

Patterns Of Farmer Irrigation Behavior Under Conditions Of Water Insufficiency And Fixed Electricity Tariff: Evidence From Vidarbha

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Abstract : Maharashtra State Electricity Board shifted from a metered tariff to Horse Power linked fixed tariff in the eighties. From 2000, it has shifted all the new connections to metered tariffs. A large majority of the electric pump users in Vidarbha are on fixed tariff system. Barring a small minority in the foothills of Satpur in Nagpur and Amarawati districts (the orange belt), most farmers rely on open dug wells that retain water only up to March. Quantum of water that can be pumped is also quite uncertain. Behavioral patterns in this region under fixed tariff are complex. Most farmers adopt 'Wait & Watch' attitude is remarkable due to various reasons. Area under cotton cultivation has been reduced to half and substituted by Soybean. Gram is taken after soyabean. No consumer desires disconnection of his line. Therefore, even though he deliberately postpones payment he behaves and pays the bill when circumstances become decisive. Affordability of HPT system is a function of land holding and water availability. These two accordingly govern the behavior of the farmers. Evidently there is a gap between the policies & actual implementation of the same regarding levying electricity bills. The enforcement is weak and allows farmers plenty of room to maneuver.

Implications of our understanding are subtle. Undoubtedly fixed tariff is more convenient to administer. It is possible to argue that the level at which the tariff is fixed is determined by taking averages of pumping hours and these regions represent "outliers". Yet it is desirable that hard rock regions that are otherwise poor, do not have any surface water sources and have uncertain shallow water aquifers not be hit with a double whammy by a very hostile tariff regime. At the least the tariff regime needs to differentiate between those who have tube wells that access deep water aquifers and others who access shallow water aquifers through open dug wells. This would mean a graded fixed tariff system one that charges less amount for single phase and small HP motors and those that have say 10 HP and more. Secondly there is an urgent need to improve enforcement. Farmers betting on slackness in enforcement is an evidence of ineptitude in collection and enforcement. Finally, clearly it is desirable that farmers shift to better water distribution methods such as micro-irrigation techniques. In general, micro-irrigation organizations need to focus on hard rock regions that dominantly rely on dug wells since farmers here depend on the little water they can access to provide security of their livelihoods.

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I. Introduction:

Maharashtra State Electricity Board (MSEB) operated a consumption linked tariff system for the agricultural applications till the late eighties and thereafter shifted to a fixed power tariff linked to Horse Power ratings of the pumps. From the year 2000 it shifted all new connections to Metered Tariff system again. As of now the MSEB is trying install electronic meters on farms and this is attracting huge resistance⁵¹. The schedule of charges hence expected charges per year for a typical pump are given in Annex 1. Rural household supply as well as other types of users continued to be charged consumption linked tariff or other special schemes as elsewhere.

Horse power linked tariff (HPT) is said to be advantageous to the supplier in that it eliminates all metering expenses. Meter units themselves are expensive and a large number of meter readers need to be hired. The metered tariff (linked to consumption as measured by meters) is not free from trouble since the integrity of the whole system remains a matter of question (incidents of tampering with meters, deliberate disuse of the meters, personnel malpractices etc. are all known to have happened not only in far flung and remote rural/agricultural settings but even in cities like Mumbai.) Fixed tariffs were justified thus on the logistical grounds.⁵²

An economic rationale for fixed tariffs was offered particularly where there was abundant and unused underground water. Since the user has already invested in the water extraction mechanism and since the power tariff is fixed any way, the variable cost for extraction of one extra unit of water is limited and hence if there exists a water markets, then the farmers tend to extract as much water as they can to maximise their profits from the water source. Simultaneously, investment is attracted in WEM and power connections increasing competition and reducing water rates for buyers. This benefits not only the farmers but also the buyers of water who can now get water for growing crops which they were unable to do before proliferation of WEM came about. The economy of the rural areas thus prospers. And if the power supplier fixes the annual tariff in such a way that he pretty nearly covers the power consumption likely to be incurred in an average WEM, there is net gain to society without any one losing.

The negative fall out of fixed tariff is the burgeoning of demand for WEM and for power for the pumps and overall deleterious impact on ground water balance. The matter gets compounded and the negative consequences become accentuated when the State owned power supplier is forced by powerful farm lobby and populist politicians to peg the fixed tariff at very low or mere notional level as has happened in almost every state in the country. The end result is seen to be disastrous

- ground water balance which depletes at alarming rates.

⁵¹ See Tarun Bharat, dated Nov. 5 and Ghar-Sansar in Tarun Bharat dated Nov. 16 2002.

⁵² The State is asking the MSEB to allow shift from HPT system to flexible system for individual WEMs though group schemes may still be under HPT system. See Tarun Bharat of Nov. 16, 2002.

The following Table shows factors deemed to be relevant for these decisions, a priori

| SN | Decision | Factors encouraging | Factors opposing |
|----|---|---|--|
| 1 | Whether to establish a water source and install a WEM | Income stabilisation High returns from possible crops Rise in land value | <ul style="list-style-type: none"> • Capital needed • Uncertainty in accessing water • Reliability of water markets |
| 2 | Whether to irrigate a crop using a given WEM | Returns from crops Treating sunk capital cost as zero | Cost per unit of irrigation Power/fuel Tariff and maintenance |
| 3 | Shifting between WEMs and distribution methods once water source is established | “more crop per drop” lower variable cost technical factors of access, ruggedness, Head etc. | Fresh investment |

