion of the town of Babrala, and this has restricted the options they have for growing crops. Many farmers here work in Babrala and on the TCL campus and only farm seven to ten days a month. The reduction in farm size has meant that farming alone does not generate sufficient income for the farmers. The villagers also complained that their land was not flat enough to grow rice, and would like TCSRD to flatten it for them.

Despite not featuring in the discussion, nilgai were identified as the biggest problem by the matrix scoring exercise, followed by access to water, urea and seed. The matrix ranking exercise placed water first, followed by access to urea.

IV.3 Mehua Hasanganj

Here again the main problem identified in the discussion was the failure of the rains and the falling water table. Many people in this village had jobs with the railways. This additional income source reduces the dependence on agriculture and made them less susceptible to changing weather patterns. This village negotiated the maximum compensation from Tata when the plant was built.

Mehua Hasanganj focus group

The matrix scoring exercise placed water and the lack of a government information centre first on their list of problems, followed by nilgai. The matrix ranking exercise placed water and nilgai joint first.

A seasonality exercise was performed with a different focus group in this village. The busiest period is December to May. Not many people grow crops from May to July, with most going Babrala, Delhi or Mumbai to seek employment as wage labourers. Not many farmers grow vegetables here because of the threat of nilgai.

IV.4 Kail

In this village, a seasonality exercise was performed first. Each farmer will grow two crops a year. From June to October, the wheat fields are fallow, and the farmers will go to the cities to find employment. After expenses, they can bring back Rs. 2 000 to Rs. 2 500 per month. Many people in this village had problems with debt.

Kail focus group

The farmers rated pests as the biggest problem in the matrix scoring exercise, followed by money and the price of pesticides. They also complained of a lack of government support: the government has not provided them with a tubewell, and when there was a drought, they did not declare this area to be affected, so they received no support. This was reflected in the matrix ranking exercise where money and lack of government support were ranked joint first.

IV.5 Panwari (Hindu group)

The farmers in this group were very angry. They said they had lost a lot of land when the Tata Chemicals plant was built and they had been inadequately compensated. A rising population had caused individual landholdings to shrink further. This led to reduced yields as economies of scale were reduced. As a reaction to this, in 1997 they allegedly began protesting against the plant, disrupting food supplies and cutting the phone wires. Tata asked the government to intervene, and the farmers are now being prosecuted. Although the case has been brought by the government, the farmers blame Tata, and said that if Tata does one thing for them it should be to drop the case. The case has lasted ten years so far, and they have to travel to the court at their own expense if summoned. One farmer was imprisoned for three months because he failed to attend. Tata say that if they ask the government to drop the case this might encourage future protests.

The farmers said there was a lot of unemployment in the village. Agriculture was the only livelihood strategy: there were no shops or other businesses providing employment.

They were also worried about the changing climate and blamed the Tata plant.

The matrix scoring exercise placed unemployment and Tata as the first and second most severe problems respectively. The matrix ranking placed unemployment first, followed by a rising population and poverty.

Panwari Hindu focus group

Panwari Muslim focus group

IV.6 Panwari (Muslim group)

This group cited similar problems to the Hindu group from the same village. The said they had lost a lot of land because of Tata and had received nothing in return. Tata built pylons to supply the campus with electricity, but this village is still without power. This year the bajra crop became diseased which affected yields. They also said that the government had not provided them with enough tubewells.

The matrix scoring exercise rated Tata as the highest problem, closely followed by lack of access to electricity. In the matrix ranking exercise, they ranked unemployment first, followed by electricity.

IV.7 Noorpur

Here again, a lack of water featured several times in the discussion. The farmers here have scaled down the sugar cane production because of sale problems. The farmers do not grow hybrid bajra, because they prefer to eat the local variety. Nilgai are a problem, but they say fencing is ineffective because people steal it. Small landholdings were a problem, as was a lack of livelihood opportunities for young people, who were following their parents into alcoholism.

The matrix scoring exercise rated the falling water table as the most severe problem. Increasing fertiliser prices and uncertainty about its availability was second. In the matrix ranking exercise, the price of and access to fertiliser was ranked joint first with the price of diesel. Water was the next most highly ranked problem.

The villagers said they would like to see Tata set up a fertiliser shop by the main gate. They said TCL do nothing for the farmers, and were worried that all this would be put in a report but nothing would come of it.

Noorpur focus group

IV.8 Analysis

It is clear from the discussions that all the villages have differing problems. Summaries of

the results of the matrix ranking and matrix scoring exercises are presented in the appendices. It seems that, for many, agriculture is not currently a sustainable option. An increased threat of nilgai has forced farmers to limit their activities to staple crops. Shrinking landholdings prevents farmers from making risky experiments with new techniques and crops. A lack of alternative sources of income locally requires farmers to migrate large distances to seek employment in the summer months. And an increasingly unreliable monsoon has led to increased reliance on a falling water table for irrigation.

V Possibilities for intervention

V.1 Nilgai

Nilgai are an antelope common in northern India. To prevent them from eating the crops, farmers can guard their fields or erect fencing. Farmers all choose the same staple crops to reduce each individual's risk. It is of course impossible for farmers to guard their fields at all times of the day, so fencing is more effective.

Nilgai in Rajpura district

TCSRD has previously offered subsidies to the purchase of fencing, paying fifty percent of the cost. Kumar (2010) found that 60% of participants only bought fencing because of this financial support, with only 10% joining because of the perceived need and the same number joining to reduce future losses. This suggests that farmers do not see fencing as a very effective deterrent. Nevertheless, 80% of participants saw reduced crop damage, and most saw increased yields.

Crops damaged by nilgai

20% of participants saw no benefit from fencing. They said the fencing was not sturdy enough to deter animals. This was because they supported the wires with sticks rather than cement poles, which were easily broken by the animals. Many also complained that the wires rusted away after two to three years.

Previous interventions in the provision of fencing have had some success, but by giving out subsidised fencing TCSRD

does not address the underlying problem preventing farmers buying the fencing with their own resources. This may be a lack of access to credit, or that because farms are small, farmers prefer to grow staple crops. If they all follow this strategy, the risk of nilgai is spread across all farmers, so the return to fencing falls, perhaps below the cost.

That the programme does not address the underlying problems means that it is not a sustainable intervention. The wires rust away and need to be replaced every few years. The farmers would need to see a large increase in income in this short period for them to be able to replace the fencing by themselves. Experience of the programme so far suggests this is not the case.

V.2 Farm size

Farm size restricts farmers' activities and yields. In all my focus groups, the most successful farmer always had a large plot. Larger plots enable farmers to exploit economies of scale in technology use. The can grow a wider range of crops, reducing their exposure to one crop's fluctuating prices. This means they can grow high return, high risk crops such as vegetables, which allows them to increase their incomes.

Farmers with smaller land holdings rely heavily on their plots to generate their subsistence income. The size of their plots makes them more risk averse, so they grow only crops with reliable returns, such as bajra or wheat, whose prices are set by the government to ensure that farmers can subsist on these crops. This policy has the side effect that farmers are disincentivised from growing higher risk, higher return crops such as vegetables.

This problem is partly caused by the inheritance system. A farmer's land is divided between his sons. A rising population leads to the plots being divided into smaller and small holdings. This tradition may be difficult to change, and a better response may be to help people find more alternative income sources. The government's policy of setting the prices for staple crops is also a problem here. This is also outside TCSRD's control.

