

# EXPLORING GROUNDWATER MARKETS

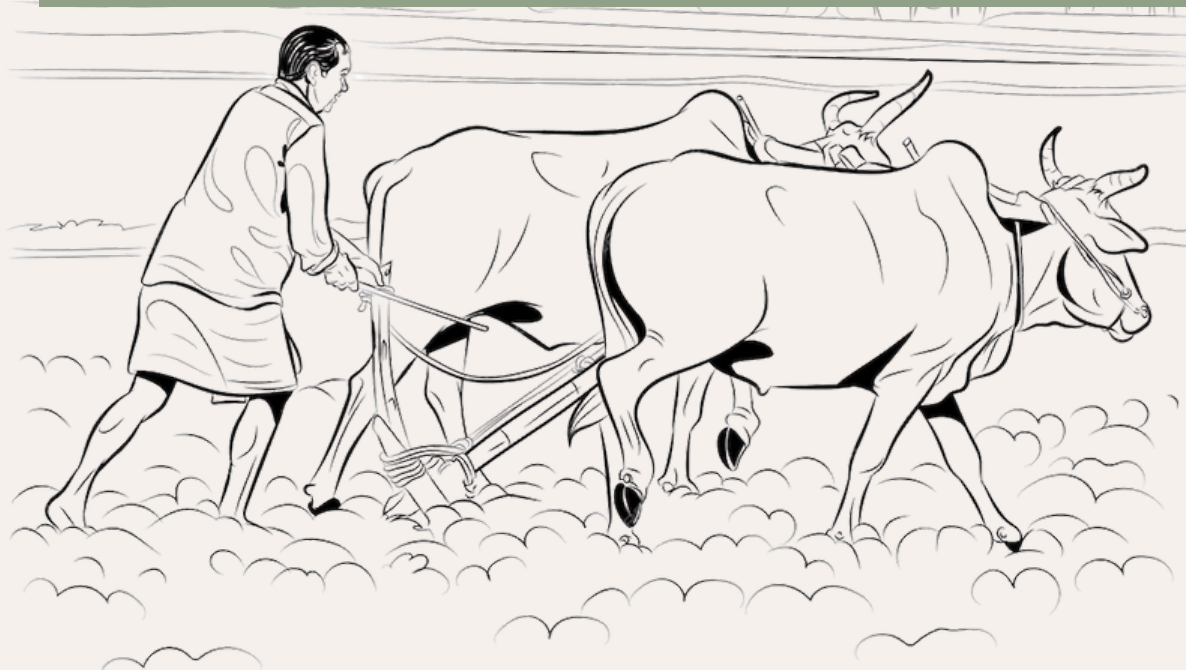


**FEBRUARY 2023**

**BASED ON CASE STUDIES OF WATER  
SELLING MODELS FROM WEST BENGAL**

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# ACRONYMS



CD

Community  
Development



HP

Horse Power



INR

Indian Rupee



PV

Photovoltaic





## INTRODUCTION

About 90% of groundwater extracted is used for agriculture in India. This makes agriculture highly dependent on groundwater for irrigation purposes.

The informal groundwater markets in West Bengal operate to ensure irrigation water for small and marginal farmers as they cannot afford to invest in Water Extraction Mechanisms. This practice of sharing water as a resource has been prevalent in Eastern India for a long time.

## THE RATIONALE OF THE STUDY

Towards understanding the present economy around agriculture, it would be worthwhile to study the current water buying-selling market which is still highly unregulated, as there has been recent changes in technology (from kerosene to diesel to electric and now solar operated pumps). The case studies of farmers would unfold perception of water as a resource among communities in West Bengal and also throw light on the socio-economic dynamics of water sharing and distribution.



