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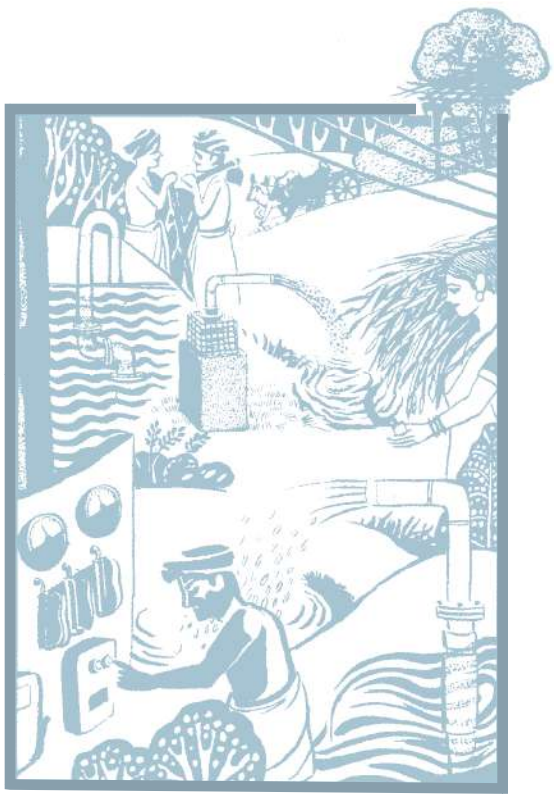

IWMI-TATA
Water Policy Program

Water Policy Research

HIGHLIGHT

Pro-Poor Farm Power Policy For West Bengal

Analytical Background for a Policy Pilot

Manisha Shah
Sujata Das Chowdhury
Tushaar Shah

For two decades, agricultural growth in West Bengal was stifled by a perverse and restrictive permit system that made it difficult, costly and time-consuming for a farmer to get electricity connection for a tubewell. In 2011, through a radical move, liberalization of permits made it easier, quicker and cheaper for farmers to install electric tubewells. Increased tubewell density improved irrigation access to well owners as well as water buyers. However, a parallel policy of metering electric tubewells and charging farmers commercial tariff all but nullified gains to water buyers who have to surrender the bulk of the irrigation surplus as water price. This Highlight proposes that the farm power pricing policy can be tweaked to make West Bengal's water markets pro-poor and outlines the hypothesis underlying a pilot project ITP has initiated in Monoharpur village of Birbhum district.

Pro-poor Farm Power Policy for West Bengal
Analytical Background for a Policy Pilot

Research highlight based on Shah and Chowdhury (2017)

1. Introduction

This Highlight presents the analytical background to a policy reform action research pilot that the IWMI-Tata Program has launched in Monoharpur village in Birbhum district of West Bengal. The hypothesis proposed is that tweaking the prevailing formula for charging farm power consumption by electric tubewells in West Bengal can transform its informal water markets from sellers' market into buyers' market, grow irrigation economy, and enhance marginal farmers' and tenants' share in irrigation surplus, especially in the *Boro* rice economy. The policy proposal has the potential to be revenue neutral for the electricity utility and will mute perverse incentives that drive growing pilferage of power by farmers. The novel element here is an experiment of implementing it in a village to examine if predicted outcomes follow. Through this experiment, the energy-irrigation nexus in the region will be examined more closely by assessing the impact of the new tariff structure on the informal water market dynamics. The proposed experiment commenced in July 2017; its results will be reported next year.

2. Groundwater Economy of West Bengal

West Bengal is predominantly a water abundant state. It receives an annual rainfall of 1,500 to 2,000 mm. It has an annual replenishable groundwater capacity of 30 billion cubic metres (BCM), of which, only 11 BCM is drafted for various purposes. At an average cropping intensity of 177 per cent, it is the largest rice producing state of the country (ICAR 2017). Traditionally, rice cultivation is done in three seasons – *Aman (Kharif)*, *Aus (winter) Boro* (summer), which implies that there is a huge potential to increase the cropping intensity of the state. *Boro* paddy is one of the most important aspects of rice cultivation here because it ensures annual food security for small and marginal farmers. But the rising cost of cultivation, owing to non-perennial nature of canals and the high cost of privately owned water extraction mechanisms (WEMs), has been slowly discouraging farmers from cultivating irrigated rice more than once a year.