V.3 Non-farm incomes

In some villages, farmers complained of the lack of alternative livelihood opportunities in the village. Shrinking landholdings reduce farmers' incomes to subsistence levels. As the population rises, farmers will be further impoverished. Alternative local sources of income would mitigate this problem. TCSRD have already done a lot of work in this area. They run training programmes in mobile phone repair, computing, typing, dressmaking and beauty therapy. TCSRD could expand this programme further, providing a wider range of courses, and a greater emphasis on general business

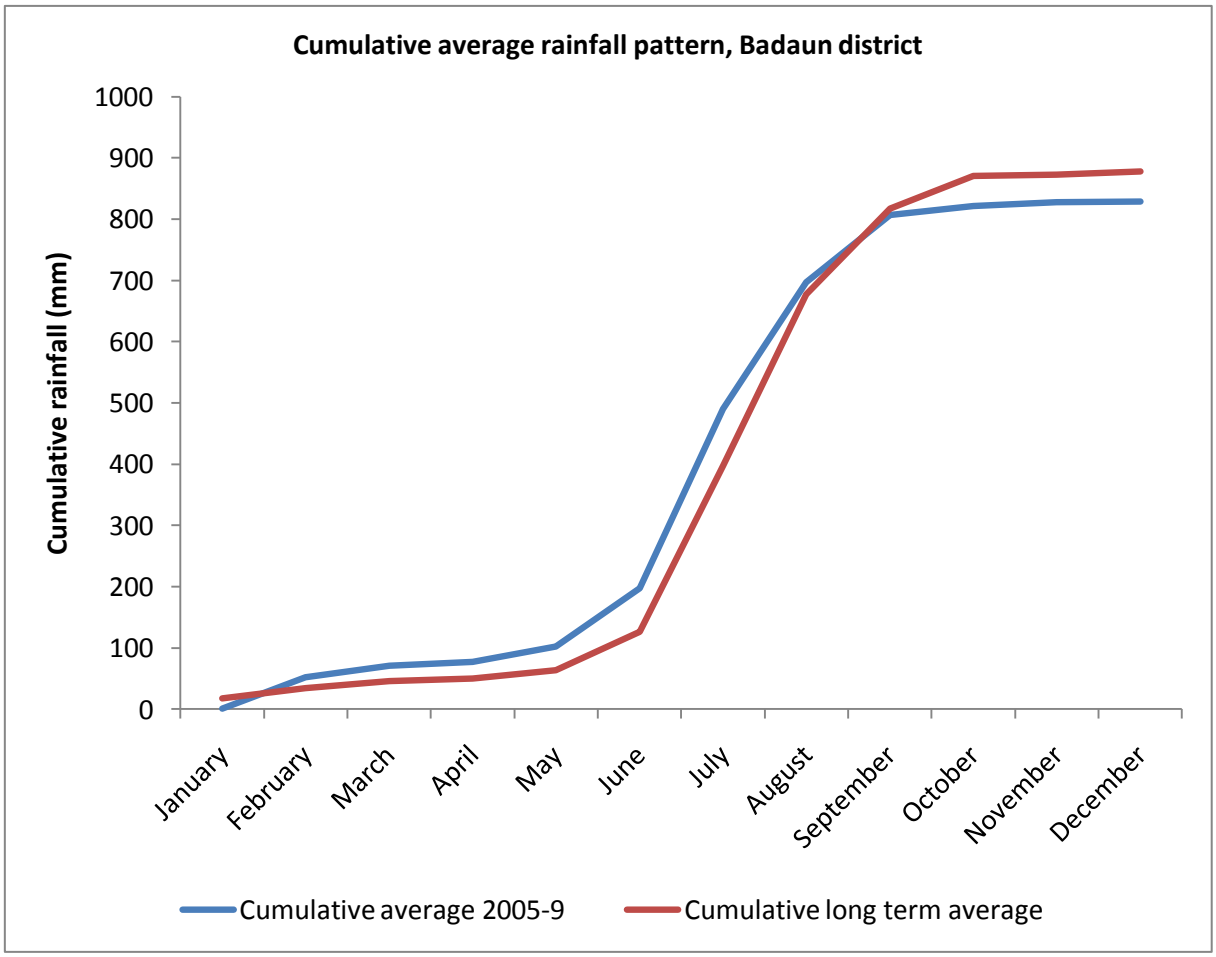
skills. Recruitment could also be more heavily targeted at villages where unemployment is worst. The self help group programme also targets this problem, with many groups now running income-generating activities. The health campaign is working to reduce population growth.

V.4 Falling water table

All the groups mentioned access to water, a falling water table or unreliable rainfall as problems. The monsoon has become more erratic in the last few years, with total rainfall also falling. This increases farmers' reliance on groundwater to water their crops. Less rainfall combined with increased use of groundwater is causing the local water table to fall.

Annual rainfall is declining across Badaun district. Average annual rainfall 2005-2009 was 829 mm, compared to a long term average of 878 mm. The chart compares the long term rainfall pattern with the monthly average for the last five years. It shows that rainfall is now higher in the first part of the year, but during the monsoon season, rainfall peaked more quickly and decreased sooner than usual. The monsoon season is important, as it when rice is grown and water is most needed to irrigate the paddy fields.

Ground water is under stress in 214 of Uttar Pradesh's 820 blocks, mostly in the west of the state, an



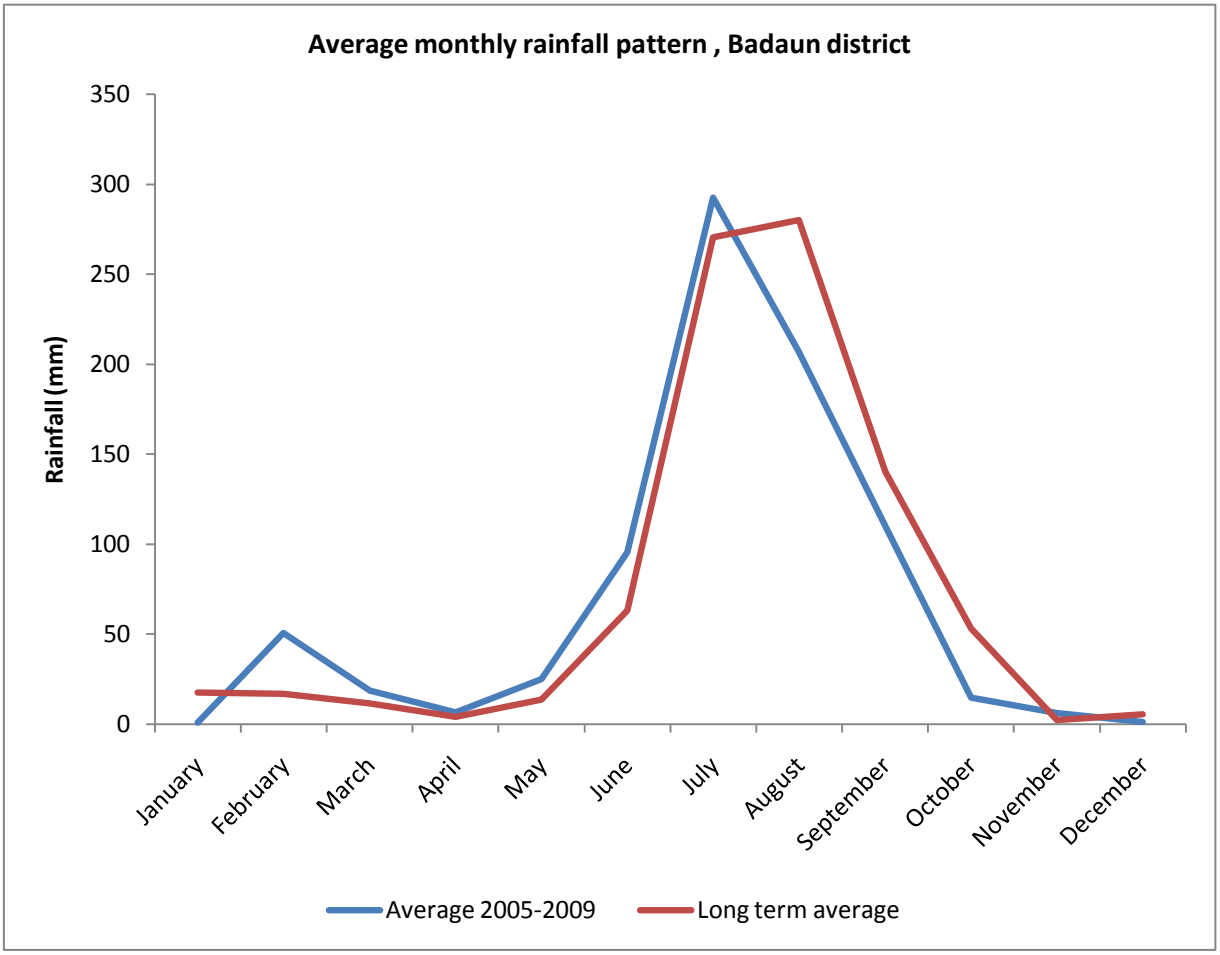
increase from 138 blocks in 2004 (Tripathi 2010).

