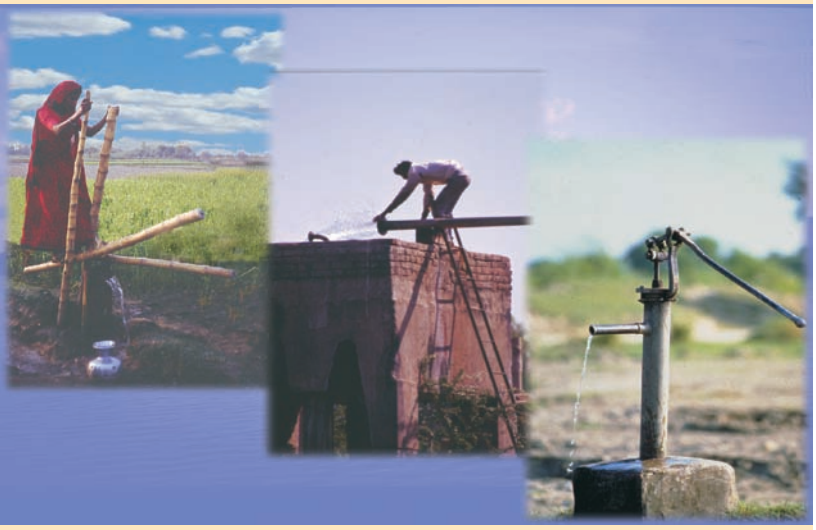
WORKING PAPER 7

Elixir or Opiate?

An Assessment of Minor Irrigation Policies in North Bengal



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IWMI
INTERNATIONAL WATER MANAGEMENT INSTITUTE

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Supported by the CGIAR

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IWMI's research is funded by the Consultative Group on International Agricultural Research (CGIAR) and other donors. Support is also given by the Governments of India, Iran, Mexico, Nepal, Pakistan, South Africa, and Sri Lanka.

This paper is based on an evaluation of the Nort Bengal *Terai* Development Project (NBTDP) carried out by the author at the invitation of the Government of West Bengal and the Project Support Unit of the NBTDP. This is a prepublication discussion paper for limited circulation for feedback and comments. The first draft was based on field research supported by the NBTDP and the IDE-Ford Foundation-sponsored *Irrigation against Rural Poverty* Research Program; it was subsequently revised at the International Water Management Institute, Colombo. The earlier draft of the report was presented to a group of senior officials of the Government of West Bengal (GOWB) in a workshop chaired by Secretary, Agriculture, GOWB. The author gratefully acknowledges the feedback and comments provided by Frank van Steenbergen, Rajeshwar Mishra and Rajnarain Indu. The author also gratefully acknowledges the financial and logistical support and the opportunities for disscussion with many staff members and consultants of the NBTDP and functionaries of the Government of West Bengal.

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Shah, T. 2001. *Elixir or opiate? An assessment of minor irrigation policies in North Bengal.* Colombo, Sri Lanka: International Water Management Institute.

ISBN 92-9090-428-3

/irrigation management / agricultural development / farmer managed irrigation systems / social aspects / organizations / farmers' associations / subsidies / policy / participatory management / governmental interrelations / small scale systems / performance evaluation / economic aspects / deep tube wells / shallow tube wells / lift irrigation / rural development / poverty alleviation / pumps / technology transfer / cooperatives / mechanization / institutions / leadership / India/

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Contents

Abbreviations and Glossary of Terms

ADO: Agricultural Development Officer
BC: BC
BDO: Block Development Officer
CM: Chief Minister
DTW: Deep Tube Well
HTW: Handpump Tube Well
LDB: Land Development Bank
MDTW: Medium Deep Tube Well
NPA: Nonperforming Assets
PDW: Pump Dug Well
PRA: Participatory Rural Appraisal
RLI: River Lift Irrigation System
STW: Shallow Tube Well
TP: Treadle Pump
TPW: Treadle Pump Well
WBEB: West Bengal Electricity Board

Aus: summer season
Aman: monsoon season
Bigha: $2/5^{th}$ of an acre
Boro: winter season
Chaas: a row of plants
Chuha: pit
Crore: 10,000,000
Dhenkul/Dhenkuli: a manual water-lifting device
Gram Panchayat: Village Council
Lakh: 100,000

Panchayat Samiti: Block Council
Pradhan: Gram Panchayat Secretary
Sabhapati: President of the Block Council
Taar-balti: Swing basket
Terai: Plain
Zilla Parishad: District Council

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Executive Summary

Introduction

This study was commissioned by North Bengal *Terai* Development Project (NBTDP) and was supported by the IDE-Ford Foundation-sponsored *Irrigation against Rural Poverty* Research Program. Its aim is to analyze North Bengal's minor irrigation (MI) policy. This report does this using a broad social policy framework and participatory field research; however, besides doing this, we also explore a range of politico-economic issues that have shaped the formulation and implementation of MI policy in the North Bengal region. After 30 years of evidence showing how infallibly the Green Revolution has chased tube well revolution West to East in the North Indian plains, the coexistence of massive groundwater resources and dense rural poverty in North Bengal remains something of an enigma. And that makes the NBTDP both interesting and significant as a strategic intervention, since it has zeroed in on MI development as the centerpiece of its agricultural development programing strategy.

Despite its underdevelopment, North Bengal brims with a variety of irrigation technologies, traditional and modern, muscle-powered and machine-driven, small and large. There are traditionally manually operated *dhenkul and taar-balti* systems; there are modern and manual—hand pump tube wells (HTWs) and treadle pumps (TPs); diesel pumps are used by farmers to pump water from ponds, bamboo tube wells, streams and rivers; and unlined field channels and over-ground poly-pipes are used as water transmission systems. Over five decades, government and donor agencies have created Deep Tube wells (DTWs), Medium Duty Tube Wells (MDTWs), Shallow Tube Wells (STWs), and Pump Dug-Wells (PDWs)—and all these with or without underground cement or PVC pipeline networks with spouts for water transmission; they have also built major and mini River Lift Irrigation (RLIs) systems; and local agencies have simplified some of these technologies further to cut costs and make their operation and maintenance (O&M) easier. This variety of technologies has spawned a diversity of institutional forms. Major RLIs and DTWs are controlled and managed by government agencies; smaller systems are managed either by *Panchayat Samities* through committees or turned over to BCs. Then, in many areas, there are booming pump irrigation markets. And most *Gram Panchayats* stock diesel pumps for renting out to farmers.

The NBTDP

The NBTDP-support has extended to several of these technologies. Until it discontinued its support to them recently, the Project provided 100 percent subsidy on capital costs to major RLIs and DTWs, which also get over 70 percent subsidy on O&M costs from state governments. In its Phase III, the NBTDP offers 100 percent capital cost subsidy to mini RLIs (and MDTWs, but none of these has been planned yet), 75 percent capital cost subsidy to STW and PDW clusters, 90 percent subsidy on HTWs (which are targeted to resource poor women as an irrigation-cum-drinking water support system), and zero direct subsidy on treadle pumps.

We deal with three distinct sets of questions regarding the subsidy policy under the NBTDP: first, about the rationale for MI subsidies in North Bengal; second, about whether the NBTDP's current subsidy policy achieves the Project's MI objectives in an efficient, sustainable and livelihood-intensive manner; and third, if there is scope for modifying the current policies for better impact. Towards the end, we also explore what should ideally be the objective of MI policy in North Bengal's socioeconomic and aquatic conditions and how it might be achieved.

Are MI Subsidies Justified in North Bengal?

Given that subsidies will continue to be extensively used in North Bengal and elsewhere in the country to spur development and promote smallholder livelihoods, the use of MI subsidies in North Bengal is justified on several grounds: a) E*nvironmental:* stimulating groundwater withdrawal in a judicious manner can create a positive externality in many parts of the region by reducing waterlogging and flood-proneness in low-lying areas; b) *Development:* MI development can give a kick-start to the region's Green Revolution, which rural North Bengal needs badly; c) *Rural poverty and capital scarcity:* left to itself, the region will take a long time before its Green Revolution takes off because the primary constraint on expansion of groundwater irrigation is its pump capital scarcity that, in turn, is caused by its rural poverty, low capital accumulation and lack of enterprise; d) *Productivity and livelihood impacts:* there is vast evidence to suggest powerful productivity and livelihood impacts of MI development far out of proportion to the investment needed; e) *Optimal use of subsidy:* considering that a backward region like North Bengal will anyway attract developmental funds, MI offers better uses of subsidies than many other activities where their productivity and livelihood impacts may be inferior.

On analyzing the NBTDP subsidy policy, we kept several normative criteria in mind: Is the existing design of the NBTDP subsidy policy appropriate, especially from the viewpoint of resource poor farmers' investment and repayment capacity? Does the current subsidy arrangement influence the choice of farmers? Is the targeting of the subsidized schemes right? Does the subsidy policy also affect the choice of irrigation technology by farmers and government decision makers? Then, does the subsidy policy help in the efficient delivery of irrigation systems? Finally, is the subsidy policy realistic in its assessment of the organizational preconditions necessary for their efficient and viable operation?

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Assessment of the MI Subsidy Policy

Our analysis fully validates the NBTDP's decision to discontinue support to major RLIs and DTWs. Our limited field research—and several other studies of these systems in North Bengal—suggest that the region offers no exception to the general experience of many countries of South Asia and most Indian States where public DTWs have been a uniform and resounding failure. Our analysis also vindicates the decision to discontinue support to the '4-hectare' scheme; besides being financially and economically unattractive, one can also argue that the buried pipeline transmission systems in general are far too costly, sophisticated, capital-intensive and unsustainable compared to their usefulness, especially in a flat, water-abundant region like North Bengal.

The NBTDP subsidy support to mini-RLIs and MDTWs is likely to produce somewhat better outcomes in that: a) these systems are smaller and technologically simpler; b) the design of the scheme provides for their turnover to a BC as soon as commissioned; c) with fewer farmers in their command, it would be easier to build a user organization to operate the scheme on a sustainable basis. The threats for the mini-RLI and MDTW program arise from: a) the ambiguity about the government order stipulating the turn over of the schemes to BCs; b) the process-intensive organization of users that a government department may neither have the will nor the capacity to undertake; c) the high capital cost per family as well as per hectare covered by these schemes; and d) the unfamiliarity of the small farmer and local technicians with some components of the technology, especially, the buried pipeline distribution system, and the consequent difficulty that they may encounter in its maintenance and repair.

From the techno-economic and organizational standpoint, the NBTDP subsidies are probably put to best use in STW and PDW cluster schemes; these fit farmer needs and constraints quite well; a group of four small farmers seems ideally suited to achieve viable level of utilization; and having to contribute 25 percent of the capital cost helps build solidarity and oblige them to transparently decide at the outset the `rules-of-the-game' for O&M cost sharing; small farmer beneficiaries are fully familiar with the technology involved, especially in diesel STWs; they are comfortable about maintenance and repair using largely local resources and skills; all in all, then, STW and PDW cluster schemes are financially viable and economically rewarding. Some worrisome aspects are: a) the allocation of budgets between PDWs and STWs, as well as allocation of schemes to different areas, appears to be somewhat arbitrary; b) the cost of the system tends to be significantly higher than what farmers themselves would incur; c) schemes fitted with electric pumps run into a variety of problems due to unreliability of power supply and flat electricity tariffs; d) the scheme may attract pressures from farmers who would normally be ineligible to claim and get benefit out of the scheme; e) there is a propensity on the part of the better-off to form `dummy groups' and effectively privatize the scheme; f) however, the negative equity impacts of such oligarchic propensities are probably far less serious than one would think and we suggest a broad, practical-political-economy approach towards these; g) at times, the partisan propensity of Panchayat decision makers might probably be more serious in choice of beneficiaries; many resource poor farmers we talked to lamented that subsidies are directed towards the politically agile and verbose rather than to the politically passive and quiet.

Hand Pump Tube Wells (HTWs) are a case apart; they are promoted as a multipurpose device used for obtaining drinking water as well as for irrigating backyard vegetable gardens in homesteads; their target is primarily resource poor women; as a result, a rather large subsidy on HTWs (90 percent on a unit cost of Rs 3,500[1]) is to be assessed not so much against their productivity and income impacts but against their contribution to health and sanitation and to gender equity. There are nevertheless cost-effectiveness issues here; in terms of water output, HTWs' performance is at best as good as of treadle pumps; however, they cost five times as much. The high cost of HTWs is explained by the deeper bore (up to 45 feet) and the use of GI pipes, cast iron head and metal strainer; it is justified on the grounds that HTWs, widely used for fetching drinking water need to tap deeper aquifers. This assumption perhaps needs probing and reconsideration.

Issues in Design and Administration of Subsidies

Important issues emerge from the NBTDP's as well as West Bengal government's experience with the design MI subsidies. One might argue that subsidies differ in their `smartness;' dumb subsidies create dependency, induce `money illusion' (that entices target groups to make choices they would not make with their own resources), and create room for allocational arbitrariness in the selection of beneficiaries. Smart subsidies minimize these, *ceteris paribus*; the best example we found of smart subsidies was the STW cluster scheme. Another relevant second order question is about designing a subsidy that gets `the best bang out of its buck.' For this, in our assessment, subsidies should: a) be `efficient'—in the sense that they should be designed to minimize the cost of assisting a beneficiary in the manner defined; b) be designed to produce sustainable change; that it should support techno-institutional interventions that beneficiaries can—and will want to—sustain on their own; and c) aim to significantly address outstanding anomalies and inequities of a society.

Without explicitly stating them, throughout this report, the analysis of the NBTDP MI policy has used these normative criteria. And, we believe that the NBTDP itself has implicitly used strikingly similar normative criteria to introduce the changes that it has made in recent years in its MI subsidy policy. However, besides learning from its own experience, we believe the Project also can—and needs to—constantly assess and learn from what farmers themselves do when their own resources are at stake, and what other agencies making similar interventions do and with what effect. We found it striking, for example, that Panchayat Samitis provide subsidy support to smaller RLIs than the NBTDPs—the *basic* minis—which cost at best a quarter of the NBTDP's mini RLI. We also found it striking that when they use their own money, farmers build even simpler RLIs—the *super* mini—that has just a pump on the river bank and a distribution system made of shiftable, flexible poly-pipe. True, the *basic* and *super* mini RLIs are less fancy and have a smaller design command, and the poly-pipes used by farmers for transmission last all of 12 months; but, *ceteris paribus*, chances are that Rs 1 million spent on 2 mini RLIs of the NBTDP will produce less actual area irrigated and reach fewer small farmers sustainably than if

[1]US$1.00=Indian Rs 43.50.

spent on 10 *basic* mini RLIs or to subsidize 75 percent of the capital cost of around 50 *super*-mini RLIs of the type that small farmers built from their own resources.

Similarly, the Project needs to analyze the full potential offered by—and the limitations of—the pump-for-rental scheme adopted by almost all the Gram Panchayats of Jalpaiguri. That so many Gram Panchayats have adopted it suggests their assessment to be that the critical bottleneck on expanding MI is not shortage of boreholes and water sources but of pumps. If this were true, there is need to assess the merit of 75 percent subsidy on the cost of Shallow Tube Wells (STBs) and PDWs in the shallow cluster scheme. Moreover, even if the Project wants to continue support for boreholes, it needs to assess, whether from the same budget head for STW/PDW subsidy, it should not reach out to a larger number of farmers by encouraging beneficiaries to build bamboo bores each at Rs 1,500 instead of GI pipe STWs each costing Rs 18,000.

There is also the question of overall strategy: if pump capital scarcity is the prime bottleneck in MI expansion in North Bengal, would the project not produce greater strategic impact through a pure pump-subsidy rather than through spending its limited budget on construction-intensive MI schemes that devote the bulk of the subsidy funds on MI miscellanies (such as buried pipe transmission systems, GI pipe STWs, etc.) that resource poor farmers seldom use to build, with their own resources? Imagine the STW/PDW scheme modified hypothetically as follows: any group of four small and marginal farmers who deposit Rs 5,000 along with the required documentation in their Panchayat Samiti are instantly issued a delivery order for a diesel pump set of their choice, a fuel-saving contraption and 500 feet of poly-pipe; the procedure for approval can be simple and completed at the level of the Panchayat Samiti itself; the farmers can produce the Delivery Order before the dealer concerned, and procure their pump and poly-pipes. A program such as this can, in our assessment, reach a larger number of small farmers and produce more MI; it will also be more sustainable because, given a chance, farmers will choose the technology they are most familiar and confident with.

The Case for Redesigning the MI Strategy for North Bengal

These suggestions are in the manner of incremental changes in existing strategy. But it is also possible—and desirable, at some stage—to review the analytical framework underlying the present strategy itself. We have repeatedly argued in the report that the critical challenge of MI development—and, indeed, of overall agrarian growth—in North Bengal is of dealing with the pump capital scarcity. North Bengal has a pump density of around 1–3 pumps/1,000 ha of net sown area. Eastern UP and North Bihar—which are similarly flush with groundwater—had pump densities in this range during the mid-1980s. Today, these latter regions have expanded their pump capital to achieve pump densities of around 25–40/1,000 ha; and in an earlier study of these regions, we have shown that this expansion in pump capital has been at the heart of the belated onset of the Green Revolution in these regions; and that it has been achieved during the past 10 years through active government policy.

North Bengal, instead, has been busy building MI miscellanies that guzzle funds but make little net addition to MI. Most of India—including states like Gujarat, Rajasthan and Maharashtra that actually need them—gave up building new public DTWs 15 years ago; but North Bengal—which

does not need DTWs in the first place—has continued building them until recently. One can also find fault with the extensive use of buried pipeline technology in North Bengal; in Gujarat, the savings in energy and water that these effect and their advantage in overcoming topographical barriers in conveying water are so huge that even private farmers invest in buried pipeline systems even though they are enormously costly to build and maintain. But the use of buried pipeline distribution systems in North Bengal—a flat terrain with the marginal value of groundwater at sub-zero levels—seems to be a doubtful strategy. In the course of our fieldwork, we found numerous farmers who owned or leased flexible poly-pipes for conveying water but we met none who invested in buried pipes. Overall, then the bulk of the public resources for MI development—in our rough estimate, around 50–60 percent—continues to be devoted to MI miscellanies and very little to putting pumps in the hands of the farmer even though it is common knowledge that any farmer in the region can make a bore ever so much more easily than lay his hands on a pump. Finally, through a series of design reversals, North Bengal's pump-subsidy scheme has become all but unworkable. Of the nearly 200 small farmers we met in the course of our fieldwork, not one had benefited from North Bengal's pump subsidy scheme, although most knew about it and many had tried; now, the scheme has acquired such a bad reputation amongst the poor that they have stopped trying. Banks have been dragging their feet in lending for pumps; subsidy resources available to the scheme seem woefully limited; of this, the bulk got captured by the Gram Panchayats (at least in the Jalpaiguri district) for their pump-rental programs; the process of getting approval for subsidy-loan applications—which involves 8–10 independent decision makers—is made so lengthy, laborious and full of hassle that the scared small farmer has all but written off the scheme as out-of-bounds; and the pump dealer, who made the scheme a success in Eastern UP and North Bihar, has remained completely marginalized in North Bengal. Result? Pump density of 1–3/1,000 ha whereas it should—and can easily—be 25–40/1,000 ha by the turn of the century.

All in all, then, one can argue that the present MI strategy of North Bengal is what might be the MI strategy of a State like Gujarat or Maharashtra—regions that have scarcity of water and abundance of capital, where governments as well as farmers have money and valid reasons to sink deep tube wells and lay buried pipeline networks, and where the sheer economics of large tube wells forces sustainable collective action amongst the farmers of the command area. North Bengal has none of these conditions; its farmers have too much water but no pump capital; collective management of large irrigation systems is neither necessary nor worthwhile for them nor have they got the economic drive and maturity to make collective enterprises work. The correct MI strategy for Gujarat is clearly a wrong MI strategy for North Bengal; the latter should be the reverse of the former.

North Bengal's conditions—socioeconomic as well as aquatic—are more akin to those of Eastern UP and North Bihar and, therefore, one would have thought that its MI policy would be similar to what these regions have. Strangely, however, this is not so; and one can argue that in promoting MI, North Bengal can learn a lesson or two from Eastern UP and North Bihar because our earlier studies showed that, over the past decade, these regions have been able to achieve remarkable expansion in their pump capital, and the resultant intensification of MI has been at the center of their belated onset of Green Revolution; our studies have also shown that this process was by no means autonomous but was induced by an astute MI policy. MI policy makers of North

Bengal should be interested in figuring out how MI policies pursued in Eastern Uttar Pradesh and North Bihar increased the pump capital in those regions and how it is at the center of their Green Revolution that has eluded North Bengal.

Getting the Biggest Bang out of the Subsidy Buck: Learning from the Experience of Eastern UP

Eastern UP and North Bihar have long since given up MI miscellanies such as DTWs and mega RLIs, community management of large MI schemes and buried pipeline systems—all of which use up a lot of resources but produce little MI; their MI policy now places a single-minded thrust on overcoming pump capital scarcity through the Free Boring Scheme (FBS) whose sole objective is to put a pump in the hands of the small farmer with the least hassle, delay or `transaction costs.' To this end, the FBS design has been modified in stages to a level where it has become a precision tool to achieve just this aim. All resources available have been pumped into the FBS to create a sense of sufficiency and to avoid stringent rationing. The system for processing applications for pump subsidy and the loan scheme has been enormously simplified and, in each *tehsil* town, an intensely competitive group of diesel pump dealers has been pitchforked into the central coordinating position in the implementation of the scheme. As a result, over the past decade or so, the FBS has supported over 70–80 percent of the close to a million new bore-wells and pumps installed in these regions.

The process that a small farmer goes through today in Gorakhpur *mandal* to acquire a pump-subsidy loan is extremely simple and involves the following steps: a) equipped with his photograph, land and caste documents, the farmer approaches one of the several dealers in diesel pump sets depending upon his choice and presents the papers to him. From then on, the pump dealer takes over. After examining the documentation, the dealer immediately delivers the engine and pump set to him, takes the farmer to the MI office and gets subsidized pipes issued to him on the same day; b) the farmer returns to his village complete with pipes and the pump set the same day. He then approaches any of the several rigging operators found in almost every fifth village and orders a bore done. If he and his friends can share the labor, the cost of boring—depending upon the depth of the water table—is just about Rs 200–250. If the rigging operator has to provide all the labor, the cost may go up to Rs 350–400, cash down, which the farmer pays from his own resources; c) in the next few days, the rig operators mount the boring operation and, once begun, they commission the bore-well within 4–5 hours. The farmer's bore-well is thus operational at a personal cash outlay of less than Rs 500 inside of a week at the most; d) some days later, the dealer comes to the village and takes the farmer on his motor cycle to the bank for completing the loan formalities. All that the farmer has to do is sign on the form. The loan for the National Bank for Agriculture and Rural Development (NABARD)-determined unit cost of Rs 12,500 gets sanctioned and is directly received by the dealer towards the cost of the pump; e) some days/weeks later, someone from the Block office visits the farmer to ascertain that the boring has indeed been done; he also collects information on the depth of the bore, the nature of the geological formation, etc., to estimate the boring costs; f) after several months, the boring subsidy comes in the form of an MI Department check. This often exceeds the actual cost of boring to the farmer, to cover the unofficial payment he was required to make to the MI Inspector. Nearly 200

beneficiary-farmers we interviewed in Maharajganj, Deoria and Gorakhpur districts of Eastern UP during November and December 1996 considered the FBS scheme to be a great boon for them and the diesel pump dealer to be their best friend, despite the fact that he charged a premium of an average of Rs 1,000 on the subsidy-loan pump. Most farmers considered this to be a small price to pay for accessing the FBS so smoothly; besides, they knew that the dealer had to keep the `system' well-oiled.

Compared to this, a small farmer in North Bengal has to go through an arduous process to get the subsidy loan benefit on the diesel pump. According to a Jilla Prishad *Krishi Karmadhyaksha* in North Bengal, the procedure of accessing the pump subsidy-loan scheme involves the following steps: a) the small farmer gets his name listed as an eligible aspirant with the Gram Panchayat along with all documentation; at the first stage, the Gram Panchayat has to agree to forward his application to the Block Development Officer (BDO); b) a Gram Panchayat member has to personally recommend his application to the BDO; c) The application is discussed in the bimonthly meetings of the bank, Gram Panchayat Pradhan and Panchayat Samiti member concerned to assess the creditworthiness and eligibility of the aspirant; d) if the aspirant clears this stage, his application is completed and forwarded to the bank with the recommendation of the Panchayat Samiti; e) after this, the bank claims the subsidy from the District Rural Development Agency (DRDA); f) the bank releases the loan but only after the DRDA pays the subsidy; g) the bank issues the Delivery Order to the beneficiary who can then claim his diesel pump. The procedure always takes one year or longer; in recent years, it seldom gets completed because banks, facing massive nonperforming assets (NPAs) in government subsidy schemes, are dragging their feet. The BDOs we met asserted that the delay was caused mainly by the banks; and Central Bank (lead bank) officials we met passed the blame to the DRDA and Panchayat authorities. These, in turn, argued that the banks do not proceed unless the Panchayat Samiti forwards an application; and the Panchayat Samiti does not forward an application unless the Gram Panchayat recommends it. None of the 200 small farmers we met in North Bengal had anything but frustration to share about the pump subsidy scheme.

Even in Eastern UP, things were not always as good as they are now. For example, a study in 1984 showed that the process of approval of an application for subsidy and loan for a diesel pump took over 11 months to complete. In the FBS of those days, the MI Department played a central role in implementing the subsidy policy; the Department maintained a stock of diesel pumps of one or two preferred brands. Similarly, the block office maintained an inventory of PVC and GI pipes, rigs, foot valves and other material needed to make bore-wells and employed an army of staff who would make the borings. When a small farmer applied for a shallow tube well (STW) under the subsidy-loan scheme, he had to accept the diesel pump stocked by the MI Department and wait for months until the government *mistry* (technician) came to make a boring. After all these, the final cost of the STW to him often turned out to be higher under the subsidy-loan scheme than if he had done it on his own. The diesel pumps stocked by the government sold in the open market at a 20–30 percent discount compared to what the Department charged; similarly, farmers who made borings on their own got them done for less than Rs 2,500; but under the government scheme, the small farmer ended up by paying over Rs 10,000 for the boring. The bulk of the actual subsidy was thus claimed by the `intermediaries'; as a result, farmers lost interest in the scheme.

Today, the scheme has a more farmer-friendly design because it has created a uniquely beneficial `dealer dynamic'; a) the pump dealer (and not the MI Department) has emerged as the point of access to the subsidy; as a result, over the years, all trading towns have grown a small community of specialist pump dealers who deal solely or mostly in diesel engines; even small district towns can have 15–20 such specialist dealers; b) this pump-dealer community offers a wide variety of brands to the farmers; c) All dealers would naturally look for the easiest way to corner as much of the subsidy as possible; d) however, they would be constrained from overdoing it because of the fierce competition amongst dealers to increase their share in a growing market; e) competition amongst alternative brands and dealers prompts the latter to choose the hard way and offer quality product and services to the farmers that go far beyond their 'call of duty;' f) and in return, if they extracted an unofficial `service charge' by jacking up pump set prices more than they would have done in the absence of the subsidy, the farmers we met did not seem to mind it very much; g) unlike earlier, in the present system, the farmers are spared the agony and hassle of dealing with the various agencies involved in approving the subsidy-loan; their interface with them is mediated by the dealer. The dealer who can offer a stable `business' is able to strike a better bargain with those in charge of processing subsidy-loan applications and change to the *hafta* system rather than settling the `rate' for each application; h) pump dealers with a larger turnover have an obvious advantage in dealing with the administrative system; they can and do form long-term contractual arrangements—informal, of course—with bank staff and MI staff to secure speedy clearance of loan and subsidy applications, and they can afford to pay larger *`hafta'* and charge lower premiums the farmers on the subsidy pump—which is probably why the discount on direct sales varies from Rs 700 to Rs 1,800; g) this dynamic propels the dealers to constantly try to increase their market share by offering better and hassle-free services to farmers.

In the course of a 1996 study (Shah et al. 1996; Shah and Ballabh 1996), our overall assessment of the FBS as it has operated in Eastern UP as well as in North Bihar was that: a) the entire subsidy amount does not reach the farmer; this is evident in the difference of an average of Rs 700–900/pump (6–8 percent) compared to the over-the-counter price; b) however, the small farmer is extremely happy with *this particular* subsidy scheme—something that cannot be said for most other subsidies; c) the services offered by the pump dealer in helping the farmer through the entire bureaucratic process seem highly valued; d) if the ultimate purpose of the scheme is to encourage small and marginal farmers to acquire and use bores and pump sets for irrigation, the dealers' drive to compete for a larger share of the subsidy-induced demand for pumps helps the scheme along in achieving this purpose; e) the FBS has dramatically expanded the pump capital stock available in these regions and has catalyzed their Green Revolution. In a subsequent study of North Bihar, we found the `dealer dynamic' so vibrant that they fiercely compete among themselves in roaming from village to village looking for eligible applicants and sell the pump subsidy-loan scheme to them at a margin as low as Rs 400–500! It is not that there is no `rent seeking' involved in the subsidy-loan approval process in Eastern UP; there certainly is; but for all the rent extracted, the small farmers there *do* get the pumps and bores commissioned inside of a week, with least hassle and delay, and at an 8–10 percent premium over the market price, which they do not seem to mind paying as a `service charge.' In North Bengal, too, the small farmers have to be prepared to pay the `service charge;' despite which, they can seldom lay their hands on a pump and a bore under the subsidy-loan scheme. The long-term ideal would be, of course, a

situation where there is no `rent seeking' and the small farmer gets smooth and quick access to the subsidy; but in the short run, a more practical approach is to accept the reality for what is it and move from a greater to a lesser evil.

As a strategic alternative, thus, we believe that a pump-subsidy scheme of the type that operates in Eastern UP can be a powerful addition to North Bengal's present armory of programs; to reproduce the same results, it should have the following features: a) sufficient resources for the subsidy as well as for the loan should be earmarked so that there is no need for stringent rationing; b) the scheme should give complete freedom to the farmers to choose any make of engine and pump, and to get bores made by themselves rather than insisting that the government-appointed contractor would do it; c) the application for the subsidy-loan should be submitted at the Panchayat Samiti and processed there itself; d) every branch of the public sector and cooperative banks should be encouraged to advance loans for diesel pumps and bores; e) there should be a separate but similar scheme under which Gram Panchayats can acquire pumps for renting out so that they do not preempt subsidy-loan resources meant for small farmers. Introducing these features would, in our assessment, reproduce the dealer dynamic that has helped Eastern UP and North Bihar to expand their pump capital and launch their much-delayed Green Revolution.

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Elixir or Opiate?

An Assessment of MI Policies in North Bengal

I. Techno-Institutional Compact of MI in North Bengal

North Bengal is amongst the aquatically best-endowed regions of India. The region has huge ground water and surface water potential and is drained by numerous large and small rivers, including Teesta, Torsa, Jaldhaka and others that flow through North Bengal into Bangladesh. Groundwater tables in most areas are less than 5 m in the pre-monsoonal period and less than 2.5–4 m in the post-monsoon period. Despite irrigation development, groundwater monitoring data show no significant secular decline in depth to the water tables indicating that increased water draft during post-monsoon months is amply replenished through recharge from rainfall, rivers, and irrigation return flows. The aquifers in the entire region are unconfined up to over 100 feet, implying that water flows horizontally to lower grounds, often causing perennial flooding and waterlogging problems in low-lying areas. According to the Central Groundwater Board estimates, Coochbehar has 2,067 million m^3 and Jalpaiguri has 4,838 million m^3 of replenishable recharge; and the present level of use is barely 217 million m^3 (15%) and 106 million m^3 (3%), respectively. The two districts thus have 0.36 million m^3 and 0.56 million m^3, respectively, of groundwater available for future development per every km^2.[2] In fact, the two districts alone have more than half of all of Bangladesh's groundwater resources;[3] and as in Bangladesh, most of it is located within 7 m from the ground even during the dry seasons. Predictably, then, all the 11 blocks of Coochbehar and the 13 blocks of Jalpaiguri have been declared 'white' by NABARD.[4] The danger of overdevelopment of groundwater resources in the region is remote except in very small pockets where groundwater withdrawals will need some monitoring fairly soon (Shah and Ballabh 1996).[5]

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[2]Assuming that 60 percent of the geographical area is agricultural land, this implies enough groundwater to submerge all agricultural lands of Coochbehar and Jalpaiguri under 3.6 m and 5.6 m of water every year, without crossing the limit imposed by long-term recharge.

[3]Bangladesh's unutilized groundwater resource was estimated to be 11,600 million m^3 during the mid-1980s .see, Orr, Islam and Barnes 1991:29).

[4]Areas with less than 65 percent development of groundwater potential are categorized as 'white'; those with 65–85 percent development are 'grey'; and those with more than 85 percent are called 'dark.' Areas classified `dark' are overexploiting their groundwater resources.

[5]This is because already the cropping pattern of a sizeable chunk of the farmers is as highly water-intensive as it can get and has little scope to get more water-intensive. There already are large areas in which 2 crops of *boro* rice are taken; and according to the farmers we met, two crops of *boro* rice and one of *aman* rice is the most water-intensive crop cycle they can follow in the foreseeable future. The most that the less well-endowed farmers of the region dream of is two crops of improved variety rice crops, typically grown during the *boro* season of a year. Thus even if two `*boro* rice crops' a year expand to the entire region, it is unlikely that groundwater use would exceed 25 percent of the replenishable recharge in North Bengal for a long time to come.

