Regulating Groundwater of Punjab
Exploring Perspectives of Different Stakeholders

MANWINDER SINGH
A project report submitted in partial fulfillment of the requirements for the
degree of Masters in Social Entrepreneurship

SCHOOL OF MANAGEMENT AND LABOUR STUDIES
TATA INSTITUTE OF SOCIAL SCIENCES
M.A. IN SOCIAL ENTREPRENEURSHIP
2008-2010
DECLARATION

I, Manwinder Singh, hereby declare that this dissertation titled 'Regulating Groundwater of Punjab - Exploring Perspectives of Different Stakeholders' is the outcome of my own study undertaken under the guidance of Dr. Subodh M. Wagle, School of Habitat Studies, Tata Institute of Social Sciences, Mumbai. It has not been previously formed the basis of the award of any degree, diploma or certificate of this Institute or any other institute or university. I have duly acknowledged all the sources used by me in the preparation of this dissertation.

5th April, 2010

Manwinder Singh
CERTIFICATE

This is to certify that the dissertation entitled 'Regulating Groundwater of Punjab - Exploring Perspectives of Different Stakeholders' is record of original work done by Mr. Manwinder Singh under my guidance. The results of the research presented in this dissertation have not previously formed basis for the award of any degree, diploma or certificate of this or any other university.

Dr. Subodh M. Wagle
Professor & Dean
School of Habitat Studies
Tata Institute of Social Sciences

5th April, 2010
**CONTENTS**

Acknowledgement vi
List of Tables, Figures and Boxes vii

**CHAPTER-1**

1.1 Introduction 1
1.2 Literature Review 3

**CHAPTER - 2 DEFINING RESEARCH OBJECTIVES AND METHODOLOGY**

2.1 Research Question 5
2.2 Sub - Aspects 5
2.3 Objectives 5
2.4 Research Methodology 6
2.5 Sampling Methodology 6
2.6 Scope of the Study 7

**Chapter - 3 RESEARCH FINDINGS AND ANALYSIS** 8

3.1 Regulating Groundwater - Reaction To Various Regimes 10
    3.1.1 Reactions to Volumetric Regulation 10
    3.1.2 Reactions to 'Royalty" on Water 12
    3.1.3 Reactions to 'Indirect' Regulation 13
3.2 Centralized Vs Decentralized 17

**Chapter - 4 CONCLUSIONS**

4.1 Conclusion 20
4.2 Limitations of the Study 21
Bibliography 22

Appendix - 1 24
Details of the FGD members for each block

Appendix - 2 30
Interview Schedule
ACKNOWLEDGEMENT

Like other better things in life, my gratitude towards people who contributed to this study can only be felt and cannot be measured.

I thank Dr. Subodh Wagle, my navigator (Research guide) who ensured that I do not get lost in the vastness of the scope of the study given the short time frame. I am inspired by his composed attitude with which he listened to me patiently and his critical thinking with which he added value to each conversation. I apologize for some patches of irregular communication during the course of study.

I thank Dr. Samapti Guha, for being so understanding and protective at times when it was needed the most.

I thank S.Sarvjit Singh, my father who contributed in more than one way to this report, as much as he has contributed to almost every bit of my life.

Heartfelt thanks to all the respondents for their valuable time and opinions that shaped this report.

Lastly, I want to apologize for delaying some things, (which were important to me) because of my time commitment for the study. I hope those who were affected by this will understand.

MANWINDER SINGH
Tables, Figures and Boxes

Tables
2.1 Details of the blocks included in the research study 6
3.1 Key Responses from Focus Group Discussions 11
3.2 Preference of Regime vis-a-vis Stakeholders 15

Appendix Tables
A 1.1 Details of the FGD Members of Village 'Kot Miyan Sahib' 25
A 1.2 Details of the FGD Members of Village 'Haveli - Magrala' 25
A 1.3 Details of the FGD Members of Village 'Jaja' 27
A 1.4 Details of the FGD Members of Village 'Khudda' 27
A 1.5 Details of the FGD Members of Village 'Sadrour' 29
A 1.6 Details of the FGD Members of Village 'Kanjli' 29

Figures
3.1 Snapshot of Verbatim records of stakeholders. 8
3.2 Average Cost of Supply in Major States. 2001-02 13
3.3 Prospective model for Community engagement 17

Appendix Figures
A 1.1 Index Map of Gurdaspur indicating the Blocks of study 24
A 1.2 Index Map of Hoshiarpur indicating the Blocks of study 26
A 1.3 Index Map of Sangrur indicating the Blocks of study 28
A 1.4 Index Map of Patiala indicating the Blocks of study 28

Boxes
3.1 Free Electricity Vs Reliable Electricity 14
3.2 Electric Subsidy - Encouraging Theft 16
CHAPTER - 1

Regulating Groundwater of Punjab - Exploring perspectives of different stakeholders

"Nothing in the world is more flexible and yielding than water. Yet when it attacks the firm and the strong, none can withstand it, Because they have no way to change it. So the flexible overcomes the adamant, the yielding overcomes the forceful."

Lao Tzu

1.1 INTRODUCTION

Punjab is a state in northwest India. The Indian state borders the Pakistani province of Punjab to the west, Jammu and Kashmir to the north, Himachal Pradesh to the northeast, Chandigarh to the east, Haryana to the south and southeast and Rajasthan to the southwest. Agriculture has been the prominent occupation of the area since centuries and has been the major source of food and fiber for the population. The State economy is dependent upon agriculture production. Punjab is the major contributor to the National food grains pool. It accounts for 21% of wheat and 11% of rice produced in the country.\(^1\)

Punjab, the major riparian State, has a limited share in its three perennial rivers (Sutlej, Ravi and Beas). It has been allocated only 17.95 BCM (Billion Cubic Meters) out of a total average availability of 42.4 BCM. The Net Groundwater available is estimated at about 21.44 BCM. The total available water resources are thus about 39 BCM against an estimated demand of about 61 BCM, showing a deficit of 38% for a major riparian State.