VI Recommendation: a water management programme

Access to water is a growing issue in the villages surrounding the TCL campus. This report recommends that TCSRD Babrala begin a water management programme to help the local community overcome this problem.

A water management programme would aim to increase the efficiency with which people use water by reducing the need for water, reducing water use where it is needed, reusing water where possible, and regenerating it after use. This means minimising losses due to evaporation, runoff or subsurface drainage in irrigation, so that as much of the water as possible reaches the crops and is as evenly distributed as possible over the field.

Such a programme requires the whole community to take part, as the water table is a common property resource. One person drawing water not only reduces his own future water supply but that of the whole community. Without regulation, he will draw more water than is optimal because he does not bear the full cost of his actions. The community must therefore work together to manage the resource in a sustainable manner. This can be done through the establishment of social norms.



Such informal enforcement of a sustainable way of behaving requires a lot of social capital within the village.

Getting the community to work together in this way will be a challenge. The TCSRD leadership should engage directly with the village pradhans to get them to help bring the whole village behind the project.

A second issue is that some villagers blame TCL for the water problem. They say all the green trees in the campus are taking the water and that the emissions from the plant have changed the local climate. A water management programme might be interpreted as an admission of guilt. TCSRD must emphasise the global nature of the changes that are occurring.

Flood irrigation of a paddy field

The constraints facing the farmer, from the theoretical framework set out in the review of the academic literature, are therefore a coordination problem, and insufficient information. TCSRD should address these by facilitating cooperation between farmers and the encouragement of behaviours that use water responsibility, coupled with information and training on how to harvest, store and use water efficiently.

VI.1 Framework

This framework proposal is based on that of TCSRD Mithapur.

Stage one: create awareness

The farmers already recognise that the availability of water is a problem. The first stage of the project is to make the people in the village aware of water as a scare resource to be used sparingly. Peer pressure will then stop people from wasting water.

Puppet shows have successfully been used in other TCSRD programmes and could also be used here. The link between water use and the ability to grow crops successfully should be emphasised. Each puppet show should be followed by a meeting where villagers can talk to TCSRD staff about what they have seen. The puppet show should be accompanied by posters and murals with an emphasis on pictorial representation of the issues. There should be village meetings to discuss the issue.

Once awareness of water as a scarce resource has been created, TCSRD can set about teaching the villagers how to use water efficiently. This could take the form of training programmes in rainwater harvesting, how to irrigate in such a way that minimises runoff and how to construct structures that encourage the infiltration of rainwater to the groundwater. There could be visits to nearby villages with successful water management strategies.

Stage 2: form a village water management committee

TCSRD should then form a village water management committee. This committee should include men and women from all communities in the village: Yadavs, Muslims and representatives of other Hindu castes.

TCSRD should work with the committee using participatory techniques to help them form a village action plan. This might include further training, or the construction of water storage and infiltration structures. TCSRD should train the villagers in maintaining a committee so that TCSRD can eventually withdraw and allow the people to govern their water management independently. This

Case study: TCSRD Mithapur Integrated Watershed Development Programme

The Okhamandal region of Gujarat lacks sufficient water for consumption and irrigation to sustain its population. Rain is low and erratic, and proximity to the sea means salinity is also a problem. The watershed development programme deepens village ponds, increases inflow to the ponds using diversion channels, creates storage tanks, diverts rainwater into wells to replenish water levels, works to prevent the water becoming saline, harvests rainwater from roofs and provides alternative water sources, such as hand pumps and new wells. One of the key elements of the watershed development project in Mithapur is community engagement. Participation of the community ensures that the villagers become managers and owners of the water harvesting structures.

TCSRD Mithapur starts a new project by first creating awareness about the project, its objectives, and the concept of participation through village meetings, exposure visits and training programmes. A village committee is then formed with representatives from all communities, including women. Participatory rural appraisal tools are used to create a village action plan. The village residents are trained in account keeping, decision making and project planning through the implementation of a pilot entry point activity. Water harvesting structures are then constructed. The local people are given continuous training as required. This programme has been very successful at increasing the availability of drinking and agricultural water in this region.

training is vital for the project's sustainability.

The committee should also be taught project management skills: how to plan, implement, complete and review a project. This could initially be done with a small pilot project in the village, before building up to larger water management activities.

Stage 3: further training and erection of water harvesting structures

The village action plan identifies areas where the village could use water more efficiently. TCSRD supports villagers with training and technical expertise for the implementation of the village plan. Continuous training is provided to all villagers, and the awareness programme continues in order to ensure the villagers remain motivated and their skills are current.

VI.2 Sustainable livelihoods

The principles of the sustainability livelihood approach are that an intervention should be people centred, responsive and participatory, multi-level, a public-private partnership, and sustainable.

People-centred

The intervention is designed to address farmers' concerns about access to water. This was identified as a priority for the farmers through focus group discussions and PRA exercises. The intervention will help ensure water access for the farmers for the future.

Responsive and participatory

The programme is a response to a problem identified through discussions and PRA exercises with the farmers. The framework for intervention puts a heavy emphasis on village involvement in finding structures and methods for water management that meet the village's needs.

Case study: Tata Motors Jamshedpur Gram Vikas Kendra water management project, Jaskhandih village

The people of Jaskhandih set aside fiver percent of their land for the collection of rainwater. This ensures that all small landholdings have access to their own body of water for the harvesting of rain. Each household has a pond approximately 10m × 5m × 5m on its farming land. This fills with water following the rains and costs about Rs 3 540 and takes three to four days to dig. As well as providing an additional source of water for irrigation, villagers can now farm fish.

Watt (2009) found that the project increased the area of cultivable land, extended the amount of time the land could be cultivated, widened the variety of crops grown, which increased incomes; and led to an increase in the groundwater level.

Multi-level

This intervention focuses only on the micro level, and so fails this criterion. The programme focuses on village institutions and behaviours. The changing rainfall pattern is due to the larger problem of climate change, which is beyond the scope of TCSRD.

Public-private partnership

TCSRD is a private sector organisation, but it will need to work with the government on this project. The government owns the rivers, village ponds and infrastructure, so cooperation will be necessary for the project to be successful. The gram panchayat of each village should have a representative on the village water management committee and should be consulted to prevent potential conflict. Research into current state and national level water management policy may provide opportunities for partnership with the public sector, as well as sources of funding.

Economic sustainability

Funding for the construction of water management structures and training is likely to have to come from TCSRD or from other state or charitable sources. The project will not generate revenue, so will not be self sustaining in that sense. The project should make farmers' livelihoods more economically sustainable. More efficient irrigation and reduced reliance on rainfall will make yields more consistent over time and reduce expenditure on deepening borewells and diesel fuel.

Institutional and social sustainability

The project creates a new institution in the village: the village water management committee. This will only be sustainable if TCSRD can create sufficient motivation among the villagers to continue activity once TCSRD withdraws. Intra-community division is a problem in this area, so TCSRD will have to work hard to bring the people together for water preservation. The farmers know that water is a problem, so it should be possible to persuade them to work together on this issue.

Environmental sustainability

This intervention will make farmers' livelihoods more environmentally sustainable. Farmers are currently overusing the water resources, resulting in a falling water table. This project would work to correct this problem.