We write this in connection with electricity tariff system of Maharashtra. We are concerned in the main with the decisions of type b and c above. Specifically, the decision is whether the farmer should irrigate a crop (and which one) once he has an electric pump on a well or should he “return the connection” on tariff grounds and whether he should shift from electric pumps to diesel pumps and if so under what conditions. The following components of behaviour of farmers in regard to irrigation using an electric pump are of particular importance to us:

- Behaviour in regard to acquiring a pump and obtaining a legal connection
- Hours of use of the pump per season/per year
- Shifting to metered charges
- Crops grown using the irrigation so generated
- Use of alternate (diesel) pumps in preference to electric pumps
- Digging Multiple wells with the same/multiple connection
- Malpractices in regard to power use
- Payment of the electricity charges in time or when forced
- Shifting to the new offer of metered charges and acceptance of electronic meters
- Requesting surrender of the electric connection
- Supply factors for water

Two important factors are relevant for this decision. The first is the quantum of water available in source. The second factor is the certainty in availability of water when needed. For instance in most wells in Vidarbha area, water availability is at the most up to March end. But whether it will be March end or mid February depends on factors like rainfall as well how many others are pumping out water in the vicinity.

Other relevant factors are power availability and reliability and of course the power tariff in force. As every where, power supply to agriculture in Vidarbha is rationed to under six hours a day. But at times this also is not available. And the quality of power supply is an

issue as well. This problem is relevant in rabi⁵⁴ when there is adequate water in the well for irrigation. After March the binding constraint is water in the well and not power⁵⁵. The system and quantum of charges is an issue as it decides the cost of irrigation vis a vis other methods of irrigation.

Demand for electric pump usage is derived from several factors as well. The most important thing is of course own need for water. This in turn depends upon land holding and crop mix since these two will determine frequency and quantum of water needed. If there are water markets, if the farmer is located to some one else's bore well which has a lot of surplus water then it is possible to buy water as well. On the contrary if one has surplus water, one may be able to sell the water to some one. Thus water markets influence demand for power. The fact of the water market coming into play depends on topography, cropping pattern chosen by the neighbour and the neighbour's perception regarding power availability.

The behaviour is also affected by some non-economic factors. Among these is the perception and knowledge of what the electricity supplier will do in case one takes a course of action (such as non-payment of bills), the assessment of the chance of getting caught, the social prestige one enjoys and that may get jeopardized because of non-payment and consequent action, political influence one can bring to bear on the implementing machinery of the supplier etc.

III. Hypotheses:

Base on the above discussion, we offer some simple hypotheses.

Under conditions of rationality

- a. Under conditions of abundant water availability, large water demand and fixed tariff farmer maximises profits by increasing pumping to high levels subject only to power availability. Under these conditions farmers will not only grow crops on their own farms but also trade in water.
- b. Under conditions of abundant water availability but low external demand for water, and fixed power tariff farmer opts for thirsty crops and three season crops etc.
- c. Under conditions of limited but certain water availability, high own demand for water and fixed tariff farmer avoids selling water to neighbours and chooses hardy crops
- d. Under conditions of limited land and water resources and fixed tariff, farmers have use electric pumps for stabilization or for non-economic reasons but would want to shift to metered tariff.
- e. Under conditions of limited and varying water availability, moderate demand and fixed tariff farmer defaults on power payment or steals power

⁵⁴ See Hitvada, citiline dated Dec. 1, 2002

- f. Under conditions of dispersed land and limited water sources farmers prefer to use diesel pumps.

IV. Methodology and Data

We followed a methodology of preparing short case studies of farmer behaviour in the face of fixed tariff and varying type (in terms of quantum and reliability) of water resources and growing varying crops. Nine cases are given in Appendix I. Each case is followed by short remarks on the aspects of farmers behaviour highlighted by it. Annex 2 gives the summary of the case data on some chosen parameters. Major inferences that can be drawn from each of the cases are indicated below:

Case 1: A large orange grower with political clout has multiple connections. He has installed a higher HP motor against his 3 HP connection. He used to pay bills in time but soon discovered that political populism made the government waive 50% of the bills and allowed even the balance to be paid over installments. He felt cheated and has now stopped paying altogether. He believes he will have enough time for making payments before his connection will be cut. Pumping is limited by water availability. He has to give up orange from a part of his plantation for paucity of water. Inference: irrespective of tariff, farmer behaviour is shaped by expectation of enforcement behaviour of the supplier.

Case 2. A small farmer can barely afford the electricity tariff. But the power connection offers him irrigation that gives some security of income. Lacking any political backing or staying power, he simply pays though grumbles a lot while paying. It is a fixed expense he does not even think of not incurring because it is so important to his security.

Case 3: A farmer with small land holding just does not run the pump long enough to warrant the payment of the full amount under the Fixed tariff regime. His connection is old and he can not afford to return and get a new connection either. This is the true tragedy of the farmer under fixed tariff and limited water conditions. He wants to shift to metered tariff but the supplier is going slow on changing over. This case seems to represent a very large number of farmers.⁵⁶

Case 4: A farmer acutely conscious of his social status pays the bills for fear of stigma of being declared a defaulter. A rare species but seems to be around still. This is the equivalent of the urban *bhadralok* who would rather make their children return all the educational loan even though no one ever worries about strict recovery of student loan!

Case 5: Hiring water to keep the plantation going: A rich farmer makes repeated bore wells and installs connections, but the supply of water is still not enough. So he must buy water at quite an expensive price of Rs. 1000 for 12 hours to keep his orange alive.

⁵⁵ See Tarun bharat March 21, 2003, describing 312 villages in 13 talukas as having acute water scarcity with wells drying up.

Shows that once you have made a long term huge commitment of land to a plantation crop, water scarcity rather than tariff is your major problem.

