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2012

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Water Policy Research

# HIGHLIGHT

## How Did West Bengal Bell The Proverbial Cat of Agricultural Metering?

### The Economics and Politics of Groundwater

West Bengal had started a program of metering of agricultural tube wells in 2007. Since then, the state has successfully metered almost 90 percent of its electric tube wells. This comes at a time when most other states in India have steered clear of metering even though universal metering is mandatory according to the Electricity Act of 2003. Why is it then that the government of West Bengal succeeded when others floundered? This paper offers answers in terms of economics of metering and agrarian politics and discourses surrounding groundwater in the state. It also suggests a few generic steps that other states may adopt in their quest for universal metering.

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# How did West Bengal bell the proverbial cat of agricultural metering? The economics and politics of groundwater[1]

**Research highlight based on a paper with the same title[2]**

## Setting the context of energy-irrigation nexus debate in India

Until the late 1970s, all State Electricity Boards (SEBs) charged metered tariff from their agricultural consumers. However, as the number of tube wells increased manifold during the 1980s, the SEBs found the transaction costs of metering to be prohibitively high and introduced flat tariffs (Shah et al. 2007). At the same time, many governments started using electricity tariff as an electoral tool of appeasement and hence flat tariffs remained perpetually low (Dubash and Rajan 2001), though not in West Bengal as we will show in this paper. In 2001, the World Bank estimated the farm power subsidies to be around USD 6 billion a year (Monari 2002:1). This subsidy stands at Rs. 45561 crores[3] (~ USD 9 billion) in 2011-12.

Flat tariff system has been criticized on a number of counts, the most important of which are the lack of energy accounting in utilities as a result of unmetered supply and distorted signals that it sends to the farmers as well to utilities (Sant and Dixit 1996). In view of several criticisms of flat tariff, there is an increasing pressure to revert to metered supply. This is also clearly articulated in the Electricity Act of 2003. While the donor agencies and the Government of India (GoI) are pushing hard for metering, there are very few takers. The state of West Bengal is one such state that has implemented metering.

## Metering of agricultural tube wells in West Bengal

According to the 4th and latest round of Minor Irrigation Census (GoI 2011), West Bengal has 5.19 lakh[4] wells and tube wells, down from 6.14 lakhs in the 3rd Census in 2001. Of these, approximately 1.09 lakhs run on electricity and the rest run on either diesel or kerosene or a mix of both. The West Bengal State Electricity Distribution Company Limited (WBSEDCL) initiated the process of metering of electric tube wells in 2007 and has completed metering of 90 percent of tube wells. Prior to metering of tube wells, all electric tube well owners in the state were subjected to a flat electricity tariff ranging from Rs. 8800/year to Rs. 10800/year for a standard 5 horse power (HP) pump. Farmers whose tube wells have been metered are now subjected to a time-of-day (TOD) tariff, while the rest still continue to pay flat tariff. Table 1 shows TOD timings, metered and flat tariff rates.

**Table 1 TOD metered tariff and flat tariff in West Bengal, 2008-2011**

| | Metered Time of the Day (TOD) tariff | | | Unmetered (flat) tariff for a standard 5 HP pump | |
|---|---|---|---|---|---|
| Year | Normal hours (6 a.m. to 5 p.m.) (In paisa/unit) | Peak hours (5 p.m. to 11p.m.) (In paisa/unit) | Off-peak hours (11p.m. to 6 p.m.) (In paisa/unit) | Electric Centrifugal Pumps (in Rs./year) | Electric Submersible Pumps (in Rs./year) |
| 2008-09 | 130 | 590 | 74 | 8800 | 10800 |
| 2009-10 | 140 | 510 | 79 | 8800 | 10800 |
| 2010-11 | 218 | 588 | 152 | 10736 | 13176 |

Source: West Bengal Electricity Regulatory Commission. (Tariff orders 2009, 2010 and 2011)

[1]This IWMI-Tata Highlight is based on research carried out with support from the International Water Management Institute (IWMI), Colombo. It is not externally peer-reviewed and the views expressed are of the authors alone and not of IWMI or its funding partners.
[2]This paper is available on request from p.reghu@cgiar.org
[3]One crore = 10 million
[4]One lakh = 0.1 million