If anything, there is a strong case for pulling down post-monsoonal water levels in many low-lying areas of the Coochbehar and Jalpaiguri districts.[6]

It is not surprising therefore that with its central focus on agricultural development, the NBTDP implemented by the Government of West Bengal with the support of the Royal Netherlands Government has included MI development as the centerpiece of its programing strategy. Besides the NBTDP, numerous other State and local government agencies are engaged in MI intervention. These include Gram Panchayats at the village level, Panchayat Samitis at the Block level, Zilla Parishads, Agriculture Department, MI Corporation, State Water Investigation and Development (SWID) Department and its agri-irrigation and agri-mechanical Departments, Scheduled Tribe and Schedule Caste Corporation, and the District Rural Development Agency. The NBTDP itself is implemented by the Joint Director of Agriculture although it is monitored by Euro-Consult through a Project Support Unit based at Jalpaiguri. With support from the Dutch government under the NBTDP, the International Development Enterprise (IDE) has launched its program of marketing treadle pumps in the Coochbehar and Jalpaiguri districts and in the Siliguri subdivision.

Since time immemorial, farmers have laboriously irrigated small plots of land using traditional water-lifting devices such as *chuha*, *dhenki* and *taar-balti.*[7] Even now they continue this practice. Now, all manner of water-lifting technologies—traditional and modern, manual and powered—can be seen in operation in the region simultaneously. The NBTDP has promoted investments in a variety of MI technologies essentially through a subsidy program. Amongst these, *Hand Tube Wells* (HTWs) or, Maya-6 hands pumps. known in Bangladesh as MOSTI) affixed to a 100–120 feet deep tube well are the most numerous and are installed by the Agriculture Department under 90 percent subsidy. Although *treadle pumps* (TPs) became known only after IDE's program began and are popular only in some pockets bordering Bangladesh, TPs smuggled from across the Bangladesh border have been widely used for several years. In the treadle pump program, the direct subsidy element is absent, except that the NBTDP supports the IDE operations in the region. Besides these, the NBTDP subsidizes a spectrum of MI technologies: at the lower end, there are *'STWs'*, 100–120 feet deep tube wells (DTWs) with a diesel pump (STWs) or, *pump dug-wells* (PDWs), which are shallow open wells with a diesel pump. At the upper end, we find 300 feet or deeper DTWs with 20-hp electric pumps, and major *River Lift Irrigation Systems* (*RLIs*). Early RLIs were big with an 81 ha (200 acre) design command using two 24-hp diesel pumps; the NBTDP has recently discontinued support for these and is now promoting *mini-RLIs*, using two 5-hp diesel pumps (with a third one as a standby) with a design

[6]In fact, in most villages of the region, one finds up-lying areas and low-lying areas; farmers with lands in up-lying areas tend to be better off compared to those with fields in low lying areas although the latter find groundwater pumping easier and cheaper. For, low lying areas remained flooded for 2-3 post-monsoon months when nothing could be grown on them. Farmers owning low-lying lands were thus condemned to one *aman* rice and one *boro* rice at the best; whereas those in up-lying areas, as a rule, took three crops annually.

[7]*Chuha* is a shallow ditch dug up to tap shallow groundwater; *dhenkuli* is a manual water-lifting device, which has a bucket tied to a bamboo with a counterweight at its other end, and which is popular throughout North and Eastern India; *Taar-Balti* is used by two persons to lift water from a surface or shallow water body in buckets, and to empty it into a watercourse at considerable speed.

command of 20.24 ha (50 acres). These pump water into a distribution chamber from where it is conveyed to fields through an underground PVC pipeline network with PVC spouts. Then, there are, what is called, *basic* RLIs, which typically have a lone diesel pump mounted on a river bank or on a stationary boat, often fitted with a thatched hut as the pump house and a buried PVC pipe distribution system. There are marked similarities between schemes subsidized by government agencies and those built and run by farmers using their own resources. Thus, we can find in many areas farmer-built and -managed *super-mini* RLIs, which are similar to *basic* RLIs except that super-mini RLIs use an over-ground, shiftable poly-pipe water transmission system for conveying water. Then, subsidy-supported STWs differ from farmer-built bamboo bores in that they use GI—or, more recently, PVC—pipes for suction whereas bamboo tube wells, as their name suggests, use cheaper bamboo for suction pipes, often with a strainer made out of bamboo chips or netted fabric. Also, compared to `STWs,' bamboo tube wells are also shallower, seldom exceeding 45–60 feet in depth. In short, the whole range of water-lifting and -transport technologies, which became popular in Bangladesh in the late 1980s has now come to North Bengal.

And with this wide range of technologies have come a variety of irrigation institutions. Several institutional models are witnessed: public ownership and management by government bureaucracies, by Panchayati Raj institutions, by BCs of various hues and by individual owner-managers. Big RLIs and DTWs—with a design command often exceeding 81 ha (200 acres) and covering some 80–100 small farmers, are established by the government agencies under various MI programs including those supported by the World Bank, NABARD and the NBTDP. Although in recent years, BCs have been organized to take over their O&M, the larger schemes are still controlled and run as public utilities by the Agri-Irrigation and Agri-Irrigation Departments of SWID. The BCs are formed in these schemes but these are powerless and have only a marginal role; and as we explore later, building robust user organizations may hold the key to efficient management of these highly capital-intensive irrigation assets. The BCs are more active in mini RLIs; however, the turnover program is still young; and it is rarely that we find mini RLIs under complete control of well-functioning BCs. In contrast, BCs have a much larger role in smaller group schemes; for instance, basic RLIs sponsored by block-level Panchayat Samitis—which serve 8–20 members in their command—are constructed by Panchayat Samiti's contractors and handed over completely to BCs as soon as they are commissioned; BCs decide the water pricing policies, take the responsibility for O&M and manage the water distribution. This is pretty much the case with STWs and pump dug-well schemes as well. Gram Panchayats and Panchayat Samitis have a powerful say in all these, essentially through the power to constitute BCs. Then, most Panchayats stock diesel pumps and rent them out to needy farmers.

In contrast to all these—which involve some form of public or collective management of a shared irrigation asset—we also find a large and growing `private' sector, complete with vibrant and functioning pump irrigation service markets. Hand pumps and traditional water- lifting devices are typically owned and used individually; and there are no rental markets in these. In contrast, in agriculturally dynamic areas, especially of Coochbehar, there is a large and growing population of privately owned diesel pumps (mostly of 5 hp) with an extensive and booming market for pump irrigation service (Shah 1997). Unlike elsewhere in India, bamboo tube wells are so cheap to make in North Bengal that pump irrigation markets basically involve the diesel pump circulating around

the village. In that sense, purchased pump irrigation is quite efficient; since water is pumped from the field being irrigated, the distance over which it has to be conveyed is small; as a result, conveyance losses (of water as well as energy) are negligible even though water is commonly conveyed in unlined field channels. Where the density of bamboo tube wells is low because the water table is relatively low, diesel pump owners often rent the pump along with 200–300 feet of rubber pipes but charge a premium for it.

Table 1. Institution-technology mix in North Bengal irrigation.

	Institutional Alternatives: Existing or under Experimentation				
	Individual ownership; autarky	Individual ownership: irrigation service markets	Collective ownership and management	Public ownership and bureaucratic management	Panchayat ownership and management
1. Hand Tube Wells*	†				
2. Treadle Pumps*	†				
3. Diesel Pumps for own use and renting	† (only large farmers)	†			†
4. STW/PDW clusters : diesel pump and well for a group of 4 farmers*			†		
5. STW/PDW clusters: 6 STWs +2 pumps			†		
6. Basic RLI: 1 pump and distributary system.			†		
7. Mini RLI & MDTW: 3 pumps and distributary chamber and pipe system.*			†		†
8. Deep tube wells*				†	
9. River Lift Schemes*				†	

II. Research and Policy Questions

Overall, then, nowhere in India does one find, in a single region, such a resplendently complex web of MI technologies and institutions as in North Bengal. And the nature of the technology seems to drive the institutional choice, as outlined in table 1. Treadle pump and hand tube wells neither need an exchange institution nor are easily amenable to it; besides, their low capital and operating costs bring them well within the reach of marginal farmers. Above all, these technologies are 'self-selecting' in the sense that their natural appeal is to those who have small lands and plentiful family labor with low opportunity cost. As a result, individual ownership with no rental markets is the inevitable institutional format for these manual technologies. In diesel pumps, we find all three

types of institutional arrangements; however, the most widespread is individual ownership with pump irrigation markets. Large farmers—typically those with more than 4.05 ha (10 acres) — seem neither interested nor able to spare their pumps for renting to others. Similarly, cooperatively owned or Panchayat-owned and -managed pumps are rare to find outside government- or donor-sponsored programs. The diesel pump technology does not seem to pose any intrinsic compulsions for collective action, especially since bamboo tube wells are common, and there are numerous sources of surface water. However, as elsewhere in eastern India, here too, many more farmers irrigate with rented pumps than with their own or through government-aided irrigation assets.

Table 2. Institution-technology compact in the NBTDP.

Parameters	Dimension	HTW	TP	PDW	STW	Mini RLI/MDTW	DTW	RLI
1. Ownership & management		Individual	Individual	Group of 4	Group of 5	Group of 40	Group of 70–100	Group of 70–100
2. Farmer contribution in capital cost	Percent of total capital cost	10	100	25	25	0	0	0
3 Farmer contribution in O&M costs	Percent of total O&M cost	100	100	100	100	100	20	20
3.Water output	Liters/second	0.3	0.9–1.1	6.1	8.3	28	56	111
4. Potential command	ha	0.14	0.19	3	4	20	40	80
5.Beneficiaries/ unit	Households	1	1	5	5	37	50	100
6. Depth	m	15	3–7	12	40	River	150	River
7. Capital cost/unit	Rs	2,000	600	9,000	12,000	450,000	530,000	725,000
8. Cost/ha	Rs/ha	11,764	750–1,200	3,000	3,000	22,500	13,250	9,062.5

Source: The NBTDP Monitoring Reports.

It is the State government policy to promote RLIs as a method of augmenting groundwater recharge (Sen 1997). Lifting river water for irrigation by private farmers is common in most of North Bengal; however, the technology they use typically includes a diesel pump and often some over-ground polyethylene-pipe for water conveyance. Big RLIs and DTWs are naturally suited for collective ownership and management. However, such techno-institutional arrangements would come up and sustain on their own only if they have significant techno-economic superiority over STWs, or where there is no alternative to them as, for instance, in North Gujarat.[8] After all,

[8]In many part of North Gujarat, especially in Mehsana and Banaskantha districts, groundwater tables have fallen to 800–1,200 feet over the past four decades. In the absence of surface water resources, the survival of agriculture has

which private irrigator would want to bore to a depth of 350 feet if he can get as much water as he needs at 20 feet? Not surprisingly, then, most of the DTWs and big RLIs we find in the region are those built by the government or Panchayat Samitis or Zilla Parishads under the World Bank or the NBTDP support.

Table 3. The NBTDP: Phase III targets.

Irrigation Units Cost/Unit	Target	Total Budget (Rs lakhs)	Budget/unit (Rs)	Full (Rs)
HTWs	15,000	652.5	4,347	4,830
STWs	400	78.0	19,500	26,000
PDW	290	52.4	18,068	24,092
RLI	22	369.6	1,680,000	1,680,000
DTW	9	72.0	800,000	800,000
4-ha units	500	147.5	29,500	59,000

Source: NBTDP: PCR 27 1996.

The NBTDP works on a substantial portion of the entire matrix of this institution-technology compact, essentially through funding government programs to construct MI schemes; the targets for support under phase III are set out in table 3. The program of support has evolved historically through a process of discussion and negotiation between the governments of the two countries; however, the monitoring mechanisms deployed for the program produce feedback and analysis that form the basis for periodic changes in the funding structure and pattern. For example, the NBTDP-supported investments in DTWs and RLIs for several years during phases I and II; however, based on the results of monitoring data and studies, the Project has now decided to support clusters of mini RLIs and Medium Duty Deep Tube wells (MDTWs).[9] Similarly, Phase III

depended upon farmers chasing these falling groundwater tables. Doing this has required progressively deeper tube wells, larger pumps, and costlier irrigation. The capital costs and the risks of well failure are so high that even large and affluent farmers cannot afford individually owned tube wells. In this region, we find tube wells owned and managed collectively by farmers' tube well companies. In the Mehsana district alone, over 3,000 such tube well companies exist.

[9]In big RLIs of phases I and II, the actual command area—area served even once during the past 3 years—-was found to be 37 ha instead of the designed *net* command area of 80 ha in a sample of 4 RLIs (Internal Monitoring Reports) .Therefore, instead of old 80-ha big RLIs, in the third phase, it was decided to build clusters of four 20-hp mini RLIs each at a cost of Rs 4.5 lakhs. Each will have three 5-hp diesel pumps and a subsurface distribution system based on PVC pipes instead of reinforced concrete pipes used earlier. It was also decided that Mini RLIs will also be farmer-managed rather than government-managed. The MDTWs too have a design command of 20 ha but are run by electric pumps. But no drilling companies are willing to come to drill the small number sanctioned so far; so the MDTWs have not taken off as yet.

project proposal provided support to `4-ha schemes,'[10] which have subsequently proved to be not viable. In contrast, after a series of laboratory and field trials, the Project Support Unit (PSU) of the NBTDP has established fuel-saving methodology for diesel pumps that can cut diesel consumption to half;[11] phase III has now taken up this methodology for propagation.

A number of issues arise: Given the small and marginal farmers' investment capacity, are current levels and mechanisms of subsidy appropriate? Would reducing subsidy levels result in the exclusion of the most vulnerable and needy sections of the farmers? Are existing mechanisms evolved under the NBTDP for subsidy provision for MI schemes, for site selection, and for O&M appropriate? Or, is it realistic and practical, given the circumstances, to choose greater beneficiary participation at all stages, from conception and site selection to O&M? Might the level and structure of MI subsidies distort the choice of technologies and institutions, which are not sustainable in the absence of subsidies? Are the costs of MI assets created under the NBTDP likely to be above market rates, and significantly higher than what farmers themselves might incur in the absence of subsidies?

Successive reviews of the NBTDP have commented upon the techno-economic basis underlying the schemes of subsidizing different technologies at different rates using different subsidy mechanisms from time to time. The most recent Mid-Term Review of the Project (MTR 1997), for instance, noted, `…All MI devices presently installed and promoted are all (except one: pump dug-well is suitable only in areas with subsurface rocks) based on suction pumps or suction principles (including hand tube well and treadle pump). This is significant because it actually means that none of the present systems can pump water from more than about 7 meters. Consequently, most systems are inter-changeable. To draw the conclusion that all but one (deep tube well with an economic rate of return of 11 percent, i.e., 1% below the opportunity cost of capital) MI lifting facilities are economically viable is incorrect because the systems are not mutually exclusive. This is a serious mistake and has led to the constant avoiding of answering the question which MI schemes are where and when the best value for money, considering also other socioeconomic and target group criteria.' (P: 44). Other issues needing close scrutiny are the sensitivity of the economics to the utilization rates of the MI assets, and the very indicators used to assess these rates (design and actual command area) in North Bengal's unique context. Past studies have also explored the sensitivity of the economics of RLIs and DTWs to organizational problems of collective or bureaucratic management.

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[10]These are masonry extensions of the subsurface transmission system. Not cost-effective. Pumping hours on RLIs and DTWs were less than 1,000 hours; and usage rates of channels is a fraction of the pumping hours. Soil cement channels, though cheaper, would be cost-ineffective too for the same reasons, especially when compared to poly-pipes.

[11]Modifications recommended under the fuel-saving methodology are:
removal of the foot valve and the use of wire net at the lower end of the suction pipe (in the case of PDWs) or removal of the check valve (in STWs)

? fitting of a hand pump on the delivery pipe for priming
? use of closed cooling system by fitting a water drum
? reduction of engine speed from 1,470 to 1,100 rpm
? cooling the gland packing with a small plastic tube

In broad terms, then, central policy issues facing the NBTDP as well as North Bengal's MI policy makers are many, but at their root are some simple conceptual questions that need to be raised as often as necessary: Why provide MI subsidies at all? Whose and what purpose do these subsidies serve at present? If they need to be provided under the NBTDP, what is the unifying logic underlying the scheme that provides 90 percent capital cost subsidies on HTWs, 0 percent subsidy on treadle pumps, 75 percent on STWs and PDWs and 100 percent on mini-RLIs and MDTWs? Should beneficiary contribution in HTWs be reviewed?[12] What impacts do MI subsidies create? Do these result in distortions in technology and institution choices? Are the technologies and institutional structures promoted with the NBTDP subsidy support sustainable? Are they replicable?

This study is an attempt to respond to some—though not all—of these questions. In doing so, we have concentrated our effort on evolving a well-rounded understanding of the political economy of MI policy in North Bengal, often straying from the main course but at the end pulling the threads together to create a coherent picture. This is also the format in which we present our learning. In part III, we discuss what we learnt about deep tube wells and large RLIs in Jalpaiguri district, essentially to explore if the experience with these `mega' schemes here has been as disappointing as it has been throughout South Asia (for a review of the South Asian experience with DTWs, see Palmer-Jones 1995). In part IV, we examine the evidence we found on the performance and political economy of smaller MI technologies promoted not only by the NBTDP but also by other agencies. In part V, we report on the `private' MI economy based on a series of participatory and unstructured interactions with groups of small farmers, local leaders, pump dealers and sundry others to explore the `non-official' thinking and viewpoint about MI technologies and how the official policy works the way it does and why. In part VI, we explore the interactions between North Bengal's dynamic Panchayat-system and the MI political economy. Based on all these, in part VII, we attempt to answer, as best as is possible given our understanding, some of the questions that the study began with.

III. Performance and Political Economy of Large DTWs and RLIs

[12]There are pros and cons. Experience with HTWs has been by and large positive. The design command of an HTW is 0.14 ha; however, surveys indicate that an HTW irrigates 0.11 ha each in rabi and pre-kharif; and in kharif, it provides supplemental irrigation to 0.02 ha; this suggests the validity of central techno-economic assumptions. On 10 percent compulsory contribution by beneficiaries, informal surveys indicate that the farmer response was largely positive; some could not deposit the money due to insufficient time allowed; only 1 out of 25 surveyed could not self-finance the investment (Internal Monitoring Reports). All these suggest that higher beneficiary contribution can be justified. On the other hand, HTWs seem to make a significant contribution to drinking water requirements (although water quality issues are important in HTWs close to the field and not maintained in sanitary conditions; bacteriological contamination is possible, especially in the post-monsoonal period, the water table rises); thus, primary users of HTWs for irrigation too are poor women who irrigate homestead plots of vegetable crops; 21 percent of the HTWs supplied so far are owned by females; many more are not officially owned by women but are primarily used by them; and it is an open question whether poor women would be able—even if they are willing—to make higher contribution to capital costs.

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Introduction

West Bengal still has a sizeable program of large DTWs and RLIs even today. While many other States have not only discontinued construction of new DTWs under their public tube well programs but have been trying to either turnover existing irrigation assets to farmer groups or sell them outright to whoever would buy them, DTWs and RLIs schemes in North Bengal are still under government control; and under both the World Bank program and the NBTDP, new DTWs and RLIs have been constructed until very recently.[13] The program has come under repeated scrutiny. A 1995 study identified low water tax recovery (at around 80%), the so-called `operator hazard,' theft and damages to the systems, overirrigation by farmers as a response to the uncertainty and undependability of water supply, and long shut-down periods as the key problems of these government-managed irrigation schemes (Rao 1995a, 1995b; CDS 1995). The financial viability of these systems has also been undermined by the huge subsidies—open and hidden. The rate for irrigation from government-operated MI schemes was a low Rs 160/ha m for a long time; in 1983, it was revised to Rs 500/ha m (or Rs 5/acre inch), which continues to be in force today.[14] A noted observer of the MI scene in North Bengal wrote, `..economic water rate of State-managed tube wells (is) around Rs 3,000/ha m if depreciation on capital is included and Rs 1,800/ha m if depreciation charges are excluded. Water rate realized from the farmers being Rs 500/ha m, the subsidy would amount to 72 percent in the latter case and as much as 83 percent in the former case. (Then,) the economic rate is calculated on the basis of design command area which is invariably more than the actual command area' (Kanwar and Bandyopayaya n.d.).

Purvo Harmothy River Lift Irrigation System

We take the analysis of DTWs and RLIs in the same stride because they have the same features and problems: they are the largest amongst lift-based MI schemes; they have similar command areas and involve user organizations of comparable sizes; moreover, their economics are similarly dominated by their high capital costs and are therefore critically dependent upon their capacity utilization; however, in North Bengal conditions, achieving the level of utilization necessary to make these systems viable requires extremely tight and skilfull management of the agricultural economy of the command area. These large schemes were not under the purview of our study since the NBTDP has already decided to discontinue support to these. However, these are still an

[13]True, West Bengal was amongst the first to start talking about turnover; and in some other districts, the turnover program of the World Bank supported tube wells has achieved promising results (see, e.g. Rao 1995a, 1995b); however, in North Bengal, the turnover has been only cosmetic; moreover, even in Hoogly and Nadia, where Rao found the turnover to be successful, the annual running hours of turned-over tube wells ranged from 289 to 1,098 hours compared to 3,500–4,000 hours/year needed for a deep tube well to achieve its techno-economic design potential and justify its high capital intensity.

[14]Even successfully turned-over tube wells studied by Rao .1995b) in Nadia and Hoogly charged all of Rs 5/hour when private diesel pump owners charge Rs35–40/hour and found plenty of takers. The highest rate of Rs 2,000/ha charged by Baksa and Babur beri clusters could cover direct operating costs but were still far lower than private economic costs of groundwater irrigation.

important part of North Bengal's MI environment; moreover, DTWs and RLIs offer good study in the dynamics of irrigation organizations; so we report on our visits to a few of these in the hope that the report would contribute to a richer and more complete analysis.

DTWs and RLIs are entirely government-managed; and as elsewhere in India, the same problems—of operator absenteeism, fuel shortages, inordinately long shut-down periods, undependable irrigation supply, and all of these resulting in low utilization rates that have turned public tube well programs into resounding failures in Uttar Pradesh, Bihar, Gujarat and Rajasthan—seemed to bewitch DTWS and RLIs of North Bengal.[15] DTWs are constructed and managed by the Agri-Irrigation Department whereas RLIs are in charge of the Agri-Mechanical Department. These agencies manage these schemes through a complex maze of procedures. Maintenance and repair, diesel procurement and supply and collection of water tax are all handled by the Agri-Mech. and Agri-Irrigation Divisions.

Box 1

Purvo Harmoti RLI

In Purvo Harmoty village, we visited a large RLI with a design command of 80 ha serving some 60–65 farmers; the scheme set up in 1980 had a large pump house with two diesel engines each of 24.5 hp; the piped distribution system had 32 spouts. Typical of all DTWs and RLIs, the scheme was owned, controlled and managed by the government. The RLI was operated by a staff of three: an Operator, an Assistant Operator and a Watchman, all employees of the Agri-Mechanical Department but under the operational control of the BDO. Their salary was paid from the funds of the Agri-Mech Department but was released through the BDO's office; their casual leave was approved by the BDO; but earned leave, by the Agri-Mech division. Although rated as amongst the better-run RLIs of Jalpaiguri, Purvo Harmoty was neither financially viable nor did it generate in its command the agrarian dynamism that a well-managed irrigation system invariably unleashes.

A major management challenge is to deal with the pronounced seasonality in demand for irrigation. Rabi is the peak irrigation season when every farmer in the command wants to raise vegetable crops; in summer, the demand drops drastically. In kharif, the system virtually remains inoperative. Then, one of the powerful constraints on full utilization of the systems is the power

[15]It was common to see here DTWs and RLIs, which had never begun to function after they were installed. On the first day of our fieldwork, on the way to Dhupguri, we stopped at Magurmari to take a look at a big World Bank and NABARD-supported DTW. Expectedly, it turned out to be out of commission. Soon after installation, apparently, the distribution system began to leak at two or three places; as a result, it has never been operated. The Panchayat Samiti member on whose land the DTW is located has drawn a domestic power line from the electricity pole; that has been the sole beneficial impact of the DTW. In fact, he could do one better: he could install an electric pump and run it without cost since he will not get an electricity bill for a public tube well. Later, we were told that there was no BC on this DTW; and if there was one, farmers did not know about it.

supply uncertainties and the complex logistics of securing diesel supply.[16] The binding constraint on their financial and economic viability is created by unjustifiably low water charges and the procedural complexity encountered in the system of water tax collection. To irrigate a crop, the farmer has to pay the water tax in advance at the office of the BDO which issues him a *challan* to be turned in to the RLI operator before irrigation starts. The purpose presumably is to ensure that water is supplied only to those who have paid the fees. However, it is not easy for the operator to restrict irrigation supply only to those who can produce the challan. Farmers near the head can always irrigate when the system is on. Then, these worries arise only when the operator displays a high level of sincerity and diligence or the Department operates a finely tuned control system; neither is however the case.

Box 2

History of Farmer Managed Irrigation in North Bengal

West Bengal began to act on farmer participation in irrigation management way back in early 1970's when most other states had not even begun talking about it. During the 1970's some 200 DTWs were built for user groups organized as registered farmer cooperatives; for a variety of reasons, this program failed miserably. This was followed by a movement to create BCs which were to own and actively manage DTWs and RLIs; these failed too because the BCs were designed to be wholly powerless and ineffectual; as a result, most of them became defunct even as they were created. With the DTWs and RLIs, these powerless and defunct BCs continue to remain marginalized even today; however, World Bank's MI Scheme in 1985 struck a major departure in the management turn over of irrigation systems to user groups. This took the shape of STW clusters under Panchayat Samitis in 1991. Each cluster has a BC with one Panchayat Samiti member, one Gram Panchayat member and one member each from the beneficiaries of each of the 6 STWs. These as well as the hon. secretary are appointed by the Sabhapati of the Panchayat Samiti. Till May 1995, 2500 such STWs were transferred to Panchayat Samitis. By a 1993 GO, the same rules were applied to MDTWs and HDTWs. However, only 12 such MDTWs and HDTWs were handed over by 1995.

[16]During rabi, when average daily operation varies from 8 to 12 hours, these systems use a substantial quantity of diesel at 4 liters of diesel per hour. However, diesel is centrally procured for all the 40 odd RLIs and an equal number of DTWs in each of the North Bengal districts by the government agency based on indents placed by the operator of each system. The operating rule is that each RLI/DTW places an indent for diesel when it has 1 drum (of 200 l) left in stock. The Agency however cannot execute each RLI's or DTW's indent separately; so it waits for a sizeable demand to build up before contacting the Indian Oil Corporation (IOC) to procure diesel. The IOC insists on advance payment; and the Agency is always short of cash; when it is not short of cash, it is short of barrels to store diesel. Altogether, then, centralized procurement and distribution of diesel to the district's RLIs is a complex logistical operation in itself; naturally, diesel shortage, especially during the peak periods of irrigation demand is one of the central operating problems of these agency-managed systems.

Irrigation rates, last revised two decades ago, are levied on a per acre basis for different crops. Once the water tax is paid, there is no officially fixed limit on the amount of water or the number of waterings the farmer can take; the operator asserted that 4–5 irrigation turns were commonly supplied for wheat and more for vegetable crops (box 3); however, the farmers we interviewed did not agree with the figures given by the operator about the number of waterings offered; they were far less happy about the reliability and timeliness of water supply, which had to be supplemented with water purchased from owners of private wells. Thus, the actual cost of RLI irrigation is quite high. Even so, the RLI irrigation rates are low by any standards one can judge; and these have not been revised for over a decade.[17] Even the rates for canal irrigation—which uses no energy—are higher in many States than the RLI rates in West Bengal. When compared to the private costs of providing river-lift irrigation, the prevailing RLI rates are of course `enormously low' and inadequate to cover either fuel or staff or even repair and maintenance costs.

Box 3
Water Tax Levied by River Lift Irrigation Systems

Crop	Rate/acre (Rs)	Waterings provided*
Mustard	30	3
Tobacco	45	4
Wheat	60	4–5
Vegetables	100	5–6
Aman paddy	60	4–5

*As reported by the Operator of Purvo Harmoty RLI.

Until 3 years ago, the RLIs were completely managed by the Agri-Mech staff and BDO. Since then, a six-member BC has been superimposed on this structure. In many CPM-dominated areas, the BC is constituted by the Gram Panchayat *Pradhan*; the BC chairman and secretary too are nominated by the Panchayat. The Purvo Harmoty RLI however had a BC selected by people with the endorsement of the Agri-Mech staff; the BC here had no member from the Panchayat but it does invite some members for some meetings when Panchayat's cooperation is needed. The BC's primary responsibility is in water distribution. It meets around once a month; but formal systems of governance by the BC are absent; in Purvo Harmoty, for example, there were neither records of minutes nor resolutions of BC meetings; and we were told this was the case in all RLIs and DTWs. Thus the main benefit of the BC as of now is in streamlining the distribution. The operating staff ignored distribution problems earlier or muddled through them but

[17]Mr. Majumdar, Jalpaiguri's Executive Engineer in charge of the Agri Mechanical Division was of the view that these have not changed for 20 years or more. The last time any thought was ever given to do a review was when Mr. Siddhartha Shankar Ray was the CM in the early 1970s; but the proposal was soon dropped; and the matter has never been raised again.

now leave them to the BC who has to struggle with them. And the BCs seem to take this seriously; however, BCs are unable to enlarge their role since they have little control on key operating parameters. Dormant in normal times, then, the BC comes to life only in times of crises. They run around to the Agri-Mech and BDO offices when the system is down due either to diesel shortage or to repair problems.

Our impression in Purvo Harmoty RLI was that the BC was powerless, ineffectual and unimportant; it has no role, no power, no responsibility except for settling minor issues in distribution; this is a messy and burdensome task for the BCs that otherwise have no role in decision making. Little or no process or organization development work has gone into their formation; as a result, it had not acquired the maturity and awareness needed for effective governance; the Secretary, for instance, did not know how many farmers there were in the command or who they were. Is there willingness amongst farmers to take greater responsibility and assume greater authority? The response seemed to be a conditional `yes.' The Purvo Harmoty Secretary told us that the BC would be willing for complete turnover of the RLI but only if it is fitted with electric pumps, which have much lower energy cost. Insightfully, he patiently explained to us the Williamsonasque transaction cost logic that private operators can make a diesel pump profitable but `in group affairs, you see, you have to make allowances; you cannot ensure tight management and therefore some slack has to be built in to cover the inefficiency and friction!' or, put simply, higher transaction costs.

An important lesson offered by Purvo Harmoty is about the motivations that drive cooperation. Would these farmers ever forge collective action to take over and manage the RLI to usher in a new era of agricultural prosperity in its command? It seemed highly unlikely. The present arrangement has virtually subsidized them out of collective action of any form. The RLI has stabilized at a low level of operation; and the economy of the command too has stabilized at a low level of equilibrium (box 4). Unless the farmers begin to face the real costs and benefits of an efficiently run irrigation system, there seems nothing to shake them out of the current low level of equilibrium. And this sense was echoed by the Council for Development Studies in their case studies of RLIs in Nutan Basti, Petvata and Barakmata villages in the NBTDP (CDS 1995: 41–45). All the three were big systems of the type we saw in Purvo Harmoty; all had BCs, which were largely irrelevant and quite uninterested and uninvolved; and equally importantly, the average member neither knew nor cared about what the BCs ought to be doing.[18] The central malaise, it seemed, was the absence of an `irrigation demand pull;' that this absence persisted even under subsidized irrigation pricing was indicative of either or both of the following: first, that many factors other than irrigation—such as the absence of output marketing institutions and infrastructure, lack of technical knowledge with the farmers and poor extension services, farmers' risk preferences, etc.—restrict adoption by small farmers of rabi and pre-kharif cultivation; second, that the *transaction costs* associated with obtaining subsidized irrigation from these RLIs

[18]There are many reasons why BCs in big RLIs do not function well; one of them is the way they are brought into existence. A case study of Petvata RLI in South Berubari GP, Jalpaiguri notes: `There is a 10 member BC for this RLI. Each member has 2-3 spouts under his operational command. Selection of members was done by a member of the Panchayat Samiti who took a meeting of farmers in one afternoon, in which he proposed names of 10 members.. He invited objections if there were any. For obvious reasons,.. the members were unanimously elected..' .CDS 1995: 44).

was very high and tended to keep the farmers in the command area from getting the best advantage out of it.

Box 4

Socieconomic Impact of Purvo Harmoty RLI

At such low water rates, one would expect irrigation demand to be sustained at high levels, farmers to switch to water-intensive cropping regimes, fertilizer use to be high; and in general, to find the RLI command to experience an irrigation-induced economic upsurge. However, we noticed no such upsurge in Purvo Harmoty. At the onset of the rabi season, farmers should be falling over one another to get irrigation; but the bunch of water indents the Assistant Operator showed us was quite thin and it looked as though payment *chalans* were presented for no more than 5–8 ha of land, less than a 10^{th} of the system's design command. The operator's assertion—that he had to operate the system every day for 6–12 hours—seemed an exaggeration. Later, Gobind Bishwas, one of the farmers in the command, confided that the staff followed the 10.00 a.m. to 5.00 p.m. routine strictly; more, on a given day, only one or at best two of the three would show up since none lived in the village itself. Rarely would the operator condescend to hand over the key to a 'responsible' farmer and allow him to operate the system after 5 p.m.