Case 6-7: Medium land holders unable to make good returns due to cotton search options for cotton crop so that the same given land and water conditions will yield better returns. These cases show how fixed tariff and limited water combine with a frozen cropping pattern to keep farmers economy in trouble. Unable to do much about power or about water, farmers seek to do what they can, change cropping pattern.

Case 8: A well off farmer tries very hard to find water in his largish holding. At long last he gets water but that too is not enough to justify full payment of the fixed tariff. So he simply returns the connection and takes to diesel pumps. Since much capital investment is needed in trying to locate good water supply or in changing over from electricity to diesel pumps, this is a rare behaviour.

Case 9 A Medium holder, this farmer pays the bill because he sees there is no alternative (TINA). He hopes for speedy change over to meter system by the supplier and also dilly-dallies with payment, but pays enough and early enough to avert any punitive action. The only good thing is that the supplier is forced under political pressure to go slow on enforcement.

We thus see the cases represent a whole spectrum of behaviours. One thing is clear that the farmers who have open dug well that have limited water do not find it economically profitable to have a fixed tariff system at all. If the well is going to have water till just mid-February, then there can be at best 150 hours of pumping. However, when one imposes the crop calendar and irrigation timing requirement on this, the effective hours of pumping shrinks to about 60% of this. Thus effectively, 90 hours of pumping is all that is possible. For this paying Rs. 6000/- is not considered worthwhile. This translates to about 200 KWH of power consumption. If the non-irrigation uses of the pump (e.g. for bathing and watering the animals, gardening, drinking or bathing water for human consumption etc.) are added at the same rate, then the effective power tariff comes to Rs. 15 per unit! This is exorbitant by any standard.

Yet it is interesting to see that only a rare farmer returns the connection. Farmers treat the pump and hence the connection as a way of stabilizing their income. "Some thing will or can be grown in rabi if I have a pump on my well even if monsoon crop fails" seems to be the thinking. While it may not yield high returns, its value as an income stabilizer is immense. The farmer who returned the connection is a Homeopath, has plenty of land and has been able to invest in one dug well each year for a number of years. His concern for income security from land is bound to be low. Most other farmers with 5 or 8 acres of land are at the edge of food security and for them this role of the electric connection is high. Diesel pumps generally would not work if the water table is over 12 mts. deep, which is often the case at least in February. And buying and storing diesel is an

⁵⁶ See Tarun Bharat, Dated Dec. 25, 2002 p. 5

additional headache. Diesel is thus not preferred except when the water source is very remote from where the electric poles and wires are laid. Connection once returned will not be easily restored. Annex 1 shows the fees to be paid. Then on top of them there are the bribes and still the delay. That is why few farmers return the connection even if the pump is not economic, though this may sound paradoxical.

Behavioral patterns under fixed tariff are complex. Most farmers adopt 'Wait & Watch' attitude is remarkable due to various reasons. Area under cotton cultivation has been reduced to half and substituted by Soybean. Gram is taken after soybean. No consumer desires disconnection of his line. Therefore, even though he deliberately postpones payment he behaves and pays the bill when circumstances become decisive. Affordability of HPT system is a function of Land Holding and water availability. These two accordingly govern the behavior of the farmers. Evidently there is a gap between the policies & actual implementation of the same regarding levying electricity bills. The enforcement is weak and allows farmers plenty of room to maneuver.

Implications of our understanding are subtle. Undoubtedly fixed tariff is more convenient to administer. It is possible to argue that the level at which the tariff is fixed is determined by taking averages of pumping hours and these regions represent "outliers". Yet it is desirable that hard rock regions that are otherwise poor, do not have any surface water sources and have uncertain shallow water aquifers not be hit with a double whammy by a very hostile tariff regime. At the least the tariff regime needs to differentiate between those who have tube wells that access deep water aquifers and others who access shallow water aquifers through open dug wells. This would mean a graded fixed tariff system one that charges less amount for single phase and small HP motors and those that have say 10 HP and more. Secondly there is an urgent need to improve enforcement. Farmers betting on slackness in enforcement is an evidence of ineptitude in collection and enforcement. Finally, clearly it is desirable that farmers shift to better water distribution methods such as micro-irrigation techniques. In general, micro-irrigation organizations need to focus on hard rock regions that dominantly rely on dug wells since farmers here depend on the little water they can access to provide security of their livelihoods.

Annex -1

Levying Electricity charges : What State Electricity Board offers

As a part of this study information has been obtained from the engineer at the office of Maharashtra State Electricity (MSEB) Boards sub division

1. Comparison between *HPT & *MT

| SN | Contents | HPT | MT |
|----|---|-------------------------------------|--------------------------------------|
| 1 | Fixed charges | Rs 110/HP/month | Rs 10/HP/month |
| 2 | Transmission & Distribution (TGL) Loss charges | Rs 10/HP/month | Rs 0.10/Unit |
| 3 | Energy charges | NA | Rs 0.90/Unit |
| 4 | Minimum operating cost for a 3 HP electric Pump | Rs 4320/Year + Energy charges | Rs 360 + consumption at actual |
| 5 | Our observation for item in SI No 4 | = Rs.6000/Year | = Rs 1500/Year |

Since May 2000, new connections are under MT

2. Expenditure for a New Connection

| SN | Contents | Amount |
|----|----------------------------|--------|
| 1 | Service connection charges | 1100/- |
| 2 | Security Deposit | 1800/- |
| 3 | Agreement Cost | 20/- |
| 4 | Meter Cost | 2250/- |
| 5 | ELCB + ECB Charges | 995/- |
| 6 | Total | 6165/- |

*HPT – Horse Power Tarriff

*MT – Meter Tariff

Annex 2 :