The production of food grains in Punjab has increased from about 3 million tons in 1961 to 25.2 million tons in the year 2005-06 to sustain the growing population of the state and the country which is expected to reach 30 million and 1250 million respectively, in 2011. Continuous Growth in population, sowing of high-water consuming and high yielding cash crops has led to increasing demands of water for diverse purposes in general and irrigation in particular, causing a great stress on available water resources in the State.

The net area irrigated is estimated to have increased from 2.02 Mha (49% of the total cultivable area) in the year 1960-61 to about 4.078 Mha (97.5%) by the end of the Year 2006-07. With the percentage area irrigated by the 150 year old canal network of the state dropping from 55% in

---


\(^2\) Punjab State Water Policy - 2008 (Draft)

\(^3\) ibid

\(^4\) ibid
**1960-61 to 29%** in 2006-07⁵, it is evident that Ground Water resources have been imprudently exploited.

There has been intensive groundwater extraction in the last four decades through installation of **shallow tube-wells** by individual farmers, *showing an increase of 521% during last 35 years!* The over exploitation of groundwater for agriculture has resulted in continuous decline of water table in most parts of the State. The water table is declining in 79% of the area of the State where ground water is sweet.

According to CGWB (Central Ground Water Board) data 103 blocks in Punjab (of a total of 138) are overexploited. Sushil Gupta, Regional Director, (CGWB), uses a simple analogy: "Hundred litres are pouring in and 110 are being taken out. It is like mining water, which is not being replenished." Stage of Ground Water development for the state is at an alarming 145%⁸.

There is a dire concern that if the rate of exploitation of our ground water resources continues in this manner, the entire ground water reserves may soon get exhausted, leading to a total breakdown of the State's economy. With these kinds of grievous consequences that stare the people of Punjab squarely in the eye, it is solicited that Punjab comes up with a Progressive Groundwater Policy. On the contrary, it appears that all the State of Punjab has done so far is to reject 'The Punjab Ground Water (Control and Regulation) Act, 1998', prepared on the guidelines laid down by the Centre in the form of Model Bill. Punjab State Water Resource Committee observed that the draft was "too harsh" on users and Model Bill was not in the larger interest of the farmers.

This paper strives to explore the perspectives of various stakeholders on the issues of Groundwater Regulation that may provide concrete clues in the formulation of a framework for effective Groundwater management.

---


⑦ The author is forced to use this terminology because of its technical acceptance

http://cgwb.gov.in/gw profiles/st Punjab.htm
1.2 LITERATURE REVIEW

- **Oxford** Handbook of Water Resources In India

  Edited By: John Briscoe and R.P.S Malik (for) THE WORLD BANK

This handbook has been compiled by taking inputs from India's leading 'Water thinkers and practitioners' and it presents a set of papers on major water policy issues in India. The book is a product of multi-stakeholder consultations amongst individuals from the Union Government, Planning Commission, state governments, the private sector, financial institutions, urban water supply utilities, NGOs, academics, professional associations, chamber of industry, bilateral and multilateral aid agencies, and UN agencies.

This volume is a comprehensive source on water resources with chapters dedicated to overview of India's water resources, relationship of water with environment, energy, rights and entitlements, government policies and programmes, perspectives of the Planning Commission, pricing and regulation etc.

The present study benefits immensely from the Chapter "Water and Energy Interactions" by Ramesh Bhatia. The relation between 'Electricity Use in Groundwater Pumping for Irrigation' and 'Groundwater Conservation' has been brought out clearly and the problems arising from subsidies on 'Electricity consumed in Agriculture' have been discussed in detail. The chapter provides arguments both 'for' and 'against' the electricity subsidies and thus proved to be of tremendous help (to the author) in interviewing stakeholders of non-aligned interests. The issues discussed in this chapter proved to be of striking importance to the present study as the author discovered an inextricable link between the perceptions of the people of Punjab about 'Groundwater Conservation' and 'Electricity Use in Groundwater Pumping' in the state.

- **Groundwater - Legal and Policy Perspectives**

  Edited by: Salman M.A. Salman, WORLD BANK TECHNICAL PAPER

The technical paper brings out World Bank's experience with water related projects across the world. The cases cover experiences from communities at different socio-economic development 'levels' and thus provide access to different lines of thinking that have been experimented with at the international level. Cases from Bangladesh, Jordan, Mexico, Yemen and Nepal are discussed here and this gives the opportunity to draw out inferences for this study. Further a discussion about options and best practices in the regulatory framework at the International level finds direct relevance to this study.
**Economic** and Political Weekly archives

*Management of Groundwater Resource: Direct versus Indirect Regulatory Mechanisms* - B.D. Dhawan

The article discusses two different approaches to regulate the groundwater - First, 'Direct' regulation i.e. regulatory measures on the lines of the model bill suggested by the centre, namely, The Groundwater (Control and Regulation) Bill of 1974 and Second, 'Indirect' regulation i.e. the indirect measures, such as restricting institutional finance and electricity connections in the endangered areas.

This discussion is of apposite relevance to the objective of the research study undertaken here and thus provides key inputs to channelize the thought process of the researcher.

*Ground Water Depletion in Punjab* - B.D. Dhawan

The article explores water consumption requirements of different crops especially from the 'Net' requirement rate. It is a holistic analysis incorporating both 'Return Flow' and 'Evapo-transpiration rates' and gives some relief to the proponents of 'Paddy' as it indicates that after incorporating for ET rates, paddy's net consumption is only marginally higher than other alternatives like maize etc. Changing Crop pattern and subsequent changes in Ground water requirement is most commonly considered as the main cause of concern for the depletion of Groundwater resources in Punjab. Though there is a need to recognize sustainable crop patterns, this article clarifies that this may not be the sole issue of concern and hence provides an effective branch of thought for the author to plan the research.

**Policy** Documents provide a fairly good gauge of the thought process of the Political system and help to identify the line of thought with which it aligns itself. This introduced the researcher to the issues that are dealt with in detail in the policy document and intrigued him over the others that were chosen to not be dealt with and thus have a both explicit and implicit bearing on the research study.

The policy documents that were studied are:

CHAPTER-2

2.1 RESEARCH QUESTION
What are the perspectives of various stakeholders w.r.t. the aspect of regulation of Groundwater of Punjab?