## Study design, sample and research questions

This study is based on data collected from 54 villages spread across Bankura, Bardhaman, Hugli, Nadia, North 24 Parganas and Murshidabad. A total of 894 respondents, including pump owners and water buyers were interviewed. In this paper, we use a smaller sub-set of our data pertaining to 321 electric tube well owners. Of these, 155 farmers had metered connection and 166 were subjected to a flat tariff regime. Data were collected for 2008-09 and 2009-10 agricultural years. Farmers owned two types of water extraction technologies: electric submersible pumps (ES) and electric centrifugal pumps (EC) and since these technologies are different, we have tabulated the results for them separately. Table 2 shows that the treatment farmers (ones with metered connection) have similar socio-economic and demographic characteristics as the control farmers (ones with flat tariff) and are therefore largely comparable across observed variables.

In this paper, we try to answer why the Government of West Bengal (GoWB) could go ahead with metering and farmers did not oppose it, when their counterparts in other states regularly agitate against it? We offer two-fold explanation in terms of economics of pumping groundwater and politics surrounding discourses on groundwater in the state.

## Economics

### High flat tariffs, but small land holdings

One of the main reasons why electric tube well owners in West Bengal actively lobbied for metering is that they were subjected to a rather high flat electricity tariff; tariffs which, they thought were not justified by their water use given their small land holdings. Table 3 shows electricity tariffs paid by farmers in other states and underlines the fact that farmers in West Bengal paid one of the highest electricity tariffs relative to their land holdings.

**Table 2 Socio-economic and demographic characteristics of farmers in control and treatment group**

| Indicator | Mean of treatment group (metered tariff) N = 155 | Mean of control group (flat tariff) N = 166 | Significantly different (Y/N) |
|---|---|---|---|
| Age of head of the household (years) | 55.70 (13.63) | 53.27 (12.03) | N |
| Years of education of head of the household | 8.97 (3.90) | 9.48 (3.65) | N |
| Number of family members | 6.44 (3.44) | 7.64 (4.64) | Y** |
| Number of family members involved in agriculture | 1.59 (.92) | 1.74 (1.22) | N |
| Total land holding in *bighas* in 2009-10 | 9.37 (7.86) | 9.45 (7.11) | N |
| Number of plots | 9.21 (9.19) | 7.83 (9.84) | N |
| Operated holding in *bighas* in 2009-10 | 19.06 (16.05) | 19.30 (13.95) | N |
| Operated holding in *bighas* in summer 2009-10 | 7.17 (5.85) | 6.78 (5.90) | N |

Source: Farmers survey conducted from August to October 2010
Note: Figures in brackets denote standard deviation. **: 5 percent level of significance in Wilcoxon rank-sum test.

**Table 3 Flat tariffs and average size of land holding in five states of India**

| State | Tariff in 2006-07(Rs./HP/year) | Tariff in 2011-12 (Rs./HP/year) | Average size of land-holding (in ha) in 2005-06 | Electricity tariff per ha of land holding (Rs./ha) using 2011-12 tariff rates |
|---|---|---|---|---|
| Punjab | 0 | 0 | 3.95 | 0 |
| Karnataka | 0 | 0 | 1.63 | 0 |
| Haryana | 420 | 2100 | 2.23 | 941.7 |
| Gujarat | 850 | 2100 | 2.20 | 954.5 |
| West Bengal | 1760-2160 | 2150-2635 | 0.79 | 2721.5-3335.4 |

Source: Tariff data is from Annual Revenue Reports of various electricity utilities and average land holding data is from Agricultural Census of 2005-06.

From our primary survey, we found that on an average, an ES owner pumped for 486 hours for self-irrigation, cultivated 14 *bighas* (~5.66 ha) of land in a year and paid Rs. 10800/year as flat electricity bill. This amounted to Rs. 57 per hour of irrigation and Rs. 1600/*bigha* of land. Average revenue from two crops of paddy (*aman* and *boro*) is Rs. 10000/*bigha* (assuming average production of 1000 kg/*bigha* and price of Rs. 10/kg). Therefore, electricity bill, assuming they used their pumps only for self-use, amounted to 16 percent of total revenue from crop cultivation - a rather high figure by any standard. Given such high tariffs and small land holdings, electric pump owners were often forced to sell water at rates that just about covered their costs with some profit margins (Mukherji 2007).