Elsewhere in the country, private water sellers would have come up to feed the unsatisfied irrigation demand in the command of a poorly managed public system. However, here, the RLI command had no privately owned STWs—which probably meant that the command area's agriculture left enormous undeveloped economic potential. The present cropping intensity is probably no more than 150–160 percent and can easily go up to 250 percent. One possibility is that the irrigation demand pull has yet not become strong enough to stimulate private investment in irrigation as in agriculturally dynamic pockets in Coochbehar and Siliguri next door; a more likely explanation is that the poor quality of irrigation service offered by the RLI has impeded the transformation of agriculture in the command.

Else, how can one explain that in Petvata, RLI started in 1989, irrigated 14.17 ha .35 acres) in rabi and pre- kharif and provided a supplementary irrigation or two to around 52.54 .130 acres) during aman and kharif seasons. In the Barakamat RLI of the same configuration, the demand situation was the same; some 40.47 ha (100 acres) were under aman paddy; and about 32.38 ha (80 acres) under rabi and pre-kharif, a lot of it getting only supplementary irrigation. Chances are that these systems operate for just 700–800 hours in the whole year. Nutan Basti RLI's command was dominated by Rajbangshis most of whom were first- generation commercial farmers; they were blissfully unaware of the economic possibilities offered by pre-kharif or rabi cultivation. However, with the development of the Haldibari market nearby, things have suddenly begun to look up for the Rajbangshis of Nutan Basti; and against the light of this emerging `irrigation demand pull,' the problems of RLI management are coming into bold relief; they have been figuring out that long shut-down periods—that have been common so far because of lackadaisical repair and maintenance—can cost them heavily in terms of burnt crops; that a good deal of the

RLI's usefulness to them is lost because of the 10 a.m.–5.00 p.m. work schedule of the operator; that much more can be got out of the RLI through better matching of the capacity of the pumping plant, water demand parameters and the size of the distribution system.

Sarkar-Mai-Baap Syndrome: Badogadi DTW

DTWs, similar to RLIs in their scale, technology, organizational dynamic, were no different from RLIs in their problems and prospects. Dependency on subsidies—and the *sarkar mai-baap* syndrome—were the visible outcomes of current MI policy. This was evident in the course of our visit to Madhya Badagadi DTW, Badogharia Gram Panchayat, Dhupguri. Here we carried out an impromptu PRA with a small group of farmers in the command of this large deep tube well, which has been nonfunctional for the past 2 months because a lightening hit the transformer and burnt it. The 7-year old DTW was 375 feet deep and had a command area of 300 bigha served by an underground piped distribution system. However, despite 7 years of DTW irrigation, we saw a good deal of local aman paddy standing all around us, which would be harvested only in December by which time it will probably be too late for potato. The DTW was in charge of an operator who lived across the village in a DTW operator's quarter in the neighboring village. The operator and the assistant operator of that DTW commuted every day from Moynaguri, 35 km away.

Our discussion was led by Mohammad Hamiruddin, the BC President who represented the irrigation interests of some 60–70 farmers (he was not sure how many) in the DTW command. Hamiruddin was a typically opportunistic 'communist party member': 'Sa'ab, poor people have no political sympathies no interests. We join whichever party can get us benefits.'

The BC was constituted by owners of land where the 12 spouts were located. Hamiruddin was conveniently appointed the President because the DTW was located besides his house. His younger brother was similarly appointed the Secretary. As elsewhere, here too, the BC had no well-defined function—except that the operator could conveniently off-load all non-technical problems on to the BC, which had so far dealt with them with a fair degree of success. But the BC had now met its Waterloo in the burnt transformer; the Assistant Engineer of the WBEB did not pay much heed to their repeated representations; and if he insisted on paying only lip service rather than doing something about the transformer, Hamiruddin and Co. will be in deep trouble in December and thenceforth. Farmers here had no doubt thought they could, through alternative courses of action in case the system does not get repaired purchase pump irrigation from private well owners which would be many times more expensive; however, their preferred option would, naturally, be for the Department to get the system back into operation; and to this end, Hamiruddin and his co-members on the BC would keep doing rounds of the government offices in Dhupguri.

Box 5

PRA at Madhya Badagadi DTW, Dhupguri

We explored alternative courses of action in such an eventuality. The Panchayat has several diesel pumps that they rent out at Rs 15–18/hour (excluding diesel and Mobil); besides, they have to pay Rs 3/hour to the operator. Private STW owners here operate as discriminating monopolists par excellence and charge Rs 40,50 or even 60/hour depending upon the market position. However, used to subsidized—why, nearly free—irrigation service for 7 years, the group would not accept any solution other than complete and immediate resumption of DTW irrigation in a mock brainstorming exercise we did with them. `If a businessman offered to run the DTW with a 25-hp diesel pump and supply water at Rs 50/hour, would you be willing to buy it?', we explored cautiously. `No way.' was the curt reply. `Would you like to rent private pumps from neighboring farmers at Rs 35/hour?', we probed further.

'Why should we? What was the point of setting up this DTW? Besides, how can we poor small farmers afford so expensive irrigation?'

'Why, if you can afford to pay Rs 100/*bigha* to private power tiller operators—and Rs 50/bigha to a bullock pair with a driver—per *chaas*, why can't you pay Rs 35/hour of pump irrigation?'

`No, all we want is our DTW to restart. Else, we will all get ruined.' We thought that here at least was a DTW, which had brought about powerful socioeconomic change through agricultural modernization. But this was not to be.

Before leaving the village, we met Nipendra Nath Das, the DTW operator and from his records, we computed that during January and December 1996, the DTW operated for all of 357 hours; that the gross area irrigated by the DTW during 1996–97 was 29.75 ha (73.5 acres), and that the total water tax paid by the farmers was Rs 8,254, over 90 percent of it in rabi. This again suggested that 7 years of irrigation experience had still not changed cropping patterns significantly; and the demand for irrigation outside the rabi season was negligible.

Dependency Syndrome: Paschim Magurmari

Back to RLIs. Our visit to Paschim Magurmari RLI produced lessons on the problems of the buried pipe distribution system and on the dependency of farmers on the administration to solve all their problems. Originally designed for a command of 40.47 ha (100 acres), the design command was reworked first to 24.28 ha (60 acres) and then to 16.19 ha (40 acres) after the pump house was found to be wrongly located. Two years later, the transmission system began to leak profusely. The combined outcome of leaking spouts and the vanishing operator was that it could barely irrigate 8.09 ha (20 acres) in rabi. Moreover, many closed spouts kept releasing water as soon as the system got switched on and nearly half of the rest refused to let water down even when opened. As a result, some fields received unstoppable supplies of water causing acute flooding; and elsewhere, all that the 18-hp system could irrigate after all day of pumping was 3–4 bighas. Another problem was that the operator worked on his 10 a.m.–5 p.m. schedule and refused to leave the keys behind; moreover, some engineer in the Department had convinced him that it is good for the health of the system to give it a 2-hour break after every 2 hours of

operation; this effectively reduced the utilization rate of the RLI to 4 hours/day for 100 days of the rabi season!

Despite all these problems, we found the farmers of Magurmari were deeply fond of and possessive about the RLI. This was not easy to explicate because all them were used to diesel pump irrigation service, which was several times more expensive compared to the RLI's subsidized water tax. Most RLI members rented diesel pumps when in dire need of irrigation. During the rabi season, 8–10 diesel pumps were always on the riverside, pumping water for irrigating potato or other rabi crops. Rental rates were Rs 40/hour without delivery pipe. For poly-pipe, the extra rent was Rs 0.50/ foot/day—which was quite steep, indeed. Operating on the private pump irrigation market, they could not have escaped the value of dependable, timely irrigation supply.

Box 6

Focus Group Discussion: Paschim Magurmari RLI

'Since you already have a BC, why don't you take over the management of this RLI, pool some funds, bring it in pin-up condition and then run it yourself?', we explored. 'No way, Saar. What we have at present is *the* best arrangement.'

We probed: 'Assume that the government is prepared to write off this system and give, instead 50 diesel pumps to individual farmers in the RLI command, would you not be happier? Would not more of the present RLI command be irrigated?' We had expected that farmers would gleefully accept this alternative. But this was not to be. Instead, one old man asked: `why should the government want to do that?'. We explained:` ..because this RLI's cost must be well over Rs 5 lakhs, which can be used to acquire 35 diesel pumps of 5-hp at around Rs 13,000 and given away to individual farmers for free..' The old one persisted: 'Will the government also pay for the diesel? You see, in the present system, we do not have to pay the electricity bill. But with diesel pumps, we will have to spend from our own pocket on diesel every time we irrigate. Also, we will have to make our own STWs at a cost of Rs 2,000 or even more. So how do you expect us to accept 50 pumps in place of our RLI?'

'But you also have so many advantages. Each one of you can irrigate *when* you want and *as much* as you want… you can also rent out your pump when it is free.. you can grow boro rice on all your field.. and there is no hassle.. you don't have to worry when the operator comes or goes...you don't have to wait for someone to come and fix your system when it conks out.. with your own pump, you are on your own.. just buy your diesel and get on with the job..'

After a long and inspiring lecture on advantages of standing on one's own feet, they reluctantly agreed to consider the hypothetical proposal. But once they did that, other options came to the fore too. It was finally settled by consensus that if the government had Rs 5 lakhs to blow up for the good of the small farmers, the best option: give away a diesel pump to any group of 4–5 small farmers who would fork out cash to make their own bore-well.

Perhaps we met only the small group consisting of fortunate owners of land actually served in its command. Be that as it may, but there was this great fascination about the fact that someone else had paid the electricity bill; and someone else had paid the operator's wages; and someone else had the responsibility of fixing the system when it conked out. This was the subsidy-created money illusion at its full play; no matter the quality of service and what it does to their farming, as long as the Department ran the RLI for them, nothing could be better.

Box 7
Comparison of Two Large MI Systems Studied by van Keulen and Dekker (1992)

	Dakshin Mathabdanga RLI	Pathanerdanga DTW
(a) Design command	60 ha	80 ha
Actual design command obtained by adding up the design (a) command of each spout	49.3 ha	41.78 ha
(b) Actual cultivated area in rabi	12.8 ha	21.7 ha
(c) Area for which irrigation was paid for	6.764 ha	17.6 ha

Problems of Water Tax Estimation and Collection

The economic viability of DTWs and RLIs—in terms of the scale of the increase in agricultural value-added caused by them relative to the resource cost of establishing and operating them—is deeply affected by their low utilization rates; however, their *financial* viability already impaired by unduly low water tax is further hit by the low water charge collection rate. A study of two such systems by van Keulen, Alice and Robert Dekker (1992) explored both low utilization and low recovery.

Reasons given by farmers for the low percent of cultivated to design command included: a) lack of money to buy seed and fertilizer; b) lack of money to hire—or nonviability of hiring—a plough; c) lack of time and of money to hire labor; d) unreliable water supply; e) resting the land! f) rabi crops cost too much to raise; g) no familiarity with rabi farming.

However, the two researchers also found that the beneficiaries irrigated more land than was recorded and paid for. For the Dakshin Mathabdanga DTW, they found the area paid for in rabi 1990–91 to be 6.5 ha and in rabi 1991–92 to be 6.8 ha; but when they actually measured the area irrigated in rabi 1991–92, it turned out to be 12.8 ha (box 7). 'The main reason for the big difference in total cultivated area is the frequent operator's absence...he (operator) does not check whether the area on the requisition slip corresponds with the actual plot size. We found many requisition slips from which the data was not written down in the book… it is easy for the beneficiaries to take water without paying because they are all allowed to open the spouts... it does not seem that the logbooks are checked, resulting in unreliable data which do not correspond with actual situation….'[19]

[19]Things were actually worse than the recorded information showed. If only the recorded data and command area according to original design criteria were used, a land utilization degree of 11 percent would be the result; fortunately,

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Some Conclusions

The conclusions that follow from our field visits could suffer from small sample bias; however, many trends we found derived indicative support from district-level aggregated data. For instance, that the RLIs were not intensively utilized despite heavily subsidized irrigation rate is clear from the block-wise picture provided by the office of the Executive Engineer (Agri Mech) and summarized in tables 6 and 7. According to these figures, during 1996–97, RLIs in Jalpaiguri district irrigated an average of 33 ha gross, some 60 percent of it during the rabi season; in net terms, thus at peak irrigation load, the systems irrigated a net area of around 18–20 ha with massive variations across blocks. Low utilization rates combined with low irrigation charges to produce worrisome economics of RLIs: the gross income per RLI averaged less than Rs 2,000 per year, 1 percent or less of their capital cost of construction, and hardly enough to pay for the *chawkidar*'s salary for one month!

Box 8
Area Irrigated, hours of operation and diesel consumption of DTW: Block-wise data for Jalpaiguri

Block	No. of RLIs	Gross Area Irrigated (ha)	Gross Area Irrigated/RLI (ha)	Hours Run/ year/block (hours/ha of gross area irrigated)	Diesel consumption/block (diesel/ha of gross area irrigated)
Jalpaiguri	12	478.41	39.87	2,925 (6.1)	11,700 (24.5)
Rajganj	7	189.84	27.12	1,330(7.00)	5,320 (28.0)
Moynaguri	16	641.68	40.10	4,080 (6.35)	16,556 (25.8)
Dhupguri	9	635.21	70.58	6,702(10.55)	26,890 (42.3)
Mal	5	64.84	12.97	520 (8.01)	2,080 (32.0)
Alipurduar I	8	194.57	24.32	1,575 (8.08)	6,300 (32.3)
Alipurduar II	12	291.13	24.26	2,750 (9.45)	11,000 (37.8)
Falakata	6	70.53	11.76	490(6.95)	1,907 (27.0)
Madarihat	3	56.14	18.71	450(8.04)	1,800 (32.1)
Kalchini	1	27.77	27.77	240(8.57)	960 (34.3)
Kumargram	3	67.42	22.47	600 (8.8)	2,400 (35.8)
All	82	2,717.54	33.14	21,662(7.9)	86,913 (32.0)

because of smaller actual design command and unpaid irrigation, the utilization ratio is 12.8 percent! No matter how viable an irrigation scheme may appear at the planning stage, no amount of cushioning can make it viable at such abominably low utilization rates.

If we assume the current replacement cost of a DTW at a conservative Rs 5 lakhs, the capital investment per ha of gross area irrigated amounts to over Rs 15,000, enough to give a diesel pump and a bamboo bore to each farmer in the command, assuming that the average landholding is 1.5 ha. The gross area irrigated per RLI varies from a high of 70.5 ha in Dhupguri to a low of 12 ha in Falakata and averages 33 for the district as a whole. If we take the cropping intensity to be 180 percent, then the net cropped area served by an average DTW is around 18 ha, less than one-fifth of the design command. The data also provide a good insight into the adequacy of irrigation provided by DTWs; the DTWs provide, on average, 8 hours of irrigation/ha or just 1 hour per bigha which is probably less than sufficient for rabi crops even in a region like North Bengal where farmers commonly grow rabi crops, largely with moisture retained in soil supplemented by light irrigation.

Another way of verifying this is diesel consumption/ha, which averages 32 l/ha or around 4.5 liters/bigha. In the course of our PRAs with farmers using small private diesel pumps, we figured that a bigha of wheat or potato is given some 12–18 hours of irrigation using 12–18 liters of diesel. Then, large systems probably use fuel more efficiently; yet, it is very unlikely that a 25-hp RLI can provide in 4.5 liters of diesel (or 1.2 hours) the same amount of irrigation that a 5-hp pump would provide in 15 liters (or 15 hours). Moreover, the timing of irrigation supply, its scheduling and distribution, conveyance losses from spouts to the field, and the difficulty of handling large flow might be the factors that can contribute to inefficient water use from such large systems compared to small private diesel pump sets. This implies that command areas of government-managed DTWs and RLIs are under-irrigated compared to privately irrigated areas.

Box 9
Area Irrigated and Water Tax Collected by RLIs:
Block-wise data for Jalpaiguri district. 1996–97

Block	No. of RLIs	Gross Area Irrigated (GAI) (ha)	Water Tax Collected (Rs)	Gross Area Irrigated/ RLI (ha)	Water Tax/Ha of GAI (Rs)	Water Tax/RLI (Rs)
Jalpaiguri	12	478.41	29,244.6	39.87	61.13	2,437
Rajganj	7	189.84	11,390.4	27.12	60.00	1,627
Moynaguri	16	641.68	38,861.3	40.10	60.56	2,429
Dhupguri	9	635.21	31,623.2	70.58	49.78	3,514
Mal	5	64.84	3,890.4	12.97	60.00	778
Aliprduar I	8	194.57	17,179.5	24.32	88.29	2,147
Alipurduar II	12	291.13	27,408.1	24.26	94.14	2,284
Falakata	6	70.53	4,096.55	11.76	58.08	683
Madarihat	3	56.14	4,155.4	18.71	74.06	1,385
Kalchini	1	27.77	2,374.15	27.77	85.49	2,374
Kumargram	3	67.42	3,942.7	22.47	58.48	1,314
All	82	2,717.54	158,704.7	33.14	58.40	1,935

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If farmers are not bitter about such poor offering by government-managed RLIs, the reasons are obvious in table 7; all they have been paying as water tax per ha is Rs 60. If they purchased the same amount of irrigation from private pump irrigation markets, they would have to pay in the neighborhood of Rs 1,500.[20] Another implication is also that, when viewed in light of the actual quantum of irrigation provided, and its timeliness and dependability, the subsidy provided on government-managed MI systems may not be as large as one would imagine. True, farmers pay a fraction of what they would pay in private pump irrigation markets; but then, they also get only a fraction in terms of the quantity and quality of irrigation service that private pump irrigation markets place on offer.

Overall, then, the conclusion drawn by Palmer-Jones (1995) based on an Asian study of deep tube wells is apt here as well:

`DTW projects never achieved the productivity targets expected of them, and at best, barely achieved accepted economic rates of return, at least as calculated in official evaluations… Many DTWs had much shortened life than planned, and few were able to cover their operating costs, leave alone amortisation charges…Some DTW projects managed in the public sector were by-words in inefficiency and corruption; those managed by farmer groups or cooperatives were little better, and the state sponsored cooperatives were often co-opted by the rural elite with inefficient and inegalitarian outcomes. One response to the poor performance of DTW has been to initiate a number of aid-supported attempts to improve the management of DTWs, but none has achieved financial sustainability, let alone full economic viability…'

IV. Small and Medium Mechanical Systems

Introduction

Technology-institutional choice in the field of MI in West Bengal gets exercised at four levels: a) state and district level government and administration (including irrigation and agriculture Department at state and district levels and Zilla Parishads); b) Panchayat Samitis at the block level; c) Gram Panchayats at the village level; and d) individual farmers. North Bengal's MI scene offers a good study because of the sharp differences in the way the choice is exercised at different levels. The State and district administration stand on one extreme; have revealed a preference for DTWs and RLIs under their own management; these are capital-intensive, complex systems with large pumping plants and advanced piped water distribution systems that can become viable only with large commands and necessitate an intricately designed and managed economic organization. On the other extreme, individual farmers choose the simplest, the smallest and the least capital-intensive irrigation technology that requires no group organization and uses simple market processes to enhance pump utilization; farmers use 50–60' deep bamboo bores costing Rs 1,500–2,000 apiece instead of 350 feet deep tubes of GI pipes costing over Rs 100,000

[20]The average RLI uses 32 liters of diesel/ha which is equivalent to 32 hours of pumping from a 5-hp diesel pump. Assuming that the RLI is 20 percent more fuel-efficient compared to the smaller pump, the small pump would need to work for 38 hours to irrigate 1 ha as well as the RLI does. At Rs 40/hour, which is the going price of pump irrigation in the private market, the cost of equivalent private irrigation would be over Rs 1,500/ha.

in DTWs; to cut conveyance losses, farmers use over-land poly-pipes costing Rs 3/foot compared to the complex underground pipeline networks with spouts costing well over Rs 60/meter; farmers use 5 or at best 7.5-hp diesel pumps with discharge of 8–10,000 liters/hour whereas DTWs/RLIs use two 25-hp diesel pumps with a discharge of 35–40,000 liters/hour. DTWs/RLIs cost Rs 12–15,000/ha of gross irrigated area; farmers' irrigation systems cost Rs 3,000–3,500/ha of gross irrigated area. Between these two extremes lies a range of small and medium techno-institutional alternatives; and it is interesting that Panchayat Samitis tend to choose smaller, less capital-intensive and organizationally simpler alternatives compared to those chosen by the State administration; and Gram Panchayats—which are closest to the people and, therefore, most realistic in their need-assessment—end up choosing even simpler and cheaper alternatives that are less capital-intensive and construction-oriented.

Box 10
Comparative Economics of MI Technologies

	HTW	Treadle Pump	Pump Dug-Well	STWl	MDTW	Mini RLI
Capital cost (Rs/Unit)	3,550	500	27,700	29,200	12,600,000	450,000
Net Design Command (ha)	0.14	0.19	3	4	20	20
Gross area irrigated (ha)	0.25	0.46	2.18	5.70	23[b]	27.5[b]
Cropping Intensity (percent)	179	242	73.9	143	115[b]	138 [b]
Capital cost (Rs/ha of DC[a])	25,357	2,635	9,233	7,233	63,000	22,500
Capital cost/ha of GIA [c]	14,200	1,087	13,850	5,125	54,748	16,364
Capital cost /beneficiary	3,500	500	6,925	5,840	21,748	12,162
Farmer contribution (%)	10	100	25	25	0	0
Incre, net benefit (Rs/year)	4,140	6,483	4,324	71,482	206,254	275,373
IRR percent	29.54	95.78	30.32	83.91	11	63

Source. Das 1997.

a. DC = Design command.

b. Assumed by the author.

c. Gross irrigated area by the scheme.

In Moynaguri BDO's office, for example, the whole range of MI works undertaken by the Panchayat Samitis from funds devolved to them was explained to us; these included surface water-based schemes such as Surface Drainage Scheme, Drainage Canal Scheme, Lock-gate Schemes[21] and Irrigation Tanks with diesel pumps. Groundwater-based schemes promoted by

[21]Surface Drainage Schemes are designed to drain low-lying areas remaining waterlogged for several months after the end of the monsoon; Drainage Canal Schemes involve transporting drained water and using it for irrigation elsewhere. Lock-gate Schemes are styled after the traditional *Jamboi* system of irrigation in which a stream is dammed to create a

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Panchayat Samitis include, besides the regulation DTWs and RLIs controlled and managed by the Agri-Mechanical and Agri-Irrigation Departments**,** STW Clusters and Pump Dug-well Clusters,[22] which provide just a well and a shared pump but without buried distribution systems that cost a fortune. Then, Panchayat Samitis also support Basic-or Ultra-Mini RLI schemes[23] costing just around Rs 1 lakh**;** these are no-nonsense RLIs with each having just one 5-hp diesel pump mounted on the river bank with the inlet pipe in the river; it has no pump house, nor a standby pump, but a low-cost distribution system. Last but not least, the Panchayat Samiti MI Menu includes Hand tube wells (HTWs) for which there is a strong demand.

Recently, Das (1997) carried out an economic analysis of six irrigation technologies supported by the NBTDP (see box 10). He found Medium Duty DTWs and Mini RLIs with design commands of 20 ha to be most capital-intensive; and these are substantially scaled-down versions of the original `mega' DTWs and RLIs with design commands of 80 ha plus. The only other technology that beat it in capital intensity was HTWs;[24] but HTWs are supported as multipurpose structures; most of them are used by small farmer households not only for irrigating small plots but also for securing drinking water supplies. In this sense, they are not strictly comparable with other pure irrigation technologies.[25] Treadle pumps, of course, are the least capital-intensive since they are used on shallow bamboo-bores or PVC bores that cost a fraction of what GI-pipe bores cost.[26] Smaller mechanized systems—pump dug-wells and STWs—fall in the middle in capital intensity; but they have larger command areas than HTWs and TPWs. Since there is a heavy element of capital subsidy in all these schemes except the treadle pump, there are major issues of distributional equity. The farmers in the command of an MDTW get nearly Rs 20,000/family as

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diversion flow for gravity-based irrigation; a gated dam is now provided to regulate the size of the diversion flow produced.

[22]Jalpaiguri Panchayat Samitis have done some 220 of these; these include a cluster of 6 STWs accompanied by two diesel pumps between the six. A common BC is supposed to manage the machines. There is an identical Pump Dug-well cluster scheme in which STWs are replaced by dug-wells. Both STW and pump dug-well cluster schemes are on 100 percent subsidy and are financed from the Government of India's Million Well Scheme. Each scheme (STWs or dug-wells) costs 1.32 to 1.6 lakhs/cluster.

[23]This was a relatively new scheme and there is one such basic RLI in each Gram Panchayat. The scheme is turned over to BCs straightaway without much ado; once commissioned, the Panchayat Samiti then takes no responsibility for these whatever.

[24]The bulk of the capital cost in HTWs is of the bore and the GI pipe used in it. We could not figure out if the cheaper materials used by farmers in Rs 1,500-STWs—such as bamboo or PVC suction pipes—are unsuitable for HTWs, which are used for drinking water supplies by most beneficiary households. If they are not, then, clearly, the current programs support overinvestment in HTWs.

[25]For instance, HTWs are set on a concrete platform which costs a packet. But the concrete platform was introduced because of the repeated finding that unhygienic conditions around HTWs cause contamination of drinking water.

[26]The choice between HYW and treadle pump however is puzzling. The treadle pump cost is one-seventh of the cost of an HTW; its discharge is nearly twice that of the HTW; I have seen many women peddling comfortably on treadle pumps in Coochbehar as well as in Jalpaiguri. Apparently, thus, it makes a lot more sense to promote treadle pump in place of the HTW, unless the latter tapping deeper aquifers pump cleaner, better-quality water for drinking.

subsidy; whereas those buying TPWs get no subsidy and those getting PDW and STW clusters get between Rs 4,000 to 5,000/family. The financial and economic returns on the schemes vary inversely with their capital intensity; TPW, the least-cost technology has the highest economic IRR; MDTW has the lowest.

In the course of our fieldwork, we got a glimpse of many of these schemes. In Saptivadi village of Moynaguri, we saw a basic RLI and talked to a section of its beneficiaries; in Dakshin Saptiwadi, we interviewed a young local political leader who had got himself one of a cluster of pump dug-wells; both he and a local leader we met soon thereafter suggested that the normal pump subsidy available to small and marginal farmers in other States is very difficult to access in North Bengal. We also explored diesel pump renting by Gram Panchayats. We visited the NBTDP mini RLI in Jungli Pada village in Dhupguri, another one in Coverbail village in Dinhatta, Coochbehar, and yet one more in Uttar Khagrabari in Moynaguri. In the remainder of this section, we present a running account of what we saw before developing an overview and conclusions on smaller MI initiatives supported by North Bengal's MI policy.

The NBTDP's Mini RLIs

Jungali Pada, Dhupguri

After supporting big DTWs and RLIs during its first two phases, the NBTDP reviewed their performance and decided to support scaled-down versions of these schemes during phase III. Large DTWs and RLIs typically have two 25-hp engines/motors and a design command area of 60 ha. The scaled-down versions—Medium Duty Tube Wells and Mini RLIs—that are now being supported have a command area of just around 20 ha. Because of technical problems, no MDTWs have been constructed as yet; however, a number of mini RLIs have been constructed. We visited some of these at different stages of operation and interviewed their beneficiaries. The first of these was in the village Jungali Pada in the Dhupguri block.

In this small village where a mini RLI (a member of a 4 RLI cluster) under the NBTDP was due for commissioning, we met a group of farmers and, Gobinda Rai, the Secretary of the BC. All the civil work was long since over; and after a frustratingly long wait, three brand new diesel engines had arrived just the day before spreading all-round joy and excitement. The mini RLI had the standard NBTDP design with three 5-hp engines and 8 spouts on a buried pipeline system. The RLI had 32 farmers owning some 128 bighas (approximately 18 ha) in the command; 11 of these beneficiaries had formed a BC and elected Rai to be the secretary. The BCs of the cluster of 4 mini RLIs had fixed Rs 26/ hour as the water tax (Rs 9/hour and Rs 2/hour to cover fuel and Mobil cost respectively; Rs 5/hour towards maintenance, Rs 5/hour as operator's wage, and Rs 5/hour as depreciation cost). An indenting system for water has been designed under which the farmer has to pay the water tax in advance for each irrigation. This poses problems; most members are too poor to fork out ready cash at such times. It is not clear how they propose to address this problem. Then, they will buy 50 liters of diesel at a time; and need working capital to the tune of Rs 1,000–1,500 in the pipeline at any point of time. To meet this, they have raised contributions from members according to ability; they have raised Rs 1,400; the secretary himself has contributed Rs 200; and this sum is used as the working capital.

There was already a tradition of irrigated rabi farming, especially of potato; but farmers rented pumps at Rs 30/hour without a delivery pipe and Rs 40–45/hour with 800–1,000 feet of poly-pipe for water distribution. The water source was not a problem; the farmer could lift water either from the river or from any of the several STWs in the village. There were four such private pumps in Janglipara; the neighboring Kothapara had many more; and all these have been doing roaring business; and their pumps have been extensively used for potato cultivation, not by the local farmers but by outside professional potato growers on leased farms.

Potato-lease—small farmers leasing their lands to merchant-farmers coming from outside—is an extensive system in North Bengal; and its institutional foundation has not been adequately explored. Apparently, a large number of outsiders—mostly merchants—lease farmlands for just the rabi season to grow potato at a rental of Rs 800–1,000 per bigha. Their farming is truly intensive; according to local farmers, over two-thirds of Janglipada's land gets leased out in rabi for such commercial potato farming; and in the neighboring village of Beltulivam, all the land is leased out to merchant-farmers for potato cultivation; they use local as well as outside labor, irrigate using rented pumps, apply high levels of chemical fertilizers and harvest 50–70 mt of potato per ha. The landowner is given preference for giving work on the land. Land lease is almost always on a fixed rent; sharecropping contracts are nonexistent in the potato economy. With the coming of the RLI, a new dynamic has been unleashed. The merchants who have been traditionally leasing land in the village have argued for access to irrigation through the RLI; and the RLI managements have agreed, suggesting that the RLI membership is attached to land and not to persons; so if the land in the command is leased by someone for a season, the leaseholder automatically becomes the member of the RLI for the period of his lease.

Tentative lessons that Jungali Pada Mini RLI offers are: a) turnover of a new scheme to BCs seems to attract better participation than of an existing scheme; b) mini-RLI probably presents a more `manageable' technology for small farmer groups than the big RLIs; c) the smaller number of farmers (25–35) form a cohesive group with lower transaction costs far more easily than larger groups that big RLIs and DTWs (80–125) require; d) in min-RLIs, there is a sense of finality about the BC taking over O&M wholesale, which is absent in big RLIs and DTWs; this sense of finality is highly functional in catalyzing the process of group formation and preparing to take over.

Coverbail Mini RLI, Dinhatta

Our experience at Jungli Pada was insightful but limited because it had yet not become operational; so we could not get to witness the dynamic of a functioning mini-RLI. This opportunity was provided by the Coverbail mini RLI that was commissioned in 1996. The Panchayat Samiti had the scheme established and handed over to the members to manage. The Sabhapati of the Panchayat Samiti had constituted a management committee of 11 members selected by him; these included a President—who was the Pradhan of the Gram Panchayat, a Vice President, a General Secretary, a Treasurer/Cashier and a paid Operator at a monthly pay of Rs 300. The scheme is basically a set of two 10-hp diesel pumps installed on a stationary boat with a boat-house to keep the pumps safe; it has 25 feet of delivery pipe after which, unlike in piped transmission system of the NBTDP mini RLIs, water gets transported in open channels. We

could not get firm figures but the system must have cost less than Rs 1 lakh. The scheme commands around 40.47 ha (100 acres) and has 70–80 members. The members had fixed Rs 26/hour as the water charge (pre-diesel price hike), which is supposed to cover the full cost of operation. The Committee, that is supposed to meet monthly since it was formed 6 months ago, was actually meeting on the day of our visit for the first time to discuss the economics of the RLI. Experience so far was that one hour of operation consumed 1.5 liters of diesel and around 40 ml of Mobil together costing Rs 15 (pre-diesel price hike). The RLI commonly operated for 10 hours/day but on many days it operated for as many as 15 hours including at night. Taking 10 hours as average, the monthly operation of 300 hours generates a surplus of Rs 2,400 after paying off the operator, which seemed enough to cover the repair, maintenance and depreciation cost. The NBTDP fuel-saving contraption, which reduces diesel consumption to half, could make the scheme even more viable; and the farmers we talked to were enthusiastic about trying it out.