Summary of case data on important parameters

| SN | Parameter | Case 1 | Case 2 | Case 3 | Case 4 | Case 5 | Case 6 | Case 7 | Case 8 | Case 9 |
|----|--|-------------------------------|--------------|----------------|--------------------------|-------------------------------|-------------------|--------------------|----------------|--------------------------------------|
| 1 | Land Holding (Acres) | Above 30 | 5-10 | 2-6 | Above 15 | 9-30 | N.A. | Above 15 | N.A. | Above 6 |
| 2 | No. Of Electric Pumps | More than 1 | 1 | 1 | >1 | 1 | >1 | >1 | 1 | >1 |
| 3 | Alternative Irrigation Mechanism eg. Diesel Engine | Nil | Nil | Nil | Nil | Nil | Nil | Nil | Nil | Nil |
| 4 | Irrigation Method | Flood | Flood | Flood | Flood | Flood | Flood | Flood Or Sprinkler | Flood | Flood Or Sprinkler |
| 5 | Financial Category | Good | Moderate | Poor to medium | Medium | Medium | Poor | Moderate | Moderate | Poor |
| 6 | Family Responsibility | Whole | Whole | Whole | Shared | Shared | Shared | Shared | Shared | Shared |
| 7 | Supplementary Income Source | Nil | Nil | Nil | Optional | Optional | Optional | Optional | Optional | Nil Or Optional |
| 8 | Crop in addition to cotton | Soyabean, Gram & Horticulture | Soyabean | Soyabean, | Soyabean, Horticulture | Soyabean, Gram & Horticulture | Soyabean, Gram | Soyabean, Gram | Soyabean, Gram | Soyabean, Gram Optional Horticulture |
| 9 | Rabi Crops | Wheat Vegetables | Gram | Gram | Gram, Vegetables | Gram, Vegetables | Vegetables | Floriculture | Gram | Gram |
| 10 | Preferred Crop | More Veg. | Veg. | Veg. | More Veg. & Horticulture | More V Horticulture | More Veg. | Veg. | Discretionary | Discretionary |
| 11 | Area Under Cultivation (%) | 100 | 90-100 | 50-80 | 80-100 | 80-100 | 50-100 | 80-100 | 50-100 | 50-100 |
| 12 | Area Under Irrigation (%) | 95 | 80-100 | 80-100 | 60-100 | 60-90 | 50-100 | 50-100 | 100 | 50-100 |
| 13 | Avg. Land Occupancy (Months) | 6-8 | 6 | 6 | 6-8 | 6-8 | 6-8 | 6-8 | N.A. | 6-8 |
| 14 | Avg. Desired Pumping (Hrs/Yr) | 1800 | 700 | 350 | 1800 | 700 | 900 | 1200 | 900 | 1200 |
| 15 | Avg. Actual Pumping (Hrs/Yr) | 850 | 325 | 105 | 850 | 500 | 450 | 650 | 100 | 550 |
| 16 | Net Bill Amt (Rs./Yr) | Multiples of 6000 | 4500 Or More | 4500 - 6000 | Multiples of 6000 | 4500 - 6000 | Multiples of 6000 | Multiples of 6000 | 4500 - 6000 | 4500 Or More |
| 17 | Add Exp. Over Irrig. (Rs./Yr) | 500 - 700 | 250 - 500 | 150 - 300 | 500 - 700 | 4500 - 7000 | 250 - 7000 | 500 - 1000 | 250 - 2000 | 250 - 5000 |
| 18 | Pref. Tariff Methodology | Meter | N.A. | Meter | Meter | N.A. | HPT Or Meter | HPT Or Meter | N.A. | Meter |
| 19 | Est. Annual Cost Of Pumping (Rs.) | Approx 2250 | Approx 1150 | Approx 650 | Approx 2250 | Approx 1600 | Approx 1450 | Approx 2000 | Approx x 600 | Approx 1700 |

Assumptions in Parameter No. 19

- Operational Pump of Minimum 3 HP
- One Hour Operation = 2.4 Units Consumption @ Rs. 0.90 / Unit + Rs.0.10 / Unit TDL + Tariff @ Rs. 10 / HP / Month

Appendix I

Patterns of Behaviour under Fixed Tariff and Limited Water availability: Some Cases of farmer behaviour.

1. "Who Bothers about Electricity Bill' s Payment Within Time"

Shri Dadoji Mhatre is a political heavyweight in Mohapa village of Kalmeshwar tehsil in Nagpur district. He owns about 48 acres of land near Mohapa. Also is the successor of now abolished traditional feudal system. The famous Orange Bowl in Vidarbha commences from this tehsil. Dadoji' s entire land is under cultivation out of which 30 acres is under irrigation. Dadoji' s sole source of income is agriculture on which he has to run his family comprising a wife and two children one of whom is seeking technical degree from a private college in Nagpur. The younger son is in school education at Nagpur. Moreover Dadoji has to sustain with certain annual traditional religious issues incurring handsome expenditure since the entire villagers at his native place are involved in the same and they are to be provided with food on one particular day every year. The occasion is Khandan ki Ijrat for him and any how he has to compulsorily carry out the ritual every year without even considering the feasibility of the same in terms of time, money & other resources in order to maintain the tradition.