Like majority of farmers across the country, especially since the mid-1980's, farmers in West Bengal have also come to depend heavily on groundwater for irrigation throughout the year. When green revolution took off in the Northern states, West Bengal was still struggling with its food security issues. Later in the 1980's, the State saw a widespread increase in agricultural production owing to diesel shallow tube wells (STWs), which spread swiftly across the region. It witnessed a 6 per cent annual growth rate in agriculture during the decade on the back of rapid expansion in STW-driven irrigation of pre-summer *Boro* rice. Like Bangladesh earlier, West Bengal too broke out of its agrarian impasse and morphed from a perennially rice-deficit to a rice-surplus state, thanks wholly to the proliferation of diesel STWs (Rogaly *et al.* 1999). But as diesel prices began their ascent in the 1990s, squeezing the profitability of *Boro* cultivation, the slowdown of West Bengal's agrarian ascent began with growth rate decelerating to 1.2-2.0 per cent per year (Sarkar 2006). Mukherji *et al*. (2012) estimated that during 2000-2008, the index of cost of labour and fertiliser went up from 100 to 136 and 115 respectively, while that for irrigation increased from 100 to 223 at 1999-2000 constant prices, a direct result of farmers' dependence on expensive diesel for pumping groundwater and low rates of rural electrification.

In spite of the rising cost of irrigation, West Bengal witnessed growth of vibrant and pervasive water markets just like rest of South Asia, especially in areas not serviced by government canals. The pump owners, who had enough spare capacity to pump water after irrigating their own fields, sold irrigation services to their neighbours who were willing to cover the variable costs of energy (diesel or electricity) and make some contribution to the overheads. These private WEMs have been able to provide benefits of irrigation even to the poorest farmers and have come to the rescue of the government unable to alleviate social and economic inequities. Mukherji (2007) found that smallholders benefitted in the informal water markets not only as water buyers but also, in several cases, as entrepreneurial pump owners. She found that, on an average, 77 per cent of all the water pumped and 69 per cent of area irrigated by any WEM was for the benefit of the buyers. The shallow aquifers in the region ensured round-the-year water availability and helped expand the service markets and the agrarian economy through an additional summer rice crop. However, the energy policies of the state eroded willingness and abilities of pump owners to sell water and created oligopolistic water markets.

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† Corresponding author Manisha Shah [m.shah@cgiar.org]

West Bengal State Electricity Distribution Company Ltd. (WBSEDCL), formerly West Bengal Electricity Board, charged tubewell owners high flat tariff until 2008, which produced a buyers' water market. In order to cover their high fixed costs, electric tubewell owners competed fiercely to sell more and in the process offered their farmer-clients high quality irrigation service at a lower price compared to diesel STW owners. However, the restrictive system of groundwater permits that was introduced in 2005, which an oppressive bureaucracy had turned into an instrument of rent seeking from farmers, led to a very slow rise in the density of electric tubewells. In 2011, after Aditi Mukheriji's persistent evidence-based argumentation, the permit system was abolished and replaced by a much simpler and cheaper system of setting up new electric connections. The expectation was that this policy change would increase the pump density manifold, creating an agrarian turnaround through competitive irrigation systems.

However, Time-of-Day (ToD) metering system of electricity, which was introduced in 2008, nullified the benefit of increased pump density for water buyers. Under flat-tariff regime, buyers used their strong bargaining power to secure lower price, deferred payment facilities etc. which had profound redistributive effects since the water buyers are often small and marginal farmers belonging to lower castes. But with consumption based billing of electric tubewells at near commercial rates (see Table 1), water sellers were no longer under pressure to sell, which created a sellers' market. Prices rose overnight and pump owners started demanding land for lease at fixed rates during *Boro* in exchange for irrigation water in other seasons as their gains were much higher in cultivating leased land than in selling water. This practice is driving the small and marginal farmers, especially tenants, out of agriculture and is a threat to their livelihoods and food security.

3. Literature Review and Discussion

In a 2014 survey of five villages in Birbhum district, Chowdhury (2015) found that permit liberalization had proved a major blessing for farmers. The number of electric submersibles had increased from 47 to 134, signifying that permit liberalization was producing the intended increase in tubewell density in the State. Chowdhury surveyed 45 electric submersible owners and 100 water buyers in six villages to quantify the impact of the policy change.