Box 11

Jangali Para: Potato-lease and pump irrigation markets

According to the people we met, the most important reason why local farmers leased their land to outsiders was their poverty. Most owned small parcels of land; they did not have the working capital needed to grow a cash-intensive crop like potato; and Rs 800–1,000/bigha seemed an attractive rent for a season, especially since it is paid in advance. Moreover, if you also get labor opportunities at Rs 30/day, that is an additional advantage. For the leaseholder, it does not make sense to grow any crop other than potato. Compared to vegetables, potato needs limited labor and is comparatively easier to manage; it is also easy on irrigation; it is meant for the market, and the merchant-leaseholder can combine production margins with marketing margins to make potato cultivation on leased land a profitable enterprise.

However, if the RLI does provide Junglipada's small farmers a reliable irrigation source, then, in theory, leasing land out to merchant farmers would become progressively less attractive. In my surmise, an important reason why this institution has become popular is the absence of irrigation, which is critical for rabi cultivation. With an assured irrigation source, self-cultivation of vegetable crops like tomato, brinjal and even potato would emerge as a far more attractive option for landowners than leasing it to merchant-farmers.

Did the members see great benefits from the scheme? Yes. Although the area has a high density of private diesel pumps, the buyers find the rental costs at Rs 30–35/hour (pre-diesel price hike) to be exorbitant. The RLI supplied water at 15–20 percent lower price/hour. Moreover, the RLI's discharge was nearly twice that of a 5-hp pump installed on an STW; in terms of actual irrigation, the RLI could do in 3 hours what the 5-hp diesel pump did in 5. This made the RLI even more attractive; in overall terms, for a watering, which earlier cost them Rs 150 through hired diesel pump now cost them Rs 78. There was thus no doubt a strong 'organizing logic' for the RLI.

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Coverbail mini RLI seemed to be the exception that proves the thesis that under well-designed farmer management, a large MI system can not only operate viably but produce large socioeconomic impacts *provided* farmers in the command have learnt to maximize gains from irrigated farming. This cannot be said about most schemes we saw in Jalpaiguri, where sluggish demand and primitive irrigated farming impeded the build-up of collective motivation to manage the system for maximal benefit for the command area farmers. This meant that skilfull process and organizational development work with the beneficiary group and the BC might help establish the right group dynamic. This also meant that some key `design' decisions taken at the start of the scheme might play a crucial role in launching the farmer-managed irrigation system in a high performance trajectory. The Uttar Khagrabari mini RLI we visited next illustrated both these.

Uttar Khagrabari Mini RLI, Bankandi, Moynaguri Panchayat

Uttar Khagrabari RLI, created under the NBTDP offered a counterpoise to the Coverbail mini RLI. The scheme included one 8-hp diesel engine and a very elaborate distribution network of underground pipes and 22 spouts, each with a threaded lid. All the spouts would be closed at any point in time except the one where a farmer is irrigating. The RLI cost Rs 1.27 lakhs; with a distribution chamber, the cost would rise to Rs 1.9 lakhs. The scheme was commissioned in 1995.

The RLI was constructed by the Moynaguri Panchayat Samiti and was given away free to the BC to manage, use and maintain. The General Body of user-members of the scheme had 32 members; there was no management committee; however, the *Sabhapati* of the Panchayat Samiti, Hillal Kumar Chakrabarti had appointed Siddha Mohan Rai, an elderly member of the community as the President and Dinesh Rai as the General Secretary. There was no Vice President or a Cashier/Treasurer. All their functions were performed by Paritosa Lashkar, the paid operator whose wage was fixed at a rather generous rate of Rs 8/hour.

We had an informal group discussion with the President, the operator and four other members of the group. Our discussion soon veered to the central problem facing the group: although the scheme was designed to command 100 bigha, it was actually irrigating much less, in fact, no more than 20 bigha. At a rate of a conservative 10 hours/bigha per rabi crop, the engine should operate for 1,000 hours; but it did less than 100 in the 1995–96 and the 1996–97 rabi seasons. The key problem apparently was the price of Rs 30/hour, which members found rather high. Many of them were earlier hiring 5-hp private diesel pumps with 2–300 feet of rubber pipe at Rs 40/hour; but they had to use such purchased pump irrigation very sparingly. They find the RLI's price equally prohibitive. For some reason, the water output of the scheme was not higher than that of 5-hp diesel pumps. Before the RLI was commissioned, members grew *aus* paddy followed by aman paddy, both of which got no irrigation and very little of other inputs. In rabi, they grew vegetables like potato, tomato, cauliflower, cabbage and others with the help of rented diesel pumps. They got three crops all right; but even now, with the RLI, they grow exactly the same crops in the same way as before. It was their dream to grow high-yielding rice at least once a year; but a bigha of *boro* rice would need 50–60 hours of irrigation, which they found prohibitively expensive.

The ordinary members present in our discussion also appeared agitated because they felt water rates were *unnecessarily* high. The engine used on an average 1.2–1.25 l/hour of diesel and around 0.3 l/hour of Mobil. The fuel cost was no more than Rs 12/hour. The scheme was

given free to them so there was no need to make provision for interest cost although depreciation needed to be provided for. But this did not justify a price of Rs 30/hour. What made Rs 30/hour necessary was the operator's wage fixed at Rs 8/hour. At this wage rate, the variable cost itself became Rs 20/hour. On the other hand, while others were not happy about the operator's high wage, the operator himself was dissatisfied too because, for all the responsibility of keeping the engine in safe custody, of stocking diesel and oil, all that he earned was Rs 800/year.

Box 12

Uttar Kagrabari mini RLI:

Exploring Alternative Pricing and Management Options

We found that the President and the Operator of Uttar Kagrabari mini RLI seemed to be simplistic in fixing the price at Rs 30/hour; they clearly did not intuitively grasp the logic of break-even analysis. So, in the course of our focus group discussion, we placed the following hypothetical proposition to the President and the Operator: "The committee hands over the RLI to me on a management contract; we promise to sell irrigation to all members at Rs 25/hour and pay to the Committee a fee of Rs 1,000/year. Would you be agreeable to this arrangement?" We thought this was an irresistible offer; but the President declined; "it would cause the loss of employment to one young man as the operator," he spilled the beans. When we said we would employ Paritosh as the Operator, he agreed but was quite suspicious. Then, we explained that members of the BC could themselves achieve the same result by slashing the water price and encouraging at least some members to switch to boro rice to start with. Every one present agreed that at Rs 25/hour, the demand for pump irrigation would rise at least to 200 hours from the present 100. We thought that at Rs 22/hour, many farmers would switch to boro rice and the RLI operation in boro season might easily increase to 600 hours. The cost-plus water pricing followed by the NBTDP RLIs ensured against hidden subsidies but could easily err on the other side, too.

Before leaving the group, we asked the President and the Operator whether they would agree to give such a management contract to their own member if one were ready. Paritosh was not ready; but one of the other members present readily agreed to be the scheme manager for an annual fee of Rs 500 to be paid to the Committee, a commitment to sell water at Rs 25/hour and taking over the entire responsibility for fuel, oil, maintenance, and repair.

There was little or no beneficiary participation in the management of the RLI. The general body meeting was supposed to be held once every season; but the attendance of members was poor. So meetings stopped being held altogether. President Siddha Mohan Rai seemed unable as well as uninterested in taking a decisive stance. All in all, Uttar Khagrabari RLI looked like the classic example of a group embroiled in degenerate collective action.

In the absence of effective group management, from the economic point of view, a superior arrangement compared to the present low-level equilibrium might be to auction annual management contract amongst members. The management committee should fix a reasonable water tax and ask interested members to bid for the management contract. Under such an arrangement, the highest bidder would have a strong interest in maximizing the RLI's capacity

utilization by encouraging members to switch to profitable, irrigation-responsive crops such as china boro or boro-9.'

`Basic' and `Super' Mini RLIs

At the start of this chapter, we suggested that the choice of technology as well as institution becomes smaller, simpler, earthier and less capital-intensive as the agency exercising the choice gets closer to the ground. In North Bengal, we saw a variety of river-lift technologies starting with monster RLIs built on the one extreme to a simple diesel pump on a river bank pumping water that gets conveyed to the fields by a shiftable, over-land poly-pipe distribution network (which someone called `super' mini RLI). The mini-RLIs supported by the NBTDP, which we reviewed in this section, fall on this continuum; these are scaled- down versions of the big RLIs; they are more manageabl and are to be turned over to BCs as soon as they are ready. The progress of the turnover program of mini-RLIs has been variable and slower than originally envisaged. The original government order of 1993 stipulated that the management of these schemes through BCs would be the responsibility of the Panchayat Samitis. A modification in this order that allowed for the BC to take greater responsibility and assume greater control over the O&M of mini-RLIs took a long time in coming; and even after it finally came, it left a good deal to be desired. As a result, the process of turnover made rapid progress where Panchayat Samiti leadership was enlightened; elsewhere, the organizational arrangement for RLI operation remained weak and ambiguous.

Under the Million Well Scheme of the Government of India, however, the Panchayat Samitis themselves have operated another scheme to construct small *basic* RLIs that are even simpler, smaller and less capital-intensive compared to the NBTDP's mini RLI. These probably cost around Rs 100,000 a piece (compared to Rs 4–5 lakhs for the NBTDP- supported mini RLI); they provide a single diesel pump of 5- or 8-hp capacity, a small distribution chamber to which is hooked a buried pipeline distribution system made of PVC pipes and spouts. The system has been designed to cut cost and to facilitate self-management by farmers. The system is handed over free of cost to the BC as soon as it is commissioned; beneficiaries contribute nothing in the capital cost; but once it is completed, the Panchayat Samiti withdraws completely from it leaving it entirely to the BC to deal with it, the way it thinks fit. We report on one such *basic mini RLI* that we saw in the course of our fieldwork. In Saptivadi village, we saw a Panchayat Samiti-supported basic-mini RLI, which had already done four seasons of irrigation. The system was far simpler and cheaper than mini RLIs of the NBTDP. It had a 5-hp diesel pump on the riverbank out in the open with the intake pipe in the river.

Box 13

Saptivadi, Moynaguri. Basic Mini RLI

This was a simple River Lift System with just a 5-hp diesel pump on the bank of a river pumping water into a distribution chamber linked to a PVC buried pipe distribution system. The capital cost of the system was around Rs 1 lakh. It was handed over to a BC as soon as it was

commissioned; the capital cost was fully subsidized; but all operating costs and the scheme's O & M were the look out of the beneficiaries.

A group of beneficiaries we talked to recounted the benefits of the RLI in terms of: a) cost savings in comparison to getting hired pump from private owners at Rs 40–45/hour; b) avoidance of output losses caused by over-economising on pump irrigation due to the hassle-factor; c) reliable, adequate, timely irrigation; d) increased cultivation of potato, brinjal, tomato, chilli and other vegetable crops in rabi. However, even at the start of the rabi season, it did not look as if the RLI was going to irrigate the entire command of 80 bigha. The operator thought that the total rabi irrigation would reach 50–60 bigha; in summer, another 15–20 bigha will demand irrigation; and in aman, 60–70 bigha of aman rice might demand one watering. Overall, I surmised, when fully operational, the RLI might have little difficulty in running for 800–1000 hours; and at that level, the entire command as well as the RLI will operate at high-level equilibrium.

The distribution system consisted of buried PVC pipes with a total of 15 spouts. Designed to serve some 80 bigha[27] (about 11 ha) owned by 14 families, it was managed by a BC that included all 14 members. The village had for long been pressurizing the Panchayat Samiti for an irrigation facility; and this was the Panchayat Samitis response; but the rest of the families felt left out and sore. There are no private pumps in the area; so farmers economized excessively in irrigation but, when absolutely necessary, rented a pump from a neighboring village, lifted river water, stored it in a temporary storage chamber and used it for irrigation through open channels. Compared to this, the new RLI was a luxury. However, the overall agricultural regime in the command was yet to adapt itself to take the full advantage of the new irrigation opportunity. The operator complained that there was something wrong with the pump; and the farmers had waited for nearly a year for the Panchayat Samiti to get the engine fixed. But the Panchayat Samiti seems to have told them:`.. nothing doing! You better fix it yourselves.'

Despite its simplicity and lack of frill, this basic mini RLI was much better-managed—and probably created more value and benefits—than the Purvo Harmoty's mega RLI under Agri-Mech management. The Panchayat Samiti had just handed over the system; it was now the group's responsibility to manage it on a sustainable basis through their BC. The members had just elected Nagendra Nath Rai as the *Adhyakha* without any interference from the Panchayat Samiti. The BC had decided the basic economic norms: water would be charged on an hourly rate of Rs 25 (Rs 20 before the diesel price hike); of this, the operator would get Rs 5/hour as wage; of the balance, Rs 11–11.50/hour would pay for diesel and Mobil; and the remaining Rs 8.50–9.00/hour will cover repair and maintenance costs and contribute to a fund that would eventually be used to replace parts of the system.

[27]The number of spouts provided in this basic mini was larger compared to the NBTDP's mini RLI, which has 8 spouts for a design command of 20 ha @ 1 spout for 2.5 ha or over 17 bighas. In the Saptiwadi basic RLI, there was one spout for every 5 bighas, which meant lower conveyance losses, better water distribution but probably also higher future maintenance cost in the distribution system.

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The demand for irrigation had not yet risen to a level where water distribution issues became important. As a result, the BC had left the RLI operation pretty much to the operator. The BC met once a month or two; but probably did not have much business to transact. The operator saw no need for a separate working capital. Whoever wants irrigation, intimates so to the operator, gives him a fuel advance of Rs 35–40; the operator goes to Moynaguri, fetches fuel, and starts the pump. Crude and laborious; but it probably works better than government RLIs and DTWs; and it does reflect the high opportunity cost of working capital, besides giving the operator the chance to show that he is earning his Rs 5/hour! He collects the balance of the irrigation fee after the irrigation is completed and from time to time, the BC deposits the moneys so accumulated, after paying off the operator, in a special bank account, which now has a balance of around Rs 1,500.

The operator was able to offer no information on the capital cost. However, in my assessment, it would not be more than Rs 100,000. The distribution system, the main component, itself might amount to 70–80 percent of the capital cost because it used PVC pipes and simple spouts. Perhaps, what the operator thought was an engine problem was, in fact, one of matching the pump capacity with the huge design command. Later in the day, a senior engineer from the Agri-Mech Department confirmed this; he told us that in the NBTDP mini RLI with three 5-hp machines has just 8 spouts; and many basic mini RLIs sponsored by the Panchayat Samities such as the basic-mini system we saw have just one 5- hp machine had 15, each serving just about 4–6 bigha (less than a ha). The problem probably was not in the engine but in the overdesigned command.

Pump Dug-Well and Shallow Clusters

Policy Goals and Farmer Preferences

Like all other MI programs in North Bengal, the choice of beneficiary groups and allocation of different schemes to selected groups occurs through a politico-administrative process that is largely a `black box' to outsiders who are not privy to the internal discussions. The NBTDP program, implemented by the office of the Joint Director of Agriculture gets subjected to pretty much the same beneficiary selection and scheme allocation norms. Most likely, what happens is that the total number of schemes approved under all the projects funded from different sources gets allocated amongst districts according to some predetermined norms; and the quota for each district gets further distributed amongst blocks. At the block level, there is an intense process of negotiation and bargaining, which is very crucial for Gram Panchayat-level leaders; our sense is that a typical Gram Panchayat leader has a dual objective function: he first tries to get as large a share of the total pie as possible; and then, he tries to get more of *those schemes*, which he thinks his people want most. But given the size of the pie, he cannot get as much of the preferred scheme as he would want because the Panchayat Samiti is given quotas of each scheme separately. And neither the Gram Panchayat nor the Panchayat Samiti seems to have the power to convert DTW budgets into mini RLIs or HTW clusters. So the Gram Panchayat *has* to accept a DTW even if its leaders as well as prospective beneficiaries would want six clusters of STWs instead of a big RLI although both would cost about the same. If such convertibility were available, it seems that a strong preference of the beneficiaries would be revealed for basic mini

RLIs or STW-clusters over big or even mini-RLIs, DTWs and MDTWs. This was evident in a PRA we did with a group of around 20 farmers in Zarmangurmari where we went to see one more defunct RLI, which had been all but washed out by a flood 2 years ago. Three 25-hp diesel engines were removed to a safe place but were now out of use. However, the distribution system was intact; and an investment of around Rs 50–70,000 on a new pump house can probably recommission the system. We suggested that if the government was not interested, the farmers could have contributed and recommissioned the system. However, the group of 8–10 farmers from the command we met subsequently were not enthusiastic about recommissioning it even with government funds. Instead, the informal leader and spokesman of the group—and the secretary of the 16 member BC—wanted a cluster of 4 STWs.

We explored to some depth the reasoning underlying their preference for an STW cluster over recommissioned RLI. And the reasons that came up were pretty much what we had expected: the RLI, after all is said and done, is just no good, even if given free on a platter because: a) irrigation quality, reliability, dependability and adequacy are poor, to say the least; b) the operator, always unavailable when needed most, as a rule, is the biggest part of the problem; he is irregular to the extreme; his presence is scarce and unpredictable; above all, he does not care about farmer needs; and the 16 member BC has no power over the operator; c) breakdowns are frequent, and each breakdown takes 10 days to 1 month to fix after all the BC members take to *pairavi-kari*[28] with the Agri-Mech local officials in Dhupguri on a full-time basis; d) diesel shortage at critical periods is another problem. What they did not articulate but nodded vigorously when we expressed was that access to control irrigation—the capacity to irrigate when the crops need it and in the quantity they need—is valuable to them and the RLI offered them no control over their irrigation regime. Subsequent discussions with other farmer groups also suggested that the groups of four partners to whom STWs and pump dug-wells were given were organizationally far simpler and easier to manage than even Mini and basic mini RLIs that needed the cooperation of 12–40 irrigators to operate the scheme through a BC and a specialist operator.

In the course of the PRA, it was also evident that what was critical, for the farmers in the area, was not the lack of water sources but the shortage of pump capital. The diesel pump was the most sought after irrigation product; most villages had a river or multiple open access surface water bodies from which they could lift water for irrigating their crops; bamboo bores could be made in two days at a cost of Rs 1,500–2,000 using wholly local resources and know-how; if a farmer could not do even this, he could just dig for 4–5 hours to make a *chuha* from which he can pump for 2–3 hours at a go, after leaving it to recharge overnight. In Zarmangurmari PRA, this dissonance between farmer need for a pump and the official enthusiasm for creating costly water sources was strikingly clear. Recently, an STW cluster was given to Zarmangurmari; although it was too early to gauge its impact; what was curious was that the scheme included 6 STWs and two shared diesel pumps although the farmers needed 8 pumps and no STWs or 6 pumps and 2 STWs. Other than the diesel pumps provided under this cluster, there were few private pumps in the village; the Gram Panchayat had two of which one was broken down and the other rented at

[28]Hindi for getting things done by influence-peddling or by wheeling and dealing (see, Arvind Das 1991). *Pairvi-kari* is the full-time occupation of politicians' underlings; and the whole tribe survives on the subsidy regime of the welfare state.

Rs 25–30/day while diesel is bought by the renter. The rent is collected by the Panchayat member on behalf of the BC; the BC also takes responsibility for their upkeep. The conked-out machine is shortly being sent for repair. Some time ago, one of the machines—the one now under repair—was fitted to an ultra-mini RLI using village technology; but that meant that its use was restricted to a small group of farmers with land near the river; there was some resistance; so the BC disengaged the machine from the RLI and decided to keep it free-wheeling and mobile for renting out to farmers.

Preference for STWs

This preference for STWs and pump dug-well clusters got readily translated in demand for them by local politicians seeking popular allegiance and mass base. In Dakshin Saptiwadi, we interviewed Karuna Gobinda Ray, a young Communist party member who had made it to the Panchayat Samiti last year. Ray won his Panchayat Samiti seat by a margin of 350 votes in the last election and since then, has thrown all his political weight around to get 30–40 STWs installed in his 'booths' under government programs; having ensured a base for himself, he is now trying to get a road extended and a college for Moynaguri. Ray, along with three others as his partners, also got himself an NBTDP-financed PDW for himself. The four members had to pay Rs 8,000; the balance Rs 24,000 would be paid from the subsidy funds. The pump had already come; and so had the rings for the dug-well; however, they had a land subsidence problem in digging the well; so the four partners just sank an STW at a cost of Rs 650–700 and got their irrigation started![29] Ray was not very forthcoming in talking about his own PDW, how he managed it, and who his other partners were, however much as we tried probing him on these. Perhaps this was so special a case of PDW that these standard questions did not make sense. But Ray showed that there is certainly no conflict between power seeking through CPM cadre and self-interest seeking along with general do-gooding for one's constituency calculated to strengthen and enlarge one's following.

Beneficial Impact of STWs

Even in the scheme for providing STW and PDW clusters, the organizational model used—which was contributed by the 1985 World Bank MI Project and continues to be in force without any modification—is unusual in some respects. The 1993 government order stipulated that the BC would consist of a representative sent by each group as a member; and one of the members would be appointed by the Panchayat Samiti as the Chairman of the BC. The organizational logic underlying this design is difficult to understand; it assumes the cluster of 6 STWs or PDWs as a single unit needing common management and governance; however, operationally, there need be no link between two STWs; they share nothing except the privilege of being funded by the same program. And such limited empirical evidence there is seems to suggest that STW groups that did

[29]Ray thought the procedure for allocation of PDWs and STWs was crazy; he thought there was no basis to keep the categorization of STWs and pump dug-wells at all, except in some specific areas. He argued that there should be just one category; and each farmer group should decide whether it can do a dug-well or an STW depending upon the site-specific conditions.

well found ways of neutralizing this management and governance structure and operated pretty much as an independent unit.

A study by van Niekerk (1993) offers a useful example of a highly effective group ownership and management of STWs given under the NBTDP in Kalamati in Coochbehar. Unlike the recent practice of providing shared pumps between a cluster of STWs, the STWs studied by van Niekerk included a 40-m bore-well and a 5-hp diesel pump fitted with a hand pump for priming. STW utilization rates were high, resulting in the actual command approaching the design command; collective mobilization of 25 percent of the capital cost from farmers helped build solidarity, cooperation and collective stake and responsibility.

The author found in these groups strong commitment for maintenance and for good record keeping. The establishment of STWs helped the beneficiary groups to switch to boro paddy, which is now their main source of income. Farmers pumped their STWs 12–15 hours a day during the boro season; an STW can practically cover a command of 30 bigha of boro rice at the maximum; and, according to van Niekerk, these ones did. So STWs were of crucial importance to the farm economies of the beneficiary groups. This was evident in the attention devoted by beneficiaries to setting aside funds for future replacement, and to ensuring full cost recovery of O&M from irrigation levies without cross subsidization. Great expense and effort were involved in night guarding and sheltering the STW; these were shared by all beneficiaries; in a few cases, this cost was borne by the Captain. Bamboo shelters costing Rs 200–500 are made every year; two people took turns each night to guard the pump during 5 months of the boro season; after boro, the pump is taken to the Captain's home. It was rarely that guards were hired at Rs 15/day, which was either shared by all or paid by the Captain. There was overall happiness with the collective operation. Collective ownership and management of STWs here created a powerful economic impact.[30]

The economic benefits of irrigation varied; shareholders got their irrigation cheapest; non-shareholders paid a `dry rent' of Rs 10–12/hour in addition to diesel; however, farmers who bought water on pump irrigation markets paid the highest for irrigation at Rs 40–45/hour. Their surplus from boro rice cultivation was the least. Irrigation costs for members was nearly half of that incurred by water buyers; this alone was enough to signify the economic benefits of STWs. Irrigation intervals as well as pumping hours needed per bigha depend upon weather conditions and soil characteristics but ranged from 4 to 6 hours for land preparation and 1–2 hours for normal waterings depending upon the distance from the well-head. If the utilization rate is defined as area irrigated per design command, the rate was 87 and 96 percent for the Kalamati STWs. The annual hours of pumping averaged well over 1,200. This was equivalent to some 32 bigha of boro rice per STW; and at a conservative Rs 400 per bigha, the average STW caused an incremental net output of Rs 12,800/year. Since the STWs—which include an STW and a diesel pump but not a buried distribution system—cost barely Rs 35,000, the *economic* payback period for the STWs is just

[30]van Niekerk's description of Kalamati STW groups might easily be taken to be oligarchic, especially since the Captain of the group takes an unduly large burden of maintenance and upkeep and presumably also has a lion's share in its use. The Captain is typically the largest of the four; and the STW is most likely located in his field. However, as long as all the members of the group can get their irrigation needs met and as long as they are comfortable with the group dynamic dominated by the Captain taking a larger share of the benefit as well as cost, there seems no reason to take exception to the way the arrangement is working.

around 3 years. The *financial* payback period too is attractively low; since the beneficiaries contribute just around Rs 8,500 towards capital cost, the interest cost at 15 percent amounts to Rs 1275/year and the depreciation at 10 percent on the entire system would be Rs 3,500, making a total interest and depreciation cost of Rs 4,775/year. At 1,200 hours of operation/year, as long as the group can generate a surplus of Rs 5,000/year over diesel and repair and maintenance costs, the STW will become financially viable.

Box 14

Successful Collective Management of STWs, Kalamati, Coochbehar, circa 1992

Common patterns have evolved in organization and management. Pumps circulate freely. Farmers in each STW command identify a Captain who is often the largest farmer and has contributed the most and commonly organizes maintenance and repair. Shareholders (SH) are those who have paid the 25 percent share; non-shareholders (NSH) are those who irrigate but have not invested in a share. NSH pay a dry rent for using the SHW on an hourly or a seasonal basis which is typically Rs 8–10/hour; they also have to buy their own diesel. However, NSHs do not have to contribute to repair and maintenance and do not have to buy Mobil. SHs do not accept NSHs as members even if they want to buy in; restricted membership and seniority claim are valued. Proportionality with acreage is strictly maintained. In some groups, an initial 25 percent was collected in proportion to acreage; in some, equal contribution was collected; subsequently, however, large farmers are expected to share a greater burden of repair and maintenance costs. Water tax collected from NSHs goes to Mobil and maintenance costs. In most cases, the Captain bears a larger share of major repair costs; sometimes, these are shared equally or acreage-wise. Repairs are quick; and shut-down periods are short, especially during rabi; the longest shut-down period reported was 2 days. Expenses on spares were Rs 500/year on acreage but ranged from Rs 100 to 1,200/year. Similarly, the fitters' charges were Rs 300–400/year.

Groups were very happy with collective ownership, with no problems in water distribution or cost sharing; rules were clear and accepted by all. Counter-intuitively, there was strong preference for group ownership of STWs over individual ownership: a) the former faces problems in drawing channels across others fields; b) those without STWs will always make demands of the STW owner for the use of his STWs, which may create ill-feelings. This preference was revealed by many other groups in the course of our fieldwork. " The machines are our gods"; so they have to be replaced when their economic life, which is 15–20 years, is over. At the end of its life, they will sell the old machine as scrap for Rs 3,500; and they will pool the balance by member contributions to rebuild their STW.

Source: van Niekerk 1993.

The Chemistry of Degenerate Collective Action: Electric STWs in Zarmangurmari

From the Kalamati experience, it would be difficult to imagine that STWs can fail to become viable and useful to their beneficiaries, especially if they are even cheaper to operate compared to Kalamati's diesel STWs. But van Niekerk's study of the seven Zarmangurmari STWs established under the West Bengal MI Project suggests that this is a distinct possibility when the chemistry of

collective action goes awry. Zarmangurmari STWs were 38–40 m deep bore-wells fitted with 3-hp electric pumps**.** Moreover, here, farmers were not required to make any contribution to the capital cost. Physical conditions were different too, compared to Kalamati. Soil was sandy; so boro rice needed a watering every alternate day; and it took 3–6 hours for irrigating a bigha. As a result, against over 30 bighas for the Kalamati STW, the average boro rice area in Zarmangurmari was barely 8.5 bigha per STW. And since conveyance losses were high, effective command per STW had reduced even further to barely 6 bigha of land closest to the STW. The soils here were better suited for rabi crops than boro; as a result, the STW utilization rate was 28 percent for boro and 57 percent for rabi.

Box 15
Economics of boro rice cultivation in Kalamati, Cooch behar, circa 1992

	Shareholder	Non-shareholder	Water buyer
Irrigation cost	425	575	875
Labor: land preparation	240	240	240
Transplanting	180	180	180
Weeding/dressing	90	90	90
Harvesting & processing	162	162	162
Seed, fertilizer, manure And insecticides	550	550	550
Total cost of cultivation	1,645	1,795	2,095
Value of Produce	2,240	2,240	2,240
Net Profit /bigha	595	445	145

Assumptions:
- command area of STW: 25 bighas
- life of pump 12 years; of well, 20 years
- Mobil: 3.5 liters/100 hours
- running hours/bigha of boro rice: 35 hours
- diesel consumption: 1 l/hour

According to the original scheme, once commissioned, the STW cluster was to be handed over to the Panchayat Samiti that, in turn, would constitute a BC including a President and a secretary. Each STW group was to send a member to the BC. The government notification about the transfer to Panchayat Samiti vested all powers and responsibilities—including those for conducting repairs, paying electricity bills, collecting charges and running the STW—in the Panchayat Samiti. Making this arrangement work was however nearly impossible from the

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Panchayat Samitis' viewpoint since they are already overburdened. In reality, therefore, the arrangement that eventually got established was different. The Panchayat Samiti and Gram Panchayat *Sabhapati* concerned encouraged the beneficiaries and their BC to completely take over the STW management. So the BC member representing each group was made the President—or Captain—of each STW groups. As a rule, the owners of land on which the STWs were located became beneficiary representatives from each group. These were, commonly, better-off farmers who could also influence the location decision. Thus, for all practical purposes, many of these STWs could well have ended up getting reserved by the BC members—or, the Captains—for their exclusive private use. However, they did not do this because doing it did not make sense; by encouraging others to use the STW, the captains could get others to make some contribution in electricity and repair costs.

Box 16
Chemistry of Collective Action: Kalamati and Zarmangurmari STW Groups

? Kalamati STW Groups	? Zarmangurmari STW groups
? Group members contributed 25 percent to the capital cost of the STW; this led to a sense of collective ownership	? Group members contributed nothing to the capital cost; so there was no sense of solidarity.
? Fitted with diesel pumps; diesel cost was the most important variable cost, which had to be paid at the time of use; so there was continuous financial transaction in the form of water tax collection.	? Fitted with electric pumps subject to flat tariff collected once in a quarter; so there was no concept of a `water tax;' members often forgot that they had to pay for using the STW; so the `Captain' ended up paying the bulk of the electricity bill and felt `exploited.'
? Each STW was a managerial unit and had a self-contained BC of its own.	? Formally, there was a BC for the entire cluster, although in reality the arrangement was different.
? The beneficiaries had taken over completely and were running STWs independently and viably.	? Strong *Sarkar Mai-baap* syndrome; groups were factious and dependency on Panchayat Samiti was high.

Counterintuitively, most `Captains' found the BC leadership to be a burden rather than a pleasurable position. There was no spirit of cooperation in these groups; the `Captains' found their responsibilities too onerous. Cost sharing amongst members here was neither done equally nor in proportion to use; at the time of payment of electricity bills, each member contributed whatever he could while the Captain made good the deficit. This was clearly far from satisfactory; as a result, the solidarity between members and the Captain, that was the hallmark of the Kalamati groups studied by van Niekerk, was largely absent here.

Pump Cooperatives

The comparative analysis of Kalamati and Zarmangurmari STW clusters suggests that organizational design issues become critical even in simple devices such as STWs. A classic example of *designed failure* was the National Schedule Tribe Development Corporation's scheme to support 500 cooperative irrigation schemes in Coochbehar, of the total of 1,500 for all of North Bengal. These are basically STWs costing Rs 40,000 apiece in which beneficiaries contribute 25 percent; the balance is divided equally into a grant made by the Corporation and a loan, which will eventually be repaid by the Government of India. This sounded like a good scheme since it required some farmer contribution. But the catch was that 8–9 SC/ST small farmers had to register themselves as a cooperative under the Cooperative Act, which complicated things enormously. A senior government official of Coochbehar with whom we discussed the scheme also thought so but argued that little could be done to help it since the scheme's design required it. The Cooperative Department naturally expressed great apprehension in registering 500 cooperatives each with less than 10 members! But the Department got them to register them somehow. Under the Cooperative Act, each group would be required to maintain formal account books; there would have to be formal election of the managing committee and Chairman; there would need to be a Cooperative Department's audit of its accounts. One wondered how these poor groups would manage all this hassle; and more importantly, why should the poor fellows have to get into such a mess in the first place, especially now when even NABARD has begun lending to nonformal registered groups.

The assessment of the government officials was that registration as a cooperative has to be gone through more as a procedural formality to meet the NSFDC conditionality; once the scheme gets commissioned, business-as-usual is likely to operate, and the groups will hopefully never have to remember that they ever were registered as cooperatives, nor entertain an audit team from the Cooperative Department. If they do, they agreed, God help them! The point was whether the Registrar of Cooperatives would be able to treat them as nonexistent. The administrators thought that he would, since cooperatives anyway are nonentities here.[31]

We were also told about the NABARD-supported program to set up 166 mini RLIs in the district at a unit cost of Rs 4 lakhs each under the Rural Infrastructure Development Fund. Beneficiaries contribute 15 percent of the total cost; the rest would be a grant. A total sum of Rs 5 crores is assigned to this scheme. Considering that a lot of irrigation infrastructure—especially RLIs—is available on a 100 percent grant basis, a major apprehension is that beneficiaries may not be willing to contribute even 15 percent;[32] the danger is that the Panchayats or the administration will not let go of the do-gooding opportunity; and they will reimburse the missing 15

[31]The Panchayat system destroyed even those few cooperatives that functioned well. One administrator explained to us how the Left Front finished the credit cooperative movement with one stroke of the pen: as soon as they came to power in 1978, in a display of devious ingenuity, they modified the principle of '*open*' membership to PACS to that of '*universal*' membership, in the process replacing a common property arrangement by an open access rights system; the government was lauded for this progressive act; but West Bengal's cooperatives never knew what hit them; they have not recovered still; in fact, the movement is as good as dead.