Dadoji has a 35 feet deep open dug well (ODW) & a 400 feet deep bore well (BW) to meet the irrigation needs. Odw gets dried around mid February and thereafter he has to pump water out of the BW , collect in the ODW and then carry out the irrigation up to May. Orange is his principal crop (56 %) which extends between October and May while Cotton (15 %), Tuar (7 %), Soybean (13 %), Jowr (9 %), Wheat (6 %) and Gram (15 %) occupy relevant respective periods between June & February. Orange needs water every 15 days and the volume Dadoji cultivates warrants around 2800 annual pumping hours. However, alongwith compulsory load shading inflicted by State Electricity Board, non availability of water is the severe limiting factor for the necessary irrigation and hence, Dadoji can irrigate for only 45 - 50 % of his necessary irrigation demands. He regrets for not having sufficient water which has compelled him to stay away from certain short duration but relatively better returns yielding crops like onion, tomato, cauliflower, brinjal etc. Dadoji feels that if the water crunch would not have existed his earnings would have been about 60 % more than that at present.

Dadoji has a 3 HP monoblock pump over ODW & a 7.5 HP bore well submersible pump for pumping. The connections are under Horse Power based Tariff system (HPT) which implies allocation of bill corresponding to the sanctioned HP irrespective of the pump usage. Under HPT Dadoji has sanction for two numbers of 3 HP electric pumps, but he is actually utilizing without any fear a 7.5 HP electric pump on one of the sanctions for a 3 HP pump. Under HPT the electric bill is charged every six monthly and the cumulative amount inclusive of electricity charges per HP per month and the Transmission & Distribution Losses (TDL) charges and surcharge is to be paid within fifteen days of bill' s issue. Thus, Dadoji owns Rs 6000 only per connection every year to MSEB i.e. he is liable for Rs 12000 every year. In addition to this he has annual expense of Rs 500 for O & M of his connection.

" Irrespective of my earnings I was sincerely paying my due amounts to MSEB with interest if unable to pay in time, sympathizing for my colleagues who were deliberately

shirking away from bill settlements” informed Dadoji. “ I was anticipating some action against them from MSEB. I was aware about the public hue & cry against payable amounts due to persisting drought across the state. I was expecting very little cognizance about the issue at ruling Government’s end and had visualized very meager help from them. I felt my colleagues had built fickle hope and will have to pay for the lapse. In turn I was deemed a fool as the Government announced subsidy of 50 % over net due amount and no penalty for the delay. I sense the issue has gained a strong political asylum and the MSEB is short of measures for stern recovery and provides numerous opportunities for amount settlements. Then why should I exhibit uncalled promptness for bill settlement I get myself laughed at. I am sufficiently resourceful to take bull by horn and avert any proposed crisis out of it”.

As of now Dadoji hardly bothers for payment as and when due, runs a pump of HP higher than the sanction and hopes for some announcement regarding subsidy. However, although he deliberately delays the payment he understands the difficulty in obtaining a new connection if the earlier is cut off and, hence, somehow he settles for the account with MSEB.

Remarks : This care freeness & tendency to deliberately prolong payment is due to the conviction that Maharashtra State Electricity Board (MSEB) provides with opportunities for outstandings’ settlement before any stern action against the consumers who have not paid the bills in schedule. They render facility as liberal as paying one bill in four equal installments @ one installment per month. The political sympathy achieved by the issue have evoked sense of relief among the consumers . They feel the government is their patron as and when the problem will arise & will work out solution which will protect them against likely penalties as well as bills’ payments. Nevertheless, in our opinion HPT is beneficial for cultivators with land holdings above 8 acres as they can get benefited by paying for smaller HP but actually operating higher HP pump. Although water may be a limiting factor but they have more land for cultivation and better chances of maximization of outputs. However, empirical rationality is achieved solely for retention of the connection.

2. “We don’t Know about Tariff Methodology. We Try to Pay As and When We are Charged For”

Shri Diwakar Girhepunje stays at Rasulabad village of Deoli tehsil in Wardha district. He owns about 8 acres of land in which cotton, sorghum, gram & sometimes wheat is cultivated. The field is cleared off around mid February and is left barren till the following cotton sowing in June. When asked about non utilization he informed about chronic water deficiency in his area, financial inadequacy for digging bore well as well as about natural land treatment due to extreme heat in summer. The heat causes the land to crack enhancing the percolation capacity, destructs sub surface pathogens, provides time for the farmer to prepare for the next season.

“ Sir, I find 60 % reduction in well water column. Every year we dig for additional 3 feet inside our well hoping we get extra water to fulfill my irrigation needs. But at the end of every season I find myself wanting even after enhancing depth of my well. I have family of six, three children & wife along with my old mother; all of us depend on agriculture for livelihood. For past three years even the almighty is angry with us as a result there are insufficient rains vis-a-vis poor returns from the cultivation. Many a times I get agog

after sensing the prospective problems which I am likely to face due to poor irrigation. In the end we leave everything for God and pass the days. I am sure, even if we get ample rains for following three years the sub surface water level will only marginally improve. Hence, our miseries are likely to continue.”

The farmers find it difficult to meet the expenses. Deep water sources are extraneous to locate due to hard rocky geological terrains. “ Bore wells are very risky as aquifers are very poor in water contents. Even if someone dares to excavate chances of tapping ground water is a game of luck. Some people in my area got about 40 % of the expected yield after digging till 400 feet. They now find it difficult to mitigate the hefty expenditure on boring and necessary pumping machinery.”

How do the farmers survive in this imbroglio?

“ Sir,” continued Diwakar “ Cotton has been reduced to about 50 % of the cultivation in past. This reduction is due to relatively longer longevity of the crop, lengthier; often irksome procedure of crop encashment due to monopoly system, higher susceptibility to pest attacks and importantly ever fluctuating rates of returns which we are not assured till we receive the currency in our purse”. He informed about some crop rotation practices (which shall be discussed separately elsewhere in this paper under new head) , enhancement in soybean cultivation etc to make the best out the situation. He emphasized agriculture as the only occupation for majority like him in his village and the sole dependence over the same for salt & bread. Therefore, people try to manage their water reservoirs meticulously as a result of which the chief focus is on optimal pumping. They understand the difficulty in reconnection if the original is lost for non payment. The onus clearly is on passing today and pondering over tomorrow’ s likely obstacle and the method to get over the same. Hence, no one weighs the method of charging electricity bill on benefit cost scale and prefer to get rid of the due amount in best possible manner and within best feasible time span.