2.2 SUB ASPECTS
a) Desirability of Regulation - To understand whether the stakeholders feel the need for the regulation of Groundwater.
b) Feasibility of Regulation
c) To gauge the preference of the stakeholders for Centralized and Decentralized regime of regulation.

2.3 OBJECTIVES
b) To explore the perspectives of the stakeholders to two different regimes of prospective regulations:
   1. Impose an upper limit on the Volume of the water that can be extracted for use.
   2. Charge a Royalty i.e. usage based charge on the volume extracted by the user.

c) To understand and illustrate the obstacles in the implementation of these regulations as perceived by the stakeholders.
d) To find out who among the stakeholders favour Centralized regime for Groundwater Management and who all favour the De-centralized regime and why.

Clarification Of The Objectives:
a) Stakeholders constitute:
   • Farmers - Land owners (Small, Medium and Large), Landless Labourers
   • Members of the Panchayati Raj Institutions
   • Government officials of the Irrigation Department, Drinking Water Supply and Sanitation Department of Punjab, (Erstwhile) Punjab State Tubewell Corporation and Punjab State Electricity Board.
   • Political Representatives.

b) Centralized Regime : State has the responsibility to plan, execute and maintain all Ground water management projects with minimal(envisaged) involvement of the community.

Decentralized Regime: Community Organisations are encouraged to be involved in one or more than one aspects of Groundwater management projects with a vision to empower the community to take complete charge of the projects, with State enabling the community by providing the suitable regulatory framework.
2.4 RESEARCH METHODOLOGY

- **Nature** of technique employed: Qualitative
- **In Depth** (Semi Structured) Interview - to understand the perspectives of Government officials, members of the PRI, Political leaders of the area.
- **Focus Group Discussions** to understand the view points of farmers.

2.5 SAMPLING METHODOLOGY

MULTISTAGE SAMPLING

1\textsuperscript{st} Stage - The area of study (Punjab) is divided into 4 ecological units (River Basins) by the four rivers of the state, namely - Beas, Ghaggar, Ravi, Sutlej. Out of these four river basins, only three(3) could be covered in the present study, primarily because of the time constraint. The river basins that were included in the study are:

- Ghaggar River Basin (South Punjab)
- Beas River Basin (North Punjab)
- Ravi River Basin (North West)

2\textsuperscript{nd} Stage - Within the River basins, Blocks were stratified as per the Percentage of Groundwater development i.e. Overexploited, Critical and Safe.

Total Number of Blocks - 3 River Basins * 2 (Overexploited, Critical/Safe) = 6

<table>
<thead>
<tr>
<th>S.No.</th>
<th>River Basin</th>
<th>District</th>
<th>Block</th>
<th>Village</th>
<th>Rate of Groundwater Development(^9)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ghaggar River Basin</td>
<td>Patiala</td>
<td>Rajpura</td>
<td>Sadrour</td>
<td>122%</td>
<td>Overexploited</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>Sangrur</td>
<td>Dhuri</td>
<td>Kanjli</td>
<td>229%</td>
<td>Overexploited</td>
</tr>
<tr>
<td>3</td>
<td>Beas River Basin</td>
<td>Hoshiarpur</td>
<td>Tanda</td>
<td>Jaja</td>
<td>189%</td>
<td>Overexploited</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td>Dasua</td>
<td>Khaddla</td>
<td>89%</td>
<td>Safe</td>
</tr>
<tr>
<td>5.</td>
<td>Ravi River Basin</td>
<td>Gurdaspur</td>
<td>Kaladan</td>
<td>Kot Miyan Sahib</td>
<td>142%</td>
<td>Overexploited</td>
</tr>
<tr>
<td>6.</td>
<td></td>
<td></td>
<td>Dinanagar</td>
<td>Haveli -Magrala</td>
<td>86%</td>
<td>Safe</td>
</tr>
</tbody>
</table>

Table 2.1 : Details of the blocks included in the research study

\(^9\)Rate of Groundwater Development = Annual Draft/ Annual Recharge * 100
Figures for the Blocks
All the blocks in both these districts come under ‘Overexploited’ category.
2.6 SCOPE OF STUDY

a) Time Frame: The time frame of the study extends over a period of 1 month i.e. Feb 2010-March 2010.

b) Place of Study: This study has been conducted in the State of Punjab. The administrative districts that satisfy the sampling requirements are Gurdaspur, Hoshiarpur and Patiala.

c) Sources of Information: The study uses both Primary and Secondary sources of information.

i) **Primary** Source: For each block that has been identified, the information was sought from the following sources:

- Farmers: One (1) Focus Group Discussion comprising 6-10 respondents.
- In Depth Interview of the Block level officials of the following departments:
  - Irrigation Department of Punjab.
  - Punjab Water Resources Management Development Corporation (Erstwhile 'Punjab State Tube Well Corporation')
  - Water Supply and Sanitation Department of Punjab.
  - Punjab State Electricity Board
- In Depth Interview of the members of the Panchayati Raj Institutions (PRI).
- In Depth Interview of the Political representatives (MLA) of the block.

*The data* set of the study includes:

- Six (6) Focus Group discussions, one for each of the identified blocks. (The details have been provided in the Appendix II.)
- 17 In Depth interviews spread over the identified stakeholders who include 6 Sarpanches, 2 MLA(s) and 9 officials of the government departments.

ii) Secondary Sources: A host of secondary resources have been referred to, (with the appropriate citations and references) to understand the view points of eminent people who cannot be interviewed in person due to the constraints under which the study was completed.
CHAPTER - 3

FINDINGS & ANALYSIS

Before we move on to the analysis, let us go through a snapshot of some verbatim records of the different stakeholders. This will help us get a quick assessment of the domain of the concerns that are to be discussed here and will also whet our thought with the perspectives of the concerned stakeholders.

"We don't want free electricity, we want an assured supply even if it is charged." - Farmers

"Our electric bore wells are drying up. More and more people are switching to submersible pumps which are costly." - Marginal Farmers

"We already buy water. Paying for the same is not new to us and therefore is not unacceptable." - Member of the PRI

"Panchayats can be involved but enforcing rules is not our job, neither can we do it. We have to ask the villagers for votes in the coming elections." - Members of the PRI

"Subsidy of electricity for agriculture gives rise to more than one problem. In addition to the non-recovery of costs, it also creates an opportunity of major power theft." - Officials of the State Irrigation Department and Electricity Board.