[32]Especially because these are costly mini RLIs spending a great deal on buried distribution system. A ratio of 15 percent of a Rs 4 lakh scheme amounts to Rs 60,000, which is a good deal compared to 25 percent on an STW scheme costing Rs 30,000, which is controlled by four partners.

percent on behalf of the beneficiaries under some pretext or other. One wonders why a mini RLI should have to cost a whopping Rs 4 lakhs, and that too *in North Bengal*. If the past performance is any guide, chances are that less than 5 of the 166 schemes will ever run for more than 500 hours in a year; and the 20–25 farmers in their command will be ever so happy if someone just gave four diesel pumps between them costing Rs 50,000.

Pumps-on-Rent: Gram Panchayats in MI

Besides all that the state administration, Zilla Parishads and Panchayat Samitis did in the field of MI, even Gram Panchayats in Jalpaiguri were important `public' players in the field of MI. They tailored their coat according to the cloth available to them; so rather than blowing money on huge MI schemes, where the problem is concerned they hit the nail on the head. Most Gram Panchayats of Jalpaiguri used the resources made available to them to acquire diesel pumps for custom-hiring them to small farmers who needed them. As we argued earlier, if pump capital scarcity—and not the shortage of water points—is the binding constraint on irrigation expansion in North Bengal, then what the Gram Panchayats did was the most appropriate answer to the problem. It is a different matter that the poor people we met had only frustration and despondency to convey about the scheme.

Gram Panchayats used different sources of funds to acquire pumps. The *Krishi Karmadhyaksha* of Jalapaiguri told us that many Gram Panchayats bought pumps from Jawahar Rozgar Yojana/Million Well Scheme funds. Many Gram Panchayats also used their own savings and internally generated resources to expand their stock of pumps. A variety of arrangements prevail about the custody of the pumps, their renting, and who get to use them; some Gram Panchayats entrusted the pumps down to BCs; others managed them themselves through their members. In the office of the *Krishi Karmadhakya* of Dhupguri Panchayat Samiti, the *Pradhan of* Shakwajhora II village outside Dhupguri told us that his Gram Panchayat has 30 diesel pumps to rent; Sakwajhora I had 20, all bought by the Gram Panchayat from its own resources. All the Gram Panchayats around Dhupguri charged a `dry rental' of Rs 8–12/hour for renting the pump; the farmers procured their diesel but Mobil would be added by the BC. Custom hiring of pumps was thus a big operation in some villages around Dhupguri; and these GPs made BC to be in charge of the upkeep and renting of these machines and they were satisfied with the results.

In the area around the Avasthali village of Moynaguri, we found the entire range of the NBTDP-supported and private MI structures; there was an STW cluster serving shareholders at zero `dry rent;' they buy their own diesel and Mobil; non-shareholders paid Rs 35/hour. There was also a private pump irrigation seller who sold water at Rs 40/hour. Recently, an NBTDP-supported mini-RLI has been constructed; although it was yet to start irrigating, its members had decided it would charge Rs 26/hour. Finally, there was a Panchayat diesel pump that was given over to a small farmer to operate on a he-keeps-profit-or-loss basis; however, he was to charge Rs 25/hour inclusive of diesel and Mobil cost.

In villages with pump capital scarcity, Gram Panchayats often—and understandably—used high rental to clear the pump irrigation market. In Avasthali, Moynaguri, the Gram Panchayat rented out its lone machine at Rs 40/hour all-inclusive; it also rented the delivery pipe at Rs 50–60/350 feet. This was higher than the rate charged by even some private pump owners. In the

Zarmangurmari village of Dhupguri block, other than an STW cluster sanctioned recently, there were few pumps in the village; the Gram Panchayat had two of which one was broken down and the other rented at a `dry rent' of Rs 25–30/day while diesel is bought by the renter. The rent was collected by the Panchayat member on behalf of the BC, which also took the responsibility for its upkeep. The conked-out machine was shortly being sent for repair. Some time ago, one of the machines—the one now under repair—was fitted to an ultra-mini RLI using village technology; but that meant that its use was restricted to a small group of farmers with land near the river; there was some resistance; so the BC disengaged the machine from the RLI and decided to keep it free-wheeling and mobile. Having discussed the Panchayat machine hire with 5–6 groups, we found it significant that none of them complained about machine breakdowns, maintenance and repair problems, operator high-handedness and nonavailability about Gram Panchayat machines in the same way as they did about the DTWs and RLIs. Their complaint was of a different nature: the BC members monopolize the machines, which are not available to others; at peak irrigation periods, too many chase the lone Gram Panchayat machine, and seldom get it because the Panchayat members have the first claim over it.

Box 17

Focus Group Discussion: Paschim Magurmari

In the course of a group discussion, we had asked the farmers in the command of the defunct Paschim Magurmari RLI: 'How would they like it if the government just increased the number of diesel pumps at the disposal of the Gram Panchayat; after all, the Gram Panchayat already had 15 diesel pumps for renting to marginal farmers like you all?'

They were aghast: 'Do nothing of the sort. Our Gram Panchayat has diesel pumps for many years… but none of us has ever seen them, leave alone renting them. They are hardly free from the work of the Panchayat members for others to be able to use them. In our Gram Panchayat, the machines have been entrusted to the Panchayat members to rent to needy farmers in their booths; there is no rental to be charged; whoever needs it can buy his own diesel and Mobil and run it. It is the Panchayat member's responsibility to keep it in working condition. This he does; he spends on repair and maintenance; but he hardly shares it with others… and, naturally… So he does not mind spending on maintenance because the machine is used solely by him! Now there is some talk of charging Rs 10/hour for the use of the machine. But it is all very complicated and will not work. So forget it. Give the pumps to farmer groups of 4–5.'

In many other villages, however, the arrangement was far from satisfactory. According to a Moynaguri Panchayat Samiti member we talked to, Saptiwadi II Gram Panchayat had 8–9 pumps; one pump was assigned to each Gram Panchayat member who selected an operator from amongst the village youth. Whoever needed to rent a pump approached the operator or the Gram Panchayat member. The operator would go with him to operate the pump; the farmer would procure diesel and pay the operator a rental at Rs 5/hour. The operator would turn in the money to the Gram Panchayat member who in turn pays him Rs 30/day and retains the balance for

maintenance and repair costs. Some of these were loose and bizarre arrangements, to say the least; and calculated to fail in a resounding manner. Mr Majumdar, Jalpaiguri's Executive Engineer confirmed that the initiative has begun to backfire for entirely predictable reasons: farmers who rented the pump bought the diesel but no Mobil; so, after a few weeks, one after the other, engines would begin to get seized; the operators seldom turned in the moneys paid to them to the Gram Panchayat members who, in turn, had no money for repairs. So many Gram Panchayats were turning into warehouses for new but conked-out diesel pumps.

Commonly, however, the Gram Panchayat pumps were the center of grassroots political brinkmanship. According to Safiur Rehman of Magurmari II in Moynaguri, ex-Panchayat Samiti member and CPM active member, his Gram Panchayat had seven diesel pumps provided by the Panchayat Samiti, one for each hamlet. For the pump, each hamlet has a BC, which has members from various political parties but led by a front-ranking CPM worker of the hamlet—who is typically also a Gram Panchayat member; he is normally the convenor and operator. The BC rents out the pump at Rs 10/hour while the farmer buys diesel. A sum of Rs 10/hour is not enough to cover maintenance; so for major repairs they collect money. Last year, for instance, the pump in Rehman's hamlet conked out needing major repairs; so each member of the BC forked out Rs 200 while the CPM member—the Chairman—coughed up Rs 300 to collect the needed Rs 1,500.

Even where systems were in place for efficient and viable renting of pumps, the question of access was paramount. We talked to over 200 small and marginal farmers' groups in over 20 villages of the Jalpaiguri District about their experience of renting Gram Panchayat pumps; in each village, there were Gram Panchayat (GP) pumps for sure; but nowhere did we come across small and marginal farmers who had actually been able to rent these, even once. The problem is that one pump per hamlet—which was the case in many villages—is hardly enough even for the BC members' irrigation needs; so it keeps doing rounds of their plots and is seldom available for other farmers. None of the six marginal farmers who were present in our focus group discussion in Magurmari II had ever got to use the Gram Panchayat's pump; a few had tried repeatedly but unsuccessfully; others knew better and had never tried. Rehman, himself a member of the diesel pump BC of his village, could hardly get to use the machine for 20 hours throughout the year; so he went ahead and purchased his own. These were bitter men, highly distrustful of GPs; they were firmly of the view that GP-owned machines were monopolized by GP members and their cronies; and that these served essentially as fringe benefits of being in power.

Despite these problems, giving GPs diesel pumps for onward renting at cost seemed a basically sound idea—in point of fact, a brilliant one, in view of the pump capital scarcity being the principal challenge in irrigation expansion in the region—and showed an uncanny understanding of what the people needed most. Whoever thought up the idea recognized that there are numerous water sources in every village; and any farmer can dig a *chuha* or a bamboo bore without having to mobilize capital; the best thing that the government can do is not blow away public funds on money-guzzling DTWs and RLIs but increase the pump capital/ha, no matter who owned it. That the Gram Panchayat pumps are not available outside their BC except in prosperous villages around towns like Dhupguri suggests that this—that is, the expansion of pump capital—needs to be done on a far larger scale, and costly construction works need to be minimized or avoided all together.

V. Private Minor Irrigation Environment

Introduction

In arid and semiarid areas of South Asia, protective role of irrigation in draught-proofing is as important and striking as its production impact. But this is not quite the case in North Bengal, which seldom suffers a draught. Rain-fed cultivation here—supported at times by very light supplementary manual irrigation—is far more productive and risk-free than in most regions of India south of the Gangetic plains. Aman paddy, the mainstay of smallholders, seldom gets irrigated and yet provides a stable, even if low, yield. Then, a good deal of moisture gets retained in the topsoil much of the year so that crops getting completely destroyed because of draught is a remote occurrence. Over time, rain-fed cropping patterns here have also got adapted to make the best use of the moisture retained in the soil after the monsoon. Thus even rain-fed farmers achieve a cropping intensity of 160–180 percent that would be envied by farmers of Gujarat or Maharashtra. Finally, all farmers—including small and marginal—are already used to protective manual irrigation through traditional methods. There are numerous surface water bodies from which limited amount of water can be drawn using *taar-balti*; or, it is always possible to dig a 5–6 feet deep ditch and procure more water manually. These sources are generally enough for small farmers with tiny patches of vegetable crops. Because of all these reasons, it is easy for a lay observer to underestimate irrigation impact on farm productivity and income.

However, this impression may prove deceptive when one visits an agriculturally dynamic area like Dhupguri where intensive irrigation use produces huge livelihood and income impacts through the multiplicative operation of increases in crop yield, higher cropping intensity and high-value cropping pattern. The most common discrete change that access to mechanical irrigation tends to produce is the switch-over to the cultivation of boro-rice varieties; since these respond well to controlled irrigation and nitrogen application, the switch often marks the departure from subsistence farming to surplus creation. And boro-rice cultivation with manual irrigation is demanding, to say the least; irrigating small boro rice plots with treadle pumps has become common in many areas of Coochbehar (Shah 1997); but doing it with *taar-balti* is well-nigh impossible. The need for mechanical irrigation—or much improved manual technologies—also becomes acute in crops like potato, wheat, boro rice and vegetable cultivation for the market. For a vast mass of North Bengal's small farmers, thus, having access to controlled irrigation may mean 12–14 *mon* (40 kg) of aman paddy instead of 6–8, 10–12 mon of tobacco instead of 3–4, and 9–10 mon of jute instead of 6–8 mon. And getting these large productivity increases may not mean more than 15–20 pumping hours (5 hp) of irrigation per acre. The most striking aspect about the role of irrigation in North Bengal agriculture is its *minimalist* nature; small amounts of controlled irrigation can produce large yield-increases, open entirely new cropping pattern opportunities to small-farmers, and help them make a transition to a higher trajectory of productivity and income.

From Manual to Mechanical

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And yet, this small amount of controlled irrigation is not available to most small and marginal farmers because the region faces acute scarcity of pump capital. As a result, their opportunity sets are unnecessarily restricted because of their inability to properly utilize the water resource that the region is abundantly endowed with. *Taar-balti* is still the most popular and widely used irrigation technology amongst marginal farmers. In the course of an impromptu PRA on the road from Jalpaiguri to Dhupguri, Sushindra Nath Roy, typical of the region's small farmers told us he does grow 1–1.5 bighas of chili during rabi but would toil throughout the season watering it with *taar-balti* while his other 5 bigha remain fallow. With 50–60 hours of a 5-hp pump irrigation, Roy would be able to grow potato on the remaining 5 bighas. Similarly, in the Avasthali village of Moynaguri, we interviewed a young farmer whose family owned 18 bigha in Ranirhat in the neighboring Coochbehar District. The family had no access to mechanical irrigation;[33] as a result, they grew aman paddy on all their land but then grew only 2.5 bighas of potato because they had no pump irrigation. Even for these 2.5 bighas, they did not hire a pump since it was not easily available in their neighborhood; but they hired two workers at Rs 15/day plus meal each to operate the *taar-balti*.[34] In Magurmari II (in the Moynaguri block), similarly, we interviewed Naik Dinesh Chandra Ray, an angry, young ex-service man with 14 bighas of mostly unirrigated and partly manually irrigated land.[35] Without access to a diesel pump, own or hired—Ray and his neighbors either avoided crops that needed irrigation or used the manual *taar-balti* system of watering from surface water bodies, or rarely, rented a diesel pump at Rs 30–35/hour from a village 8 km away.

[33]They had a power-tiller costing Rs 90,000 but not a shallow costing Rs 15,000. They had tried getting a diesel pump and a shallow because they knew the Agriculture Development Officer (ADO); but despite ADO, the banks refused and instead encouraged him strongly to buy a power tiller. He paid Rs 77,000 and got a subsidy of Rs 12,000. It looks as though the machine costs Rs 85,000 cash down without subsidy; going through the subsidy route, the price swells to Rs 89–90,000 the farmer gets Rs 8,000 subsidy; rent-seeker's pocket Rs 4,000. Even then, the power tiller subsidy took 8 months to come. He rents his power tiller to cultivate some 150 bighas of others' land mostly in Rabi and for 1 *chaas* and collects Rs 18,000. The power tiller takes 1.25 hours to do one *chase* and uses up 2.5 l of diesel.

[34] To get the facts right, farmers with tiny holdings did not see the diesel pump more appropriate to their needs as compared to the *taar-balti.* In the Avasthali PRA, we also explored with a group of young and old farmers of Avasthali what was better to irrigate potato with: diesel pump or *taar-balti.* The general conclusion was that *taar balti* is impractical for anything more than a bigha; hiring workers to operate *taar-balti* is costlier and messier than hiring a diesel pump. But then, many farmers present, especially the older ones, also felt that *taar-balti* water output is easier to manage and use well, compared to the water gushing out of a 5-hp diesel pump drawing from a surface ditch. They would have probably found the treadle pump more appropriate to their needs; but farmers here were unfamiliar with the technology; the few who had heard about it were mal-educated about the strengths and weaknesses of the technology. Lesson for IDE: these farmers would need to be disabused of their current notions about the treadle pump before they become ready to try it out with an open mind.

[35]Ray was bitter about the partisan approach of the Administration. As an SC farmer, he would normally be entitled to diesel pump subsidy; but Ray was resigned that he cannot get it and had stopped trying. No one he knew of had got it yet; and even if it were really available, he asserted, it would first go to the party members and their associates before the benefit trickled to the non-political ones like him. Things were sort of falling into a pattern; from what both the Rays—Dinesh Chandra Ray in Magurmari II and Karuna Gobind Ray in Saptivadi II— gave us to understand, it is more critical to be a political animal in rural Bengal—rather than being a Communist party member—to access any government schemes.

Another manual technology increasingly coming into use was the hand pump tube well promoted by the NBTDP as a device preferred by women for homestead irrigation-cum-domestic water needs. We could not see enough of these to form a good overview of their irrigation use; in some areas, we saw women irrigating small backyard vegetable plots as their own separate little enterprises. But as we figured in the course of a discussion with a group of men and women owning HTWs in Uttar Altagram (Magurmari II), `HTWs are no good for serious agriculture; *taar balti* is much better.' But in Coochbehar, we found treadle pumps have left behind all traditional manual irrigation technologies and have taken off as devices useful for `serious agriculture' (Shah 1997a).

Box 18

PRA with marginal farmers in village Ullar Dabdi in Moynaguri:

What difference would it make to them if they had access to an STW?

- All agreed that crop yields would be higher but marginally, and in rabi and pre-kharif seasons;
- aman paddy would continue to be the standard fixture on their crop cycle;
- almost all would grow either boro rice or a range of rabi crops such as potato, wheat, tobacco, chili, and vegetables such as bitter gourd;
- those who grow rabi crops would take jute in summer; those who choose boro paddy would settle for two paddy crops a year.

What would change with access to mechanical irrigation? We explored this issue with the farmers in our Avasthali PRA. Very little, in the short run at least. The cropping pattern might change only marginally since boro rice varieties were unsuitable for this particular stretch because of the sandy nature of the soil; irrigating boro rice with diesel pumps would be prohibitively expensive here. But the farmers felt they would be much better-off growing a wide variety of vegetables. And they would also grow a lot more potato, wheat and tobacco than they are doing now.[36]

[36]There would also be a substantial increase in the cropping intensity, especially as the holding size increased beyond 3-4 bigha on which manual irrigation can be managed by a large family of adults. We examined the cropping plan of Lankeshwar Burman on his 10-bigha holding. Two years ago, before he got himself an STW, he grew aman paddy on all his land; and potato on 4 bighas; that is about all he could manage without mechanical irrigation. Now that he has an STW, he still cannot grow boro season rice; but he takes 3 crops a year on 4 bighas, 2 crops on 2 bighas and 1 crop on 2 bighas, which are far from his residence. In the first 4-bigha plot, he grows china boro or mala rice during Aman, which gets ready for harvesting in early November; he follows it up with potato and vegetables in rabi, which takes him through to March; in March-April, he takes a crop of *pat.* In the second 4 bigha-plots, he grows traditional aman rice, which gets harvested in December and then leaves the land fallow and takes a *pat* or aus paddy crop in summer. In the last 2 bigha plots, he takes only aman paddy. This took his cropping intensity to 220 percent. Many other farmers who participated, however, argued that Burman was not getting the biggest bang out of his STW!

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Box 19

The *taar-balti* production function, based on an impromptu PRA in village Ullar Dabdi in Moynaguri.

Crop	Bighas*	Hours per watering	No. of waterings needed	Total cost of cultivation	Output kg/bigha
Potato	1.5	26–30	3	3,000–3,500	3,200–3,600
Wheat	1.5	26–30	3	1,000–1,200	240–320
Tobacco	1.5	18–20	4	1,500–2,000	160–200

* Maximum that can be reasonably irrigated with *taar-balti* by an average smallholder family including imputed irrigation cost. Operating *taar-balti* requires two people working in a team; many farmers hire labor at Rs 40/day; others cooperate with each other.

Later, we probed similar issues with another group of a dozen marginal farmers who took time off from aman-paddy harvesting to participate in our impromptu PRA in the village of Ullar Dabdi in Moynaguri. We began with Dulal Sarkar, a young farmer, by exploring the economics of rain-fed farming. Sarkar had 4 bighas in two plots, both thoroughly unirrigated. He still grew two crops: aman paddy (high priced *Pai Jaam) in* August-Mid-November; and then jute in summer (March-July). He did not use any irrigation either through rented pump or the *taar-balti*. In an average year, he harvested 40 *mon* of aman paddy (1,600 kg, or 400 kg/bigha or about 2,800 kg/ha); and 20 mon of jute (800 kg or 200 kg/bigha). His was low-input farming; in his crop of aman rice, Sarkar spent nothing on seeds, Rs 200 on 20 kg of chemical fertilizer, Rs 500 on insecticides, manure from four of his cows and Rs 2,000 on hired labor (at Rs 30/person/day plus meal). In jute, he spent even less; last year, with jute prices crashing, he lost heavily since he had to sell his crop at Rs 250/mon instead of the recent normal price of Rs 500; but even at Rs 500/mon, he might have just about broken even .

Does he not find irrigation an attractive investment? Very much so; Sarkar revealed his plan to set up an STW in one of his two plots. He expected to complete it within a budget of Rs 15–16,000; the pump would cost Rs 12,000, and the boring complete with PVC pipe, strainer and casing should be Rs 2,500–3,000 since the boring rate charged by private rig owners is Rs 10/foot. This again brought to the fore the question about the high cost of externally supported STW schemes.[37]

Yet, irrigation did not seem an overly binding constraint for these marginal farmers. They considered the substitutability between *taar balti* and diesel pump to be high; at Rs 40/day paid as wage, they can produce in a day an amount of water equal to that a diesel pump, hired for an hour

[37]We repeatedly checked if there was any difference in the boring they made and those made under government schemes; but they asserted that `...a boring is boring... they are the same everywhere...' and yet the costs were so vastly different.

at Rs 40, can. And because of their very small-sized parcels, they were under no great pressure to raise the water output *per hour*. They certainly preferred *taar balti* over HTW, perhaps because through constant use, they had developed a high level of dexterity and proficiency in its use. They had heard about but not used a treadle pump[38]

Technology Choice in a Subsidy Environment

A constant refrain throughout our discussions with small farmer groups was that, in the present subsidy environment, farmers view themselves as facing zero resource cost *without* budget constraint, when it comes to government schemes; and a high resource cost with stringent budget constraint in deciding in favor of their own resources. In the course of our PRAs, we tried to force them to make choices in a situation of budget constraint. In the Ullar Dabdi PRA, for instance, we asked the group what they would choose if the government offered them the option of a) a diesel pump without boring; and b) a boring without a diesel pump; the unanimous choice was a pump without a boring, which they could do at Rs 2,000–2,500; of course, they insisted that the government must give them both. We also asked them whether they would prefer individual STWs or pumps shared by a small group of 4–5; surprisingly, several preferred the second option. But when we asked them to choose between a) 2 STWs between 12 farmers, and b) a diesel pump without a bore to each, initially, there was no consensus but after two minutes, it emerged that those who owned less than 3 bigha would prefer a) and those who owned 5–8 bighas or more would prefer b).[39]

In the Avasthali PRA, likewise, we explored with a small-farmer group their relative preference for a poly-pipe versus a soil-cement-lined channel for water conveyance. Poly-pipe has been the farmers' answer to the problem of transporting water from the well-head to a distant field at acceptable water and energy loss; and soil-cement-lined channel is being promoted under the NBTDP at 50 percent subsidy. At Rs 3–3.5/foot, poly-pipes are inexpensive; they are also mobile and shiftable but may last for no more than 2 years; a soil-cement channel at Rs 50/foot costs a lot more but may easily last 20 years. In the course of our discussion, the strong farmer preference for the lined channel—or, rather the dis-preference for the poly-pipe was evident. The main reason was the short life of the pipe, which gets torn or cut because of thorns and sharp edges of anything in its way. According to the group, the useful life of a poly-pipe under intensive use is just around a year. Another reason was that the land here is so flat that the pipe's advantage of overcoming topographical irregularities is heavily under-perceived and discounted. But the relative costs do not enter this discussion; it is implicitly assumed that poly-pipes are at

[38]Here was another sample of the disenchantment of the poor with the Gram Panchayat pumps. The Gram Panchayat kept and rented out diesel pumps; but these were of no use to them because it was hardly available for them; in fact, there was hardly time left after the Panchayat members were done with them. If and when it was available, the rate charged was Rs 10-12/hour as rental and the farmer had to buy the diesel and Mobil.

[39]One of them began giving to the group and us a well-articulated lecture about having to live in a society with mutual cooperation; but a wry old man cut him short and explained the basic economic logic of why it makes sense to get diesel pumps for 3-4 partners rather than to individuals: a small farmer will not be able to utilize the asset enough and will find it costly to maintain it; so shared STWs would be easier to maintain since the maintenance costs will also be shared; but a large owner would be attracted by an individual STW because he can achieve a high level of utilization!

their cost, and soil-cement channels areat the government cost, mostly. In this cost regime, preferences are clear: the government should construct only soil-cement channels because they help in better water management and delivery pipes have a life of only one year. The moment we introduce relative costs, the tenor of the discussion changes:

> 'But if there was a scheme in which you got entitled to 1,000 feet of delivery pipes *every year* versus soil-cement channel once and for all, what would you prefer?''

There was general confusion. One or two still preferred soil-cement channels; but most did not want to commit themselves. Would they ever build soil-cement channels themselves? No, no way. But all who have diesel pumps buy delivery pipes in the normal course of events.

Finally, we found a similar attachment to open, ring wells over shallow bore-wells although we seldom came across a farmer who constructed his own open well using his own resources. If provided under a government scheme, they prefer dug-welsl; they find them pretty to look at; they seem to give a better water yield; they have a longer life. But they cost Rs 20,000 to make as against Rs 1,500 for a bamboo bore with a PVC strainer pipe,[40] and though they are better, dug-wells are not *all* that better so that they will pay 15 times more. It is a different matter if the government was to give it; then, of course, they would like only dug-wells, why not? But one seldom finds privately financed dug-wells, in any case, rarely of the type given under government-subsidy programs.

Pump Irrigation Markets

Most small farmers without their own pumps in North Bengal supplement manual irrigation by purchased diesel pump irrigation in the informal pump-rental markets. The depth and width of these markets are determined largely by the density of pumps in the area; and outside agriculturally dynamic areas like Dhupguri in Jalpaiguri and Dinhatta in Coochbehar, diesel-pump density in North Bengal tends to be low. As a result, small farmers commonly rent pumps from private owners in other villages. Rental rates vary depending on several factors; but the standard rent is Rs 40/hour if the field is closeby and Rs 50/hour if it is far away. The rent tends to rise to as high as Rs 60–70/hour in periods of peak irrigation demand; also, separate charges are levied for poly-pipes; these range from Rs 0.30 to 0.50/foot/day; Rs 50/day for 300 feet of poly-pipes is common in areas with well-developed pump-irrigation markets.

In areas with low diesel-pump density, small farmers rent the pump only under extreme stress, and then too, heavily economize on its use. High cost may be just one factor; the hassle of getting it when needed may be equally important. In advanced potato villages of Dhupguri where a single village may have 100 pumps or more, renting a diesel pump may be no big deal and has become a standard, widely used practice; but in villages where only 2–3 private pumps may be on offer, the

[40]To check on private cost of making STWs, we visited Narain Rai in Uttar Altagram (Magurmari II) who made a 60' deep STB 6 years ago at a cost of Rs 4,900; he spent Rs 3,000 on the GI pipe itself; if he had chosen PVC pipes instead, this cost would have come down to Rs 500.

`hassle factor' may be overriding in farmer decisions to get a pump on rent. To check on this, we asked the farmer group in Magurmari II the cost of pump rental for a bigha of China boro; the figure we got was Rs 400, which would buy 8–10 hours of irrigation, one-third of what would be needed for a good yield of 22–25 mon/bigha.

The monopoly power of pump irrigation sellers easily translates into large surpluses on pump-irrigation sale; and this applies not only to diesel-pump irrigation but to all machine- rental markets. The government-run irrigation schemes, however, were largely unable to use this opportunity because of their pricing policy and poor management. In Purva Harmoty, we interviewed Gobind Biswas, the only owner of a diesel engine; but this he used to operate a threshing and milling plant for wheat and paddy. On a pump capital of Rs 25,000, Biswas made a profit of Rs 25,000/year;[41] Bholanath Mondal, a pump irrigation seller in the upper part of the village also earned Rs 20,000 on his diesel pump costing Rs 20,000 (see box 20); with its total investment of Rs 7 lakhs and annual gross business of Rs 6,000, the Purvo Harmoty RLI makes a net economic loss/year of probably Rs 2.5 lakhs or more![42]

The degree of development of pump-irrigation markets varies greatly across the region. In remote, agriculturally stagnant areas, pump-irrigation markets tend to be thin and shallow, fragmented and highly imperfect; they contribute little to augmenting the total irrigated area of non-pump owners. In contrast, in agriculturally advanced areas near urban centers, where pump density is high, pump irrigation markets are highly developed and contribute substantially to the agrarian dynamism. Curiously, advanced pump irrigation markets result in the divorcing of the irrigation political economy from the politics of the State; government schemes and subsidy-loan programs progressively lose their significance in these areas as the energetic agrarian economies dominated by pump-irrigation markets get on with the job of wealth creation and break away from the shackles of politics-ridden government schemes.

Box 20

Underdeveloped Pump Irrigation Market of Purvo Harmoty

[41]This looked like good business since he gets customers from several neighboring villages. He invested around Rs 20,000 in facility in 1989. The 10-hp plant used 1.7-1.8 liters of diesel/hour of operation; and Gobind needed 150-180 liters of diesel every month, indicating 90-100 hours of running per month. He charged Rs 80/qtl for wheat and Rs 20/qtl for paddy as processing charges; and in 1 hour, he could process 60 kg of wheat and 240 kg of paddy. Thus, effective processing charge per hour was around Rs 45-48. Taking diesel and Mobil cost at around Rs 12/hour, he earned a contribution of Rs 33-35/hour and made a net profit of around Rs 25-30, 000 after allowing a liberal sum of Rs 12-15, 000 towards repair, maintenance depreciation and interest cost.

[42]Take the average staff cost of the operators and chawkidar at Rs 3,000/month/person; the annual staff cost per RLI is Rs 108,000. Take annual hours of operation at an ultra-conservative 1,000; at 8 liters/hour, the system uses 8,000 liters of diesel costing Rs 88,000; take Mobil as 10 percent of diesel cost; energy cost is Rs 96,800. Take repair, maintenance, depreciation and interest cost at 20 percent of the capital cost of Rs 3 lakhs. This makes the total annual operating cost of the RLI to be Rs 264,000 of which the water tax does not bring even Rs 6,000!

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In up-lying part of Purvo Harmoty village, which is not served by the Purvo Harmoty RLI, most small farmers pursued rain-fed farming; 3–4 had diesel pumps; they used their pumps primarily for own irrigation needs and a little for selling pump-irrigation service. These were first-time pump owners; the pump was the most intricate machine and valuable movable asset they had ever possessed; so they refused to part with it and believed they had to go with the pump wherever it went; so the opportunity cost of their time had become the binding constraint on water selling. Some years ago, nonowners used to get hired pumps from the neighboring Bhotpatti village. In recent years, Bholanath Mondal, a poor young farmer with 9 bighas of largely useless land, had emerged as a specialist water seller; he bought a pump with a bank loan and had made water selling into a full-time occupation. He had also invested in 800 feet of delivery pipe at Rs 2.5/foot (Rs 75/kg and 3 kg contain 100 feet). He sold water to 18–20 farmers in rabi at Rs 45/hour if delivered through pipe and Rs 40/hour if not. Bholanath treated his investment in pipe as an operating cost because the life of the rubber pipe was around 1 year, especially as he made intensive use of it involving frequent shifting and laying. Bholanath told us he sold around 500 hours of water a year;[43] however, in my estimate, Bholanath probably sold more than 1,000 hours per year, mostly during rabi and probably earned Rs 40,000–50,000 gross, and Rs 20,000–25,000 net from his pump-irrigation service selling business.

Just outside Dhupguri, we met the fanatically apolitical Noor Hussein Fazle Rehman of Gadong village.[44] Gadong is a village wholly devoted to potato production; but besides growing an outstanding crop of potato, Hussain also kept an eye on its market; so last year, when every potato farmer in the region was wiping tears of frustration arising from the depressed potato prices, Hussein sold half of his crop before everyone else and sat pretty on the other half through the season; he lost 10 percent in spoilage but got the long-term average price. Hussein also rented out his diesel pump without delivery pipe and irrigated 60–70 bighas of others' potato crop besides his own. But the pump rentals in Gadong were astronomical. He charged Rs 50/hour for his 5-hp diesel pump; he further charged Rs 50/day for 100 feet delivery pipe.[45] But the pump-renting

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[43]We interviewed Bholanath in the presence of a group; this compelled him to make his business sound far less-profitable than it probably is. Had he sounded too upbeat, there were two diesel-pump owners who would have considered the water market prospects with renewed interest; and that would have meant intensified competition for Bholanath. In any case, in general, we found pump owners in North Jalpaiguri District to be reticent in talking about their renting business.

[44]An honours graduate in History, Hussain struck it out as a private tutor and has a roaring tutoring practice in Dhupguri that earns him Rs 7–8,000 a month. On the side, he had an equally booming farming enterprise with total focus on potato cultivation.