Remarks : In our studies about 10 % cultivators exhibited this trend. These cultivators had limited resources , limited opportunities for cash crops and suffered from chronic water shortages. Their primary aim was to survive the crisis rather than assess the tariff methodology in vogue. They were found to be focused more on deriving optimal cropping under given circumstances to generate money and treated bill amount weather under HPT or metering system as the compulsory input. They were not found to be serious about whether the net payables were proportional to actual consumption.

3. “ Mai Bap Sarkar, Please Sanction us Regular Meter. We can not Afford HPT ”

“ Ka sangujee tumhale hey HPT amachya sathi lai mahag aah” (What to tell you Sir, HPT is immensely costly for us.) Shiva Wankhede was painfully saying. He stays at Belgaon in Wardha tehsil of Wardha district. He has a meager 6 acres on which he has to sustain his wife, daughter and a son. His elder son runs a tea stall & somehow makes for his own living. Water level is very deep and it is very difficult to cultivate any other crop than traditional Cotton, Sorghum & Gram for want of water. Shiva has a 60 feet deep ODW which almost dries around January. After January he can operate his 3 HP electric monoblock pump alternate day & for just 30 minutes at a time. Even before January he can operate for about 3 hours a day only when irrigation is required for the crops. Higher well depth and coupled with higher initial & higher O & M cost does not allow for

employment of diesel engine as the irrigation equipment. Thus, geographical, natural and financial features does not support agriculture to be commercially too viable. " Sir, MSEB holds compulsory load shading for 6 hours in a day. This again severely influences my irrigation. We cultivators are destined to experience death every day in every year. I manage to met hardly 30 % of my irrigation needs. Tell me, where from I can generate sufficient? I have to pay about Rs. 4800 every year due to HPT. I just can not afford to pardon that much. Shall I feed my family or shall I abide the statute? I am in severe dilemma. It is vividly clear that HPT system is expensive ; at times exorbitant for me and hence I plead to MSEB officers for allotting me regular meter" concluded Shiva.

Remarks : Marginal cultivators have found HPT difficult to bear with. Add to this feasibility of pumping for hardly one hour due to water availability to allow for that much only and the cultivation for only six months in an year the situation is more grim. The cultivators felt that had the tariff would have been under the meter system they would have to pay just Rs 1500 only considering their actual pumping water & electricity availability wise.

4. " Even though Bill Payment is Stressful I Pay Because I Lose my Status in Village if Declared Defaulter"

Meet Shri Namdeorao Chavre of Deobuldi in Kalmeshwar tehsil of Nagpur district. He has 43 acres land out of which 25 acres is under irrigation and 5 acres is under dry cultivation. He has six ODWs all fitted with a 3 HP electric monoblock pump each. Three connections out of six are under HPT whereas the remaining governed by regular meter. Average depth of each well under HPT is about 27 feet with average water column of about 7 feet up to March. After March till monsoon he has to remain satisfy with only 3 feet water every well. Due to HPT he is liable to pay about Rs 18000 only every year. He cultivates Cotton, Soybean, Tuar, Sorghum, Wheat, Gram and Oranges. His Annual Profit & Loss account is solely determined by the Orange crop.

" This HPT system inflicts financial penalty over me as I am not able to utilize water in proportion of my compulsory bill amount . I am hardly able to pump for average two hours a day due to water paucity against requirement of minimum five hours of pumping" Namdeorao quoted. " Considering the cash value Oranges should contribute 50 % of my annual income. But for past few years it is not happening due to some natural calamities putting stress on my pocket. At times I get so frustrated that I feel like selling my land. I do not wish to unnecessarily delay the payment. But when my backbone is broken how can I sustain? We undertake cultivation hoping against hope. MSEB do not allow for excessive delay. Since village is tiny everyone is aware about the happenings in surroundings. No information can remain secret for long. To sustain rural politics is a tough job" Namdeorao explained. He is regarded as a heavy weight among the contemporaries, enjoys special status among villagers. He fears disconnection of his electric line will become news cracking his status and hence he opts for bill settlement at the nearest opportunity even if he has to accept debt for the same.

Remarks : This behavioural trait was seen among those holding special status among the village. Although they do not wish to pay in time due to plethora of reasons they have to compulsorily pay to withstand their reputation. The % cultivators exhibiting this was about 5 .

5. " We Hire water to Maximize the Output vis-à-vis Meet the Compulsory Expenses"

Four wells to irrigate entire 12 acres land under cultivation, isn't it enviable? One can visualize easily the greenery and prosperity accruing out of such wealth. However the reality is different. Shri Nagesh Bonde, a farmer at Mohali in Kalmeshwar tehsil of Nagpur district finds hard to run the show. He owns electric motor pump over each of his 4 wells, three out of which are under HPT. The wells are average 50 feet deep with 8 feet water column between September and December. After that wells gradually begin to dry with chronic water deficiency experienced from March till monsoon. According to him there is 60 % deficit between demand and his actual irrigation partly due to power shortage & partly due to water shortages. He can irrigate hardly for three hours a day. Orange is the chief contributor to his income and hence it either makes or breaks his economy. Other crops cultivated by Shri Nagesh are Cotton, Tuar, Soybean, Wheat, Sorghum and some seasonal vegetables all of them need irrigation at some time during their respective lives.