VII Conclusion

This project used participatory rural appraisal methods to identify a new sustainable livelihood intervention for TCSRD. The discussions identified water access as a major problem for farmers. This was supported by secondary data confirming a decrease in annual rainfall and that ground water levels in western Uttar Pradesh are falling. This report recommends that TCSRD start a water management programme to help farmers overcome this issue. This will require substantial effort on the part of TCSRD to overcome community divisions so that the local people will work together to conserve water. The fact that the farmers recognised water as an important issue should help reduce this problem.

TCSRD should also extend of the youth training scheme with a wider range of courses, more emphasis on business skills, and a greater recruitment effort from villages with the highest unemployment rates. A factory fertiliser outlet by the campus gate would be of great help to farmers by providing a reliable supply to quality fertiliser. It might also be profit making.

Appendix 1: Notes from focus groups

Kail ki Madhiyan

Tuesday, 27th July 2010

Focus group 14 farmers

1. **Is this a good year or a bad year? Why?**

   This year was not a good year. Wheat is the major crop here. This year the rains were bad, which caused the harvest to be small. It was too hot at harvest time, which damaged the grains. Similarly, there was not enough rain for the menthol.

2. **What is the most difficult time of the year for you? Why?**

   The hardest time of the year is March to July when sugar cane is cultivated. The fields need four irrigations per month, which is quite demanding. Most villagers here have bore well pumps, but the water table is falling.

3. **How do you manage during these months?**

   Bore wells.

4. **What has changed in the last few years?**

   In this area, they mostly cultivate traditional crops such as wheat, sugar cane and bajra, but production is falling. The rains are becoming more uneven lately. They need rain in winter, but none came this year.

5. **What problems do you face?**

   Availability of fertiliser is a problem. They trust the quality of the government distributed fertiliser and the fertiliser from TCSRD, but fertiliser from the market can be unreliable and overpriced. Vendors mix different brands so it is hard to ascertain the quality before buying it.

6. **Who is the most helpful person that comes to the village? In what way are they helpful? What is important to you in choosing which crops to grow?**

   No one from the government comes for agriculture. The only people from government who come are health workers such as the ASHA, but they focus on the women, and don't have anything to do with the farmers. Dhirendra brings useful information and training for the farmers. TCSRD has been promoting a life insurance scheme, but they only paid for one year, and it expired without them knowing.

7. **What is important to you in choosing which crops to grow?**

   The most important factor is the characteristics of the land. Higher lands are used for bajra cultivation. Lower land, where the water will sit, is used for paddy. Another factor is the nilgai. These farmers used to farm chickpeas, peas and pulses, but they cannot grow these now, as the nilgai will eat them. When they used to grow them, they were too successful, so the nilgai were able to breed. Because the people of the village are Yadavs, they will not kill the nilgai [they believe them to be cows, whereas in fact they are antelopes] so can only chase them away. Some farmers have fences, but many cannot afford them.

8. What do you think of the following crops?

a. Rice

Rice is a good crop because it is easy to grow, the nilgai will not eat it, and the return on the crop is good. It needs careful weeding however.

b. Wheat

Wheat is the staple food, as it is used to produce roti. Because everyone grows it, each individual's vulnerability to the nilgai is reduced.

c. Maize

Maize requires a lot of security because of nilgai and birds. Some farmers have fences, but this is too expensive for other farmers, who must simply stand guard.

d. Bajra

This is a big crop, and is mostly used as fodder for the cattle and buffalo.

e. Tomatoes

Tomatoes are seldom grown here. They are only grown on a small scale in kitchen gardens if at all.

f. Capsicum

Capsicum is not grown here, because the nearest market where it can be sold is 40km away. The next nearest is Delhi. This crop also requires a lot of work.

g. Onions

Same as tomatoes

h. Menthol

Menthol is intercropped with wheat and sugarcane. It is costly to produce, but offers a good return.

i. Ladies' fingers/okra

j. Cucumbers

No cucumbers are grown here.

k. Watermelons

Watermelons require a lot of security, as they are eaten by the nilgai and the foxes. They are grown on a small scale.

l. Sugar cane

Lots of different varieties are grown here.

m. Mustard seed

Mustard is a good crop but it is eaten by an insect called a maho, which is a problem, as they can destroy an entire crop. The crop is not costly to produce.

n. Eucalyptus

Eucalyptus needs sandy soil, so can only be grown in some small areas here.

9. Who is getting richer? Can you think of a household that is better/worse off now than a few days before? Why are they richer/poorer now? What happened?

About 60% of the families in the village are getting richer, and 20% are getting poorer. TCSRD offers really good training, seed and advice, so farmers who take advantage of this are doing well. Families who are getting poorer are the families without land. The children of seasonal labourers will not work like their parents did, so their expenditure is greater than their income.

10. Who is the richest farmer in the village? What makes them rich?

The family with the most land is the richest: sixteen acres between three brothers.

11. Who is the most effective farmer in the village? Who has the highest yields per acre? Why? Why do you not do the same?

Nemsingh is the most effective farmer. He has lots of land and money. He used to be the village pradhan, so has good connections.

12. If you compare this community to a nearby community/village [insert name] how is this one different? Is it the same, richer or poorer? Why?

This village is small but progressive. They think all the neighbouring villages are of similar incomes.

13. Is there anything else we should know about?

This village is part of Kail Gram Panchayat. A lot of the government aid and services reaches Kail and stops there, so does not get to this village.

Matrix scoring Approximately five to six farmers

The farmers were asked to list problems they face and then to rate the severity of the problem out of ten.

Drought	7
Nilgai	10
Insect infestation	5
Insufficient money	5
Lack of engine	1
Problems selling output	6
Lack of organisation among farmers	10
Lack of awareness/education	7

The nilgai and a lack of organisation among farmers are the most important problems preventing farmers in this village from improving their positions. Lack of awareness and drought are also important problems.

Matrix ranking Approximately five to six farmers

This exercise took five of the most important problems and asked farmers to compare each pair in turn. They were asked to state which problem was the greater, and to rate its relative importance compared to the other problem out of five.

	Nilgai	Lack of organisation among farmers	Lack of awareness/education	Drought	Problems selling output
Nilgai	-	=	=	0	0
Lack of organisation among farmers	=	-	=	=	=
Lack of awareness/education	=	=	-	4	4
Drought	5	=	4	-	0
Problems selling output	5	=	4	=	-
TOTAL	**10**	**=**	**8**	**4**	**4**
Rank	**1st**	**5th**	**2nd**	**=3rd**	**=3rd**

According to this exercise, the biggest problem facing farmers in this village is the nilgai, who prevent them from cultivating more valuable crops. This corroborates the conclusions of the previous exercise, and information from the group discussion. It is interesting to note that in the exercises the farmers made no mention of fertiliser quality. This may be because the farmer who brought this up during the discussion did not stay for the exercises.

Baghau

Wednesday, 28th July 2010

Focus group 11 farmers

1. **Is this a good year or a bad year? Why?**

   This year has been so so. The monsoon is on time, which is good.

2. **What is the most difficult time of the year for you? Why?**

   The hardest time of year was before July when there was no rain.

3. **How do you manage during these months?**

   During the drought, water is pumped from underground using a diesel pump. Villagers without a pump can usually borrow or rent one. This usually yields enough water, but the water table is falling so it failed for some farmers.

4. **What has changed in the last few years?**

   They used to grow sugar cane here, but not anymore. This is for two reasons. This village is very close to the town of Babrala, which is growing rapidly. This leads to the farmers' land holdings falling. Secondly, in the last eight to ten years, the rains have been less reliable.

5. **What problems do you face?**

   A shortage of water is a big problem. Weeds are also a problem. The herbicides they can use to control them can damage the crops.

6. **Who is the most helpful person that comes to the village? In what way are they helpful? What is important to you in choosing which crops to grow?**

   TCSRD staff are helpful, but do not come very often to see the farmers here, only once a year.