"Metered electricity sounds good on paper but in the field it has myriad problems attached to it. Collection is dismal." - Members of the PRI
"Electricity should not be free. It must be charged. We’ll charge when we come in power. No new infrastructure required for collection."

"Subsidy of electricity may not be removed. But a better way to ensure that the subsidy reaches to the needy is required."

"The idea of creating Vibrant Community organizations seems interesting and we have seen some examples where it runs successfully though not many. There are World Bank sponsored projects related to ‘Water Supply(Drinking) and Sanitation’ where the ownership has been transferred to the Panchayats."

"People want rights and are not ready to accept the responsibilities that are come along with them."

"We have been running Agricultural co-operatives since a long time now. I am sure if we are provided with the right legislation co-operatives can definitely play a major role in helping Punjab out of this crisis."

Figure 3.1 : Snapshot of Verbatim records of stakeholders.
3.1 REGULATING GROUNDWATER - REACTION TO VARIOUS REGIMES

The respondents related to the need of restoring the health of the SEB (State Electricity Board) as the crisis is discernable in their daily lives from the power cuts and the unreliable Power supply. So, the majority of the farmers voiced their opinion against the 'Free Electricity' being provided for irrigation and felt that the SEB must recover at least their operational costs to sustain an assured supply of electricity in the future.

The respondents saw 'Paid Electricity' for irrigation as a two pronged approach that will restore the health of the SEB assuring a sustainable supply of electricity available for irrigation on one hand and will convey the cost of pumping water to the end users on the other hand which will incentivize the users to think about conservation.

The other two regimes i.e. 'Volumetric regulation' and 'Royalty per unit of water' didn't seem to go down well with the farmers especially. The respondents doubted the feasibility of these regimes and in some cases even the need for the same especially when they were ready to pay for the electricity which in their opinion serves the purpose of conservation as well being a two pronged strategy as discussed earlier.

The reactions to all the regimes are discussed here:

3.1.1 Volumetric Regulation

a. Water requirement differs by land type and the crop one sows. One crop at two different locations or different crops in the same land require different amounts of water. Therefore its difficult to affix the maximum amount of water one can draw.

b. Water flow meters will be an additional cost to the farmer.

c. From the perspective of the officials of the irrigation department, the monitoring of such a system is a huge task and will involve huge costs.

d. Controlling the demand of a good whose supply is not in your hand is a virtually impossible task.

e. Controlling the extraction of groundwater by a systematic way of 'Rationing of Electricity' seems to be a better option - as told to the author by the officials of the Electricity Board.

f. "We should not try to come up with a completely new system without exhausting the possibilities of the existing system." - as told to the author by MLA, Tanda Block, Hoshiarpur.
| **Table 3.1 Key Responses from the Focus Group Discussions** |

<table>
<thead>
<tr>
<th><strong>Question</strong></th>
<th><strong>Yes</strong></th>
<th><strong>No</strong></th>
<th><strong>Other</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Is there a need to register?</td>
<td>Yes</td>
<td>No</td>
<td>Other</td>
</tr>
<tr>
<td>Dock - General</td>
<td>Dock - General</td>
<td>Dock - General</td>
<td>Dock - General</td>
</tr>
<tr>
<td>Gear and Gear</td>
<td>Gear and Gear</td>
<td>Gear and Gear</td>
<td>Gear and Gear</td>
</tr>
</tbody>
</table>

**Note:** The table above summarizes key responses from the focus group discussions. The questions were designed to elicit feedback on the necessity of registration and specific areas of concern. The responses include positive feedback, negative feedback, and other considerations.
3.12 Royalty to be charged per unit of Water

g. As discussed earlier in [1a], water requirement differs by land type. So sowing the same crop can be costly for some farmers and cheaper for others.

h. Charging per unit of water necessitates the need to measure the actual consumption which translates into new infrastructural requirements that will incur huge costs - as told to the author by officials of the Irrigation Department of Punjab.

i. "Water is a natural resource and is a gift from God. We don't produce it so we cannot charge for it too." - MLA, Dinanagar Block, Gurdaspur

j. "We already pay for the water that we buy from the landowners who have tubewells installed in their fields. So we do not mind paying for the water if supplied directly\textsuperscript{12} by the government. But we fear that imposing the cost on the landlords will increase the final cost for us" - Opinions voiced by Marginal farmers at a FGD in Dhuri Block, Sangrur.

k. "We cannot pay for both water and electricity. And it makes no sense paying for water if don’t get electricity." - from FGD at Khudda, Dasua Block, Hoshiarpur.

l. If we take cues from SEBs all over India, on an average revenues from agricultural sector contribute only 3.2% of the total revenue of the boards inspite of being the major consumer (75% sales goes to this sector).\textsuperscript{13} The collection of the revenues thus seem to be one major issue that will have to be dealt with if this regime is implemented.

\textsuperscript{12} The respondents are referring to the Government owned deep tubewells that are dug and operated by 'Punjab Water Resources Management Development Corporation' (Erstwhile 'Punjab Tube Well Corporation') basically in Kandi (Mountaneous regions) areas or as per the socio economic survey reports.

\textsuperscript{13} Oxford handbook of Water Resources in India, 2007
3.1.3 Indirect Regulation - Charging for the electricity supply for the Irrigation Pumps.

The state of Punjab started supplying 'Free Electricity' in the year 1997-98. Continual supply of electricity at 'Zero' tariff against an average cost of production of 285 paise/kwH is one of the major concerns and contributing factor to the State Revenue Deficit. The Electricity Subsidies for Agricultural Consumers constitute 65% of the Revenue Deficit in the State Budget.  