[45]As if these businesses were not enough, Hussain has an equipment leasing business. He invested in a power tiller (Rs 87,000 bank loan), which now cultivates 300 bighas of net cropped land besides his own at Rs 100/bigha/ploughing. His hired driver can finish a bigha in 1 hour flat, will burn 1.3 liters of diesel and collect Rs 100 as service fee. In my

season in Gadong is always short and intensely busy. The whole of Gadong—that is, some 3,000 bigha of farmland—would be under potato during rabi; so every one would want to irrigate at the same time, sending pump rentals skyrocketing at critical irrigation periods. It was strange that even in a tradition-bound, close-knit rural society, oligopolistic sellers in the pump-rental markets should find prices as the only way of clearing the market!

The Gram Panchayat pumps-for-rental scheme could have played a powerful disciplining role on the informal pump-irrigation markets; if they have not done so in most villages of North Bengal, it is because access to these is determined by political calculus and as we gathered from one village after next, small and marginal farmers who are not active players on the local Panchayat scene find it impossible to use the Panchayat pumps. We figured, for instance, that Hussein's Gram Panchayat also had 5 diesel pumps, which they rented out at Rs 25–30/hour. Did they—the Panchayat pumps—not put pressure on private renters to lower their rentals? No; because at peak irrigation periods, there were just not enough pumps; Gram Panchayat's pumps went first; but even in this, they had a pecking order shaped by the political hierarchy: the Panchayat pumps went first to irrigate their BC members' lands, then, those of their kith and kin, then their supporters' crops. By then, they had no machine time left for the remaining all and sundry. So the all and sundry had to hire machines from the likes of Hussein at sky-high rates and still feel grateful to them. In Hussain's village, active CPM party members were given the charge of the Gram Panchayat pumps; so it was also necessary to be their political supporters to get a favorable treatment.

Pump Subsidy-Loan Schemes

In studies of North Bihar and Eastern Uttar Pradesh, which are similarly well-endowed with groundwater, a major factor behind rapid development of groundwater irrigation—and upsurge in agricultural productivity and income—during the past decade and more, has been caused principally by a growing stock of privately owned diesel pumps and the consequent rise of booming and pervasive pump-irrigation markets (Shah et al. 1996; Shah Ballabh 1996). These studies have also shown the overwhelming influence of the MI policies followed by State administrations in these regions; and the growth in pump capital stock has been ensured not so much by private capital accumulation but through a government policy that combined subsidy on pumps with easily available bank credit through a scheme that was readily accessible to small and marginal farmers (Shah et al. 1996). Although both Bihar and Uttar Pradesh have public tube well programs, these are not nearly as large and prominent as in North Bengal. Moreover, in North Bengal, all public funds and subsidies have been directed through State administration and Panchayati Raj institutions; as a result, the bulk of the pump capital growth has been controlled by these agencies and the privately owned pump capital stock has grown very slowly; in contrast, in North Bihar and Eastern UP the resources under JRY and MWS have been used largely to support subsidy-loan to building up private stock of pump capital—which, in turn, has spawned vibrant pump-irrigation markets.

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surmise, he recovers his entire capital 1.5 times over every year. So much for the mechanical undercapitalization of North Bengal agriculture and the exceedingly high rate of return on machine capital.

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One would have thought that a similar strategy—designed to a) rapidly augment private stock of pump capital and b) catalyze vibrant pump-irrigation markets—would have unleashed North Bengal's Green Revolution just as it did in Eastern UP during the late 1980s and has been doing in North Bihar during mid-1990s. In the course of our fieldwork, however, we gathered that the MI subsidy-loan policy in North Bengal has been systematically co-opted by the State MI administration and the Panchayati Raj institutions as *their* instrumentality; as a result, it has not even begun to play the kind of role it has played in Eastern Uttar Pradesh and North Bihar. On the contrary, the process of accessing the scheme in North Bengal has become so lengthy, complex and laborious that small farmers without backing in the political system have completely given up hope of benefiting from it.[46]

According to a Jilla Prishad leader in North Bengal, the procedure of accessing the pump subsidy-loan scheme involves the following steps: 1) the aspirant gets his name listed as eligible with the Gram Panchayat along with all documentation; at the first stage, the Gram Panchayat has to agree to forward his application to the BDO; 2) a Gram Panchayat member has to personally recommend his application to the BDO; 3) The application is discussed in the periodic meetings of the bank, Gram Panchayat Pradhan and Panchayat Samiti member concerned, to assess the creditworthiness and eligibility of the aspirant; 4) if the aspirant clears this stage, his application is completed and forwarded to the bank with the recommendation of the Panchayat Samiti; 5) after this, the bank claims the subsidy from the DRDA; 6) the bank releases the loan but only after the DRDA pays the subsidy; 7) the bank issues the Delivery Order to the beneficiary who can claim his diesel pump. The procedure always took 1 year or more; now it seldom gets completed because banks, facing massive NPAs in government subsidy schemes, are dragging their feet. We met the Dhupguri BDO who asserted that the delay was caused mainly by the banks dragging their feet; but the Central Bank (lead bank) officials we met passed the blame to the DRDA and Panchayat authorities. They argued that that the banks do not proceed unless the Panchayat Samiti forwards an application; and the Panchayat Samiti does not forward it unless the Gram Panchayat recommends. This means that the Panchayat leadership *has* a tight grip over the process. Bank officials suggested that Panchayat members—and their protégés—are naturally the first to access the system; and ordinary folk cannot access it except through the goodwill of the Panchayat leadership. Delays also occur because the first thing every bank checks in an application is whether the applicant is on the BPL (below poverty line) list or not; if not, the application goes back to the Panchayat Samiti.

Because of the large number of overdue loans, banks have, of late, been tightening the procedures. Under the new arrangement, the bank retains the subsidy amount until the loan is repaid; if it becomes a problem case, the bank adjusts the subsidy against the loan repayment. Moreover, to avoid cases of malpractice, it is stipulated that the loan cannot be repaid before 5

[46]The pump subsidy scheme in North Bengal is run under several schemes including the IRDP by the DRDA. Under this scheme, SC/ST and BPL families are entitled to a subsidy of Rs 6,000 on a unit cost of the pump. The Government Departments involved in MI subsidy are DRDA (IRDP), Agriculture Department, and the SC-ST Corporation. The unit price of an STW has recently been raised. The subsidy is 50 percent or Rs 6,000 whichever is less. The bank finances the whole investment for the diesel pump, but will not give cash; instead, it will issue a Delivery Order to the dealer; the dealer will issue the pump and the engine and later gets reimbursed by the bank.

years; even if it is, the subsidy cannot be released before 5 years.[47] With this change in procedures, the Panchayat leaders have lost interest in the subsidy scheme; not a single proposal has been put up so far under the new arrangement as also under the Ganga Kalyan Yojana. This means that under the earlier system, many bank loans were paid up immediately by selling off the asset (or, better still, by not buying the asset at all!); and the subsidy was eaten up. Poor recovery and growing NPAs are a major concern for the banks that are therefore beginning to drag their feet.

We explored farmers' experience with the diesel pump subsidy- loan scheme under the Million Well Scheme with several small farmer groups we met. There was all-round frustration with the scheme, which was matched only by their frustration in accessing the Gram Panchayat diesel-pumps-for-renting. A young Panchayat Samiti member from Dakshin Saptiwadi thought the procedure to access the subsidy-loan scheme to be `very lengthy, complex and tiresome; small farmers in his area seldom try it. Moreover, each district, each Panchayat Samiti and each Gram Panchayat had a quota.' A farmer wanting to get it has to apply to the *Krishi Prajukti Sahayak* (KPS) who decides and forwards it to the ADO with a recommendation from a Gram Panchayat member and after a long wait, the subsidy-loan may or may not get approved. This was true about other farm equipment as well. Rehman, a Panchayat Samiti member in Magurmari II in Moynaguri had tried accessing the subsidy-loan scheme himself but found the experience frustrating.[48] According to him, there is no point in trying to access subsidy for the diesel pump; it may not come through; even if it does, it may not get approved before 18–24 months. For claiming the pump loan and subsidy, the application has to be processed at several levels starting with the KPS and then in the ADO's office. Rai, an ex-serviceman turned small farmer said that, ostensibly, the subsidy was being reserved for landless and marginal farmers for giving them pumps for renting out; but added tongue-in-cheek that, in fact, the bulk of it actually went to diesel pumps purchased by Gram Panchayats, and in many villages, effectively ended up with the Gram Panchayat members and their protégés.

[47]A common malpractice was to get a subsidy application sanctioned, get a diesel pump issued, have it sold in the market, repay the loan component immediately and pocket the subsidy. Repaying the loan immediately reduced the interest burden; stipulating that the loan cannot be repaid before 5 years and the subsidy cannot be released before 5 years is a deterrent to swindlers but it also undermines the purpose and the attractiveness of the subsidy scheme. In effect, the applicant has to find from his own sources an amount equal to the subsidy before he can get the pump.

[48]According to him, the problem was not only with the diesel pump subsidy but all agricultural machinery. He showed us the receipt of Rs 5,000 he had deposited in early 1996 (18 months earlier) with the Agro-Industrial Corporation towards the margin money for a loan to buy a power tiller; he had still not received any response. And there was only a small element of subsidy here. Despite these difficulties, one found privately owned power tillers more common than diesel pumps; this was curious because the power tiller costs Rs 90,000 whereas a diesel pump costs all of Rs 14,000. In Zarmarguri PRA, farmers agreed that people invest in private power tillers more easily than on STWs; one reason probably is that banks are far easier on giving credit for power tillers than for diesel pumps. Zarmarguri had already 4 power tillers, all bought with the help of a bank loan and Rs 12,000 subsidy; these have extensive rental markets; and bullocks are gradually being retired from the area. The *power tiller wallahs* come and finish a bigha inside of an hour for Rs 100; a *goru-walah* comes for Rs 40 but works only from 7 a.m. to 12 noon, does a bigha light *chaas* and expects a meal as a bonus.

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In the final analysis, the net impact has been that the pump subsidy scheme has got stuck in the quagmire of complex procedures evolved by the Panchayat institutions, DRDA, ADO's office, and the bank bureaucracy; as a final result, North Bengal may enter the twenty-first century with among the lowest pump densities (pumps/1,000 ha of net sown area) amongst all the regions of the country with comparable water resources. The Zarmangurmari village, which we visited had less than 10 diesel pumps for an agricultural area of over 600 acres. Besides its low-performing mega RLI, Purvo Harmoty had all of 12 private pumps for over 1,500 bighas of farmlands. It is only in areas around agriculturally dynamic towns such as Dhupguri and some parts of Coochbehar that the pump density is approaching the figure of 8–10/1,000 ha, which is common in some of the most far-flung areas of Eastern UP and Bihar; elsewhere in North Bengal, the pump density may be as low as 0.5–2/1,000 ha.

Why so little private pump capital in a region so flush with water? As we posed this question repeatedly, farmers were very clear about the reason: Banks, NABARD, and the ADO's office are together responsible for a good deal of under-capitalization of pump capital in the area. Banks' lending policy, according to them, was the main culprit. Banks insist on 15 bigha for loaning for a power tiller as well as diesel pump; no small farmer wants a power tiller, so the requirement does not hit power tiller aspirants; but most people who want diesel pumps are small guys; and banks do not lend to them. Farmers expressed frustration and resignation about the diesel pump subsidy; some said it is discontinued; yet others said the hassle and time taken were too much and the results are highly uncertain; so the effort was not worth its while.

Diesel pump dealers—who are the hub of the pump subsidy-loan schemes in Eastern UP and Bihar—shared the farmers' frustration in North Bengal. And the low population of pump dealers in North Bengal towns were an eloquent indicator of the pump capital starvation of the region; in Eastern UP and North Bihar, in tehsil towns, one can find dozens of pump dealers who do nothing else but sell diesel pumps; here in North Bengal, you can find a handful of pump dealers only in district towns; and for all of these, diesel pumps are just one of the several products they sell. An oil engine dealer in Jalpaiguri lamented that a) the system of processing subsidy-loan in West Bengal is extremely complex and takes enormous time; b) the dealer has absolutely no role in it; he comes into the picture only after all the processing is done; and c) this affects the demand for engines, which can be potentially large. B K Jain (Sukhlal Baid), a prominent and experienced diesel pump dealer of Coochbehar explained why the subsidy-loan scheme here does not function quite like it does in Eastern UP.[49] During the previous year, the demand for subsidy pumps had

[49]Jain dealt in Atul Shakti and BSA brands; other brands popular in the region were Bharat, Usha, Kirloskar, Shakti, Bharat Shakti, Kangaroo, Dipco, etc. All 5-hp pumps sold at Rs 14,500–15,000; Kirloskar sells at Rs 16,500. NABARD recently revised the unit cost for diesel pump to Rs 15,000. Jain's estimate of the uptake of diesel pumps in the NBTDP districts was around 4,300–4,500 pumps a year as follows:

Coochbehar	2,500 units/year
Jalpaiguri	1,000 units/year
Siliguri	800–1,000 units/year

According to Jain, there has been a sudden spurt in private demand for pumps over the last 5 years; earlier, the uptake was just around 400–500/year, and almost all demand was under government subsidy programs. Now, slowly a demand

slackened because the Government of India had begun to discourage purchase of pumps under the JRY in which the material cost cannot exceed 40 percent. Jain did a lot of business in subsidized pumps; but still, over 50 percent of his pump sale was over the counter—which was somewhat surprising. Government demand tended to come in bunches and under different programs. A year earlier, for instance, Coochbehar Jilla Parishad bought 258 pumps under the Prime Minister's grant to give away two pumps to each Gram Panchayat to rent it to poor farmers. Similarly, during the previous year, 1,400 STWs were done under the World Bank scheme. All these were to be electrified; but there were no power connections; so there was a move now to provide two diesel pumps for a cluster of six STWs by the Panchayat Samitis.[50]

The difference between the over-the-counter and subsidy price of the pump is around Rs 500–600. This is to cover the marketing costs involved, agent's commission, etc. The dealer here has a very limited '*pairavi*' (mediating) role; once a beneficiary's application is approved, the agent tries to sell his brand to him. The transaction cost of influencing the Panchayat decision-making process is very high; therefore, the diesel pump dealer in North Bengal has not been very aggressive. Jain told me however that the pump dealer is indeed a very aggressive player in agriculturally dynamic districts such as Burdwan and Hoogly. Perhaps, the large overall volume of business there has increased dealers' stake in an enlarged coordination role, and at larger volumes, they can absorb the higher transaction costs of `managing' the Panchayat decision making in the MI field.

Comparison with Eastern Uttar Pradesh and North Bihar:
Where Subsidy Has Sent the Market for Diesel Pumps Booming!

For over two decades now, the UP and Bihar governments have been operating a Free Boring Scheme (FBS) which provides the farmer complete subsidy towards the cost of boring and pipes, and a partial subsidy towards the diesel pump cost.[51] The FBS offers an interesting study because: a) in Eastern UP, it may well be among the most powerful rural development interventions benefiting marginal farmers and unleashing a belated Green Revolution in the region; b) it seems to have met with resounding success in terms of its quality of subsidy-targeting, reduction in leakages and in creating a political economy that, instead of compromising or subverting the goals of the scheme, actually furthers them; c) the good performance of the scheme is an outcome of a

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outside the government subsidy is emerging. According to Jain, the demand under subsidy schemes is still 40 percent of the total demand.

[50]This, we finally figured out, was the genesis of the 1 diesel pump: 3 STWs formula of the STW cluster scheme. One still wonders why it was 6 STWs and 2 pumps and not 2 STWs and 6 pumps or 6 pumps and no STWs!

[51]This is Rs 2,800 for small farmers (with < 5 acres); Rs 3,600 for marginal farmers (<2.5 acres) and Rs 5,650 for SC/ST marginal and small farmers.

series of *design* changes made, which have aligned the incentives and motivations of those involved in subsidy administration with the interests of the poor. It thus offers wider lessons on the design of `smart' subsidy programs (Shah et al. 1996).

In the course of a field investigation of groundwater irrigation in Eastern UP, over 200 marginal farmers we interviewed in several areas of the Gorakhpur Mandal expressed great happiness and satisfaction with the FBS. This was not because no `transactions costs' were involved in accessing the subsidy-loan scheme; in fact, it was widely agreed that, buying an engine and a pump off-the-shelf without a subsidy, a farmer has to pay a premium varying from Rs 700 to 1,800 if he avails of the subsidy-loan scheme.[52] Despite this, marginal farmers we met throughout Gorakhpur mandal expressed a high degree of satisfaction with the working of the scheme although they had only anger and frustration to convey about the bureaucracy and other government programs in general.

At the heart of the popular admiration for the FBS is the high-quality supported provided by the pump dealer. Farmers described to us in detail how the pump-dealer took care of almost all the formalities of claiming the subsidy and loan on the pump and engine; all that a small farmer has to do is provide a photograph of himself and a copy of his land record; the rest was all taken care of. Many farmers described the FBS as `a real friend of the farmer'. A group of farmers in Maharajganj explained that the scheme's design made hassle and delay difficult. For a new aspirant the process of getting a bore and pump under FBS subsidy is the same as that described earlier (page 7, a–f).

Applying the normal thinking about subsidies on the FBS, the Scheme should by now have gone off badly. Diesel engine quality should have deteriorated;[53] farmers should be cursing the dealers and the MI office; and; in general; there should be a lot of stink around the scheme. But, at least in Eastern UP, none of these fears seemed justified. The farmers we met did not seem to mind at all the 'reasonable service fees' charged by the dealers for the services rendered. And the services offered seemed substantial; under the subsidy-loan scheme in Eastern UP, the pump dealer does not sell just a pump set; he virtually rolls out the red carpet for the small farmer, taking over all the bureaucratic chores, which would normally make life hell for a subsidy-seeker!

One probable reason was that the dealer and manufacturer incentives were aligned with farmer interests. Because there are a large number of manufacturers—and even a larger number

[52]A more accurate statement is: the off-the-shelf buyer gets a `discount' of Rs 700–1,800 compared to a farmer applying for the subsidy-loan scheme. This `discount' on direct purchase without subsidy is an extremely important indicator of a variety of variables that come into play in this complex game; at the least, it includes: a) the unofficial payments or bribes that pump dealers have to pay to agencies authorized to approve the loan and subsidy; b) other money and time costs—mostly of running around from office to office—involved in getting the application processed; c) interest costs incurred during the processing time—between the date of the farmer's first approach with photograph and land records when he collects his engine and pump, and the date when the check is released. The discount varies over a large interval because large dealers—who get applications processed in fair-sized lots—are able to carry out these tasks at a lower *average* cost compared to small dealers who get applications processed in ones and twos; and because of intense competition, rather than using their lower cost to increase monopoly profits, large dealers offer larger-charge lower premiums to attract customers and increase their market share.

[53]Because dealers and manufacturers would have figured out that big money lies not in selling a good quality product but in keeping the subsidy-controlling bureaucrats in good humour.

of dealers—each vying with each other to tap the growing demand for pump sets stimulated by subsidies, there is a powerful drive among dealers to offer a comprehensive package of services to farmers, including getting bank loan formalities and subsidy procedures completed effortlessly. And many services in this `comprehensive package' are probably dominated by fixed costs; keeping the bank officials in good humor, ensuring that the Block office and the MI office quickly clear *his* cases also probably involves a fixed monthly or annual *hafta;* as a result, aggressive dealers with a large market share are able to cut average unit costs of the `comprehensive package of services' they offer to farmers.

R. K. Chaudhary, a pump dealer in Basti town, explained to us: `Diesel engine makers provide good commissions. So if a dealer can sell 250–300 sets a year, he earns a very decent income. This is the primary driving force. And this has become possible in recent years. There are some 28 dealers in Basti; the demand for diesel pumps in the district is around 5,000/year. But then there is a lot of competition in this business. If I do not help the farmer, he will immediately walk away to another dealer.'[54] And even small farmers did not mind paying an

average of Rs 1,000 extra as service charge to the dealer for cutting the red tape for them; they deemed it reasonable considering the range of services provided in collaboration with the bank and government administration.[55,56]

[54]At Sandila town near Hardoi, we met five dealers of diesel pumps to discuss the FBS. Sandila town itself had 22 pump dealers working through the Land Development Bank (LDB) alone; there were others working through nationalized bank branches. The five we met together sold around 600 sets per year. There was intense competition amongst the dealers to increase their share in the total demand for diesel pump sets at 1,200–1,500 sets a year. During 1995, the LDB branch at Sandila alone had loaned Rs 70 lakhs for pump sets; at a unit cost of Rs 12,500, this meant 560 sets. The intense competition among pump-set dealers was the principal source of the freedom-from-hassle in the FBS. Here also, we found the diesel-pump-subsidy-at-the-farmer's-doorstep working as smoothly as elsewhere in Eastern UP. Again, two problems frustrated the dealers: a) the increasing gap between the NABARD-determined `unit cost' and the actual cost of the pump set; and b) the service area approach of the nationalized banks, which restricted the freedom of an aggressive bank branch to finance pump sets outside the area assigned to it, and on the other hand, condemned many villages to a bank branch, which was apathetic to pump financing.

[55]Compare this with a differently designed treadle pump subsidy in an eastern state in 1995: a TP which the manufacturer would be prepared to market at Rs 800 is being sold by the government at Rs 1,400 but with a 50 percent subsidy; thus the farmer pays Rs 700; the manufacturer gets Rs 800, and the remaining Rs 600 disappears on the way! Things have since changed.

[56]The process of subsidy-loan scheme as described by the dealer was as follows: a) the farmer gets his *Khasra-khatauni* and a photograph and approaches him; b) the dealer gets a file prepared in the block office; this takes around 1 week; c) the file goes to the bank, which again takes around a week to process it; the file originating from a good dealer grows extra feet and travels fast through the chain; once approved by the Department and the bank, the dealer gets a check from the bank on himself and the amount gets debited against the farmer's name in the latter's new loan account; after his first approach to the dealer, the farmer has to come just once to sign his loan papers; (d) the farmer gets 60' pipe and 100' strainer issued from the MI office at the block level; the dealer organizes these; the farmer then gets a bore done directly. Depending upon the location, depth and geology, he is entitled to a labor cost subsidy of Rs 400-700, after the bore is inspected and certified by the Block-level MI officials. One point of hassle and delay was at this juncture: it takes quite a while to get the MI staff to inspect and certify the bore. Then, there is the problem with the

In a subsequent spell of fieldwork in the Muzaffarpur District of North Bihar, I found that the FBS of the Government of Bihar has generated even more farmer-friendly dealer dynamic; dealer's agents roam around in villages looking for potential buyers of pumps under the subsidy-loan scheme; and once they find them, they provide them the same package of cutting the red tape to give services at their doorstep. Here, subsidy for borings—ranging from 70 to 90 percent of the cost of boring and pipe—is available only to those who have land to do borings; but diesel pump subsidy is available even to the landless. Thus the idea underlying the scheme is that a pump set has an earning capacity independent of the land belonging to its owner; and both irrigation surplus on land and pumping surplus from pumps can be separately appropriated through pump-irrigation markets. In the Gaighat block in Muzaffarpur, for instance, we found there were around 15 pump dealers—or, 'agents' as farmers call them—whose full-time job is to roam around in the villages looking for customers for engines under the subsidy program. These agents fiercely compete with each other for clients by outperforming competing agents with the offer of a superior package of services. The 'services' basically include speedy clearance of subsidy-loan papers; we were told that subsidy-loan applications for diesel pumps in Gaighat got processed in a record time of a week or less. As in the Gorakhpur Mandal, all that the applicant has to do is to provide a photograph of himself and a copy of the *khasara*; the rest is all taken care of, and the pump set often delivered at the doorstep of the farmer.

The superior performance of the pump subsidy scheme here is explained not so much by the superior quality of development administration, which is much better in North Bengal, but by design of the scheme that has created a positive dealer dynamic. This becomes evident by comparing it with the difficulty of accessing the new subsidy program on sprinkler systems announced by the Government of Bihar. The product, which includes 100 feet of pipes with five nozzles, costs Rs 27,500; there is a subsidy of 90 percent on it so that it can be had for just Rs 2,750. But the access-process is agonizing and involves repeated greasing of palms at various levels, which require special skills and abilities that are not widely distributed. The product is stocked by the government and is released on a case-by-case basis. Manufacturers, dealers, and agents do not come into the picture. Chances are that the manufacturer would be quite willing to market the product at a fraction of Rs 27,500; but the product price is inflated by subsidy administrators to create room for rent extraction.

Our overall assessment of the FBS as it operates in Eastern UP and North Bihar is that: a) the entire subsidy amount does not reach the farmer; this is evident in the difference of Rs 700–1,800 between the price of the same pump in direct sale versus price of sale under the subsidy scheme; b) however, the small farmer is happy with *this particular* subsidy scheme, something

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method of payment of subsidy. There has been a change in this procedure now. The subsidy for the borehole labor cost gets directly credited to the loan account of the farmer in the bank, which gives him loan for the pump set. This subsidy is then adjusted against the repayment due from the farmer for the pump set loan. Elsewhere, some farmers complained that since this change came into operation, one has to take a pump loan in order to get the borehole subsidy. However, there is still a long delay in the preparation of checks. Mr. Chaudhury agreed that the dealers take over the entire hassle of setting the government procedures in motion once the farmer approaches them. On an average, a dealer is able to get the procedure completed within 15–30 days. In the earlier version of the scheme, the farmer had to come to him just once and all his problems were taken care of; now, he has to make 4–5 *chakkars*.

that cannot be said for most other subsidies; c) the services offered by the dealer in helping the farmer through the entire bureaucratic process seem highly valued; d) if the ultimate purpose of the scheme is to encourage small and marginal farmers to acquire and use bores plus pump sets for irrigation, the dealers' drive to compete for a larger share of the subsidy-induced demand for pumps helps the scheme along in achieving this purpose; e) the FBS has dramatically expanded the pump capital stock available in these regions and has catalyzed their Green Revolution.

The present design of the scheme has been achieved by gradual changes calculated to make it farmer-friendly. Initially, around the mid-1980s, the FBS scheme in Eastern UP was very different and far less easily accessible and attractive than it is today[57]: a) farmers were required to choose between a small number of 'designated' brands; b) the Department stocked pumps for giving away to farmers at a subsidized rate, and c) the boring had to be done by the MI Department staff using their own rigs. Together, these features severely restricted the role of the dealer and the competition among them and made the government and bank bureaucracy the central coordinating mechanism of the FBS. As it operates today, the scheme has a more farmer-friendly design because a) the pump dealer (and not the MI Department) has been made the point of access to the subsidy; as a result, over the years, all trading towns have specialist pump dealers who deal solely or mostly in diesel engines; even small district towns can have 15–40 such specialist dealers; b) this pump-dealer community offers to farmers a choice from a wide variety of brands; c) each dealer would naturally look for the easiest way to corner as much of the subsidy as possible; d) however, he would be constrained from overdoing because of the fierce competition amongst dealers to increase their share in a growing market; e) competition amongst alternative brands and dealers prompts the dealers to take the hard way and offers to farmers quality product and services that go far beyond their 'call of duty'; f) and in return if they extract an unofficial `service charge' by jacking up pump-set prices more than they would have in the absence of the subsidy, the farmers we met did not seem to mind it very much; g) unlike earlier, in the present system, the farmer is spared the agony and hassle of dealing with the various bureaucracies involved in approving the subsidy-loan; his interface with them is mediated by the dealer; and the dealer who can offer a stable `business' is able to strike a better bargain with those in charge of processing subsidy-loan applications and change to the `hafta' system rather than settling the `price' for each application; h) pump dealers with larger turnover have obvious advantage in dealing with the administrative system; they can and do form long-term contractual

[57]In Eastern Uttar Pradesh, for example, a study in 1984 discovered that the process of approval of an application for subsidy and loan for a diesel pump took over 11 months to complete. The MI Department played an active role in implementing the subsidy policy; for example, the MI Department maintained a stock of diesel pumps of one or two preferred brands. Similarly, the block office maintained an inventory of PVC and GI pipes, rigs, foot valves and other material needed for making bore-wells and employed an army of staff who will go and make borings. When a small farmer applied for a shallow tube well under the subsidy-loan scheme, he had to accept the diesel pump stocked by the MI Department and wait for months until the government mistry came to make a boring. After all these, the final cost of the STW to him often turned out to be higher under the subsidy-loan scheme than if he had done it on his own. The diesel pumps stocked by the government sold in the open market at 20–30 percent discount compared to what the government charged; similarly, farmers who made borings on their own, employing private contractors, got them done for less than Rs 2,500; but under the government scheme, the small farmer ended up paying over Rs 10,000 for the boring.

arrangements—informal of course—with bank staff and MI staff to secure speedy clearance of loan and subsidy applications, and can afford to pay larger *`hafta'* and charge lower premiums to the farmer on the subsidy pump—which is probably why the discount on direct sale varies from Rs 700 to Rs 1800; i) this dynamic propels the dealers to constantly try to increase their market share by offering better and hassle-free services to farmers.

According to the pump dealers we interviewed, the FBS scheme would become even more hassle-free if additional changes are made in the scheme *design*: a) The nationalized banks' service area approach reduces the effectiveness of the scheme; each branch is allotted 20–25 villages for pump-set loans; if the bank and the branch are not inclined towards pump-set loaning, the farmers in those villages have no option; and this is a real problem because many nationalized bank branches minimize agricultural lending. Fortunately, the LDBs operating in the region provide an option and as it happens, in many districts, the bulk of the pump loans are made by the LDBs. But such artificial monopoly-making not only hits the scheme and the farmers but also increases the scope for corrupt collusions; b) the NABARD unit cost fixed in 1992 continues to be Rs 12,500 while pump-set prices have gone up to Rs 15,000 and more; this needs to be raised so that the farmer does not have to fork out cash for the balance; c) in Eastern UP, bankers expect the dealer to help them keep a tab on the FBS beneficiaries and in ensuring loan recovery from the farmers who came through them; many bankers we talked to agreed that dealers were helpful in ensuring loan recovery. However, dealers did find the additional duty burdensome. A suggestion they had to improve recovery was: give the subsidy on pump set as well as on the boring as a fixed deposit (just as the DIC does) with attractive rates of interest; this would reduce the scope for malpractice and increase farmer incentives to repay.

Overall, then, the evolution of the present FBS design greatly enlarged the market for diesel pumps. It enabled the pump dealer to emerge as a powerful change agent for the farmer. As a specialist red-tape cutter, the dealer was able to accomplish subsidy-loan approval at much lower `transaction costs' than the farmer could; as a result, the farmers are gladly willing to pay him the `service charge' in the form of a premium. For the efficient red-tape cutting dealer, this premium, added on the margins provided by the manufacturer, strengthened his incentive in expanding his share in the local pump market. This design of FBS fundamentally changed the ballgame of diesel pump marketing. In fact, over 70–80 percent of the new private shallow tube wells in Eastern UP established after 1988 have been supported by the government subsidy-loan program; and this growing stock of diesel STWs owned by small farmers has been at the center of the belated onset of the Green Revolution in Eastern Uttar Pradesh. One can also argue that but for the rapid expansion of diesel pump sales, the growing de-electrification of agriculture in these regions after 1988 (reflected in steep decline in the number of functioning electric tube wells) would certainly have slowed down—if not all together stopped—this belated onset of the Green Revolution.

Lessons for North Bengal

While the rest of India has a great deal to learn from Bengal's experience in building a vibrant system of Panchayat institutions, at least in this one respect—of catalyzing a Green Revolution by stimulating MI investment—we tend to think that Eastern UP and North Bihar can teach a lesson or two to the planners and administrators in North Bengal. Considering that all the three areas are

similar in their water resources potentials and in their flood-proneness, it is pointless to belabor the argument that a bright agrarian future can be built in all three by expediting MI development. And by no criterion can one say that North Bengal has done as well in this respect compared to Eastern UP and North Bihar—both of which have, in the past decade, achieved pump densities in the neighborhood of 80–120/1,000 ha while North Bengal as a whole is still hovering around 2.5–5/1,000 ha barring a few pockets with dynamic agriculture. Our comparative analysis shows that Eastern UP and North Bihar have followed a completely different path in MI development.

? First, they have given up all pretence that government and community management of large-sized MI systems can offer a big, long-term institutional model for irrigation development. Under the World Bank DTW program, Uttar Pradesh continued to build large public tube wells based on the World Bank design; but by the late 1980s, studies had already shown their continued worthlessness; as a result, since 1990, the UP government has been trying hard to turn over public tube wells to any group of farmers in the command who would care to take them over;

? Second, while these efforts have proved unworkable even with lucrative terms of turnover, during recent years, the focus of the MI policy has been squarely on the FBS. All resources available under all manner of schemes—state and central government—have been assigned to the FBS thereby creating a sense of sufficiency and obviating the need for stringent rationing.

? Third, as we described earlier, through a series of design changes, the policy has created room for the pump dealer to pitchfork into the central coordinating role in the FBS; this has not eliminated the dangers of leakage or mis-targeting or even of rent-seeking but it has made the scheme extremely friendly and accessible to the small farmer at a service charge the farmer finds reasonable for the package of services that the dealer supplies.

? Finally, and belatedly, the MI policy has accepted that the key problem it needs to tackle is of shortage of pump capital and its challenge, of increasing the pump density; and the FBS is best suited to meet this challenge.