7. **What is important to you in choosing which crops to grow?**

   Insects, seed quality and sale price

8. **What do you think of the following crops?**

   a. **Rice**

      They have the wrong type of land here for rice. It's not level enough.

   b. **Wheat**

      They grow this, but they want TCSRD to give them cheaper, higher quality seed and pesticide than they can get on the market.

   c. **Maize**

      This is a small crop here.

   d. **Bajra**

This is the main crop here, with rice.

e. Tomatoes

Not grown.

f. Capsicum

Not grown.

g. Onions

There is no market for onions here. They grow garlic though.

h. Menthol

They grow this in small amounts.

i. Ladies' fingers/okra

They grow small amounts of this.

j. Cucumbers

Cucumbers are not grown here.

k. Watermelons

These are grown here a little bit.

l. Sugar cane

This is not grown here anymore.

m. Mustard seed

This is used for intercropping.

n. Eucalyptus

This is not grown here.

9. Are people in this village getting richer or poorer? Why?

Many people in this village work on the TCL campus, but only get Rs 100 per day, which is not enough. Two years ago, it was only Rs 80 per day. These people are very poor. Farmers here only farm seven to ten days per month. The rest of the time, they work in Babrala pulling rickshaws etc. Farming does not create enough income for them here.

10. Who is the richest farmer in the village? What makes them rich?

The *pradhan* is the richest person in the village. Everyone else is pretty much the same.

11. Who is the most effective farmer in the village? Who has the highest yields per acre? Why? Why do you not do the same?

Ram Prasad is the most effective farmer in the village. He has lots of land (5 acres) and his own tractor and pump. He bought the tractor with a loan, which he has now repaid. These farmers

do not have the documentation to prove they own their land and houses, so they cannot get a loan. Even if they had the necessary papers, they say they would not take a loan, as it is too risky.

12. If you compare this community to a nearby community/village [insert name] how is this one different? Is it the same, richer or poorer? Why?

They see all the villages in this area as being about the same.

13. Is there anything else we should know about?

They would like a computerised land flattener. This is a machine used with a tractor to flatten the land.

Matrix scoring 7 farmers

The farmers were asked to list the problems they face and to indicate the importance of the problem on a scale of one to ten (ten is the most problematic).

	If the problem worsens	If the problem eases	TOTAL
Levelling	3	0	3
Urea and seed	3	1	4
Water	4	0	4
Nilgai	5	1	6

This exercise indicates that the nilgai are the biggest problem faced by the farmers in this area.

Matrix ranking farmers

The farmers were asked to list the problems they face. Each problem was then compared with every other problem in turn. The number in each cell is the number of the problem considered the more severe in that pair.

	1. Levelling of land	2. Urea and seeds	3. Water	4. Nilgai
1. Levelling of land	X	2	3	4
2. Urea and seeds	2	X	3	2
3. Water	3	3	X	3
4. Nilgai	4	2	3	X

Problem	Number of "wins"	Rank
Levelling of land	0	4th
Urea and seeds	4	2nd
Water	6	1st
Nilgai	2	3rd

This exercise indicates that access to water is the most important problem in this village.

The farmers present said that the government was supposed to provide them with a tube well. Once the government builds it, the farmers would meet the operating costs. There is one pump, but it is not sufficient for all the land, and it is on the other side of the railway line, too far from a lot of these farmers' fields.

Mehua Hasanganj

Thursday, 29th July 2010

Focus group 7 farmers

1. **Is this a good year or a bad year? Why?**

   This was a bad year. Wheat is the main crop here. This year the average yield was 2 to 2.25 quintals per bigha, whereas it's usually 4 quintals per bigha. This is because of the lack of winter rains this year, and because of the heat.

2. **What is the most difficult time of the year for you? Why?**

   July to October was the hardest time this year, because of the lack of rain. The drought means it's unbearably hot, and that they have to work very hard to irrigate the fields.

3. **How do you manage during these months?**

   They took out loans for pumps, which they paid back fine. They took the loan from the money lender, and they are happy with the outcome.

4. **What has changed in the last few years?**

   Output per bigha is decreasing. This is due to low rain leading to the water table falling. They don't know how to use fertiliser correctly, so they are using it all the time.

5. **Who is the most helpful person that comes to the village? In what way are they helpful? What is important to you in choosing which crops to grow?**

   No one comes. They are self-dependent.

6. **What is important to you in choosing which crops to grow?**

   Important factors are the availability of DAP (di-ammonium phosphate), urea and zinc, the quality of seeds and irrigation.

7. **What do you think of the following crops?**

   a. **Rice**

      They grow rice for their own consumption and sell any excess. Only 15 to 20 people in the village sell the entire crop. The rest do not have enough land.

   b. **Wheat**

      Wheat is grown for household consumption only.

   c. **Maize**

      Maize is grown for animal fodder.

   d. **Bajra**

      Bajra is also grown as animal fodder.

   e. **Fruit and vegetables**

These are not grown here.

f. Menthol

Menthol is grown as a cash crop here.

g. Pulses

Pulses are not grown here.

h. Sugar cane

This is grown as a cash crop and is supplied to the local sugar mill.

i. Mustard seed

Mustard seed is used to produce oil for own consumption. The rest is sold at the market

8. Are people in this village getting richer or poorer? In what proportions? Why?

The people who are dependent on agriculture are getting poorer, as output is falling. Those working in services such as the railways are getting richer.

9. Who is the most effective farmer in the village? Who has the highest yields per acre? Why? Why do you not do the same?

Hari Bhavan is the wealthiest farmer because he has the most land. He has eight acres.

10. If you compare this community to a nearby community/village [insert name] how is this one different? Is it the same, richer or poorer? Why?

Compared to other villages, this village is richer because many people work in the service sector. About 60% of the workforce here works in the railways. Recruiters come to this village before the others, so villagers in this village are first to get the jobs. This village also negotiated the maximum compensation for the land they lost when the TCL campus was built.

One of the men in the focus group had links with the Punjab, where farmers have higher yields than in Uttar Pradesh. He said he thought that this was because Punjabi farmers were more willing to adopt new techniques. They rotate crops in a calculated way: they know what nutrients each crop requires and rotate accordingly. He said that farmers here are scared to change, as they don't have the required knowledge.

Matrix scoring 7 farmers

The farmers were asked to list problems they faced and to rate the severity of each problem out of ten, with ten being the most severe.

Problem	**Rating**	**Rank**
Water	10	=1st
Nilgai	7	3rd
Difficulties in getting fertilisers on time	6	4th
Lack of a government information centre	10	=1st

This exercise indicates that access to water and the lack of a government information centre are the most severe problems faced by these farmers.

Matrix ranking 7 farmers

Each problem was then compared with every other problem in turn. The number in each cell is the number of the problem considered the more severe in that pair.

	1. Water	2. Nilgai	3. DAP	4. Government information centre
1. Water	x	1	=	1
2. Nilgai	1	x	2	2
3. DAP	=	2	x	4
4. Government information centre	1	2	4	x

Problem	**Number of "wins"**	**Rank**
Water	4	=1st
Nilgai	4	=1st
DAP	0	4th
Government information centre	2	3rd

This exercise indicates that access to water and the nilgai are the most severe problems facing these farmers. This conflicts with the matrix scoring exercise, which rated the lack of a government information centre as as severe as water access.

Seasonality exercise

6 farmers

The farmers were asked to describe how their activity changes over the year.

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Wheat	■	■	■	■	■							■
Barley	■	■	■									■
Potatoes	■	■										■
Sugarcane	▨	▨	▨	■	■	■	■	■	■	■	■	▨
Rice						■				■		
Bajra						■		■				
Maize	▒	▒	▒	▒	▒	▒	▒	▒	■	■	▒	▒
Mustard	▒	▒	▒	▒				■	▒	▒	▒	▒
Peppermint	■	■	■	■	■	■						
Vegetables	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒

Key	
■	Activity in this crop
▒	Low-level activity
▨	Sowing and harvest

Although they were included in the seasonality exercise, we were told that not many people grow potatoes or other vegetables in this village. This is because of the threat of the nilgai.

The season starts with rice, maize and bajra, and ends in June.

Sugarcane is harvested eleven months after it is sown.