# REVIEW OF LITERATURE:

## 1. The Energy-Irrigation Nexus and its impact on groundwater markets in eastern Indo-Gangetic Basin: Evidence from West Bengal, India - (Mukherji Aditi, 2007)

This study unravels the idea of economic scarcity of water in West Bengal. The high replenishable capacity of West Bengal due to the geographical and topographic advantages of the state allows water to recharge at a faster rate. The paper assesses the groundwater markets in terms of equity, efficiency and sustainability. The study also conducts a comparison between irrigation water sold through diesel pump and electric pump and advocates for a high flat rate of electricity by the Government.

## 2. Monopoly Power and Distribution in Fragmented Markets: The Case of Groundwater (Jacoby and Murgai, 2001)

This paper takes the case of Pakistan to understand the price determination of irrigation water. It takes the case of water selling in different seasons and compares the peak season pricing. It associates the idea of water buying and selling with Water Lords and subjects differential pricing to market forces of demand and supply. It also compares the case of groundwater irrigation with canal irrigation.



## REVIEW OF LITERATURE:

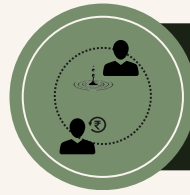
Through this study, SwitchON tries to capture cases of water selling in West Bengal. The case studies put forward cases of irrigation water distribution in West Bengal and has the three main objectives-



Understanding the functioning of water markets through documenting rates of water, mode of payment, and details of transaction. This objective will dive deeper into the components of price determination of water.



Understand the perceptions of ownership of water as a resource among community



Understanding the socio-economic background of water sellers and buyers



# RESEARCH METHODOLOGY:

The study would primarily look into the experience of the farmers to find out possible driving/restraining forces behind practices around buying and selling of water.



## RESEARCH SETTINGS

The universe of the study would be water buyers and sellers (all farmers) from Pandua C.D. Block of Hooghly district in West Bengal.

## LOGIC & APPROACH

The study will be inductive and would follow the qualitative research method having the case study approach. The study would be exploratory in nature.

## TIME-FRAME

The study would be conducted during February 2023.

## METHODS & TOOLS OF DATA COLLECTION

The study will capture data through In-Depth semi-structured interviews. Interviews will be conducted with 3 water sellers and 2 water buyers.

## SAMPLE SIZE & SAMPLING PROCEDURE

The study follows a multistage sampling method with a mix of probability and non probability sampling techniques to select farmers. 3 water sellers and 2 Water Buyers will be selected from the list of 20 beneficiaries using random number generators.

## LIMITATIONS & RISK MITIGATION

The number of samples is very small. Hence, the research team would restrain from claiming any pattern in observation as the sample is not adequate statistically and would limit itself to exploring the scope of future studies.

# THE CASE OF GANESH BISWAS



Ganesh Biswas is a middle-aged farmer from Champakdanga village in Pandua C.D.Block of Hooghly district in West Bengal. He installed Solar Panel on January 2019. Ganesh cultivates 10 bigha (3.33 acres) of land out of which 5 bighas are leased in. His monthly income is INR 13000-14000 and household expenditure is around INR 9000 per month (Excluding agriculture, loan repayment etc). Ganesh owns a 5HP Solar Pump.

Ganesh sells ground-water (from around 50 ft depth) on a seasonal contract (meaning he has to ensure irrigation of the decided crop for the entire season). If he fails to ensure the same, he wouldn't be eligible to receive any money even for the water already provided).

The rate for vegetables like Potato is INR 1200 per bigha (0.33 acre) per season whereas the same for paddy is INR 800. There's a risk involved if reliance is entirely on Solar Pump. On cloudy days, no ground-water could be pumped. To respect the contract, this scenario is often compensated with another 5 HP diesel pump through out-of-pocket expense. As a back-up, one kerosene pump is also there. Overall, Ganesh manages to get INR 30000 per year by selling water.

On the other hand, Ganesh has to buy water himself in another part of his land @ INR 36 per decimal (435.6 square feet) which is similar to that of the rate at which he sells water. Within kin, the water is also often "exchanged" based on location of land or sold/bought at lower price than market rate. In a seasonal contract, payment of water is paid only after the season is covered. Ganesh has no idea about the limitation of groundwater and assumes groundwater to be "unlimited". He's not couldn't comment about his "right" over groundwater.