In North Bengal, in contrast, the MI policy is still obsessed with state and community management of large MI schemes despite abundant evidence to suggest high failure rates. The bulk of the public resources devoted to MI development—in our rough estimate, around 70–80 percent—continues to get devoted to construction and very little to putting pumps in the hands of the farmer even though it is common knowledge that any farmer in the region can make a bore ever so much more easily than lay his hands on a pump. This suggests that the MI policy of North Bengal is pretty much like that of Gujarat or Rajasthan; it fails to recognize the criticality of pump capital scarcity as its principal challenge; and instead keeps building capital-intensive MI miscellany such as deep bores and buried distribution systems that farmers would never build with their own money. Finally, through a series of design reversals, North Bengal's pump-subsidy scheme has become all but unworkable. Resources available to the scheme are probably woefully

limited; of this, the bulk got captured by the Gram Panchayats (at least in Jalpaiguri District) for their pump-rental programs; the process of getting approval for subsidy-loan applications, which involved 8–10 decision makers, is made so lengthy, laborious and full-of-hassle that the scared small farmer wrote off the scheme as out-of-bounds; and the pump dealer, who made the scheme a success in Eastern UP and North Bihar, remained completely marginalized in North Bengal. Result? Pump density of 1–2/100 acres whereas it should be 15–20.

VI. Panchayat Institutions and MI Policy

Panchayat Politics and MI Policy

With the Panchayati Raj institutions playing such a dominating role in the administration of all government programs, it is neither possible nor desirable to conclude an assessment of how North Bengal's MI policy works—and with what impact—without exploring the dynamics of the Panchayat institutions. Several aspects of the functioning of the Panchayat system set apart the socioeconomic dynamic in rural North Bengal from what we had found in Eastern UP and North Bihar (Shah et al. 1996; Shah and Ballabh 1996): a) The Panchayat system in North Bengal is far more mass-based and participatory than in most other States because the Panchayat leadership is under constant pressure to respond to people's aspirations; b) The level of corruption and malpractice of Panchayat leaders is far less than elsewhere because the political environment is mature and animated, and because local leaders are constantly watched by people as well as by the 'party;' c) Opposition to a reform in the present design and administration of MI subsidy on the lines of Eastern UP may well come from the Panchayat leadership itself because in the sort run at least, many leaders may conclude that such reform might undermine their power base.

According to some observers of the North Bengal Panchayat scene, perpetuating a development regime based on subsidies has been a political necessity for the government. From the beginning of its days in power, the present government has arduously cultivated an image of a `caretaker' or `steward' for the masses. Starting with the resounding success of Operation Bargha—through which landless and marginal farmers throughout the State were given secure title over land—each major policy initiative was designed to give poor people resources they did not have to *earn* or *fight for*. In the process, the government and the Communist Party were able to rapidly expand and consolidate their mass allegiance.

The Motivations of the Grassroots Political Leader

The transactional nature of the interplay between political support-seeking and subsidy allocation was nowhere in fuller play than at the level of the Panchayat Samitis and Gram Panchayats. Emerging grassroots leaders seem to pursue a dual objective function: first, recognition, approval and support by the 'Party,' and second, the capacity to attract and sustain the allegiance of the masses. Young party workers understand both these sides of the coin very well; all leaders—at least among those harboring political ambitions—try to attract mass support in their respective domains to the best of their ability, waiting for a time when their talents would be noticed by the Party's senior leaders. According to many analysts, it is at the hands of such Party upstarts that

some of the most constructive mobilization and organizational work get done by the Communist Party cadre. Because they have to start from scratch, these leadership-aspirants have to find genuine people's causes to espouse; and since they have no resources to work with, they have to push their effort and imagination to the limit in doing something worthwhile for the people that will earn them popular accolade and allegiance.

A young worker identified to be have probable possession of such capacity is given the first break in some position such as membership of the school board.[58] In this new position of moderate authority, the objective function of the leader remains the same: of expanding and consolidating mass allegiance to himself and the Party; and of winning recognition and support within the Party. However, s/he has somewhat diversified means to pursue these objectives because of some power of patronage, such as in recruitment of teachers and peons. In this role, the party functionary ends up dividing his time between 'party work' and the constructive mobilization and organizational work he was doing earlier.

From now on, the time and energy left with a middling local Party leader for constructive work tend to be inversely proportional to the success he has in winning recognition and support in the Party. If he is successful, he rapidly gets drafted into the Party political machine and in local governance structures. The most likely trajectory for a high-flyer is *Adhyaksha*-ship of the Gram Panchayat, to start with, or the membership of the Panchayat Samiti. Once in these tracks, the leader has considerably more diversified resources for consolidating his mass base. Moreover, once in this slot, recognition within the Party tends to get linked directly with general Party perception about his mass base. As a result, the leader devotes more and more of his time and energies to enlarging and strengthening popular allegiance to himself and the Party. However, in this slot, he has hardly any time to pursue a truly constructive development agenda. Instead, he builds and sustains his political base, essentially through the preferential allocation of development resources.

Subsidies are thus closely associated by local people with Panchayat politics and an indulgent government. Over several rounds of subsidized development programs, the post- Operation Bargha, the *Sarkar mai-baap* (government as provider) syndrome has got deeply entrenched in the popular psyche. At the lowest levels, political rivals are expected to win support and allegiance through maximization of free resources made available to the domain's collectivity; and the aspiring leaders of the ruling party are happy with this arrangement because their being in power at the level of the State, district, block and village levels places them in a strongly advantageous position to play the patronage card. The leadership at the State level is happy too because its mass base depends upon an agile grassroots cadre that feels actively involved in mediating development programs.

If this is a broadly accurate description of the driving force of Panchayat leaders, several hypotheses can be formulated about the way the political calculus works in North Bengal:

[58]Well, this is not all that innocuous a position; in point of fact, school board membership in rural West Bengal is a rather powerful position since the entire class of primary schools is controlled and run by the school board. This board membership also provides some opportunity for patronage since recruitment and posting of primary teachers are the responsibility of this board.

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? Since the quantity that a Panchayat leader has to maxime is the *number* of people who can be benefited through him, from a given entitlement of subsidy resources, he would prefer schemes/technologies such as treadle pumps (Rs 150/family) that help him reach out to large number rather than a hand pump (Rs 3,000/family) or STW/PDW (Rs 5–7,000/family) or RLI/ DTWs (Rs 25,000/family) that are quite expensive ways of winning mass allegiance; if this were true, treadle pumps will always remain under danger of a subsidy imposed by the Panchayat leaders.

? People give allegiance to a leader in proportion to the improvement in their well-being that political patronage causes; thus an RLI that remains defunct yields the Panchayat leader less political allegiance than one that functions well, even if both were fully subsidized;

If this were true, the leader should be concerned not only with `winning' a scheme for his village/block but also in its beneficial operation and its 'intrinsic value' to the recipients; on the other hand, if allegiance were given just for getting schemes, local leaders would not worry too much about the quality of functioning of the schemes.[59]

We tried to test this logic with a variety of people with whom we came in contact in the course of our field work; and as usual, there was some evidence that supported this logic; and a lot more that suggested things to be more complex and nonlinear. Many well-informed small farmers agreed that an average rural voter is indeed strongly driven to a local leader's capacity to bring government schemes and resources—and the general inclination for public works—in choosing a candidate to support in a Panchayat Samiti election.[60] Discussions with farmers also highlighted the singularly heightened manifestation here of the 'winner-take-all' nature of the political spoils system. Regardless of where in India, the ruling party tends to enjoy critical advantages in reinforcing and enlarging their support base through their control over resources; however, how well a party is able to press this advantage depends critically upon the quality of its organization and its grassroots presence. The CPM's strong grassroots cadre has emerged as its great strength in this respect. At all levels, the main concern of the party cadre has been to obtain developmental resources and direct them with the singular purpose of strengthening and enlarging mass allegiance of the people to themselves and the Party. In the process, a good deal of the mass support that has been built is probably based less on ideology or programs than on the politics of patronage.

Local Panchayat leaders we talked to also readily affirmed our key hypothesis that a local political aspirant has a `two-axes' objective function: he has to cultivate a good image with the

[59]Stretching this logic further, if allegiance were the function of the intrinsic value of patronage, then, there should be evidence about Panchayat leaders taking actions to ensure smooth and efficient operation of, for instance, group irrigation schemes; and if they are 'smart,' we should find them arguing for some form of operational contract that uses or mimics market processes rather than to favor slow, wasteful collective action or bureaucratic management;

[60]In the present conditions with CPM control over administration, people would prefer that their chosen candidate belongs to the ruling coalition; but the voters in his constituency threw out a CPM sitting candidate—who proved good-for-nothing—in favor of a Revolutionary Socialist Party candidate who has transparent sincerity but is still unable to do much because the CPM-dominated ruling coalition is ruthless in selectively directing all schemes and resources to its members and supporters.

party superiors[61] and also win the support of the masses; and that his supporters expected him to mobilize resources under development programs, get them for his constituency, and selectively allocate them to his present and potential supporters.[62] However, some also raised a question about our other hypothesis—that Panchayat leaders would prefer low-cost assets like treadle pumps to reach large numbers; from these discussions, it seemed that the motivations—or, rather, the methods—of the political leader are more complex; not all supporters are of equal importance; some `fixers' who command mini vote banks are more important and need to be propitiated with more valuable largesses—such as PDWs or mini-RLIs—than ordinary supporters who will be happy with a treadle pump or a shared STW. Thus the `mass' whose allegiance is sought is not homogenous but is organized in a stratified hierarchy.

While the politically active and articulate amongst the rural folk strike opportunistic alliances with local big-wigs for a share of the spoils, we met numerous small and marginal farmers who were politically naïve and uninvolved, found the Panchayat institutions blatantly partisan and experienced deep anguish and frustration. A good spokesman for this class was Dinesh Rai, an angry, young ex-serviceman with 14 bighas of mostly unirrigated and partly manually irrigated land, and highly embittered about the partisan approach of the Panchayat authorities. As an SC farmer, he would normally be entitled to diesel pump subsidy; but Ray was certain he could not get it and never tried it. No one he knew of who had got it yet; and even if it were really available, he asserted, it would first go to the party members and their associates before the benefit trickled down to the nonpolitical ones like himself. According to him, to get access to government programs in rural Bengal it is not enough to be just eligible; it is critical to be a political animal.

Internal Contradictions?

Thus, while we did find a good deal of evidence in favor of West Bengal's highly acclaimed Panchayati Raj system, a curious internal paradox seemed built into the system as it has evolved under the present government policies over two decades. The argument—that the Communist Party's strong grassroots presence through its cadres has given distinctive vigor and substance to institutions of local governance—seemed validated through all our interaction with common people, Panchayat leaders and social analysts. The claim that West Bengal's Panchayat system has a far larger presence and salience in the rural socioeconomic scene than in most other States does not need to be belabored. However, hidden somewhere in the success of the institution might

[61]When we asked when does he expect to become the Sabha Pati, he sheepishly said: 'That is for the party to decide... what can I say in the matter… we party workers just do our bit... and ultimately the party decides whom to nominate for the Panchayat Samiti…' Another local party leader later explained to me that at the level of the Sabhapati, the party leadership has to take many considerations into account besides the grassroots work, mass base and organizational skills of the candidate; the person must have some education; he should be capable of leading the Panchayat Samiti, etc. So even if there may be local leaders with strong mass support, the party may select relatively lightweight leaders for such positions.

[62]See the context on pp. 47-48, which states that Ray won by a margin of 350 votes in the last election and since then, has been able to get 30-40 STWs installed in his 'booths' and is trying to get a road extended and a college for Moynaguri.

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lie important threats to its future success; and the most likely of these threats might be the inherent propensity of the grassroots political leaders to use development programs and resources to expand and sustain their mass base through the patronage mill. This is likely to create a `winner-take-all' situation in which a party in power can keep progressively expanding its mass base at the expense of other parties ending up in a single-party dominance of governance institutions, and weaken the political competition that would pressurize the cadres to perform. Thus, in an informal discussion, a young political scientist argued that the existing Panchayat system accompanied by the Communist Party's strong grassroots base has very nearly annihilated all other parties and virtually emasculated the plurality and `political competition.' According to him, the seeds of the decay of the present system may well be contained in the present situation of virtually uncontested control of the ruling party over grassroots institutions; as a result of this situation and the massive scale of resources and development schemes, the Panchayati Raj institutions and development programs are used by the ruling party cadres to further entrench and congeal their power base at the local level.[63]

Another observer disagreed with the assertion that the ruling elite had a built-in propensity to use development programs and resources in a partisan manner to consolidate and expand their power base,[64] and questioned the empirical and conceptual bases of such an assertion. He did not agree that Panchayat leadership in North Bengal acts in a partisan manner; second, he agreed even less that other decision makers—such as administrators—are less partisan or judgmental or inspired. He also argued that people have their own ways of culling out the riffraff from the political arena and therefore only those who are known to have a basic sense of fairness tend to rise to the fore and dominate the political platform.

One problem was in reconciling this belief with the vehemence with which the poor, whom we had interviewed in village after village, criticized the Panchayats and their leaders not for being *inept* or *corrupt* but for being *partisan* and selective in favoring people for winning or retaining political support.[65] To this, one plausible response was that as long as the Panchayat leaders are not supporting the unworthy, it is difficult to fault them for being selective towards their political

[63]Having been a congressman earlier, Debu's antipathy towards the Left Front was understandable; but his analysis seemed plausible. However, even so, it is useful to bear in mind that congress or any other party would have fallen prey to the same propensity under similar circumstances. After all, such are the rules of politics; when you are in power, no one can fault you for wanting to secure, strengthen and perpetuate your power. And CPM is doing it well because it has a strong grassroots presence; congress in many states was not able to do it because it has allowed its local organization to virtually disintegrate during the past three decades.

[64]Sinha sounded sympathetic to many aspects of left front policies, especially, with the way powerful Panchayat institutions have emerged under its reign, the constant pressure on the administration to be more people-friendly, and the subordination of the local bureaucracy to elected leadership. So, I told Mr Sinha I was not being evaluatory or critical about the Left Front but merely setting out a hypothesis about political behaviour which would apply to any formation in similar circumstances.

[65]I described to him the repeated PRA inputs from the resource poor who said that Gram Panchayat diesel pumps were seldom available to anyone outside the group of Panchayat members and their cronies. We also told them about our interview with Karuna Gobinda Ray in Dakshin Saptiwadi; and our repeated encounters with local political activists whose loyalties were shaped less by ideological leanings than by expected gains from opportunistic alliances.

supporters; that was because people are habitually inclined to accuse those in power of corruption and partisan decisions. If, instead of political leaders, the administrators took the same allocative decisions, they too would be criticized similarly.

Our sense however was that people—at least those we talked to in the villages—did *expect* the Panchayat politicians to behave in a partisan manner but *hoped* that they would not; on the other hand, people expect bureaucrats to be *arbitrary* or *corrupt* but not *partisan* in a political sense. So if an administrator decided to favor a poor farmer who is also a 'party member,' other poor people who are left out are not likely to perceive partisan behavior as they would when they know that the decisions are being taken by 'party leaders.'

Our problem was also the ruling elite's apparent lack of sensitivity to popular perceptions of partisan behavior and the angst expressed so vehemently by the excluded poor. Being so close to the grassroots, one would expect the Panchayat leaders' antennae to capture such sentiments and reshape their behavior accordingly; but this did not seem to be happening. And what is politics if not the art of managing the *perceptions* of the people? One explanation was in terms of opportunistic political behavior; politicians believe that people will offer them their allegiance if they selectively direct 'goodies' to them; those who are established supporters will feel vindicated in having reposed their faith in the right man and the party; new supporters will find enough empirical evidence to rationally decide to support them; and fear of God will be suitably instilled in those who are nonsupporters or opponents by their deliberate exclusion from the distribution of the goodies. If an average (or typical) political leader believed people to behave thus, he would then be impelled towards partisan behavior. However, if he believed that people were looking for *Ram Rajya*, for rule-of-law, for a fair system of governance, then he would strive to offer them what he thinks people demand from him. So one way of explaining partisan politician behavior is by suggesting that people expect politicians to be partisan.

One analyst offered an interesting inference of the dynamic of the Left Front politics: according to him, the CPM has always given much more importance to enlarging its grassroots presence rather than strengthening its power base at the higher levels. Until recently, it never took national politics seriously; and at the State level, West Bengal has an alliance of left parties but in the Panchayat system, each party is on her own. To the CPM, it has always been very critical to entrench and expand its power and mass base at the district level and below. So today, all the Jilla Parishads of the State are run by CPM *Sabhadhipatis*. In its long term political strategy, thus, the CPM is very different from the Congress. The BJP is the only other party that gives grassroots politics the same level of importance.

However, according to him, major changes have been occurring with the Panchayat politics and the internal dynamic of the Communist Party. Some 20 years ago, in the CPM, some of the most sagacious and powerful district-level leaders would not be nominated for posts of MP or MLA or even *Sabhadhipati* in the Jilla Parishad; they would be appointed the Secretary to the district-level party committee. The strategy was to concentrate real power in the party functionaries; and distribute the trappings of office to the loyal but less sagacious. With the growing power and resourcefulness of the Panchayat system, however, the *Sabhadhipati*'s, *Sabhapati*'s and *Pradhans* have begun to attract all types of rewards: they have power to give away doles; the *Sabhadhipati* has the rank of a Minister of State; `even *Sabhapati* of the Panchayat Samiti (at the block level) moves around in a chauffeur- driven car with beacon lights;'

they have far greater visibility; everyone who wants anything done has to seek their indulgence. In contrast, the Party Secretary's post has been singularly devoid of glamor, status, reward or recognition. He cannot even be introduced as the Party Secretary in a public forum. True, he still has the ultimate power; but some of the most competent and ambitious leaders are getting attracted to Panchayat positions; and the party management is gradually on the decline. The erosion of this intricate balance between the party and the government is a major potential source of atrophy in the CPM. The ambitious leader has found great scope for activism in the empowered Panchayat system of West Bengal; and in pursuing this activism, he has gone overboard, so much so that the Panchayat has become *the* administration; the Panchayat leader has usurped the role of the administrator. As a consequence, rather than providing a system of responsive local government, what the CPM has ended up offering is a representative development administration, which is responsive to popular aspirations but at the same time is also subject to the demands of partisan politics. This, then, is the source of propensity towards partisan dispensation of development programs and resources.

In sum then, the larger dimension of North Bengal's MI policy cannot be understood—far less assessed—without exploring the internal dynamic of the region's Panchayati Raj institutions and the political canvas in which they are embedded. In the course of our earlier discussions, we noted that it is difficult to find any other Indian State where government administration and the Panchayat system are as active and dominant in the MI scene as in North Bengal. Nowhere else is the direct participation of these agencies in establishing irrigation schemes, financing them, running them, governing them as striking as in North Bengal. Nowhere do we find such a great plurality of small-scale irrigation technologies and institutions as in North Bengal. And nowhere is MI policy as closely mixed up with grassroots politics as here. And all these can be attributed to the present dynamic of the region's Panchayati Raj institutions.

Equally, no other region as well-endowed with water resources has been as slow and ineffectual in transforming them into an agrarian economic revolution. In large part, this is explained by an MI policy that a) has been mindlessly obsessed with governmental or community-control and management; b) has placed far greater weightage on constructing water points than on expanding the overall size of the pump capital—which is the binding constraint on MI expansion in the region; c) has continued to support and expand the large, bureaucratically managed stock of big DTWs and RLIs long after other States gave these up as wasteful, unviable and inequitable; d) has completely overlooked and wasted the potential for `efficient' irrigation expansion offered by privately owned pumps and pump irrigation markets; d) has focused much more on `backward linkages' and done little to strengthen `forward linkages;' and e) has encouraged a *Sarkar Mai-Baap* (Government as the Provider) culture that has paralyzed farmer initiative and participation to ensure proper management and upkeep of government-supported MI establishment.

VII. Policy Questions and Concluding Observations

The original objective of the NBTDP in commissioning this study was to analyze the subsidies provided under the Project to MI schemes, to explore their rationale and impacts and to

recommend a more rational subsidy regime and elucidate the logic supporting it. This objective could have been served through a tighter study with a narrower focus. Instead, we have undertaken a bigger exercise: besides analyzing subsidies *per se,* we have also attempted a broader socioeconomic analysis of MI investments in North Bengal to evolve a broad-based policy assessment of MI policy environment in North Bengal. The reasons for this overkill are several: first, a broader assessment of overall MI policy in North Bengal appeared interesting and useful in its own right; second, there are important parallels to be drawn with the experience of other regions in developing a fuller understanding of what can and needs to be done in the region; finally, and most importantly, analyzing MI subsidy policies in the region on purely micro-economic grounds would have proven trite and meaningless because of the larger questions of political economy involved. So, in these concluding remarks, we consider some of the specific questions posed to us against this larger backdrop of North Bengal's MI political economy.

We are confronted with three distinct sets of questions regarding the subsidy aspects of the NBTDP: *first,* about whether there is justification and rationale for MI subsidies in North Bengal; *second,* about whether the NBTDP's current subsidy policy achieves the Project's MI objectives in an efficient, sustainable and livelihood intensive manner; and *third,* if there is scope for modifying the current policies for better impact. In the remainder of this, we deal with these important but difficult questions as best as we can.

(A) Justification and Rationale for Subsidies

An important basic set of questions that needs to be tackled at the outset is: Are MI subsidies necessary in North Bengal? What could be an appropriate rationale for designing subsidies? On what grounds can they be justified?

Environmental Grounds

In pure micro-economic theory, subsidies are called for in situations where the presence of public goods or common property externalities creates a divergence between private and social costs. Subsidies are used in such a situation to encourage private economic agents to do more of something that is desirable from the social viewpoint. In this sense, subsidies to groundwater irrigation would be justified only in areas, which suffer from flooding and waterlogging conditions. Here, pumping of groundwater by private economic agents creates a positive externality by reducing the intensity and length of post-monsoonal flooding. And the reduction of social loss of production and income due to flooding would be reduced by private economic action. Since private pumpers have no interest in pumping to mitigate flooding, on their own they would tend to pump less than is socially desirable to reduce flooding; so it makes sense for public agencies to stimulate private pumping of groundwater through subsidies to pumpers. Else, public authority would have to undertake direct action to pump groundwater as under the SCARP program in Pakistan and Satluj Yamuna canal in Northern India where government-operated pumps were installed specifically to mitigate waterlogging in the canal commands.

Many parts of North Bengal—and of Eastern Uttar Pradesh and North Bihar—especially those with low-lying areas in these regions, face the problem of flooding and waterlogging for months during and after the monsoon. These conditions result in multiple economic losses and

other problems. Flooding of low-lying lands implies that their owners cannot grow crops for nearly half the year; owners of low-lying lands can grow crops only towards the end of rabi and during summer when their fields are dry and the groundwater table has receded beyond the root zone of crops. Then, flooding of villages with stagnant water creates major health hazards. Many villages get cut off from market towns, making communication and transport difficult and costly. Villages near rivers often need huge and costly embankments as flood protection structures. In all these regions, the social dis-benefit caused by waterlogging and flooding would substantially decrease if the post-monsoonal groundwater tables were pulled down by a few feet compared to their present levels. And this could happen through escalation of private pumping. In the absence of private pumping, the task of maintaining the groundwater tables at an environmentally 'safe' level would need to be performed by public agencies using public resources. On this ground, then, there is strong justification for *selective* subsidization of private MI.

Selective because overdoing it—or doing it indiscriminately—might create new, negative externalities. In the water table aquifers as in North Bengal, lowering the water tables would create positive externalities for low-lying areas but negative externalities in up-lying areas where farmers will face increased pumping depths and costs. Lowering the water table down too much might make it costly or impossible for a large number of farmers using traditional and modern manual or animal-driven irrigation devices that become useless or impractical beyond a certain depth. For instance, treadle pumps are not practical beyond the water table depth of 20–25 feet; traditional *taar-balti* technology—widely used by resource- poor farmers would become infeasible when the uppermost aquifers become emptied. The seriousness of the productivity and equity impacts of these negative externalities will, over time, decline as farmers take to mechanical devices in increasing numbers; but until then, a balance has to be struck between positive and negative externalities of groundwater development.

Figure 1. Pumps per 100 ha m of groundwater resource.

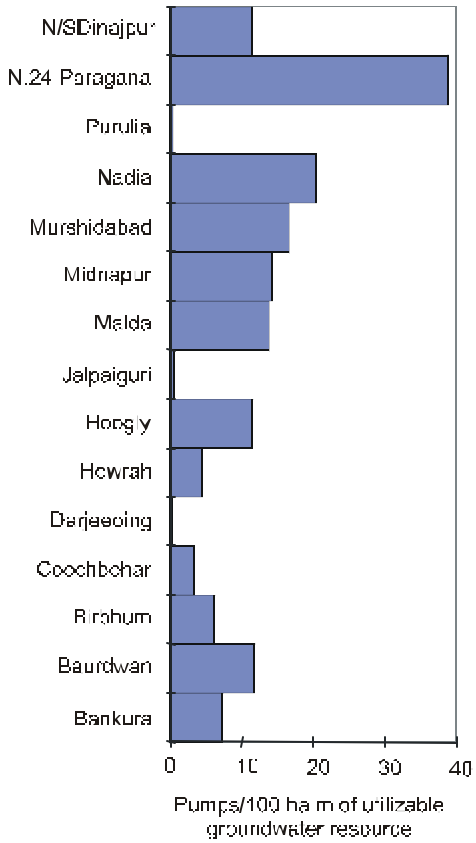
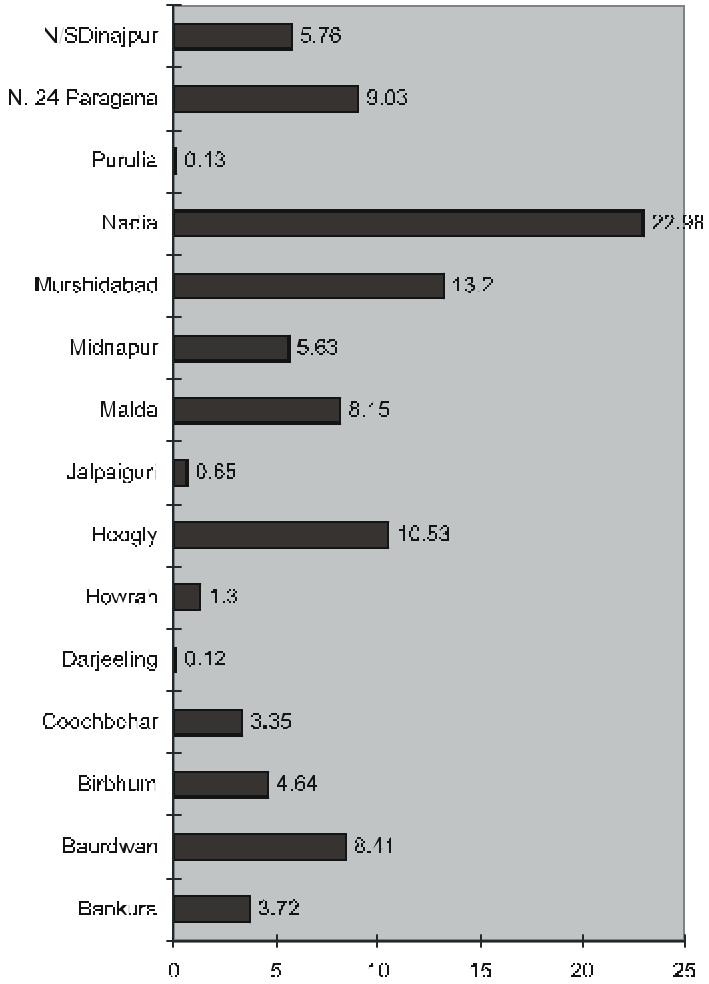


Figure 2. Pumps per 1,000 ha of net sown area.



In sum, then, MI subsidies are justified in North Bengal even on purely micro-economic grounds. However, the grounds on which the present subsidy policy is based have little to do with the divergence between private and social costs; they are based more on the understanding of the powerful role that MI development can play in facilitating rapid agricultural development and expanding livelihood and employment opportunities for the rural poor. This understanding has been repeatedly—and amply—validated by the experience of many regions in India and other South Asian countries, especially Bangladesh, which has an aquatic and socioeconomic environment very similar to North Bengal's. Within India, the most recent cases of agrarian revolution based on groundwater-irrigation have been Eastern Uttar Pradesh and North Bihar; earlier, however, the rapid rise in agricultural productivity in Western UP and Haryana too has been attributed to the tube-well revolution that preceded the Green Revolution in these areas (Dhawan 1982). Even in semiarid Gujarat in Western India and Tamil Nadu in the south, MI explains a large part of the agrarian dynamism and rural livelihood growth.

North Bengal has been amongst the last and the slowest in capturing the livelihood-development potential offered by MI. It is therefore not surprising that development planners in the region are keen to expedite the development of the sector; all the more so because they do not have to worry unduly about the deleterious environmental impact of groundwater development that soon followed the tube-well revolution in States like Gujarat, Tamilnadu and Haryana. North Bengal is far more generously endowed with groundwater; it has so numerous and plentiful recharge sources that the region can easily sustain a several-fold increase in its present groundwater use without any environmental threat; what is more, even though it uses less than 10 percent of its utilizable groundwater potential, North Bengal already supports large areas under irrigation-intensive paddy cultivation. So MI development is not likely to multiply groundwater extraction by a factor as large as has been the case in areas that moved from purely rain-fed to irrigated farming; here, MI is likely to create agrarian wealth more through crop-diversification, through increased yields of already irrigated crops, more intensive use of inputs such as fertilizer, farmyard manure and labor—all encouraged by greater control enjoyed by farmers over the timing and quantum of water application.

Rural Poverty and Capital Scarcity

In many areas of India—such as, for instance, Gujarat, Maharashtra, Western Uttar Pradesh, Punjab and Tamilnadu—where groundwater irrigation through modern pump- and tube- well technology caught the fancy of farmers during the 1960s and 70s, most of the development took place at private initiative using private capital. For a long time, governments at the State as well as central levels had no policy on groundwater; there was little government support to or regulation of private MI development. However, in retrospect, it is evident that MI development at private initiative has powerful and well-defined spatial and social biases: in all the States mentioned above, mounting evidence suggests that capital formation in MI occurred in agriculturally dynamic areas and fuelled their dynamism even further; tribal areas in Gujarat, for instance, lagged behind central and north Gujarat by over 20–25 years in making their MI investment; even within a village, the scale-bias of MI technology is repeatedly established. In general, regions with a history of enterprise and multiple sources of capital accumulation have tended to build up machine capital fast; in contrast, regions with inward-looking cultures, absence of entrepreneurial tradition, and low capital accumulation occurring in a primitive format through agrarian production systems tend to be low on their machine capital base and have tended to be slow to take to the MI revolution. North Bengal appears a classic example of the latter type of regions. Its large Rajbangsi population is a community of first-generation settled farmers with little or not tradition of enterprise and capital accumulation and with a primitive outlook towards modern technology. Its postage-stamp sized landholdings, dependence on traditional technology, and weak input and output marketing institutions have provided the sure-fire formula for machine capital scarcity. It is understandable, then, that little MI development has taken place at private initiative with private capital; and left to private initiative and capital, chances are that it will take several decades before North Bengal achieves the same level of MI development as, for example, Medinapur or Nadia Districts. This then is another ground for infusion of external capital through subsidies.

Productivity and Livelihood Impacts

One of the key conclusions of our field research has been that scarcity of mechanical pump capital is the primary bottleneck on North Bengal's Green Revolution. This was evident in the extremely low pump density we found in most areas we visited; this was also evident the from the 1987 MI census. The vast transformation of the region's agriculture through expansion of pump capital becomes clear when one compares areas such as Kalchini, Raiganj, Falakata with Dhupguri, Moynaguri and Dinhata in Cooch-behar. In the former areas, we still find the predominance of traditional varieties, dependence on aman paddy, low fertilizer use, wide use of *taar-balti* irrigation, and ill-developed pump- irrigation markets; in the latter, we find the full battery of Green Revolution symptoms—such as high fertilizer use, mechanical irrigation, adoption of high-yielding varieties, production for the market, intensive land use and vibrant pump- irrigation markets. Our judgement is that the transformation of agriculture is an 8–10 year process during which a lot of changes can occur besides irrigation methods; there is an all-round increase in mechanical capital including power tillers, powered threshers, tractors and diesel pumps; there is a faster growth of input and output marketing institutions; there are changes in the cropping patterns and land use intensities. However, the shift to modern groundwater irrigation is, in our view the catalytic agent that unleashes this transformation.

The high productivity of pump irrigation is revealed by the transactions in the pump- irrigation markets. Where private diesel pumps abound, small farmers commonly rent these at Rs 40–45/hour; irrigating an acre of potato takes 25–30 hours and of boro rice 45–50 hours (in low-lying areas); this implies that buyers of pump irrigation are willing to spend up to Rs 1,000–1,200/acre to pump-irrigate potato and up to Rs 2,000/acre to pump-irrigate boro rice. They would not be willing to spend so much unless pump-irrigation productivity is high. Regrettably, in many parts of the region, the density of diesel pumps is so low that it cannot even support pump-irrigation markets.[66]

To give a big kick-start to groundwater-based agricultural transformation in North Bengal, thus, what is needed is to sprinkle the region with some100,000 diesel pumps. These may cost all of Rs 150 crores; however, this needs to be stimulated through a part-subsidy loan program since, left to themselves, the resource-poor farmers of the region may not be able to mobilize investible capital of this size for a long time. The point is that, 5 years down the line, the Rs 150 crores spent to day in augmenting the region's pump capital will produce production and livelihood impacts that may well pay for the investment several times over, and every year.