Farmers leave their plots empty from May to July. They will go to Babrala, Delhi or Mumbai to find work as wage labourers in brick kilns, construction or in the rural employment guarantee scheme.

Kail

Monday, 2nd August 2010

Seasonality exercise 7 farmers

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Wheat												
Sugarcane												
Rice												
Bajra												
Maize												
Menthol												

Key	
	Sowing/crop in field
	Crop in field
	Harvest
	Sowing and harvest

Each farmer grows two crops a year: wheat and rice, wheat and bajra, wheat and menthol or wheat and maize.

June to October the wheat fields are fallow. The farmers with only ten to twelve bighas of land will go to Delhi, Ghaziabad, Mumbai, Dehradun, Haridwar, Haryana, Punjab or Chandigarh, or to the local Tata Chemicals plant, to find work in this period. They work as wage labourers or sell tikki. They will earn Rs. 100 to Rs. 125 per day. After expenses, this adds up to Rs. 2 000 to Rs. 2 500 per month.

In a year, about 50% of a farmer's income here comes from agriculture. 20% comes from wage labour and 30% from loans. Farmers can borrow Rs. 7 000 per bigha with a KCC (farmer's credit card). They are charged 0.75% of the loan per month simple interest[1]. In addition to this, if a farmer has three acres, they can get a loan for a tractor, and if he has one acre, he can get a loan for a bore pump engine. The farmers are in a cycle of credit. If a farmer cannot pay his loan, his brother will borrow the money on his land to pay the loan. In addition to these cash loans, farmers with three acres of land can get a loan to buy a tractor, whereas those with only one acre can get a loan for an engine.

Matrix scoring 7 farmers

The farmers were asked to list problems they faced and to rate the severity of each problem out of ten, with ten being the most severe.

Problem	**Rating**	**Rank**
Money	9	=2nd
Unreliable monsoon/water unavailable	7	7th

[1] A loan of Rs. 1000 will be charged Rs. 7.5 per month. This adds up to Rs. 90 per year, as the interest is not compounded.

Pests	10	1st
Good pesticides are not available	6	8th
Pesticides are too expensive	9	=2nd
The government does not help them	8	=4th
Lack of tubewell (or electricity to power it)	8	=4th
Nilgai	8	=4th

The problem of the government not helping them refers to an incident in 2009. The monsoon did not come, and a drought was declared in many parts of the state, triggering government aid. These farmers were also suffering from lack of rain, but no drought was declared in this area. It is interesting to note that villagers in neighbouring Kail ki Madhiyan complained that government support went to Kail, but did not get through to them at Kail ki Madhiyan.

This exercise indicates that pests and the price of pesticides are the biggest problems facing this village.

Matrix ranking 7 farmers

Each problem was then compared with every other problem in turn. The number in each cell is the number of the problem considered the more severe in that pair.

	1.	2.	3.	4.	5.	6.	7.	8.
1. Money	X	1	1	1	1	=	=	1
2. Water/monsoon	1	X	2	2	2	6	7	8
3. Pests	1	2	X	4	5	6	7	8
4. Pesticides not available	1	2	4	X	=	6	7	=
5. Pesticides expensive	1	2	5	=	X	5	7	=
6. No government help	=	6	6	6	5	X	6	6
7. No tubewell/electricity	=	7	7	7	7	6	X	=
8. Nilgai	1	8	8	=	=	6	=	X

Problem	**Number of "wins"**	**Rank**
1. Money	10	=1st
2. Water/monsoon	5	4th
3. Pests	0	8th
4. Pesticides not available	2	7th
5. Pesticides expensive	4	=5th
6. No government help	10	=1st
7. No tubewell/electricity	8	3rd
8. Nilgai	4	=5th

According to this exercise, money and lack of help from government are the biggest problems facing this village. After being told the results, the farmers said that money was the greater of the two problems.

Panwari (Hindu group)

Wednesday, 11th August 2010

Focus group 9 farmers

1. **Is this a good year or a bad year? Why?**

   This was a normal year, but there were some weather problems. It was very windy around the time of the March harvest. This made the grains soft and thin. This has not happened before. The Tata Chemicals factory has made the weather warmer and should be got rid of. The factory takes the gases from the air and has lowered production.

2. **Typically, what is the most difficult time of the year for you? Why?**

   The hardest time of year is February and March, just before the harvest, when they are running out of money.

3. **How do you manage during these months?**

   If they run out of money, they take loans from people in the village, the government or the bank. They do not have problems repaying these loans.

4. **What has changed in the last few years?**

   Productivity is falling. The environment is changing, and industry is responsible for this. Rainfall is not on time. Winter and the harvest are not at the right times. Summers are uneven.

5. **Who is the most helpful person that comes to the village? In what way are they helpful?**

   No one particularly helpful comes from outside. The villagers help each other. They lend each other money and share farming equipment.

6. **What is important to you in choosing which crops to grow?**

   The most important thing is to plough the field first, then to choose the best quality of seed, to irrigate enough and at the proper time, and to use good fertiliser at the right time. The farmers in this village grow one cash crop and one food/fodder crop.

7. **What do you think of the following crops?**

   a. **Rice**

      This is a cash crop with a good yield.

   b. **Wheat**

      This crop is a necessary crop, and is the staple crop.

   c. **Maize**

      This is a good crop for the winter and is used for food and fodder.

   d. **Bajra**

      This is the same as for maize.

e. Fruit and vegetables

They do not grow these. They buy from the market.

f. Menthol

This is a cash crop.

g. Pulses

Pulses are grown for food.

h. Sugar cane

This is a cash crop.

i. Mustard Seed

This is grown both as a cash crop and for household oil.

8. Are people in this village getting richer or poorer? What proportions? Why?

Ten percent of the people in the villager are rich and 90% poor. Those with no or little land are poor, and most have very little land, because so much was taken from them when the Tata Chemicals plant was built, and they did not get enough compensation.

9. Who is the most effective farmer in the village? Who has the highest yields per acre? Why? Why do you not do the same?

The pradhan is the most effective farmer in the village. He is corrupt and takes all the government development money for himself. He is the cleverest in the village.

Desia Singh has the best yields. He has seven acres, so is more productive because of economies of scale.

10. If you compare this community to a nearby community/village [insert name] how is this one different? Is it the same, richer or poorer? Why?

This village has less land and more people than other villages. There are no livelihoods here other than farming: there are no shops or other sources of employment. The Tata Chemicals plant does not help this village as much as the other villages.

Matrix scoring 9 farmers

The farmers cited poverty, unemployment, a rising population, Tata, access to electricity, disease and the court cases against them as important problems. When the Tata Chemicals plant was built, the farmers here lost a lot of land, so they say they do not have enough to live on. There are no other jobs, so unemployment and poverty are problems. They say Tata did not give them enough compensation for their land. They would like Tata Chemicals to give loans to the poorest farmers.

When the plant was built and their land was acquired, the villagers agitated outside the main gate. There is an ongoing court case against them on this issue. It has lasted ten years so far. The villagers say that it is Tata who has filed this case. [Tata say that it is the Government.] They believe that Tata is conspiring against them. They have to go to Badaun from time to time at their own expense. One of them went to jail for three or four months at one point because he failed to turn up on the required day. If Tata does anything for them, they would like them to drop the charges.

The farmers were asked to rate the problems they listed for importance out of ten, with ten being the most severe.

Poverty	5
Unemployment	9
Rising population	5
Tata	8
Electricity	2
Diseases	2
Court cases against them	7

This exercise identified unemployment as the most important problem in the village, followed by Tata and then the court cases.

Matrix ranking 9 farmers

Each problem was then compared with every other problem in turn. The number in each cell is the number of the problem considered the more severe in that pair.