**Tariff and Average Cost of Supply in Major States**

<table>
<thead>
<tr>
<th>State</th>
<th>Average Cost of Supply</th>
<th>Tariff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uttar Pradesh</td>
<td>119</td>
<td>384</td>
</tr>
<tr>
<td>West Bengal</td>
<td>52</td>
<td>377</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>42</td>
<td>358</td>
</tr>
<tr>
<td>Gujarat</td>
<td>62</td>
<td>365</td>
</tr>
<tr>
<td>Karnataka</td>
<td>98</td>
<td>37%</td>
</tr>
<tr>
<td>Bihar</td>
<td>13.1</td>
<td>377</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>17.2</td>
<td>325</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>13</td>
<td>310</td>
</tr>
<tr>
<td>Punjab</td>
<td>10</td>
<td>285</td>
</tr>
</tbody>
</table>

Figure 3.2 Tariff and Average Cost of Supply in Major States, 2001-02

It is perceived that the farmers are benefitting from this state of condition, but the primary data extending over 6 Blocks in 3 river basins of Punjab suggests that in reality farmers are unhappy about the 'Free BUT UNRELIABLE' supply of power. (See Table 3.1)

---

Same as 12
Fanners realize that one of the major causes of Groundwater depletion is the inefficient and excessive use of Groundwater - which is effectuated by 'Free Electricity' amongst other causal factors. Some of the cases of inefficient uses cited by the farmers are listed below:

- "Electric power supply for irrigation is generally supplied at night (minimum load on Electricity Boards for alternative uses). Now because the power is supplied free of charge, farmers sometimes let the pumps running for the whole night instead of standing there/ or returning to switch the pump off after adequate water has been supplied." - From FGD at Khudda, Dasua, Hoshiarpur

- Leveling of a field was done to ensure water is supplied in equal amounts to every part of the field. This is becoming a practice of bygone days now. With free electricity, thus free water no one cares for the hassle and thus a lot of water is wasted. - From FGD at Jaja, Tanda, Hoshiarpur

- "Farmers used to channelize water by constructing small channels inside and in between the fields for timely and efficient irrigation. Now water overflows from one field to the other !" - Parminder Jeet Singh, Sadour, Rajpura, Patiala.
(Table 3.2) maps the preference of the regulatory regime for different stakeholders. Within the Paid electricity regime, reasons (as cited) are presented for preferring one of the two models of pricing electricity i.e.

a) Flat Rate - Fixed Charges (For eg. May be based on Power rating of the electric motor/ Area irrigated).

b) Metered Rate - Charge per unit of electricity consumed.

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Preference of regime</th>
<th>Details</th>
</tr>
</thead>
</table>
| Farmers                            | Paid Electricity - Flat rate (In 4/6 Blocks that were studied) | 1. Simple to Understand  
2. Affordable by the farmer  
3. Better than Metered - Metered susceptible to power theft.  
4. Costly for the poor farmers as charged per HP and not per acre irrigated. |
| Officials of the Irrigation Department | Paid Electricity - Metered / Flat Rate  
1. Additional infrastructure required to implement this regime lesser than other 'Direct Regulation of Water' regimes.  
2. Metered preferred - No Marginal costs in Flat Rate system to de-incentivize the farmer from wasting water.  
3. But recognizes the difficulties in metered system. |
| Officials of the Electricity Board  | Paid Electricity- 'Progressive'  
Flat rate i.e. base rate to be based on last few months average of the village transformer. | 1. Charging for water will not help if we cannot provide electricity.  
2. Restoring the health of the Electricity Board - Primary Concern.  
3. Metered rates are a distant reality in India. We have to start with Flat rates. However as suggested the flat |
rates can be progressive to communicate the marginal cost to the farmer and thus incentivizing conservation of water.

1. Instead of charging for water, restoring the health of electricity boards is more important and can save the purpose of water conservation also.

2. Poor have to subsidized - A better and transparent mechanism of delivering subsidies to the poor has to be devised.

Table 3.2 Preference of regime vis-a-vis Stakeholders

| Political Representatives | Paid Electricity - Flat/ Metered but provision of subsidy must | 1. Instead of charging for water, restoring the health of electricity boards is more important and can save the purpose of water conservation also.  
2. Poor have to subsidized - A better and transparent mechanism of delivering subsidies to the poor has to be devised. |

**BOX 3.2**

**Electrical Subsidy – Encourages theft**

Electricity Subsidy of Punjab contributes 65% of the total Revenue Deficit of the state. Its projected as the black sheep in the Balance Sheet of the State Electricity Board. The fact of the matter is a bit different. The Subsidies are overestimated to the tune of 50% as reported in the study conducted by the World bank (2003) on the State Electricity Boards in India. The two factors that contribute to the overestimation are:

1. Overestimation of the ‘estimated’ consumption of electricity in the agricultural sector.

   Data on agricultural consumption are not actually measured consumption (since there are no metres) but are residual – they overestimate agricultural consumption by the extent to which distribution losses and pilferage are shown as agricultural consumption. Simply put, the employees of the board can connive with the users other than farmers and supply them free electricity. The losses will be put under the ‘Agricultural Subsidy’ head as no one knows how much electricity is being consumed by the agricultural sector in reality.

2. Overestimation of the Cost of Supply of Power to Agriculture

   No distinction made for the marginal cost of supply of power to agriculture sector that in fact may be lower than the average cost if most of the power supply to agriculture is during night time when the opportunity cost of power is minimum and is equal to the marginal cost of supply (cost of fuel and O&M).

*Source: World Bank Report on State Electricity Boards in India (2003)*
3.2 CENTRALIZED VS DECENTRALIZED

(Please Refer Table 3.1)

Taking cues from the revenue collection of the Electricity Boards, on an average 33% of the sales of the State Electricity Boards (SEBs) goes into the agricultural sector but the revenue from the same contribute just 3.2% of their total revenue. The collection rates have thus been dismal and one of the common feature of this failure story has been the "Centralized System of Management" where there is zero involvement of the community in the management of the resource which is supplied for their welfare/use.

Decentralized system of management involves the involvement of community in the management of the project i.e in one or more than one functions of planning, execution and maintenance of the project with a vision to empower the community to take complete charge of the projects, with State enabling the community by providing the suitable regulatory framework.

The idea here is to formulate Community Organisations (under the panchayats or independent) that will serve as a link between the Government body (State Electricity Board) and the community thus decreasing the gap between the two and decreasing the in efficiencies particularly in the area of Monitoring and Revenue Collection.