She found farmers happy with abolition of tubewell permits and low set-up cost of electric WEM but unhappy with their soaring electricity bills. While the increase in WEM density in the post permit liberalization years definitely had a positive effect on increasing the area under *Boro*, it did very little to reduce the cost of irrigation for water buyers. For the decade before 2011, *Boro* cultivation had stagnated or even declined; but by 2014, it had bounced back, with nearly every acre brought under the plough in the season (Figure 1).

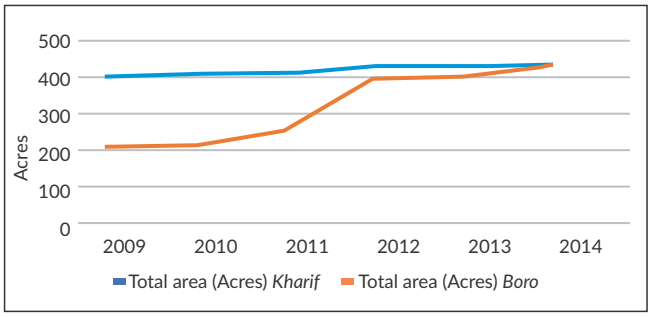

Figure 1: Area under *Kharif* (*Amon*) and *Boro* Paddy

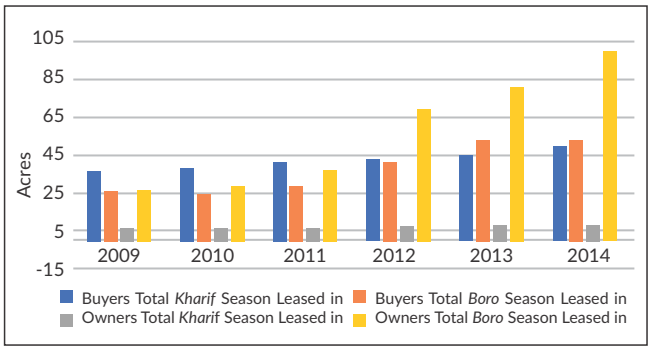

Figure 2: Area leased by pump owners and water buyers in different seasons

The study revealed that there was hardening of monopoly power of WEM owners who formed a cartel to fix water rates every year. Pump owners increasingly preferred leasing-in land only for *Boro* rice cultivation at a fixed rental of 1.2 quintals of paddy or a cash rental of ₹2,000 per bigha[2]. According to Chowdhury's calculations, a pump owner can earn only ₹1,500 by selling irrigation to a bigha of *Boro* paddy but can make a net surplus of ₹4,225 to ₹10,425 by leasing in a bigha after paying all costs, including the lease rental of ₹2,000. She found many pump owners committing *Amon* irrigation only on the condition that the buyer leases out all or a portion of his land to him for *Boro* cultivation. Refusing *Boro* irrigation was another strategy to compel small farmers to lease out their land. Figure 2 shows the increase in area leased in by submersible owners in *Boro* season.

While it seems that tubewell owners are behaving like water lords and monopolizing the water market and gaining at the expense of water buyers, it is also very important to look at the electricity tariff increase over the years which added to the woes of the former. The average tariff increased nearly 3 fold from ₹2.31/kWh to ₹6.51/kWh; moreover, the spread between peak and off-peak rates rapidly closed, giving them no opportunity to reduce electricity bills by using more off-peak power. The current tariff structure of the State is shown in Table 1.

Chowdhury's data shows that pump owners have not raised water prices in proportion to the rise in electricity prices. During 2009 to 2014, *Boro* irrigation price has risen by less than twice, reducing the W/AC[2] multiple by a significant

[1] 1 acre = 2.5 bigha

[2] W/AC multiple shows the competitiveness of an informal water market where W is the price of water and AC is the average cost of the service delivery.

extent. Figure 3 compares the indices of average electricity price and *Amon* and *Boro* irrigation prices. This shows that *Boro* irrigation rates have risen more slowly compared to average electricity tariff. Whether there is a moral economy in play or societal pressures on the pump owners is a matter to explore.

