

Making the water flow: Conflict(s) and cooperation between formal and informal urban water regimes in Asia and Africa

The Case of Rawta Village, Delhi, India



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Executive Summary

This is a study of the relationship between formal and informal modes of drinking water supply in Rawta, an urbanising village of Delhi. Rawta is interestingly situated at the fringe of two expanding cities. Delhi the capital city of India and Gurgaon (officially named as Gurugram). Although Delhi Jal Board (the Delhi Water Company) has the official mandate for drinking water supply in Rawta, the study sheds light on the diversity of drinking water sources which occur in an urbanizing village on the fringe of two larger cities and describes the relationship between them. The study of drinking water sources in Rawta suggests that a wide range of possibilities exist but that these possibilities are mediated by various forms of conflicts and cooperation between formal and informal means of drinking water supply.

Delhi Jal Board (DJB) provides water through a piped network. However, this is made available only on every alternate or third day and at night. This creates a water supply gap that is further supplemented by water provided through water tankers also operated by the DJB. The main informal source of water supply is that provided by a private vendor in partnership with another village resident, though it is used much more for domestic purposes other than drinking. Different perceptions and uses of these sources of water exist. We see evidence of conflict, cooperation as well as conflict of interest both within as well as across these modes of water supply provisioning.

This research suggests the need to more closely unpack the notion of 'piped water supply'. Piped water supply tends to conjure images of reliable and timely potable water supplied to households by the state. However, this research suggests that there is far greater complexity in the modes of provisioning of drinking water supply. The variety of technologies through which drinking water is supplied, appropriated and stored as well as the institutional arrangements through which they materialize needs better appreciation in the discourse on improved drinking water supply. The conditions that create situations of cooperation, conflicts or conflicts of interest need further attention in scientific research on the modes of water provisioning.

Acronyms used in the report

DJB	Delhi Jal Board
SDMC	South Delhi Municipal Corporation
MLA	Member of Legislative Assembly
MP	Member of Parliament
ITI	Indian Technology Institute
R.O.	Reverse Osmosis

1. Introduction

This is the case study of Rawta, an urbanising village in Delhi. The case study, using a qualitative, ethnographic research design, explores the relationship between the formal and the informal means of drinking water supply. Patterns of conflicts, cooperation and conflicts of interest are examined. We notice these patterns to exist within the formal and informal modes of water delivery, but also across those.

Fieldwork was conducted over the period April 2019 to January 2020. The rest of this report is organized as follows: Section 2 provides a brief description of the case study site. Section 3 reviews the overall research question and how the research questions have been examined. Section 4 provides a review of the methodology. Section 5 describes the main features of the formal and informal modes of water delivery and explores the patterns of conflicts, cooperation and conflicts of interest. Section 6 concludes the report with its key messages.

2. Case study description

Rawta is a village on the banks of the Najafgarh *jheel* (drain). It is under the jurisdiction of the SDMC (South Delhi Municipal Corporation). This means that the Delhi Jal Board (DJB) has formal responsibility for the provisioning of water supply in the village. There are other visible signs of the influence of the Delhi administration, for instance, an SDMC school. The residents of the village maintain close ties with Delhi. It is common for at least one member of each household to commute to Delhi on a daily basis for work, for instance, in public utilities or some industries. Nazafgarh in Delhi serves as the nearest wholesale market for agricultural produce. It is common to see modern buses with automated doors and high floors on the main road that runs through the village, allowing the residents to move to and from Delhi. In most interviews, residents identified themselves as being part of Delhi, even though the border with Gurgaon, the emerging residential, outsourcing and recreation hub of the North -western Indian state of Haryana, is much closer in terms of physical distance.

Even though Rawta is administratively under Delhi, agriculture is common with wheat and paddy being the main crops; livestock rearing is prevalent, but much less so than the earlier decades. It is noted that the village has a history of 700-800 years old prior to becoming urbanised. In interviews with residents, two reasons stood out for the diminishing role of agriculture. The first was the gradual disappearance of grazing lands (mainly on account of land consolidation and their distribution among the landless) and the second was a reduction in the number of working hands in the family as many of the village youth took up jobs in the city. Thus, in terms of a livelihood profile, the village could be considered peri-urban, straddling the rural-urban divide.