Under HPT system Nagesh has to compulsorily pay Rs 4500 only per connection every year. Also his connection under regular meter inflicts expenditure of about Rs 1500 only every year. Add to this his O & M cost for every connection and he is thus liable to pay about Rs.18000 every year to MSEB. The complexities upon disconnection for non payment make Shri Nagesh compulsorily pay the electric bills.

How to make best with insufficient resources at hand?

Cultivating crops with less water needs is not the optimum option for him. Fortunately he has some friends who have surplus water resources. So Nagesh opts for hiring water @ Rs 1000/ 12 hours as and when needed. Average execution of this option is about 5 times per year. " Kya kare Sir? This option puts additional burden over my purse. But at least I make sure that my cultivation does not get litter for want of water. I hope to generate that much more upon hiring water. If I do not seek this option it is certain that I run into more troubles which may be unsustainable for me and almost impossible to come out of " concluded Nagesh.

Remarks : Those cultivators who are assured about better returns and hold other sufficient resources for value addition except water opt for this pattern. Although most of the cultivators were found to hire water at some time their only concern was to prevent total massacre for want of water. The heavy price of hiring water makes this option feasible for those only who can regularly afford payments. For them this hiring is value addition in the true sense as this hired water improves their productivity noticeably. Thus, naturally this pattern of behaviour is common in cultivators of above average financial status. This tendency to hire water is common when cash crops are cultivated in more than 50 % acreage of total cultivation.

6. " Let us Work Upon Alternatives for Cotton"

Soybean is short duration crop occupying period between June and November. Most of the irrigation is rain fed and needs very little attention & external supplements. Shri Deorao Mohite at Pulgaon in Deoli tehsil of Wardha district has 35 acres of land distributed at three places within the system. Additionally he is cultivating his friend's

land on rent as his friend stays at Gadchiroli due to occupational commitments. Deorao's own 12 acres plot only can be artificially irrigated because other plots do not have access to any other water resource. His remaining two as well as his friend's plot are dependent on rains only. Therefore Deorao puts more hopes for income after cultivating his plot possessing well on which a 3 HP electric motor pump has been installed about 6 years back. Net yearly payable tariff is around Rs 6500 payable in two equal installments. Herds of pigs & parrots at times add to the woes by destructing the standing crops overnight and also there are chances of burglary since Deorao's land is neighboured at times by pastorals. So, Deorao suffers either from natural non assistances or from artificial calamities accounting for at times heavy financial losses almost every year. He has to remain mentally prepared for some percentage of bad debt every year. Such happenings create such contingencies that sometimes he has to bypass his pre planned expenditure schedule & meet the contingencies. The traditional Cotton crop is no longer a sure bet for him due to various reasons. Also, lack of proper infrastructure & non availability of adequate water resources impede his options of cultivation.

Deorao is a tough nut. He is aware about the happenings elsewhere in the agriculture industry. To survive in the situation he has adopted crop alteration through which he has reduced his cotton cultivation by 60 % and has substituted it with Soyabean which is either grown as pure crop or in intercropping system along with Tuar in alternate lines. Soybean incurs high & early returns and also can be eradicated as quickly as within 48 hours after yield. This implies another crop can be sown within 72 hours of Soybean maturation.

Deorao sows Gram at the place of Soybean & once Tuar is realized at the end of winter its place is taken by summer variety of Gram if desired. Thus, as against the earlier system of Cotton + Tuar a new equation has been scripted which reads Soybean + Tuar with some % of Cotton followed by Tuar + Gram and again followed by Gram if deemed necessary. This cropping pattern is yielding satisfactory if not handsome solution to majority of the cultivators in the region for past three years as a result of which Soybean replacing about 50 % cotton in Kharif season & Gram for Rabi is an established pattern since past three years.

Remarks : Almost all the sample under study unanimously emphasized about the sufferings due to pure cotton cultivation. Cotton is no longer profitable if in monoculture alone. Therefore the previous pattern of Cotton + Sorghum + Tuar in majority has been almost substituted now with Soyabean being everyone's first choice irrespective of land holding and other resources at the expense of proportionate cotton. Although Gram has been accepted as option for dry land cultivation since past 15 years in Kalmeshwar tehsil some cultivators at Tishthi, Deobuldi & Pilkapar villages are experimenting agriculture without Cotton since past seven years by cultivating various crops belonging to botanical family Cucurbitaceae along with some regional varieties of legumes & some leafy vegetables like Spinach in Kharif season. The logic is to stay away from the anticipated ignominy in Cotton and cater the festival season when such vegetables are in volume demands in near by Nagpur city:

7. " Avert Water Crisis by Experimenting New Concepts : Go Ornamental "

Shri Raghunath Chowdhary belongs to joint family comprising four brothers with respective progeny. He is a tout in wholesale vegetable market at Deoli in Wardha district. All other brothers are busy in respective occupations of Krishi Sewa Kendra,

grocery shop & politics. All of them according to own convenience look after their traditional farm spread across 15 acres near Pulgaon where they reside. Raghunath being eldest acts as the lynchpin in any affairs concerning the family; be it occupation, social or domestic issues. He looks after entire management of family and holds the last say especially in agriculture. The farm is equipped with a open dug well fitted with a 3 HP electric pump for irrigation. The well is already 70 feet deep with 8 feet water column only till December and almost dry around February till following monsoon. Also, the frequent load shading or inadequate power availability are common phenomenon restricting irrigation feasibility further. Also the ground water stratum is grossly inconsistent limiting the number of dug wells in the area. He is contemplating bore well next year if he can generate necessary finance and gets convinced till then about the success of the same.