# THE CASE OF **DILIP MONDAL** (Water Seller)



Dilip Mondal is a farmer from Champakdanga village in Pandua C.D. Block of Hooghly district in West Bengal. Dilip cultivates 20 bigha (6.66 acres) of land out of which 10 bighas are leased in. Dilip owns a 5HP Diesel Pump (surface). Dilip sells water @ INR 200 per hour, which includes INR 60 of fuel cost. He also reminds that attaching a long pipe to the pump consumes more fuel to generate pressure. The pump owned by him is over 40 years' old which once required a repair cost of INR 8000-9000. Dilip's land is fragmented. His 30 decimal land is 1 km away from the location of his diesel pump. Hence, he too is compelled to buy water from others. There's no class/caste/religion/community barrier while the transaction of water buying-selling takes place. He buys water on a seasonal crop basis @ INR 1200 per bigha (33 decimal) or INR 36 per decimal (435.6 square feet) for vegetables like potato etc.

# THE CASE OF **TAPAN MAJHI** (Water Seller)



Tapan Majhi is a farmer from Champakdanga village in Pandua C.D. Block of Hooghly district in West Bengal. Tapan cultivates 13 bigha of land out of which 6 bighas are leased in. His annual income is INR 80000. Tapan owns a 5HP Diesel Pump (surface). He sells water on a per hour basis. In per hour selling contracts, payment is received in a more frequent manner unlike seasonal contracts. However, with passing time, more farmers are owning pumps now. Hence, scope of water selling by individual farmers has decreased. Within kin and close neighbourhoods, pumps are often leased out at minimal cost of INR 50 per hour rent or even free of cost (the borrower has to arrange the fuel). The pump he owns is more than 40 years old, and required repairing service only once which cost INR 8000. He didn't install the Solar Pump as it doesn't operate in early morning hours (7 am). Tapan was affirmative about his right over groundwater under his land.

(Water Seller)

# THE CASE OF SIDDHARTA MONDAL



Siddharta Mondal is a farmer from Champakdanga village in Pandua C.D.Block of Hooghly district in West Bengal. Siddharta cultivates 7 bigha of land. His annual income is INR 165000. He buys water both through seasonal and per hour contracts. He didn't invest in pumps because of the fragmented nature of land. However, he is aware of Government schemes regarding subsidized water pumps. He also mentions that the price of groundwater has doubled in the last 5 years. However, as per his experience, the price of water from Solar Pump is 33% less than that from Electric Pump. However, he deters the fact that the seasonal contract has an absolute rule of paying at the end of season. He recalls paying even in the middle of the season as per the request of the water seller.

(Water Seller)

# THE CASE OF RAMCHANDRA BISWAS



Ramchandra Biswas is a farmer from Champakdanga village in Pandua C.D.Block of Hooghly district in West Bengal. Siddharta cultivates 6 bigha of land out of which 4 bighas are leased in. His annual income is INR 100000. He buys water both through seasonal and per hour contracts. He added one new fact that under seasonal contract, the farmer (buyer) is bound to pay for water per bigha even when the land lies idle in any particular year. Failing this, the guarantee of getting water in the subsequent year stands nullified. Hence, INR 2000 per bigha stands as the fixed cost for ensuring cultivation of paddy and potato in the respective seasons. However, beyond this, paddy in off season (Ex. Miniket rice) would cost INR 2400 for irrigation per bigha as more water would be required. He also mentions that the price of groundwater has more than doubled in the last 5 years. On a per hour basis, the charge is around INR 220 per hour excluding fuel cost (which was INR 100 including fuel cost 5 years ago).

# CONCLUSIONS

## FINDINGS ON PERCEPTION OF OWNERSHIP OF WATER

There have been mixed reactions regarding ownership of water. While some are confused about the ownership but think it's OK to draw groundwater for agricultural purposes, others sounded confident that the groundwater is theirs (with the logic that if someone excavates a pond, the ownership of the water in the pond is theirs. Same logic they think should be applied to bore-well)

## UNFOLDING TERMS OF WATER MARKET IN WEST BENGAL

Different pricing systems of water based on source of power

Diesel pump- Price of water is determined per hour.