**Metered farmers pay less electricity bill for same hours of use**

Now let us see what happened after metering. Table 4 compares electricity bill paid by farmers with flat and metered tube well connection and hours of operation of those tube wells. It shows electricity bill is substantially less for metered consumers for similar hours of use. For example, metered EC pump owners pumped for around 25 percent fewer hours than farmers with flat tariff, but paid an electricity bill which was 45 percent to 34 percent less than their flat tariff counterparts. Metered ES pump owners on the other hand, pumped for 12-17 percent more than their flat tariff neighbours and paid roughly same electricity bill.

**Table 4 Electricity bills and hours of pumping by farmers facing metered and flat tariff bills**

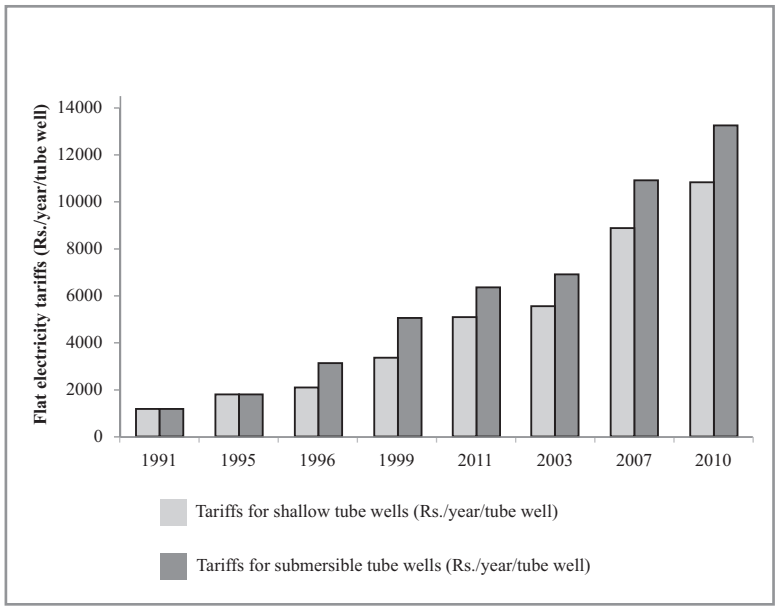
| | 2008-09 | | 2009-10 | |
|---|---|---|---|---|
| | Flat-rate Connection | Meter connection | Flat-rate Connection | Meter connection |
| Electricity bill in Rs./year for EC pump owners | 8800 (45) | 4818 (52)$^{+}$ | 8800 (42) | 5758 (55)$^{+}$ |
| Hours of operation/year for EC pump owners | 988 (45) | 738 (52)$^{++}$ | 1072 (42) | 793 (55) $^{++}$ |
| Electricity bill in Rs./year for ES pump owners | 10800 (132) | 9726 (89)$^{+++}$ | 10800 (123) | 11155 (99) |
| Hours of operation/year for ES pump owners | 1266 (132) | 1490 (89)$^{+++}$ | 1362 (123) | 1536 (99) |

Source: Farmers survey conducted from August to October 2010
$^{+}$: Significant at 1 percent level, $^{++}$: Significant at 5 percent level, $^{+++}$: Significant at 10 percent level (T-test)
Figures in brackets denote number of respondents in each category.

### Metered farmers earn more profits from selling water

As mentioned earlier, due to high flat tariffs, majority of tube well owners were compelled to sell water just to be able to recover a part of their fixed electricity bill. Over the years, as flat electricity bill increased (see Figure 1), tube well owners' dependence on their water buyers to recover that bill also increased. As a result, water markets in West Bengal became more of a buyers' market (Mukherji 2007), with the buyers dictating prices. While this was a good thing for the buyers, it was not so good for the pump owners. For example, flat tariff rates increased 10 times (from Rs. 1100/year to Rs. 10800/year) between 1991 to 2007, but price at which pump owners sold water increased by less than 3 times from Rs. 300/*bigha* to Rs. 800/*bigha* during the same time. This meant, over the years, their profit margins got squeezed.