For him Cotton is no longer attractive option of revenue. Also he is circumspect over Soybean's yield and longevity. Almost elimination of Wheat for want of water, lack lusterness associated with Cotton and bit of academic interests prompted him to think about purposely viable option even if on pilot scale. He cultivated flowers like tube roses, Delia, roses, marigold & shewanti and to his surprise and joy found these orchards less water demanding and attractive. " Sir, these flowers render aesthetics to my farm, provide me option for better returns and sort of uniqueness in the market." He is yet to arrive at the exact economics, feasibility on large scale considering routine O & M on mega scale and of course the relevant market considering the rapid perishable nature of the output.

Nevertheless, the experiment of first year has developed confidence to practice this trade on minimum three acres and he is finding some emulators around his periphery.

Remarks : This normative educative trend is rarely seen to have been adopted for want of water. The success of the same for firm establishment is now difficult to predict. Still good for those who wish to experiment novelties and possess surplus land & resources.

8. " Surrender Connection Due to Water Paucity "

Dr. Marotrao Dahake has 30 acres of land at Belgaon in Wardha tehsil of Wardha district. He is a homeopath by qualification, runs a consulting at the same village but the major occupation is agriculture. He stays in the village with his wife, younger daughter who is high school student whereas his two sons stay at Pulgaon for respective occupations. One of them is married and the younger brother stays with him. Neither of them is dependent on their father for anything. They share cordial relationship with each other and frequently meet each other for some reason or the other. Dr. Marotrao also runs vermi compost unit in his farm and is always after some co curricular activities in agriculture.

Marotrao is nicknamed Kala patthar Baba (Man with Black stone) in his village because his attempts proved futile when he successively attempted a open dug well for fifteen years in order to irrigate his 25 acres of land under cultivation. At last he got success when instead of black stone he could discover water after digging. His cropping pattern commensurated with that in the region i.e. Cotton with Tuar in Kharif season followed by Gram in Rabi. As soon as he had water he attempted Oranges in 12 acres. He had an

electric pump over the well with tariff payable under HPT system. The proposed payable amount was around Rs. 6000 per year. However, this proved to be a blunder because water was too meager to either sustain the irrigation demand of Oranges or to last beyond December. This paucity directly influenced the productivity and Dr. Marotrao found that he has ruined money in Orange cultivation as well as in electricity bill payment because due to HPT he had to compulsorily pay the amount but actually he could not consume equi-proportional electricity due to water scarcity. He also experimented with seeking water from the neighbourer and also had paid him in cash or in kinds but immediately realized that such hiring can not become a strategic option. Hence, he deemed surrendering the connection worth while. Nevertheless, he continued his search for water and tasted success last year. Now he has a 5 HP electric pump under meter system over his well for irrigation.

Remarks : Rarest of all the behavioural patterns. The cultivators very well understand the pros & cons of obtaining fresh connection upon disconnection of the original.

9. "TINA Factor Drives us Towards Bills' Payments"

TINA (THERE IS NO ALTERNATIVE) was found to be crucial factor in maximum cases settling the bill amounts. As an illustration following case is presented.

Shri Ramrao Nasery owns 9 acres land at Tishthi in Kalmeshwar tehsil in Nagpur district. His entire land is under cultivation of Cotton, Tuar, Sorghum, Soybean in respective % with Orange. In raby season he cultivates Wheat, Gram and some seasonal vegetables. He has a well fitted with an electric motor pump for irrigation. Being under HPT he incurrees Rs. 6000 annually towards bill. He desires about 900 pumping hours annually for his crops. Water although not sufficient is not too meager to meet the demand satisfactorily. However, water' s non availability at the time of feasible pumping hours during actual working time in field put stress over him. Also, the perennial load shading present hindrance to pumping. Thus, the pumping activity is negatively influenced either due to natural non co operation or due to electric supply as a result of which Ramrao can utilize hardly 50 % of what he has to compulsorily pay due to HPT system. The desired cropping pattern consequently has been influenced restricting Ramrao from cultivating Banana, Sugar cane, Ornamental Flowers of commercial value. Instead he has remain satisfied with cultivating crops like Gram which although need less water but are not attractive considering their mediocre financial returns. The economics is thus disturbed and the bill amount which might have been sustainable if adequate water would have been available now looks little out of capacity to meet with. Hence shirking tendency creeps in which prevents settlement of bill in time.

However, likelihood of line disconnection, implied handicapness for irrigation and known lengthy procedure of seeking new connection does not allow the cultivator to

delay or sink the bill amount altogether. Bill settlement is definitely on their agenda . the only question is When ? Ramrao confessed that he delays the amount for about one year.

Remarks : No cultivator wish to call crisis himself even though he may try to toy with bill settlement issue. They understand MSEB will not switch over to meter system overnight. The change , they know will be gradual and hence are not committing any extra ordinary efforts for the same. The silver lining to the story is they can wishfully prolong bill payment without accruing substantial penalty. Concluding Remarks

- 1 Behavioral Trends under HPT are complex. % Consumers employing 'Wait & Watch' attitude is remarkable due to various reasons.
- 2 Although for reasons other than drawbacks of HPT system, % of cotton cultivation has been almost reduced to half & is well substituted by Soybean & Gram.
- 3 No consumer desires disconnection of his line &, therefore, eventhough he deliberately postpones payment he behaves positive when circumstances become decisive.
- 4 Affordability of HPT system is a function of Land Holding & accordingly governs the behavior of the consumers.
- 5 Evidently there is a gap between the policies & actual implementation of the same regarding levieng electricity bills.
- 6 Even after sanctioning certain exemptions quiet a huge amount remains un recovered may be due to availability of adequate infrastructure & resource.