Electric Pump- Price of water is determined per bigha (33 decimals) per season.

Solar pump- Price of water is determined per bigha (33 decimals) per season.

While diving deep into the mechanism of the selling and buying model, it became eminent that the per hour model is rather a flexible model with flexible rates between INR 140-220 per hour (excluding fuel cost) depending on the season and relationship/closeness between buyers and sellers. There have also been odd cases where pumps were leased out for a rent as low as INR 50 per hour to kins and close associates. However, "per bigha per season" model is rather stricter. This one is a verbal commitment based informal contract where the seller is bound to arrange all irrigation requirements of a previously demarcated land for a particular crop, over multiple subsequent years. The buyer, in return, is bound to provide the premium amount irrespective of the status of use of the land (whether under cultivation or not), over multiple subsequent years. Failing to respect the contract from any side results in deteriorated relationship and trust and the relationship of buyer-seller gets halted in subsequent years.

For seasonal crops like Lalswana paddy, the premium amount per season is INR 800 per bigha (INR 2400 per acre). For seasonal vegetables like potato, the premium amount per season is INR 36 per decimal (435.6 sq. ft) or INR 800 per bigha (INR 2400 per acre). For off season summer paddy like Miniket etc., the premium per season is double the seasonal rate at INR 2400 per bigha (INR 7200 per acre).

Most of the buyers stated that the rate of buying water has doubled in the last 5 years. The sellers, on the other hand, stated that the scope of selling water is reducing day by day as more people are starting to own pumps with passing time. Hence the number of pump owners has been increasing with a reducing number of buyers.

## UNDERSTANDING THE SOCIO-ECONOMIC AND CULTURAL DYNAMICS OF WATER

Given the fragmented nature of land, the small and marginal farmers have adapted a collaborative arrangement irrespective of class, caste, religion, community etc. When it comes to buying or selling water, buyers and sellers perceive only one identity: that they are all farmers. People are accustomed to not only share water but also share pumping infrastructure in exchange of water/infrastructure/premium amount/goodwill, so that none of the farmers are at loss of resources.

# WAY FORWARD

Water is a common natural resource. West Bengal is primarily an agrarian state but the distribution of irrigation water among farmers of West Bengal is highly skewed. For increasing agricultural production and optimum utilization of farm land and labor, it is essential to increase access to irrigation water among small and marginal farmers. Since the landholding in West Bengal is highly characterized by scattered lands, exchange of irrigation water is a practical solution for augmenting agricultural growth. The Water User Associations can play a crucial role in ensuring that process is just both for the water buyers and sellers.

However, while the exchange of groundwater for irrigation purposes presents a practical solution for enhancing agricultural growth in West Bengal, it is crucial to address the concerns surrounding over-extraction. The fact that some water vendors consider themselves well owners highlights the need for a comprehensive monitoring and evaluation system of groundwater abstraction by the relevant authorities. Neglecting such monitoring can lead to severe consequences, as deeper aquifers take decades to recharge once exhausted, making their restoration nearly impossible. Moreover, excessive groundwater extraction not only contributes to water contamination and land subsidence but also leads to water depletion, further exacerbating the skewed distribution of irrigation water among farmers.

To ensure the sustainability of groundwater resources and promote ethical extraction practices, it is imperative to devise a thorough monitoring and management strategy. This strategy should focus on safeguarding the aquifer by preventing over-abstraction and addressing negative consequences. By implementing measures to reduce water pollution and land subsidence, the Water User Associations can play a critical role in promoting just and equitable access to irrigation water for all farmers in West Bengal. It is through a collaborative effort among stakeholders, including farmers, water vendors, and regulatory bodies, that the long-term viability of groundwater resources can be safeguarded, fostering agricultural productivity and prosperity in the state.

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