**Figure 1 Change in flat electricity tariffs in West Bengal, 1991 to 2010**




Source: Yearbook of West Bengal State Electricity Board (WBSEB) and ARR filings by WBSEDCL, several years

After metering, this has changed. Table 5 shows the revenue earned by electric pump owners from selling water and the total electricity bill that they pay. The ratio between total receipts from water sales to electricity bill is a rough indicator of profit margins. It shows that, in case of both EC and ES pumps, farmers with metered connections earn more profit from selling water than farmers with flat rate connection. This is because, while electricity costs per unit of water pumped have declined for metered consumers, the price at which water is sold has not. In addition, they also have better bargaining power vis-à-vis their buyers because under a metered tariff regime, they are no longer compelled to sell water.

To sum up, farmers in West Bengal were already paying a very high flat tariff and metered tariffs worked out to be a cheaper option for them given their overall pumping requirements and hence the acceptance of metering. This is not the case in other states where farmers either get free electricity or pay a highly subsidized tariff.

The next question then is: how could the GoWB keep raising flat tariffs without farmers protesting against it? The GoWB also introduced a number of other measures that restricted farmers' access to groundwater resources

**Table 5 Revenue earned from selling water and electricity bill received for metered and flat tariff farmers (water sellers)**

| Type of tariff/ Type of pump | Farmers subjected to flat tariff | | | Farmers subjected to metered tariff | | |
|---|---|---|---|---|---|---|
| | Total revenue from selling water (Rs./year) | Total Electricity Bill (Rs./year) | Revenue from water to electricity bill ratio | Total revenue from selling water (Rs./year) | Total Electricity Bill (Rs./year) | Revenue from water to electricity bill ratio |
| Submersible (ES) | 22420 (103) | 10800 (103) | 2.08$^{++}$ | 24422 (89) | 11593 (89) | 3.11 |
| Centrifugal (EC) | 11678 (32) | 8800 (32) | 1.33 | 12214 (40) | 6445 (40)$^{+}$ | 2.14 |

Source: Farmers survey conducted from August to October 2010
$^{+}$: Significant at 1 percent level, $^{++}$: Significant at 5 percent level (T-test)
Figures in brackets are number of respondents in that category

such as SWID permits and full capital cost of rural electrification. We seek explanations for these policy choices in terms of politics and discourses surrounding groundwater and agriculture in the state. We have argued elsewhere that these discourses are at variance with resource conditions in the state which receives as high rainfalls as 1500-2000 mm in a year and where water tables in 80 percent of the villages are within less than 10 m (Mukherji 2006).

### Politics and political ecology discourses

First, let us look at the context of agriculture and water control in West Bengal and elsewhere. Unlike states like Gujarat and Punjab, where farming activities even in rainy season will stop in the absence of groundwater, it may not be the case in West Bengal. Here, due to abundant rainfall, farmers can still grow one rainfed crop in the *kharif* season. However, in reverting to rainfed farming, as many Bengali farmers have already done due to lack of electricity connection and high diesel costs, farm incomes plummet drastically and this indeed gives rise to immense distress among the farmers. Whether this unrest finds expression in the form of farmers' movements depends on organizational set up of farmers' unions.

This is well demonstrated by the contrast between the Bharatiya Kisan Sangh (BKS) in Gujarat and the Krishak Sabha (KS) in West Bengal. BKS is a farmers' organization recruiting its members from amongst landed farmers, and the leadership also rests with the farmers. On the other hand, membership to KS is open to farmers (and sharecroppers), landless labourers as well as the so called rural intelligentsia - mostly teachers and it is the rural teachers who mostly lead KS. Ironically, the interests of the farmers, the agriculture labourers and the rural intelligentsia are very different and at times even diametrically opposite, and farmers' concerns were often overruled. In Gujarat, on the other hand, the BKS successfully protested against the rise in electricity tariff, even though the BJP (of which BKS is the peasant wing) was in power in the state.