Electricity consumption data of pump owners of Monoharpur village in 2016-17 shows that they paid an average rate of ₹5.18/unit (almost same as domestic and industrial power tariff, see Table 1) even after trying to maximize their pump usage in the off-peak hours, while their counterparts in many other states have access to free farm power. Even then, they did not increase irrigation prices drastically. According to Chowdhury, water sellers are united in defending an agreed price and a water seller seldom encroached upon the customer of another water seller in her sample villages. When they increase or decrease water price and others do not follow, they feel pressure to undo the price change. Many water sellers are also water buyers and understand that the profitability of paddy cultivation is under constant stress from rising input prices. Moreover, the last thing pump owners want is their water buyers deserting paddy farming altogether, as they may lose their customers permanently.

In a recent case study of groundwater-abundant Kumarpur village in 24 Paraganas district, Banerjee (2016) found that

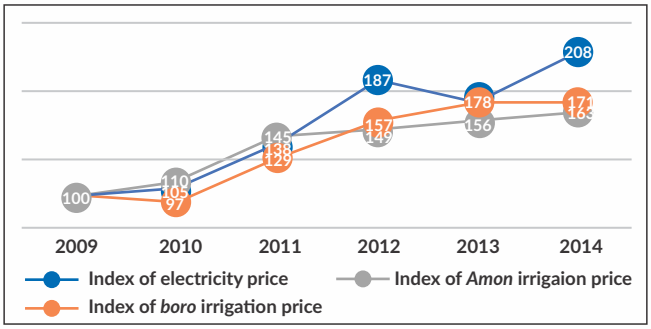

Figure 3: Comparison of electricity and irrigation prices

post-2012, electric submersible WEMs increased from 20 to 28, and as a result, the earlier declining trend of *Boro* rice area was reversed booming *Boro* rice and year-round vegetable cultivation. But he found that economics of *Boro* rice cultivation with purchased irrigation turning awry because the water price doubled from ₹1,000/bigha to ₹2,000/bigha in Boro season. Like Chowdhury (2015) and Mukherji *et al*. (2010) earlier, Banerjee also found that submersible owners were more aggressive in leasing in land for *Boro* paddy cultivation at a fixed rental of 180 kg paddy per bigha in exchange for irrigation water in *Amon*. Such a trend raises questions about food security of small and marginal farmers and could trigger seasonal distress migration to urban centres.

Focus group discussions held with pump owners and water buyers of Monoharpur and ITP's research in the last two decades have revealed that many pump owners resort to illegal practices such as line hooking (Picture 1), meter tampering, passing off larger motors as small and bribing meter readers due to the high metered tariff which they found difficult to pay on several occasions. The water sellers do not get timely payment from water buyers, who mostly pay after crop harvesting leading to accumulation of huge monthly penalties on late bill payment. In seasons of poor crop yield, they even complain of not getting paid for irrigation services. This leaves them with few options to break even on their investment on WEMs and earn profit, often pushing them to resort to illegal practices.

Shah (1987; 1993) explored the role of energy policies in determining W/AC multiple in some detail. Positing a village groundwater market as a 'natural oligopoly', Shah (1993: 210) suggested that increasing the density of WEMs in a village is a slow route to increasing competition among water sellers, reining in their monopoly power and whittling down the W/AC multiple. A quicker and stronger route to turning these

Picture 1: Transmission lines prone to illegal hooking in the village

Table 1: Current Farm Power Tariff and Rural Domestic and Industrial Tariff[3]

	Farm Power ToD Rates (in Rs/kWH)*				Other Rural Power Tariff	
Time Window	6:00 – 17:00	17:00-23:00	23:00 – 6:00		**Domestic**	**Commercial**
ToD Metered	3.78	7.48	2.42		₹5.26 (first 102 units) to ₹8.99 (above 900 units)	₹6.17 (first 180 units) to ₹8.94 (above 900 units)
Prepaid ToD Metered	3.78	7.25	2.63			
**in addition to this, a fixed charge/demand charge of ₹ 20/kVA per month is levied per connection*						