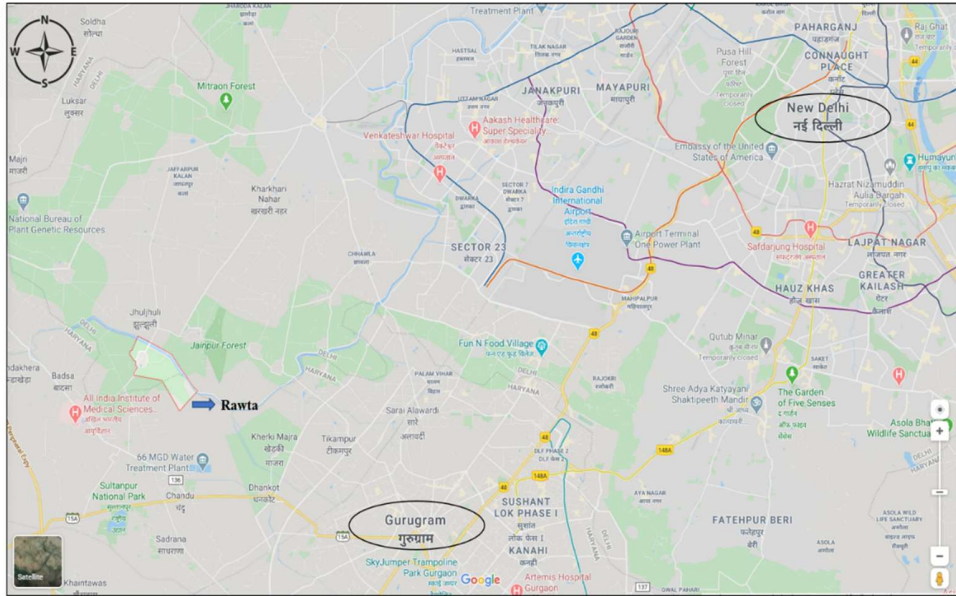


Figure 1: Location of the study site, Rawta

The social group strongest in the village numerically, socially and in terms of land ownership are the *Jaats*. *Jaats* are the agriculturists. They comprise about 75 to 80 per cent of the population. *Brahman*, *Baniya*, *Prajapati*, *Harijan*, *Chamaar*, *Jheemvar*, and *Balmeeek* are some of the other groups residing in the village. The population is about 5000-6000 with 2500 electoral votes. The village, in addition to the resident population, draws some migrants. The movement of migrant laborers from adjoining states of Delhi such as Uttar Pradesh but also further North-East from Bihar and Madhya Pradesh to work in Delhi as construction laborers is a well-known phenomenon. Migrant laborers also provide labor in the paddy fields, for transplanting and harvesting paddy. Those who come for transplanting paddy as wage laborers, stay long. Those who come as contract laborers stay for a month and then go away.

Besides, there are some long term migrants, too. The people who live in the settlement area called the *Tokas Niwas* are original inhabitants from Munirka, another urbanising village in Delhi. They moved here when their land was acquired in Munirka; they bought land here from the sale proceeds. This is an extended clan and lives in one large settlement. The other residents of Rawta are local residents, hailing from the village itself.

Administratively, the village is under the jurisdiction of the SDMC, as mentioned above, or the Nigam Parishad. The village has had no Panchayat (village level unit of governance) since 1986, when it came under the control of the Delhi Administration. The current governance structure is Nigam Parishad followed by MLA (Member of Legislative Assembly) and MP (Member of Parliament). The MLA is an elected member of the legislative body at the state level while MP is an elected representative in the National Level Parliament.

3. Report main research question and objectives

The case study analyses and develops empirical data for answering the research question

How does the interaction of formal and informal water regimes produce different forms of conflict and cooperation?