Another factor that held a disproportionate sway over government policies in West Bengal is the influence of urban intelligentsia and their views on groundwater. In West Bengal, a rurally disconnected[5] urban middle class often hear and read accounts of dwindling groundwater resources and ill effects of arsenic contamination and are totally oblivious of the benefits that farmers derive from it. For example, the headlines in state's leading Bangla daily, Ananda Bazar Patrika on 15th May 2012 criticized the new groundwater laws of the government that aims to ease access to groundwater for small and marginal farmers on the grounds that "over-exploitation" of groundwater will lead to land subsidence and increased incidence of earthquakes - claims that were not backed up by any data. High incidence of arsenic and the emotive appeal of seeing pictures of arsenic affected people also affect public opinion. However, very few people are aware that there are more practical ways of dealing with arsenic problem without banning access to groundwater and impoverishing farmers - ways that Bangladesh has been practicing with some degree of success since the last 20-25 years. These are: massive information campaigns, provision of safe drinking water, provision of folate supplements to people with chronic malnutrition and hence most susceptible to arsenic poisoning, improved land use practices for better management of arsenic rich irrigation water etc.

The nature and the political ideology of the state also matters. For example, there is a tendency to look at pump owners as exploitative water lords (Adnan 1999; Webster 1999), even when, various studies had shown that informal groundwater markets were at the very heart of agrarian transformation in West Bengal (Palmer-Jones 2001; Hariss 1993; Mukherji 2007; Mukherji et al. 2009).

So what does this tell us about groundwater and electricity policies in India? It tells us that "perceived", as against "real" water scarcity determines policies and this perception is a function of strength of farmers' lobbies vis-à-vis the strength of other opinion makers such as the urban intelligentsia. Thus, the politics of groundwater has given rise to a strange paradox in India - successful groundwater regulation where little is needed (West Bengal) and a virtual free for all where resource condition is precarious (Punjab, Tamil Nadu etc.).

### Conclusions: What can the other states learn?

In this paper, we have offered explanations for successful metering in West Bengal in terms of both economics and political discourses. Politics is state specific and deeply embedded - something that cannot be changed overnight. Yet, it is vital that agriculture tube wells be metered - not only because the Electricity Act of 2003 requires it, but also because metering is the only way to create accountability and discipline among utility staff and to lesser extent, among farmers. What can the states, where farmers' lobbies are strong, do? First, we suggest that states should adopt an incremental approach towards pricing electricity. For example, where electricity is free, as in Punjab, they can start by imposing a nominal flat rate and keep raising it slowly, but steadily to a level, where farmers, especially small farmers, start demanding

[5]Majority of urban middle class in Bengal do not have rural roots any longer. This is partly a legacy of *Zamindari* system that created a legion of absentee landlords and the fact that upper caste Bengalis, who are also the opinion makers, moved to urban areas a long time ago to become clerks and officials of the British government. Such disconnect is not found in states like Gujarat and Punjab where the rural urban divide is much less rigid than it is in Bengal.

metered tariffs. A recent survey in Punjab shows that farmers are willing to pay for electricity, provided it is charged on HP basis (IWMI 2011). Such incremental increases have already happened in Gujarat, where tariffs were raised from Rs. 850/HP in 2007-08 to Rs. 2100/HP in 2011-12 and now many small farmers are volunteering for metered connections. Price pinch is not the only pinch that farmers feel; they also get affected by severe power rationing. This is happening in most states - from 16-18 hour power supply in 1990s, farmers in Punjab, Haryana, Gujarat, Karnataka, Tamil Nadu and Andhra Pradesh now get only 6-8 hours of power supply in a day. Farmers cope in two ways, either through use of diesel pumps and generators (as in Punjab) at great expense, or by leaving their lands fallow (as in Karnataka) (see IWMI 2012). In such cases, provision of longer hours of electricity, through a separate feeder, but only on the condition that connections are metered, even if that metered tariff is nominal, may find some takers. In other eastern Indian states like Bihar, Assam and Orissa, where farm electrification levels are still very low, new connections should be metered from the very beginning to avoid pitfalls of the past.

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## About the IWMI-Tata Program and Water Policy Highlights

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