[3] Source: wbsedcl.in/irj/go/km/docs/internet/new_website/pdf/Tariff_Volumn/PDFsam_mergetariff2.pdf

oligopolies into competitive water markets would be to charge electric tubewells at affordably high flat tariff instead of pro-rata tariff (Shah 1993), as many electricity utilities were already doing. Shah alerted that flat power tariff would benefit resource poor water buyers but would also threaten the sustainability of groundwater and strain the finances of electricity utilities. He argued that both these could be controlled by rationing farm power supply and periodically revising the flat tariff to cover the cost-to-serve to farmers (Shah 1993). West Bengal is one of the best examples in support of the arguments made by Shah. Even though the pump density has increased significantly over the last decade, the farm power policy has come in the way of accelerated agricultural growth and a competitive irrigation markets where the tubewell owners function more like 'privately-owned public utility' rather than 'pumping for profit' entities capturing majority benefits of the expanding *Boro* economy. The incidence of illegal practices associated with high metered tariff is also likely to go down under the proposed regime.

Figure 4: Study Area

4. Hypothesis

Based on evidence from field and studies in other parts of India, we propose a hypothesis that West Bengal can maximize the benefits to the farmers equitably by adopting a flat-cum-metered tariff structure, where a tube well owner is required to pay a fixed tariff per month per HP (higher during *Boro* season) in addition to a lower consumption linked rate (metered tariff). This structure will ensure that the tubewell owners are not burdened by a high flat tariff rate and thus, do not perform excessive extraction of groundwater and at the same time are motivated to sell more water to buyers, making the water market more competitive. The electricity company can also increase the fixed component periodically to cover its costs. Such a pricing regime will restore submersible owners' role as 'privately operated public utilities', rein-in unfettered monopoly power of water sellers and turn the water market again into a buyers' market to benefit the poor. Even for the pump owners, this system is likely to be less repressive than the high flat tariff regime prior to metering.

Such a competitive irrigation market is likely to ensure an equitable benefit of groundwater irrigation to all farmers, help utilities reduce power theft and boost rice cultivation.

5. About the Pilot

5.1 Location and Sampling

Monoharpur village of Birbhum district (Figure 4), with 23 submersible owners participating in water selling, has been selected for the pilot. Kendradangal village of the same district, has been selected as the comparison village. All the pump owners (water sellers) in both the villages are a part of this action research pilot. All the farmers (including lessees and sharecroppers) of Monoharpur and an equal number in Kendradangal are being surveyed to estimate the redistributive benefits of the proposed farm power policy.

5.2 Experiment Design

A baseline survey was conducted in the selected villages to understand the existing groundwater market dynamics and related transactions. The entire village's farm economy is being mapped and the contribution of water trade estimated. Amongst the measurement variables selected are: irrigation charges, number of renters, area irrigated per pump, payment mechanism (cash, produce, leasing contracts), quality of irrigation service provided by private water sellers, cropping intensity, time-based pump use pattern and productivity of land.

July 2017 onwards, a flat-cum-metered tariff structure has been proposed to pump owners wherein they will be paid 70 per cent of their monthly electricity bill in excess of the benchmark set for every month (Table 2). The monthly benchmark has been calculated using historical consumption data of last year and shall act like a flat rate and the remaining consumption will be charged on low metered tariff (30 per cent of actual tariff).

5.3 Village Characteristics

Treatment and control villages are comparable on several parameters (Table 3).

6. Epilogue

While baseline data has captured the existing water market dynamics through variables, endline data will try to see the changes in them under the new regime. As all pump owners are aware of the actual cost of pump operation under this experiment, their rational behaviour is likely to make them more aggressive water sellers in order to make the most out of this subsidy offered and the irrigation market would end up being more competitive. Calculations based on assumption of full pump utilization and competitive market under the proposed tariff structure suggest that water buyers can gain up to ₹1,900 per acre, which means an aggregated gain of ₹2 million in three cropping seasons for the farmers of Monoharpur. The practice of leasing-in land from smallholders in exchange for irrigation is likely to decline, benefitting the buyers even more.

Any unexpected behaviour from these market players challenging our hypothesis will also open up new arenas for research. Insights from this pilot can guide us as well as the policy makers in the energy sector to understand the energy-irrigation nexus better and undertake policy reforms accordingly for equitable gains to the key stakeholders involved – pump owners, water buyers and utility.