The question is answered by the following three sub-activities

1. First, the report describes information collected in support of understanding the formal water regime
2. Secondly, the report documents the understanding of the informal water regime
3. Thirdly, the report analyses how the two regimes interact in terms of producing different forms of conflict and cooperation

4. Methodology

The research relies on a qualitative, ethnographic research design, using a case study method (Yin, 1984). In the spirit of a case study, the focus was on collecting data from multiple sources and in immersing in the context of the research. Further, the aim is to engage with analytic rather than statistical generalization. The analysis of the data is used to theorize about the nature of conflict and cooperation between the formal and informal water regimes, but also within them.

The main source of data have been semi-structured interviews conducted with the residents of Rawta village. These interviews were conducted over the period April 2019 to January 2020. All social interaction has had a spatial and temporal dimension (Giddens 1984). Practices around water access were directly observed (for instance, at the time of water collection from a water tanker) and became a basis for further investigation. Discussions with groups of women and men were conducted to obtain an overall understanding of the context of formal and informal water supply and the relationship between the two. Some interviews were conducted with members of a household seated together, at times joined by their neighbors. Sumit, a local shop-keeper, was an important key informant, and was interviewed several times in order to obtain clarity on issues that seemed nebulous or vague to the researcher. Likewise, Dilbagh, one of the partners in providing groundwater for domestic purposes was another key informant, interviewed on several occasions in the course of the study. The researcher developed strong social ties with a family headed by Sunil Puluswal, who himself worked as a driver of a water tanker employed by the Delhi Jal Board. The ties of friendship facilitated repeated interactions with them to gain greater clarity on several issues.

All interview texts were transcribed and stored. Periodic reflection on the data lead to writing of memos that served to consolidate the analysis. The data was progressively coded and classified to denote categories of cooperation, conflict and conflict of interest.

In all, approximately 30 semi-structured interviews were conducted with individuals; data was collected from groups of people (family members seated together; joined by their neighbors at times; groups of men seated together; members belonging to particular a social group, settlement or street) on seven different occasions.

5. Results of the case study analysis

5.1 Understanding the formal water regime

5.1.1 Piped water network

Formal water supply is conceptualized as the water provided by the Delhi Jal Board. It is provided both through a piped network, and through water tankers. We first describe the formal water regime as characterised by the piped water distribution network, and then the water supplied through the mechanism of the water tankers. The piped water is currently made available for free. The reason for the piped water being available for free is attributed to the absence of meters in the households consuming the water. A move towards a regime of pricing would require the laying down of a new piped infrastructure with metered connections. Staff at the Delhi Jal Board, further, claim that the free water provisioning by the water tankers is also free as part of conscious state policy, to provide water as a basic necessity. "*yeh to sarkaar ka kanoon hai* (this is the law of the state)", as junior staff at the pumping station at Rawta put it, which was re-enforced by his immediate Senior, the Junior Engineer, stationed at the DJB office in Nazafgarh.

Piped water supply is made available from the DJB through an underground connection that originates from the DJB boosting plant at the village Ujjwah, (located about 6 km away). The DJB pipe line system runs about 6 feet below the ground. Water from the DJB piped network is received by fitting an own pipe to the pipe laid down by the DJB. This is a curious arrangement that has however strong social legitimacy. Through the interview with the supervisor at the DJB boosting station at Ujjwah, we learnt that the boosting point also serves adjoining areas such as Daurala, Khedala, Dhansa and Munerha Pudh. As a way of rationing the scarce water supplies, these areas receive water on alternate days. One day is the turn of villages in the direction of Daurala and Khedala (this is the direction in which village Rawta is located) and the other day is the turn of Dhansa and MunerhaPudh. The water source is at Nongloi. There is an underground pipe that runs from Nangloi. There is no water treatment plant here; it is only a boosting station. If they have a problem of leakage or of water quality, the residents of the water receiving village need to write and complain to the DJB Junior Engineer.

At the household level in Rawta, residents need to connect to the DJB water pipe using their own "boosters" to pump water from the formal network and they also need to build small reservoirs in the ground to store it, Figure 2.