![Diagram](image)

*Figure 3.3 Prospective model for Community engagement*

---

The major facets of the Community Organization shall be:

a) The Water User Association to be formulated for a group of villages by the representation from every village. The multi village committee will help to check the possible connivances between the same village members.

b) Primary responsibility of the WUA is to ensure 'Electricity Bill Collection' (Flat/ Metered). The WUA gets bills from the SEB(State Electricity Board). The WUA collects the bills from all the users and hands over a percentage of the total collection to the SEBs retaining some percentage of the collection (say 10%).

c) The WUA becomes a Self sustaining entity which can pay for the salaries of the bill collectors, meter readers, Pilferage reporting agents etc. It will thus generate Employment at the village level.

d) In addition to this, the funds generated can be put to the socio economic development of the village. For e.g. Water purification plants can be set up and their operation and maintenance can be taken care of by the revenue generated by the WUA.

e) WUA to be entrusted with enabling legislation from the State government and to be provided support for enforcement.

This idea was presented to the respondents as an alternative mode of revenue collection than the existing centralized system and their perceptions about the same have been recorded here:

(See Table 3.1)

a. Bill collection cannot be handled by Panchayats. - MLA, Tanda Block, Hoshiarpur

b. Panchayats are already bogged down with a lot of work. Nobody appreciates whatever we do. We do not want another responsibility. - Sarpanch, Village Jaja, Block Tanda, Hoshiarpur

c. The scope of the panchayats has now been extended to distribute pensions. So if we can distribute pensions, we can collect the revenue too. But being an elected body, it will be difficult for us to enforce airtight legislation against our own villagers. So we suggest that the monitoring part may be done by an outsider who in turn may be monitored by the panchayat. - Sarpanch, Village Magrala, Block Dinanagar, Gurdaspur.

d. We have successful examples of co-operatives functioning in our village. For e.g., The scope of the Agricultural Co-operatives may be extended to include the collection of electricity bills. - Ex. Secretary - Agricultural Cooperative, Jaja, Tanda, Hoshiarpur.

e. Enabling Legislation and provision of effective enforcement for the co-operatives to function is the key. Capacity building of the members of the WUA and other villagers
who will take the benefit of the employment opportunities generated at the village level is necessary. - Assistant Registrar, Punjab Department for Cooperation, Block Dasua, Hoshiarpur.

f. The generation of employment opportunities for the youth is one of the key problems of our society. If WUAs can address this along with the issue of conserving water, we will be more than happy to adapt to this system. - from the FGD at Village Kanjili, Block Dhuri, District Patiala.

g. Collection of bills should be handled by the state only. In case of a fraud, innocent farmers may be duped off their money. - from FGD at Village Sadrour, Block Rajpura, District Patiala.

h. WUA can help the electricity subsidy reach out the actual needy. Instead of paying the bill for the electricity the marginal farmers can pay through coupons that can be tallied with the unit consumption of the village transformer. This way, coupons will act as a receipt of the subsidy and hence will bring out the true picture of cost of subsidy for agriculture. This will also help uncover losses and thefts that are presently put under the head of electricity subsidy. - Prof H.S. Gill, Institute of Development and Communication, Chandigarh.
CHAPTER - 4

4.1 CONCLUSION

This "brief study brings out the responses of different stakeholders w.r.t. the aspect of regulation of groundwater, specifically about the desirability and feasibility of the different regimes discussed here. While all the stakeholders felt the need of regulating groundwater, their choice for regulation has some differences.

Out of the three regimes proposed here that are "Volumetric Regulation", 'Royalty per unit of water'(Direct Regulations) and "Effective Pricing of electricity for agricultural consumption' (Indirect Regulation), most of the stakeholders expressed their preference for the Indirect regime that is 'Effective Pricing' of electricity. One factor that may have contributed to this preference is the immediate shortfall of electricity supply in Punjab that is manifested in the life of all the stakeholders as they face repetitive load shedding. Farmers in particular, clearly expressed that they preferred 'Reliable supply' of electricity (Even if charged) over the 'Free' supply that they are being provided right now.

The feasibility of the other two regimes was doubtful in the view of some of the stakeholders considering the huge costs it would incur on establishing a new system and monitoring of the same. Monitoring of groundwater is seen as a much more complex task (because of the 'Common pool' nature of the resource) in comparison to monitoring of 'Electricity supply' where in the supply can be regulated unlike in the case of Groundwater.

'Effective Pricing' of electricity supply to agricultural users is seen as two pronged strategy that will restore the health of the SEB assuring a sustainable supply of electricity available for irrigation on one hand and will convey the cost of pumping water to the end users on the other hand which will incentivize the users to think about conservation.

Further, the stakeholders' perspectives for two models of 'pricing' the electricity, i.e. 'Flat Rate' and "Metered Tariff, were discussed. As per the study 'Flat rate' is preferred by maximum number of stakeholders though for different reasons which have been enunciated here. A different strategy i.e. "Progressive Flat Rate’ is suggested to incentivize the end user for efficient use of electricity and thus water.

"Overestimation of the electrical subsidies' to cover up the pilferages is recognized as a major problem. A unique system of 'Subsidy Coupons’ is suggested here which will act as a feedback mechanism for the actual subsidy that reaches the end user level and hence the points of pilferages can be targeted.

Lastly, it is clear from the discussion that community participation in developing groundwater management solutions needs to be widespread given the highly distributed nature of groundwater resources. The importance of policy framework to enable such community organizations to
govern access and use is emphasized. Efforts to increase public awareness to promote conservation are strongly recommended.

4.2 LIMITATIONS OF THE STUDY

1. The time frame of the study is of one (1) month, which might be a smaller period considering the objectives of the study. No data from the 'Sutlej' river basin could be collected due to the lack of time.

2. The stakeholders other than farmers are small in number, particularly the political stakeholders. Interviews with only 2 MLA(s) could be scheduled in the time-frame.

3. Officials of the departments were interviewed in their working hours at their workplace. This may have affected their response and their willingness to continue through the full interview process.