Table 2: Monthly benchmark calculated based on historical consumption data

Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Subsidy kick-off point (₹)	489	343	376	331	1004	917	2218	4492	3351	4074	200	200

Table 3: Village characteristics of treatment and control village

Parameter	Monoharpur	Kendradangal
Number of households	273	300
Pump density (bigha/pump)	38	22
Landless households	10	100
Electrification	99%	100%
Main source of drinking water	Hand pump	Hand pump
Paved road	Yes	No
Canal access	Seasonal	Nil
Main crops	Paddy, Potato, Mustard	Paddy, Potato, Mustard
Average paddy price	₹1,262.5	₹1,300
Price of land/ bigha	₹2,00,000	₹2,00,000
Leasing rates (Kharif)	2:1 or 1:1 (Owner: Labour)	2:1or1:1 (Owner: Labour) or per bigha 240 kg paddy
Leasing rates (Boro)	per bigha ₹ 2,000 or 180 kg paddy	per bigha 120 kg paddy
PDS (Ration Shop)	9 km	Within the village
Bank	6 km	5 km
Police station	18 km	12 km
Flood affected land	60 bigha	30 bigha
Water price per bigha (Boro)	₹1,500-2,000	₹1,500
Water price per bigha (Kharif)	₹500-1,000	₹600
Labour rates	₹200-250 per day	₹180-200 per day
Average price paid per unit of farm power	₹5.18	₹5.32

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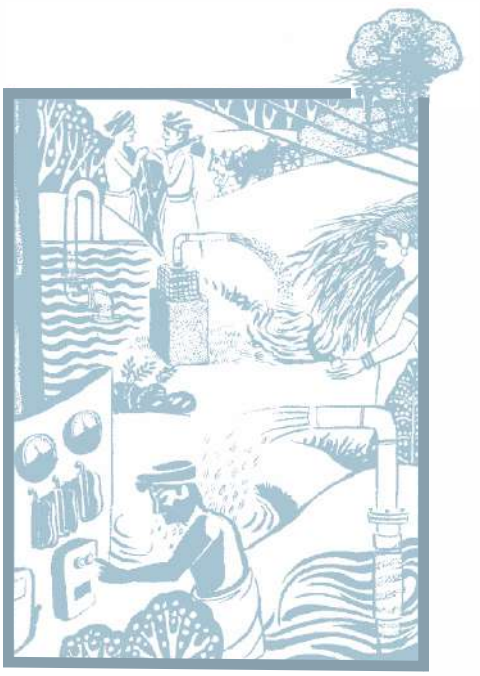

About the IWMI-Tata Program and Water Policy Highlights

The IWMI-Tata Water Policy Program (ITP) was launched in 2000 as a co-equal partnership between the International Water Management Institute (IWMI), Colombo and Sir Ratan Tata Trust (SRTT), Mumbai. The program presents new perspectives and practical solutions derived from the wealth of research done in India on water resource management. Its objective is to help policy makers at the central, state and local levels address their water challenges – in areas such as sustainable groundwater management, water scarcity, and rural poverty – by translating research findings into practical policy recommendations. Through this program, IWMI collaborates with a range of partners across India to identify, analyze and document relevant water management approaches and current practices. These practices are assessed and synthesized for maximum policy impact in the series on Water Policy Highlights and IWMI-Tata Comments.

Water Policy Highlights are pre-publication discussion papers developed primarily as the basis for discussion during ITP's Annual Partners' Meet. The research underlying these Highlights was funded with support from International Water Management Institute (IWMI), Tata Trusts, CGIAR Research Program on Water, Land and Ecosystems (WLE) and CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). However, the Highlights are not externally peer-reviewed and the views expressed are of the author/s alone and not of ITP or any of its funding partners.

IWMI Headquarters
127 Sunil Mawatha
Pelawatte, Battaramulla
Colombo, Sri Lanka
Mailing Address
P. O. Box 2075, Colombo, Sri Lanka
Tel: +94 11 2880000, 2784080 **Fax:** +94 11 2786854
Email: iwmi@cgiar.org **Website:** www.iwmi.org

IWMI-Tata Water Policy Program
"Jal Tarang"
Near Smruti Apartments, Behind IRMA Gate
Mangalpura, Anand 388001, Gujarat, India
Tel: +91 2692 263816, 263817
Email: iwmi-tata@cgiar.org