	1.	2.	3.	4.	5.	6.	7.
1. Poverty	X	2	1	4	1	1	1
2. Unemployment	2	X	2	2	2	2	2
3. Population	1	2	X	3	3	3	3
4. Tata	4	2	3	X	4	4	=
5. Electricity	1	2	3	4	X	5	7
6. Disease	1	2	3	4	5	X	7
7. Court cases	1	2	3	=	7	7	X

Problem	**Number of "wins"**	**Rank**
Poverty	8	=2nd
Unemployment	12	1st
Rising population	8	=2nd
Tata	6	4th
Electricity	2	6th
Diseases	0	7th
Court cases against them	4	5th

This exercise indicates that unemployment is the biggest problem facing this village. Poverty and a rising population are joint second. Tata is the fourth biggest problem.

Panwari (Muslim group)

Wednesday, 11th August 2010

Focus group 5 farmers

1. **Is this a good year or a bad year? Why?**

   This was a good year. The crop was better this year for Nasir Ali. He worked hard and God rewarded him with good weather and a good crop.

   There was a problem with the bajra crop this year. It contracted a disease they could not deal with.

   They use urea fertiliser, but Tata does not provide it to them, so they must pay higher prices elsewhere. The plant should be locked.

2. **What has changed in the last few years?**

   The water table is falling because the Tata plant takes all the water: it has a lot of green trees. Productivity is falling.

3. **Who is the most helpful person that comes to the village? In what way are they helpful?**

   No helpful people come to the village.

4. **What is important to you in choosing which crops to grow?**

   The timing of ploughing and irrigation are very important.

5. **What do you think of the following crops?**

   a. **Rice**

      This is a staple crop, but productivity is poor because of a lack of government services. Most of their land was taken by Tata. They say that the government should provide at least one tubewell for every 400 bighas of land if they are to have enough water to grow rice.

   b. **Wheat**

      This is grown a lot. Productivity is good, but the crop needs proper irrigation.

   c. **Maize**

      High yielding varieties of maize can be grown all year round, but need proper irrigation, which requires a tubewell.

   d. **Bajra**

      Bajra thrives on rainfall.

   e. **Fruit and vegetables**

      These are grown in small amounts. TCL has helped them fence their fields to protect the fruit and vegetables from nilgai. They get a fifty percent subsidy towards fencing for up to two hectares of land.

f. Menthol

Menthol needs 90% irrigation.

g. Pulses

This is grown in small quantities. The nilgai destroy it.

h. Sugarcane

Water problems affect their ability to grow sugarcane.

i. Mustard Seed

Big farmers grow mustard seed as a cash crop. Smaller farmers grow it for their own consumption.

6. Are people in this village getting richer or poorer? What proportions? Why?

80% are poor and 20% are rich. The poor 80% are those whose land was taken, and who were insufficiently compensated. The 20% who kept enough land have a livelihood. The others do not.

7. Who is the most effective farmer in the village? Who has the highest yields per acre? Why? Why do you not do the same?

The named the same person as the Hindu group: the one with the most land.

8. If you compare this community to a nearby community/village [insert name] how is this one different? Is it the same, richer or poorer? Why?

This village lost a lot of land to TCL, resulting in low agricultural output.

Matrix scoring 5 farmers

The farmers complained that TCL had built pylons to supply the plant with electricity, but they still do not have an electricity supply.

One elderly farmer in the group was one of the people fighting a case in court, as discussed with the Hindu focus group. He complained that Tata had taken their land and given them nothing.

The farmers were asked to rate the problems they listed for importance out of ten, with ten being the most severe.

Water	7
Nilgai	5
Electricity	9.9
Tata	10
Unemployment	7

This activity identified Tata as the biggest problem for this village, followed by electricity access, then unemployment and access to water.

Matrix ranking 5 farmers

Each problem was then compared with every other problem in turn. The number in each cell is the number of the problem considered the more severe in that pair.

	1.	2.	3.	4.	5.
1. Water	X	1	3	4	5
2. Nilgai	1	X	3	2	5
3. Electricity	3	3	X	3	5
4. Tata	4	2	3	X	5
5. Unemployment	5	5	5	5	X

Problem	**Number of "wins"**	**Rank**
Water	2	=3rd
Nilgai	2	=3rd
Electricity	6	2nd
Tata	2	=3rd
Unemployment	8	1st

This exercise identified unemployment followed by electricity as the biggest problems facing this village.

Noorpur

Thursday, 12th August 2010

Focus group 6 farmers

I felt that the responses given to questions one to seven were heavily influenced by Harpal Singh, who seemed to be answering the questions on behalf of the farmers, and then sometimes confirming with them after he had given me his information.

1. **Is this a good year or a bad year? Why?**

   The rabi season was not good this year. Production was down. This was because of the lack of winter rains.

2. **Typically, what is the most difficult time of the year for you? Why?**

   There are three times each year that are hard. The first is April, when they harvest and thresh the wheat. The second is July and August, when they sow the kharif crop, intercrop it and transplant the paddy. The third is October to December, when they harvest the kharif crop and sow the rabi crop.

3. **How do you manage during these months?**

   During these periods, they work longer hours. They might work up to sixteen to twenty hours per day. They help their neighbours and friends. Those with little land help those with more. They hire extra labour, from within the village, and from the surrounding area. The women and children help.

4. **What has changed in the last few years?**

   There have been no big changes in the last five years. They have stopped or reduced their cultivation of sugar cane, because the price was falling and the receipt of payments was unreliable.

5. **Who is the most helpful person that comes to the village? In what way are they helpful?**

   TCSRD help farmers. The health department does immunisations. The animal husbandry department supports cattle owners. The agricultural department gives detailed information about government policy.

6. **What is important to you in choosing which crops to grow?**

   Identify an area for a particular crop. The timing of irrigation is important. Weed and pest control is accounted for. The application of fertiliser and the harvest must be timely.

7. **What do you think of the following crops?**

   a. **Rice**

      This crop was good this year, so they made a good profit.

   b. **Wheat**

      This is a rabi crop.

c. Maize

This is a winter crop. This was bad this year because of bad seed from the supplier. He gave the local variety.

d. Bajra

In this area, there are two types of bajra, local and hybrid. Small farmers will grow the local variety for food and fodder. Medium and large farmers will grow the hybrid crop also. The farmers do not like to eat the hybrid variety, so they continue to grow the local variety, despite its lower yield.

e. Fruit and vegetables

Farmers with land near the village may use a small amount of land to grow vegetables for their own consumption, but farmers whose land is further will not, because of the threat of nilgai. To protect the crops, they can stand guard or spray the plants. Fencing is too expensive and may be stolen.

f. Menthol

Menthol production is falling because the water level is falling. More irrigation is needed. Pests are also increasing. Farmers irrigate using a borewell or a diesel engine. They use the flat irrigation technique: a channel is dug and the water flows along it.

g. Pulses

Fifteen to twenty years ago, everyone here grew pulses, but not anymore. They require a lot of irrigation. They used to use a rehet for this. The population has grown, resulting in smaller land holdings. Pulse crops are risky, and now that farmers have smaller plots, they are more risk averse. Nilgai are also a problem.

h. Sugar cane

Not all farmers grow sugar cane. Some do, but other villagers sometimes steal it for their own use. Nilgai are also a problem.

i. Mustard Seed

This is a cash crop. It has a short growth period.

8. Are people in this village getting richer or poorer? What proportions? Why?

99% of the people in this village are getting poorer. People have small landholdings. There are no livelihood opportunities for young people. Alcoholism among adults is spreading to offspring. The fertility of the land is falling. Cattle damage the crops.

9. Who is the most effective farmer in the village? Who has the highest yields per acre? Why? Why do you not do the same?

The pradhan is the richest farmer in the village. Nawab Singh is the most effective. He has yields of three quintals per acre. He uses new seeds. He irrigates properly and with proper timing. Others do not follow because of lack of money. This year there was a DAP shortage, so they had to go to Bareli to get it.

10. If you compare this community to a nearby community/village [insert name] how is this one different? Is it the same, richer or poorer? Why?

More people in Panwari work in the Tata campus than in Noorpur. Panwari has two sources of income and so is richer. Noorpur has only agriculture.

Matrix scoring 6 farmers

The farmers were asked to rate the problems they listed for importance out of ten, with ten being the most severe.