4. The study had to be concentrated only on the 'Irrigation' part of the Groundwater use. Though "Irrigation for Agriculture' forms a major component of Groundwater use, perspectives of other users, for e.g. Municipal users, Industrial users could not be covered in this study.
BIBLIOGRAPHY


Appendix - I

Detail of the Focus Group Discussion Members

1. Ravi River basin
   District – Gurdaspur
   Blocks – Kalanaur, Dinanagar
   Villages – Kot Miyan Sahib, Haveli Magrala

*Figure A 1.1 – Index Map of Gurdaspur indicating the Blocks of study*
### a) Village: Kot Miyan Sahib* (Block Kalanaur)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name</th>
<th>Age</th>
<th>Land Size (Acres)</th>
<th>Classification</th>
<th>Irrigation Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Manjeet Singh</td>
<td>47</td>
<td>7</td>
<td>Medium</td>
<td>TW(2)</td>
</tr>
<tr>
<td>2.</td>
<td>Darshan Lal</td>
<td>65</td>
<td>7</td>
<td>Medium</td>
<td>TW(1)</td>
</tr>
<tr>
<td>3.</td>
<td>Kuldip Singh</td>
<td>62</td>
<td>7</td>
<td>Medium</td>
<td>TW(1)</td>
</tr>
<tr>
<td>4.</td>
<td>Gulzar Singh</td>
<td>80</td>
<td>20</td>
<td>Large</td>
<td>TW(4)</td>
</tr>
<tr>
<td>5.</td>
<td>Veer Singh</td>
<td>36</td>
<td>6</td>
<td>Medium</td>
<td>TW(2)</td>
</tr>
</tbody>
</table>

*Note: The village Panchayat handles the village 'Drinking water' system that was built under the "World Bank" funded scheme of" Punjab Drinking Water Supply and Sanitation Department'. The Drinking water system is complete with a pump set, an overhead reservoir, water purification apparatus and pipelines to individual houses. The community holds a financial stake of 10% in the Project Cost with the rest 90% funded by World bank.

### Table A 1.2 Details of the FGD Members of Village 'Haveli-Magrala'

### b) Village: Haveli-Magrala (Block Dinanagar)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name</th>
<th>Age</th>
<th>Land Size (Acres)</th>
<th>Classification</th>
<th>Irrigation Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dalbir Singh</td>
<td>42</td>
<td>6</td>
<td>Medium</td>
<td>TW(2)</td>
</tr>
<tr>
<td>2.</td>
<td>Balbir Singh</td>
<td>37</td>
<td>4</td>
<td>Small</td>
<td>TW(1)</td>
</tr>
<tr>
<td>3.</td>
<td>Chaen Singh</td>
<td>32</td>
<td>6</td>
<td>Medium</td>
<td>TW(1)</td>
</tr>
<tr>
<td>4.</td>
<td>Rajinder Singh</td>
<td>46</td>
<td>3</td>
<td>Small</td>
<td>TW(1)</td>
</tr>
<tr>
<td>5.</td>
<td>Prem Singh</td>
<td>28</td>
<td>1</td>
<td>Marginal</td>
<td>Buy water</td>
</tr>
<tr>
<td>6.</td>
<td>Satpal Singh</td>
<td>65</td>
<td>1</td>
<td>Marginal</td>
<td>TW(1)</td>
</tr>
<tr>
<td>7.</td>
<td>Rajinder Singh</td>
<td>53</td>
<td>4</td>
<td>Small</td>
<td>TW(1)</td>
</tr>
</tbody>
</table>

*Note: The village Panchayat handles the village 'Drinking water' system that was built under the "World Bank" funded scheme of" Punjab Drinking Water Supply and Sanitation Department'. The Drinking water system is complete with a pump set, an overhead reservoir, water purification apparatus and pipelines to individual houses. The community holds a financial stake of 10% in the Project Cost with the rest 90% funded by World bank.*
2. Beas River Basin

District – Hoshiarpur

Blocks – Tanda, Dasua

Villages – Jaja, Khudda

Figure A 1.2 – Index Map of Hoshiarpur indicating the Blocks of study
a) Village - Jaja, Block Tanda

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name</th>
<th>Age</th>
<th>Land Size (Acres)</th>
<th>Classification</th>
<th>Irrigation Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pritam Singh</td>
<td>62</td>
<td>15</td>
<td>Large</td>
<td>TW(3)</td>
</tr>
<tr>
<td>2.</td>
<td>Harbhajan Singh</td>
<td>45</td>
<td>8</td>
<td>Medium</td>
<td>TW(2)</td>
</tr>
<tr>
<td>3.</td>
<td>Inderjeet Singh</td>
<td>36</td>
<td>8</td>
<td>Medium</td>
<td>TW(3)</td>
</tr>
<tr>
<td>4.</td>
<td>Jasjit Singh</td>
<td>28</td>
<td>3</td>
<td>Small</td>
<td>TW(1)</td>
</tr>
<tr>
<td>5.</td>
<td>Major Singh</td>
<td>48</td>
<td>4</td>
<td>Small</td>
<td>TW(2)</td>
</tr>
<tr>
<td>6.</td>
<td>Kesar Das</td>
<td>52</td>
<td>1</td>
<td>Marginal</td>
<td>Buy Water</td>
</tr>
<tr>
<td>7.</td>
<td>Amar Chand</td>
<td>36</td>
<td>4</td>
<td>Small</td>
<td>TW(1)</td>
</tr>
</tbody>
</table>

Table A 1.3 Details of the FGD Members of Village 'Jaja'

b) Village - Khudda, Block Dasua

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name</th>
<th>Age</th>
<th>Land Size (Acres)</th>
<th>Classification</th>
<th>Irrigation Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Tarlochan Singh</td>
<td>42</td>
<td>12</td>
<td>Medium</td>
<td>TW(3)</td>
</tr>
<tr>
<td>2.</td>
<td>Gurpreet Singh</td>
<td>27</td>
<td>6</td>
<td>Medium</td>
<td>TW(2)</td>
</tr>
<tr>
<td>3.</td>
<td>Harvinder Singh</td>
<td>29</td>
<td>18</td>
<td>Large</td>
<td>TW(3)</td>
</tr>
<tr>
<td>4.</td>
<td>Tejbir Singh</td>
<td>36</td>
<td>7</td>
<td>Medium</td>
<td>TW(2)</td>
</tr>
<tr>
<td>5.</td>
<td>Kishor Lal</td>
<td>56</td>
<td>6</td>
<td>Medium</td>
<td>TW(2)</td>
</tr>
</tbody>
</table>