[66]Many demand side factors however reduce immediate profitablity of MI investments in hinterland areas. Weak irrigation-demand conditions, excessive public-policy emphasis on backward linkages in contrast to forward linkages, underdeveloped output marketing institutions, and low levels of farmer enterprise—all these exogenous factors influence the actual economic returns generated by MI investments; given these, the financial and economic performance of MI investments tend, in general, to decline as we move from small to large, from individual or small groups to large groups of beneficiaries, and as the MI technology chosen for project support becomes progressively *unlike* the technologies that farmers in the region choose when using their own resources. Financial and economic performance of MI investments are also critically influenced by the design and performance of the organizational arrangements for the management of irrigation assets; in overall terms, there is great scope for overall improvement in this department through better organizational design and process work.

Box 21
Irrigation Impact on Crop Production and Farm Income:
Dakshin Mathabdanga DTW and Pathanerdanga RLI

	DTW		RLI		Average Yield Impact (kg/acre)	Prices (Rs/mound)	Irrigation Value Product (Rs/acre)	Median Irrigation Value Product (Rs/acre)
	before	after	before	after				
Wheat	510	678	456	754	233	100–150	580–870	730
Jute	532	498	398	780	191*	150–600	710–2850	1,90
Brinjal	3,00	4,00	2,80	5,10	1,65	50–100	2,50–4900	3,80
Aman paddy	675	766	452	823	186	100–150	460–690	580
Early aus	-	1,00	382	618	236	100–150	590–885	737
Tobacco	400	446	410	412	24	300–400	180–240	210
Potato	6,00	8,40	2,40	6,24	2,62	50–80	3,50–7525	4,85
Chili		9,00	1,20	3,20	1,00	50–70	2,50–3150	2,00
Gourd		1,20			1,20	160–230		
Mustard		320		320	320	250–450		
Lentil				376	376	300–400		
Sesam				380	380	350–500		

Benevolent Development Politics

Finally, as we noted, West Bengal's grassroots politics is far more strongly development- oriented than in many other States where the Panchayati Raj institutions are not as strong and well-entrenched as here. The principal weapon that political leaders have to strengthen their mass base is the resources available under various development programs. Unlike elsewhere, local political careers are made or marred by the effectiveness with which grassroots politicians are able to claim and channel resources with maximal beneficial impact on their supporters. In many other States, such resources tend to get channeled to programs that have little or no livelihood impacts. However, since West Bengal politics invests considerable power and influence in its local politicians who are close to the scene of action, the bulk of the resources has been channeled into MI projects, which *have* great potential for livelihood impacts. It is therefore plausible to argue that the resources used to subsidize MI investment have low opportunity costs because, if not MI, they will be used to subsidize some other developmental activity, which may have lower potential to generate livelihoods and incomes; and that a) substantial resources are available to a region from various sources depending upon its level of underdevelopment and poverty; b) in the absence of a `demand pull,' a good deal of these resources may end up being allocated to activities/projects with doubtful livelihood impact; and c) if the grassroots political leaders perceive

MI to be a livelihood-intensive sector in a region like North Bengal, based on demands made upon them by their vote banks, and if they successfully channel these to this sector, they are doing a great service to the poor people because in the absence of their demand pull, these resources would have been spent as subsidies in non-livelihood-intensive activities/programs.

In sum, then, subsidization of MI investment in North Bengal seems justified on four grounds: a) enhanced withdrawal of groundwater and moderate lowering of the groundwater tables might create positive externality in low-lying and flood-prone areas; b) North Bengal has a huge unutilized groundwater potential; the region has been amongst the slowest in the country to translate this resource into livelihoods for the resource poor; and if it succeeds in doing this, there is unlikely to be any adverse environmental impact; c) the region is so poor and devoid of an entrepreneurial tradition that left to individual initiative and private capital, its Green Revolution will for long be held back by scarcity of pump capital; d) the production and livelihood impact that infusion of pump capital can generate is likely to be large compared to the investment needed to expand pump capital to requisite scale although the resource-poor farmers on their own may not be able to mobilize so much capital except over a long period of time; and, finally, e) if development resources available are not used to subsidize MI capital, it is likely to get used to subsidize other activities, which may have far lower livelihood potential.

(B) Assessment of the NBTDP's MI Subsidy Policy

The second class of questions we need to address is about the appropriateness and impacts of the current subsidy policy: Is the existing design of the NBTDP subsidy policy appropriate, especially from the viewpoint of the resource-poor farmers' investment and repayment capacity? Do the current subsidy arrangement influence the choice of farmers? Is the targeting of the subsidized schemes right? Does the subsidy policy also affect the choice of irrigation technology by farmers and government decision makers? Then, does the subsidy policy result in efficient delivery of irrigation systems? Finally, is the subsidy policy realistic in its assessment of the organizational preconditions necessary for their efficient and viable operation?

This are involved and complex questions that have driven the core of this study; and in tackling these, the methodology we have used has been eclectic, using all the resources available—including, of course, the substantial and excellent literature the NBTDP itself has helped create on the subject over the past decade—besides using the learning and insights derived from the author's own fieldwork and PRAs we have used to test central conclusions of this study. Tentative responses to some of these questions are scattered all over the earlier sections; here, we will attempt to pool together some of these to evolve as coherent a response as possible to the questions raised in this class.

We have already reviewed the NBTDP MI subsidy structure: until the Project discontinued support to them, DTWs and RLIs—the big MI structures—got away with 100 percent subsidy on capital cost *and* around 80–90 percent subsidy on full cost of O&M; in Mini RLIs and MDTWs—the scaled-down versions of RLIs and DTWs—get 100 percent subsidy on capital cost but no subsidy on O&M; STW and PDW clusters get 75 percent subsidy on capital cost and none on O&M cost; HTWs get 90 percent subsidy on capital cost and none on O&M; and treadle pumps get no direct subsidy, on capital cost or on O&M cost. In addition, the soil-cement distribution

structures on 4-ha plots were eligible for 50 percent subsidy; but this project has been dropped. There is also no project subsidy on the fuel- saving device developed and promoted by the Project. Some aspects that we found striking in the course of our fieldwork—and which we have already discussed in the main report—can be summarized as follows:

Major RLIs and DTWs

The NBTDP decision to discontinue support to mega DTW and RLIs is very well justified; all the information we could find—our direct field experience as well as the data furnished by the administration suggests that these schemes do not—and, in all likelihood, cannot, in North Bengal's present conditions—become viable, efficient and sustainable method of expanding poor people's access to groundwater irrigation; experience throughout South Asia has repeatedly shown that: a) they are technologically too complex and awesome for small farmers to handle; b) the assumptions made at the time of their planning and design are unrealistic and rarely hold once the scheme is commissioned; c) their management by public agencies through bureaucratic structures is invariably bewitched by operator-absenteeism, long shut-down periods, delayed repair and poor maintenance, fuel or power supply problems, all of these resulting in the actual area commanded being a small fraction of design command; d) they can become viable and equitable only under an extremely tight management regime that necessitates a high-calibre user organization rarely found outside areas (such as North Gujarat) where there is no alternative to deep tube well technology; e) even after providing 100 percent capital cost subsidy and over 70–80 percent O&M subsidy, if these schemes help transform their command areas into vibrant and booming agrarian economies, the subsidies provided can be justified; however, all available evidence indicates that the economic impacts of these schemes in their commands are far from commensurate with the public investments made in them; as a result, they are neither financially viable nor economically justifiable; f) as a consequence, the only logical course open to MI authorities with respect to major RLIs and DTWs is: stop constructing any more of such schemes, treat past investments in these as a sunk cost; and try to establish a program to turn over these schemes to farmers in their command areas[67] or auction them to whoever would buy them.

Mini-RLIs and MDTWs

[67]The most eloquent testimony to the unsustainablity of these systems is the reluctance of farmers in many command areas to take over their management even if they are given away free to them. This is the case in other States too; Gujarat has tried for 10 years to turn over its 3,500 public tube wells to farmer groups almost at giveaway—more recently, at zero—price; and there have been notakers for them. So now, the Gujarat government is hell-bent on getting them off its back even by selling them through auction to whoever would buy them at *any* price above zero. A major reason why farmer groups are unwilling to take them over is that they can never sell water at the government-subsidized rate and run the systems viably; and farmers used to the opiate of subsidized irrigation for years are unwilling to buy irrigation at market price even if the quality of subsidized irrigation they get under public management is so poor that it confines their farm enterprise at a permanently low-level equilibrium.

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The NBTDP subsidy support to mini-RLIs and MDTWs is likely to produce better outcomes than its support to major DTWs and RLIs in that: a) these schemes are smaller and somewhat simpler technologically[68], b) the scheme provides for their turnover to a BC as soon as they are commissioned,c) because of the fewer farmers in their command,it would be easier to build a user organization that can operate the scheme on a sustainable basis. The threats for the mini-RLI and MDTW program arise from: a) the ambiguity about the government order stipulating the turnover of the schemes to BCs, b) the process-intensive organization of users in the command of the mini-RLIs and MDTWs, c) the high capital cost per family as well as hectare covered by these schemes, and d) the unfamiliarity of the small farmer and local technicians with the buried pipeline distribution system, and the consequent difficulty they are likely to encounter in its maintenance and repair.

STW and PDW Clusters

From the techno-economic and organizational standpoint, we believe that the NBTDP subsidies are put to best use in STW and PDW cluster schemes; many aspects of this scheme fit farmer needs and constraints well; a group of four small farmers seems ideally suited to achieve a viable level of utilization of these systems; the requirement that they contribute 25 percent of the capital cost helps build solidarity among them and also oblige them to transparently decide the `rules-of-the-game' for O&M cost sharing at the outset; small farmer beneficiaries are fully familiar with the technology involved; they are comfortable about maintenance and repair using largely local resources and skills; all in all, then, STW and PDW cluster schemes are financially viable and economically rewarding. A few worrisome aspects of these schemes are: a) the allocation of budgets between PDWs and STWs, and the allocation of schemes to different areas tend to be somewhat arbitrary; b) the cost of the system tends to be significantly higher than what farmers themselves would incur if they were making their own capital investment; c) schemes fitted with electric pumps seem to run into a variety of problems because of the unreliability of power supply and the flat system of electricity tariffs; d) because these fit small farmers' needs well, naturally, there are pressures from farmers who would normally be ineligible to claim and get benefit of the scheme; e) there is a propensity amongst the better-off amongst the small farmers to form `dummy groups' to claim the subsidy but effectively privatize the scheme; f) however, the negative equity impacts of such oligarchic propensities are probably far less serious than one would think and we suggest a broad, holistic outlook towards these[69]; g) the problem of choice of beneficiaries is more serious vis-à-vis the partisan propensity of Panchayat institution decision

[68] They use 5 or 8-hp diesel pumps that farmers are familiar with; they also have a smaller and buried PVC pipeline network with fewer PVC spouts that are cheaper to fix or replace.

[69]Because of the following reasons: a) of critical importance is the need to increase pump density in a village regardless, largely, of who owns the pump; (b) a small farmer finds it very difficult to utilize a pump fully on his own land; so he is anyway under pressure to custom-hire it with others; (c) as a result, even if one of the four members pays the 25 percent contribution on behalf of all the four and claims individual ownership, chances are very high that he will have to encourage others to use it and share the maintenance and repair costs.

makers; it is very likely that most of the subsidies are directed towards politically active farmers to the exclusion of the politically passive; however, there is no easy resolution of this problem except by removing the rationing of subsidies or by letting the market clear the demand for and supply of subsidies.[70]

Treadle Pumps

The problem of choice of beneficiaries is simplest in case of treadle pumps because they enjoy no subsidy; as a result, there is no concern for misallocation in their case; however, even when they enjoyed a 50 percent subsidy during 1996, the problem of mis-targetting of treadle pump subsidies was probably never serious because of the self-selecting nature of the technology; it is of appeal only to the resource poor who have small parcels of land and are acutely short of capital; thus it is unlikely that treadle pump subsidies would have suffered mis-targetting; however, a recent small sample survey carried out by the International Development Enterprises expressly for this study showed that while farmers who purchased the treadle pump with subsidy and without subsidy were all small and resource poor, the former were worse-off compared to the latter on several counts. This is the only piece of concrete evidence to suggest that even such low-cost irrigation assets can have a price-elastic demand function. The treadle pump technology has already proven its techno-economic viability in Bangladesh where a million such pumps are in use; however, even in North Bengal, several sample surveys and field studies have shown the financial viability and economic benefits of the device for marginal farmers.

HTWs

Hand Pump Tube Wells (HTWs) are a case apart; they are promoted as a multipurpose device used for obtaining drinking water as well as for irrigating backyard vegetable gardens in homesteads; their target is primarily the resource poor women; as a result, rather large subsidies on HTWs (90% on a unit cost of Rs 3,500) are to be assessed not so much against their productivity and income impacts but against their contribution to health and sanitation and to gender equity. There are nevertheless cost-effectiveness issues here; in terms of water output. The performance of HTWs is as good as that of treadle pumps; however, they cost 5 times as much. The high cost of HTW is explained by the deeper bore (up to 100 feet or more) and the use of GI pipes, cast iron head and metal strainer.[71] it is justified on the grounds that HTWs, widely

[70]Political leaders have to be partisan in allocation of subsidies because available subsidy resources are not sufficient to cover all eligible poor; if subsidy resources for a given scheme were unlimited, there would be no need for them to be partisan. If subsidy resources are allocated through market-like processes, then the subsidy administrators would allocate subsidies to those beneficiaries who offer them highest rent (bribe); and if competition amongst administrators is strong and if subsidies to be doled out are large, then competition would drive the rents down to low levels so that the resource poor, regardless of their political affiliation, would be able to access the subsidies by paying small rents as has happened in Eastern Uttar Pradesh in recent years.

[71]As a result, the bore-well itself costs over Rs 2,500; in contrast, treadle pumps commonly use 15' bamboo for pipes as well as for strainer and MS sheet for the head and cost hardly anything.

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used for fetching drinking water need to tap deeper aquifers;[72] women are more comfortable with hand-operated pumps than foot-operated ones because with the former, they can hold a container in one hand while pumping with the other; finally, there is an implicit cultural bias against using foot-operated devices for fetching drinking water. Over the past decade of the NBTDP operation, thus stylized gender conventions have emerged around the two manual devices: HTWs are the women's pump for drinking water located near homesteads and used secondarily for irrigating vegetable gardens; in contrast, treadle pumps have emerged as a serious irrigation device used mostly on farms and driven mostly by men. Be that as it may, the HTW program needs some reexamination on cost-effectiveness grounds. If water quality in upper aquifers is good—or if there are other technical compulsions to use deeper bores with GI pipes and metal strainer—there seems no reason why HTWs should cost as much as they do now.

Box 23
Does Subsidy Reach the Poorest?
Results of a Special Survey for those who leased in.

	With subsity	Without subsity
Sample size	23	20
Amount Paid for the pump	190	375
Installation cost (mean)	136	187
Total cost	326	562
Average land owned (bigha)	3.93	4.46
# Who leased in land (& average bigha*)	6 (2.83)	0.0 (0.0)
# Who leased out land(& average bigha)	1 (3.0)	0.0 (0.0)
Number owning bicycle (%)	11 .48)	14 .70)
No. owning bullocks (av. no./owner)	21 (3)	20 (3)
No. who owned diesel pump	0.0	2
No who owned transistors	2	3
No. who owned spray pumps	2	1
No. (%) who are Rajbansis	20 (87 %)	15 (75)

Source: A quick survey done by IDE, North Bengal expressly for this study.

Overall, then, there is no gainsaying the need for intelligent subsidies in North Bengal's MI development. Even so, there are important issues in the design of subsidies; while some capital investment subsidy can be justified, it is difficult to justify large subsidies on operating costs as provided in major DTWs and RLIs; similarly, the rationale underlying different levels of subsidization for different MI schemes is far from clear, and the arrangement such as obtained at present might, in fact, be counterproductive; above all, the current scheme of subsidization might

[72]A number of tests have shown water in upper aquifers to face a higher risk of contamination and, in many areas, it is already unsuitable for human consumption.

support and encourage a culture of dependency and patronage on the part of the rural poor and stimulate a profligate, construction-oriented program of MI investment on the part of the administration, which is likely to be poor value for money from the viewpoint of the tax payer and donors as well as of the beneficiaries. Three broad apprehensions need to be noted.

Apprehension 1: Sarkar Mai-Baap Syndrome

A major apprehension with the use of subsidies is that they create dependency and stifle enterprise. A related concern is also about sustainability and endurance of the micro-level change that subsidies create. Ideally, a capital subsidy serving as a tonic or an elixir should help beneficiaries rise to a higher trajectory of operation where they will not only mobilize techno-managerial and financial resources to self-finance O&M but also make replacement investment when it becomes necessary. When a capital subsidy fails to induce such transition, it results in dependency. In the NBTDP, this apprehension is most evident in major DTWs and RLIs in which we found the *Sarkar Mai-Baap* syndrome deeply entrenched. The beneficiaries of a few of these whom we visited were blatantly unwilling to contribute to O&M—either through responsibility for management or through cost-sharing; even in defunct schemes, the beneficiaries were happy waiting for years before the government recommissioned the schemes rather than invest in new, superior irrigation alternatives.

The profligacy and myopia produced by the *Sarkar Mai-Baap* syndrome in MI promotion is quickly catching up with the *Sarkar*. As if taking a leaf from the NBTDP book, the newly announced Ganga Kalyan Yojana of the Government of India stipulates that 25 percent contribution must come from beneficiaries in all *Kalyan* schemes and there has to be a loan component. This has put the Zilla Parishads, Panchayat Samitis and Gram Panchayats in an awkward position; RLIs and DTWs, which so far went on a 100 percent subsidy basis, will now have to be redesigned, or better still, given up; in HTW too, beneficiary contribution will probably have to be increased. Panchayat Samiti, Dhupguri had the issues thrown up by the Ganga Kalyan Yojana to the people; the *Krishi Karmadhyaksha* discussed the new conditionality in an open meeting, appealing to them to adapt to the changing circumstances; but the *Praja* was in no mood to let go of the opiate of subsidies they have been addicted to over the past decades.

The experience with mini-RLIs in the current phase is too limited for us to make a judgement whether these will perform better on these counts.[73] Our judgement is that STW/PDW cluster schemes do not breed the dependency syndrome because they represent a widely used technology, they are organizationally simple and robust, and they generate large and early economic benefits; besides, the design of these schemes as one-shot subsidy support has helped moderate popular expectations. Treadle pumps, of course do not face this problem at all since it offers no subsidy; however, even with 50 percent subsidy last year, it had little to worry on this count because of its low cost and its large productivity benefit relative to its cost. The high HTW subsidy, however, may create dependency because few resource poor women might buy it in the

[73]The redeeming aspect of these, however, is that they will be handed over to beneficiaries as soon as commissioned; and there would be no subsidy on O&M costs. The scope these will offer for `dependency building' will therefore be limited.

absence of the subsidy. This might mean that the poorest beneficiaries might give up conked-out HTWs or expect the government to get them repaired rather than get them repaired with their own resources. However, evidence so far suggests these apprehensions to be unfounded; and that a high proportion of HTWs installed remains functional.

Apprehension 2: Subsidy-Induced 'Money Illusion'[74]

Another apprehension is about the bias that subsidies tend to introduce in the choices people make through the creation of a `money illusion' of sorts. In specific terms, the presence of subsidies makes government contractors feel that earning margins is easier in a subsidy regime than in the normal course of business; in MI, thus business would always put pressure on greater allocation of subsidies to construction components; they would prefer the schemes chosen to be capital-intensive and large since their margins lie in large schemes with high construction-intensity. Similarly, beneficiaries too would suffer from a `money-illusion' created by subsidies; if an asset is to be available free or at a vastly reduced price, the chances are that they will opt for a costlier option even if cheaper alternatives could serve the same need equally well. Thus, one reason why major RLIs and DTWs survived for long was probably that they were far more beneficial to contractors than treadle pumps, and because farmers are fascinated by complex buried pipeline networks as long as they do not have to spend on them. Similarly, many beneficiaries we met preferred the NBTDP to its costly GI pipe STWs although they would themselves build bamboo bores or use PVC strainers, which are nearly as productive but cost less than a fifth of the government STWs. Then, in many PRAs, farmers invariably showed a preference for buried pipeline networks or *`pucca'* soil-cement channels although none of the 250 poor and well-off farmers we interviewed had ever used anything other than *kuchcha* channels or over-land poly-pipes to convey water.[75] One might also suspect that both beneficiaries and contractors might resist cost-efficient improvements in HTWs without any loss of quality; beneficiaries will do so

[74] `Money Illusion' is illusion about one's wealth that is absent; people subject to money illusion tend to spend more money than they have. In the present context, it may mean that even if a consumer is indifferent between two products x and y, she may prefer x with a subsidy which makes x cheaper; if x is costlier than y, and if the consumer is indifferent between the two, she will buy; but if a subsidy makes x cost the same amount as y, she will tend to choose x; even if x remains costlier than y, she might choose x because of the `money illusion'. The reasons why people prefer hand tube wells so much compared to TP: (a) it fits their needs better than treadle pump; (b) it comes with a proper tube well with a metal suction pipe, and a metal pump; (c) it produces high level of money illusion; by chipping in Rs 300, a beneficiary family gets an article perceived to be worth Rs 3500; where as in the treadle pump, by forking out Rs 500, they get an article perceived to be worth Rs 500, never mind if the TP is equally or more useful in an intrinsic sense.

[75] In one PRA, we asked farmers whether they would accept a 100 percent subsidy on poly-pipes or 50 percent subsidy on soil-cement channel; the smart ones calculated and opted for latter option; but when we asked them to choose between a one-time 50 percent subsidy on soil cement channels versus 100 percent subsidy on 500 feet of poly-pipes every alternate year, they chose the latter. This suggested that farmers behaved `with opportunism bordering on guile' when it comes to choosing amongst alternatives in a subsidy regime; they do not necessarily choose the option that is suited best to their needs; but they try to maximize the subsidy receivable even if it involves forgoing an equally good but less expensive option.

because of the `subsidy-induced money illusion;' contractors will resist because it will mean reduced margins.

Apprehension 3: Partisan Selection Bias

Yet another apprehension is about the tendency of those in positions of power to allocate subsidies and select beneficiaries to favor their chosen groups. Equally, there is also pressure from the powerful and articulate to corner subsidy resources. From the larger social viewpoint, this tendency is probably harmless as long as those favored satisfy the eligibility criteria; however, if they result in selection of ineligible beneficiaries, the goal of the subsidy policy gets compromised. In our assessment, the NBTDP subsidies suffer least in terms of this bias; it is likely that the Panchayat leaders have influenced the beneficiary selection in favor of eligible families from their support base; however, there seems little mis-targetting of subsidies to farmers who are otherwise ineligible for subsidy support. In group schemes such as DTWs and RLI, it may be very difficult to find a command area exclusively of small and marginal farmers groups; as a result, inevitably, some medium and large farmers may end up benefiting from subsidy; however, in HTW and STW/PDW schemes, our assessment is that the subsidy has been targeted to small and marginal farmers. It is also our view that this has been achieved by close and continuing monitoring of the beneficiary selection process by the Project Support Unit of the NBTDP.

We would not undermine this achievement, especially since the track record of the administration and Panchayat institutions in targeting subsidies has not been all that good. In the main body of the report, we have documented substantial—if qualitative—evidence to show the frustration of the politically naïve among the resource poorest people with the partisan approach of the Panchayat leaders in the allocation of subsidies to the politically agile among the poor. The most widely referred was the case of Gram Panchayat-owned diesel pumps meant for renting to the poor; every farmer—among the 200-odd we talked to—knew that his Panchayat had pumps for renting; and none had ever been able to rent any because the pumps were monopolized by the Panchayat members and their cronies.

(C) Policy Conclusions and Recommendations

From a purely micro-economic analysis, subsidies can seldom be justified except perhaps in the presence of externalities; yet, development interventions everywhere use subsidies directly or indirectly suggesting that development planners are governed by a more pluralistic and complex set of considerations than by the logic of purely micro-economics. In development programing, subsidies seem justified, for instance, if: a) they help pioneer a new idea (such as the fuel-saving contraption of the NBTDP); b) they are `minimalist in nature'—that is, they unleash a large change by removing a minor constraint that keeps it bottled (such as the treadle pump); c) they have potential for large strategic impact in a society (such as by expanding pump capital in North Bengal); d) they are appropriately targeted to achieve an important social end (such as of gender equity through HTW subsidy); e) they are more `additive'—that is, topping up what the target group is already prepared to incur—and less `substitutive' that replaces what the target group would have spent anyway. Most of the NBTDP subsidies can be justified on one or more of these

grounds. However, a relevant second-order question is about whether the project gets `the best bang out of its buck.'

This can be assessed by judging a subsidy program against a set of normative criteria. To produce the desired impact, in our assessment, a subsidy should: a) be `efficient'—in the sense that it should be designed to minimize the cost of assisting a beneficiary in the manner defined; b) be designed to produce sustainable change; that is it should support techno-institutional interventions that beneficiaries can—and will want to—sustain on their own; c) aim to significantly address outstanding anomalies and inequities of a society.

Without explicitly stating them, the analysis of the NBTDP MI policy throughout this report has used these normative criteria to assess it. And, we believe that the NBTDP itself has implicitly used strikingly similar normative criteria to introduce the changes that it has in recent years in its MI subsidy policy. Discontinuation of support to major RLIs and DTWs, abandoning of the 4-ha scheme, support to mini-RLI with 100 percent capital subsidy but 0 percent O&M subsidy, etc.—all these changes are based on implicit and explicit analyses that are synced with our own assessment. We are also in full agreement with several stated and unstated assumptions/hypotheses on which the NBTDP Phase III has rested—such as, a) the success and viability of mini-RLI and MDTW will depend crucially on the quality and robustness of the beneficiary organizations to which they are turned over; b) the STW-PDW cluster scheme should not be burdened with the buried piped transmission systems; and c) treadle pumps are best left out of the direct subsidy, etc.

We believe that a reflective incremental approach of this type—in which the Project reviews periodically the performance of each component and modifies the component mid-project—is a valid and functional approach of planning and implementing a self-correcting development project. However, besides using its own feedback loops to improve project performance, the Project also can—and needs to—constantly assess and learn from what farmers themselves do when their own resources are at stake, and what other agencies making similar interventions do and with what effect. We found it striking, for example that Panchayat Samitis provide subsidy support to even smaller RLIs, which cost at best a quarter of the NBTDP's mini-RLI; and, when they use their own money, farmers themselves build even simpler RLIs that have just a pump on the river bank and a distribution system consisting of shiftable flexible poly-pipe.[76] True, the basic mini-

[76]In some senses, subsidy provided in the NBTDP MI program on buried pipeline transmission system is the most problematic; for one, it is the largest cost component in RLIs, DTWs, mini RLI and MDTW; second, farmers and their BCs are the least comfortable with is maintenance and repair; third, the most frequent cause of underutilization of these schemes is the transmission system, which needs expert outside input for fixing; finally, their techno-economic justification is questionable in a region like North Bengal. Buried pipeline transmission systems are indicated in regions like Gujarat and Maharashtra where water if often pumped from depths of 800-1,000 feet and is to be conveyed across undulating terrain. Here, water extraction costs in private as well as social terms are very high; cost of making deep tube wells is so high that it makes more sense to spend Rs 6–7 lakhs on one tube well and use it for 3,500–4,000 hours/year than to sink many such tube wells and use them for 1,000 hours a year; buried pipe transmission systems here play multiple roles: a) channels are often useless here to convey water due to topographic constraints; b) buried pipe transmission systems help reduce the number of tube wells needed to irrigate a village's farmland; c) since water is scarce, the saving of evaporation losses in conveyance through open channels is a major gain in these area; d) because of high water-extraction costs, energy costs saved are also high. Because of all these reasons, buried pipe transmission systems are so attractive from financial as well as economic viewpoints that it is common for private farmers to invest

RLIs have a smaller design command and poly-pipes used by farmers for transmission last all of 12 months; but, *ceteris paribus*, chances are that Rs 1 million spent on 2 mini-RLIs will produce less actual area irrigated than if spent on 10 basic mini-RLIs of the type Panchayat Samitis have supported or to subsidize 75 percent of the capital cost of around 50 super-mini RLIs of the type that private farmers use.[77]

Similarly, the Program needs to analyze the full potential offered by the pump-for-rental scheme adopted by almost all the Gram Panchayats of Jalpaiguri. That so many Gram Panchayat's have adopted it suggests their assessment that the critical bottleneck on expanding MI is not shortage of boreholes but of pumps. If this were true, there is need to assess the merit of 75 percent subsidy on the cost of STWs and PDWs in the STW cluster scheme. Moreover, even if the Project wants to continue support for boreholes, it needs to assess whether from the same budget head for STW/PDW subsidy; it should not reach out a larger number of farmers by encouraging beneficiaries to build bamboo bores at Rs 1,500 instead of GI pipe STWs costing Rs 18,000.

There is then the question of overall strategy: if pump capital scarcity is the prime bottleneck on MI expansion in North Bengal, would the project not produce greater strategic impact through a pure pump-subsidy scheme rather than through spending its limited budget on construction-intensive MI schemes that devote the bulk of the subsidy funds on structures (such as buried pipe transmission systems, GI pipe STWs, etc.) that farmers seldom use their own resources to build? Imagine the STW/PDW scheme modified as follows: any group of four small and marginal farmers who deposit Rs 5,000 in their Gram Panchayat is issued a delivery order for a diesel pump set of their choice, a fuel-saving contraption[78] and 500 feet of poly-pipe; the procedure for approval can be simple and completed at the level of the Gram Panchayat itself or at worst, at the

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in them. None of these reasons is however valid in North Bengal; the topography here is flat so that conveying water across fields using channels is common; conveying water over long distances is neither economic nor necessary; it is cheaper to have more boreholes and inexpensive transmission system than an expensive transmission system and a few bores; the opportunity cost of water lost through evaporation during conveyance is low in North Bengal; and finally, the cost of water extraction here is amongst the lowest in the country; a 5-hp diesel pump commonly gives a discharge of 15–17,000 liters/hour; getting the same water output in North Gujarat would need a 15–17.5-hp diesel pump. Because of all these reasons, the financial as well as economic rationale for investing in buried transmission systems needs hard rethinking.

[77]The NBTDP mini-RLI costs around Rs 5 lakhs, have a design command of 20 ha, 3 5–8-hp diesel pumps and a buried pipe transmission system with 8–14 spouts; Panchayat Samiti-supported basic mini-RLIs cost around Rs 1 lakh, have a design command of 4–6 ha, one 8-hp diesel pump and a buried PVC pipe transmission system; farmers' super-mini-RLI costs less than Rs 25,000, has a 5-hp diesel pump and 600 feet of poly-pipe; its design command is 3–4 ha. Real life experience seems to suggest that a mini-RLI with a problematic organization and management system falls far short of its design command, and a super-mini-RLI of a private water seller will commonly exceed its design command.

[78]We should think that more than anything else, the fuel-saving contraption developed by the NBTDP is the most worthy of a subsidy. It is a pioneering innovation that needs wide-scale propagation; farmers are not familiar with its potential benefits; the fuel saving that its wide-scale use can effect is far more valuable to the society than to the farmers because the cost of diesel to the country is probably higher than the price farmers pay for it; and the marketing of the contraption fits very well into a program of subsidizing pumps and poly-pipes.

Panchayat Samiti level; the farmers can produce the DO before the respective dealer and procure their pump and poly-pipes. A program such as this can, in our assessment, reach a large number of small farmers and produce more MI;[79] it will also be more sustainable because, given the choice of spending a sum of Rs 20,000 on any manner they wish but on MI, chances are that most small and marginal farmer groups would spend the sum on a pump and poly-pipe.

Better still, we recommend to irrigation administrators and policy makers to give a serious look to the way the FBS has operated in Eastern Uttar Pradesh, and the variety of MI benefits it has produced. We firmly believe that a scheme with the following features can produce similar impacts in North Bengal as well. For this to happen, the key design features of the scheme should be as follows: a) sufficient resources for subsidy as well as loan should be earmarked to it so that there is no need for stringent rationing; b) the scheme should give complete freedom to the farmer to choose any make of engine and pump, and to get a bore made himself rather than insisting that the government-appointed contractor should do it; c) the application for subsidy-loan should be submitted at the Panchayat Samiti and processed there itself; d) every branch of the public sector and cooperative banks should be encouraged to advance loans for diesel pumps; e) there should be a separate but similar scheme under which Gram Panchayats can acquire pumps for renting out so that they do not preempt subsidy-loan resources meant for small farmers.

[79]For instance, instead of one major RLI costing Rs 10 lakhs, one can support 66 small-farmer groups of 4 each with Rs 15,000 pumps plus a poly-pipe subsidy; from one mini-RLI costing Rs 4.5 lakh,s 30 such groups can be supported; instead of one STW/PDW scheme, 2 groups can get pumps plus a poly-pipe subsidy. From the NBTDP Phase II budget for STW/PDW and mini-RLI/MDTW schemes, nearly 1,600 groups each of 4 marginal farmers can be supported with pumps plus a poly-pipe subsidy.

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