Nilgai	5
Cattle destroy the field when grazing	5
Water level is falling	10
Increasing fertiliser prices and uncertainty about availability	8
Increasing diesel prices	3
Shortage of agricultural labour	5

This exercise identified the falling water level as the most severe problem facing farmers in this village. Increasing fertiliser prices and uncertainty about its availability was the second most important problem.

Matrix ranking farmers

Each problem was then compared with every other problem in turn. The number in each cell is the number of the problem considered the more severe in that pair.

	1.	2.	3.	4.	5.
1. Nilgai and cattle	X	2	3	4	=
2. Water	2	X	3	4	2
3. Fertiliser	3	3	X	=	3
4. Diesel	4	4	=	X	4
5. Labour shortage	=	2	3	4	X

Problem	**Number of "wins"**	**Rank**
Nilgai and cattle	0	=4th
Water	4	3rd
Fertiliser	6	=1st
Diesel	6	=1st
Labour shortage	0	=4th

This exercise indicated that the prices of fertiliser and diesel and the availability of fertiliser are the most pressing problems in this village, followed by access to water.

The farmers said that, as TCL produces fertiliser, it should set up a shop by the main gate. They said TCL does nothing for farmers. They said that I would take all this down, write a report and nothing would happen. They complained about the political system in Uttar Pradesh. They said that the government does nothing for the Yadavs. The old Chief Minister did, but he lost the election.

Appendix 2: Summary of matrix scoring exercises

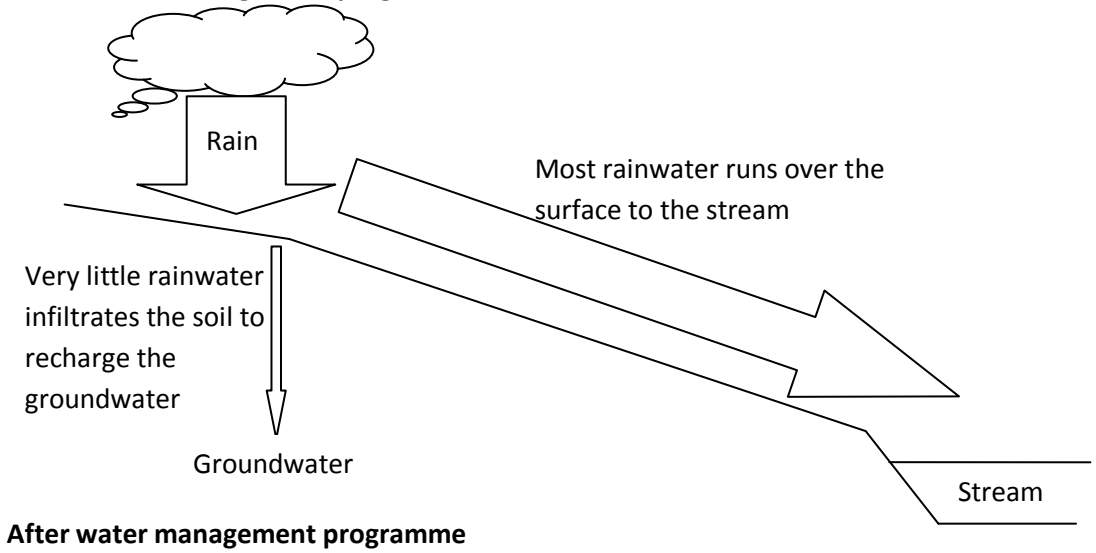
	Kail ki Madhiyan	Baghau	Mehua Hasanganj	Kail	Panwari (Hindus)	Panwari (Muslims)	Noorpur
Water	●●●●● ●●	●●●●	●●●●● ●●●●●	●●●●● ●●		●●●●● ●●	●●●●● ●●●●●
Nilgai	●●●●● ●●●●●	●●●●●	●●●●● ●●	●●●●● ●●●		●●●●●	●●●●●
Fertiliser and seed prices and availability		●●●●	●●●●● ●				●●●●● ●●●
Electricity				●●●●● ●●●	●●	●●●●● ●●●●	
Lack of government help			●●●●● ●●●●●	●●●●● ●●●			
Tata					●●●●● ●●●	●●●●● ●●●●●	
Unemployment					●●●●● ●●●●	●●●●● ●●	
Pests	●●●●●			●●●●● ●●●●●			
Money	●●●●●			●●●●● ●●●●			
Lack of organisation among farmers	●●●●● ●●●●●						
Price of pesticides				●●●●● ●●●●			
Court case					●●●●● ●●		
Lack of awareness/education	●●●●● ●●						
Availability of pesticides				●●●●● ●			
Problems selling output	●●●●● ●						
Poverty					●●●●●		
Rising population					●●●●●		
Agricultural labour shortage							●●●●●
Cattle destroying the field while grazing							●●●●●
Diesel prices							●●●
Levelling		●●●					
Disease					●●		
Lack of engine	●						

Appendix 3: Summary of matrix ranking exercises

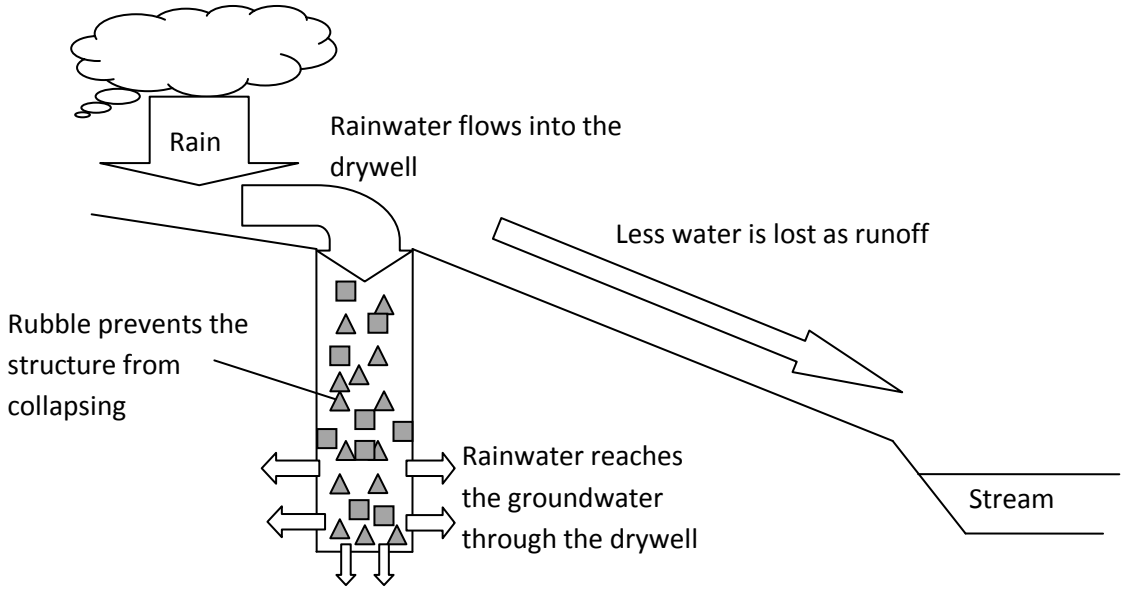
	Kail ki Madhiyan	Baghau	Mehua Hasanganj	Kail	Panwari (Hindus)	Panwari (Muslims)	Noorpur
1	Nilgai	Water	Water; nilgai	Money No government help	Unemployment	Unemployment	Fertiliser Diesel
2	Lack of awareness/ education	Urea and seeds			Poverty Rising population	Electricity	
3	Drought Problems selling output	Nilgai	Lack of government information centre	No tubewell or electricity to power it		Water Nilgai Tata	Water
4		Levelling	Getting fertiliser on time	Water/ monsoon	Tata		Nilgai and cattle Agricultural labour shortage
5	Lack of organisation among farmers			Pesticides expensive Nilgai	Court case		
6					Electricity		
7				Pesticides not available	Disease		
8				Pests			

Appendix 4: An example of a simple water management structure: the drywell

Before water management programme



After water management programme



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