Table A 1.4 Details of the FGD Members of Village 'Khudda'
3. Ghaggar River Basin
   District: Patiala, Sangrur
   Blocks: Rajpura, Dhuri
   Villages: Sadrour, Kanjli
a) Village - Sadrour, Block - Rajpura

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name</th>
<th>Age</th>
<th>Land Size (Acres)</th>
<th>Classification</th>
<th>Irrigation Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Parminder Jeet Singh</td>
<td>29</td>
<td>16</td>
<td>Large</td>
<td>TW(4)</td>
</tr>
<tr>
<td>2.</td>
<td>Amarendra Singh</td>
<td>33</td>
<td>4</td>
<td>Small</td>
<td>TW(1)</td>
</tr>
<tr>
<td>3.</td>
<td>Sukhchain Singh</td>
<td>67</td>
<td>8</td>
<td>Medium</td>
<td>TW(2)</td>
</tr>
<tr>
<td>4.</td>
<td>Satwant Singh</td>
<td>54</td>
<td>2</td>
<td>Marginal</td>
<td>Buy Water</td>
</tr>
<tr>
<td>5.</td>
<td>Kishori Lal</td>
<td>39</td>
<td>6</td>
<td>Medium</td>
<td>TW(2)</td>
</tr>
<tr>
<td>6.</td>
<td>Tarsem Das</td>
<td>63</td>
<td>1</td>
<td>Marginal</td>
<td>Buy Water</td>
</tr>
<tr>
<td>7.</td>
<td>Sheesham Singh</td>
<td>42</td>
<td>2</td>
<td>Marginal</td>
<td>TW(1)</td>
</tr>
</tbody>
</table>

Table A 1.5 Details of the FGD Members of Village 'Sadrour'

b) Village - Kanjli, Block - Dhuri, District - Sangrur

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name</th>
<th>Age</th>
<th>Land Size (Acres)</th>
<th>Classification</th>
<th>Irrigation Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Harbans Lal</td>
<td>47</td>
<td>2</td>
<td>Marginal</td>
<td>Buy Water</td>
</tr>
<tr>
<td>2.</td>
<td>Harkishan Das</td>
<td>35</td>
<td>2</td>
<td>Marginal</td>
<td>Buy Water</td>
</tr>
<tr>
<td>3.</td>
<td>Mohan Singh</td>
<td>68</td>
<td>3</td>
<td>Small</td>
<td>TW(1)</td>
</tr>
<tr>
<td>4.</td>
<td>Mehar Singh</td>
<td>29</td>
<td>1</td>
<td>Marginal</td>
<td>Buy Water</td>
</tr>
<tr>
<td>5.</td>
<td>Satpal Singh</td>
<td>32</td>
<td>4</td>
<td>Small</td>
<td>TW(1)</td>
</tr>
<tr>
<td>6.</td>
<td>Kishore Singh</td>
<td>46</td>
<td>2</td>
<td>Marginal</td>
<td>Buy Water</td>
</tr>
</tbody>
</table>

Table A 1.6 Details of the FGD Members of Village 'Kanjli'
Appendix - 2

Interview Schedule - 'Regulating Groundwater of Punjab - Exploring perspectives of different stakeholders'.

Basic Information

Name of the Respondent: 
Sex: 
Age: 
Education Level: 
Classification of the Farmer: Marginal (<1 Hectare), Small(1-2 Hectares), Medium(2-5 Hectares), Large (>5 Hectares)

Source of Irrigation: TW (Electric Tube Wells), DE(Diesel Engines) Canal Irrigation, Monsoons, Any Other ______

Body of the Schedule

1. In your opinion, the rate of Groundwater depletion in Punjab is:
   a. A matter of alarming concern - Immediate steps required to rectify/control the situation
   b. Is a matter of concern but immediate action may not be required.
   c. The situation is comfortable and there is no matter of concern.

2. In case of (a,b) what according to you is the reason of the present state of groundwater in Punjab? ______
   [Expected lines of thought as per the literature review ... Hybrid water consuming crops/Free Electricity/Inadequate recharging]

3. What actions should be taken to ensure sustainable continued supply of water for the future?
   a. Supply Side Requirements?
   b. Demand Side?

4. What are your views on 'Regulation of Groundwater'? Will it help in conservation of Groundwater?
5. If yes, which of the following regimes will be the most appropriate?
   a. Volumetric Regulation - Maximum volume of water to be allocated per land size and/or crop pattern.
   b. Royalty to be paid by the users per unit of the water used.
   c. Indirect Regulation - Charge for the electricity for Irrigation pumps
   d. Any other...?

6. **What** are the problems that you envisage will be associated with each one of the above regimes, especially from
   a. Feasibility point of view - Do you think this regime can be implemented effectively?
      [Issues of monitoring / royalty collection to be discussed - To be discussed for all the regimes proposed in the preceding question]
   b. In case of option (c) in the preceding question i.e. 'Charging for the electricity for Irrigation pumpsets' - Should the charges be
      i. Flat Rate - (Fixed Monthly charges based on HP size) -
         [Discuss the issue of 'No Marginal Costs for Flat Rates]
      ii. Metered Rate -
         [Discuss the issues of bill collection for this]

7. In your opinion, what system of management will be better suited to design and implement sustainable and effective usage of water resources :
   a. Centralized System
   b. Decentralized System

   [ Discuss the advantages/ disadvantages as perceived by the respondents for both the systems. ]

8. In case of a decentralized system , what functions should be handled by the Community organizations (CO)/ Water User Associations (WUA) and which ones should be handled by the state ?

   [ Planning Budgeting / Daily Operation and Maintenance/ Regulation and Enforcement/ Collection of Revenues ]

9. **What** role should the state play to help foster such vibrant Community Organisations ?
   [ Provision of Legislation/ Capacity Building/ Any Other ... ? ]

10. How can farmers be incentivized to form and run such vibrant community organizations and thus foster community ownership and concern for natural resources?