Figure 2: Underground storage tank in a private bungalow in the upstream part of the village

Sometimes there is a further elaborated network of pipes and pumps installed by the water users to lift the water to the higher floors, Figure 3. Thus, the piped water supply of the state to be made effective needs to be supplemented by a parallel informal network of pipes (and associated privately owned and managed water boosting pumps and storage devices) laid down by the household itself.



Figure 3: Pipes and pumps to lift water supplied by DJB to higher floors in a private bungalow

The water is made available starting around 7 p.m. till about mid-night in the winters and from 7 p.m. until about 3 a.m. in the summers. Houses located in the upstream part of the village, closer

to the pumping station receive the water first; when the water has been appropriated by these households, only after that can the downstream households appropriate it. The downstream households receive water much later, which means that women in these households who fill water need to stay up late through mid-night, or wake up in the early hours of the day (usually before dawn) making this a burdensome task particularly for the women.

During the period of piped water supply the residents of Rawta fill their water containers for 2-3 days. They have water containers with a capacity of 200- 300L. One of the village elders also had installed a *piyaou* (tap) outside his house as an act of altruism; this *piyaoo* also was served by the piped water supply. One of the households interviewed in the course of this research observed that when water is released from the piped network, the early discharge is somewhat saline; it is therefore used for washing and cleaning purposes. The latter discharge is less saline, and used for drinking. Due to the over appropriation of water from the formal network upstream, lesser water became available downstream. This over appropriation is linked to diverting drinking water into agricultural uses. 20-30 households in the upper reaches of the village have made heavy bores and over appropriate the water by taking it to their agricultural fields, or for vegetable gardens (*gher*), Figure 4. Water is used for growing vegetables as onion and spinach as well as fodder crops such as *jowar* (pearl millet) and *burseem* (sorghum). The justification given for using formally supplied drinking water for agriculture by the upstream water users is that the groundwater is so saline that if they irrigated vegetables with it, the vegetables would burn. Because of the over appropriation of the water upstream, only two portions of the village are able to enjoy the benefits of the piped water supply (map 1, annex).



Figure 4: Vegetable garden (*gher*)

According to many of the downstream residents interviewed in the course of this research, this situation can only change if metered connections are introduced by the DJB. When the piped water supply system came in first, during 1970s-80s, there used to be meters. Then the meters were removed and many perceived that this is when the over appropriation of water started.

This suggests also that the dichotomy between piped water supply - assumed to be meant for domestic consumption or for drinking - and irrigation is contested on Rawta. Though the piped water supply is meant to be for drinking purposes, it is in reality also used for irrigation. This is in fact one of the reasons that lesser water is available for being used downstream for drinking. Furthermore, there is a topographical dimension to this as the upstream users are in the low lying regions while downstream are in the higher terrains where water is difficult to pump.

It is important to note that the water provided by the DJB is free of charge for the users. However, this water is put through a privately owned R.O. treatment at the household level before being used for drinking, Figure 5. The cost for that is incurred privately and only by water users who can afford R.O technology. We notice stark differences between the perception of men and women surrounding the use of this water. Men say that there is no problem of water in the household and the presence of multiple sources eases any potential stress associated with it. Women, however, while feel satisfied with the adequacy of water, complain of unease associated with filling water supplied by the DJB. In one interview a woman said that there is a problem that the DJB water is available at a very inconvenient time. “ Because I do not know when the water will come at night, I am unable to sleep... and without water one will be sleepless anyway”. The other gender dimension in the use and appropriation of formal water is in terms of water filling tasks. In most households, the responsibility of filling water supplied by the DJB is that of women. This role changes when the connection to the piped water supply is located in a *gher*. Since the water supply is made available at night, it is the man of the household who sleeps at the *gher*, and fills water when it becomes available.



Figure 5: Reverse Osmosis Water Treatment Technology used at household level.

Therefore, other than the availability of piped water supply, the timing of its supply, as well as the frequency are important. Some respondents said that when the piped water supply service starts in the evening, the early inflow of water is saline, and the latter inflow less so.

5.1.2 Water tankers operated by the DJB

The other mode of provisioning of drinking water within the formal regime is through the water tankers provided by the Delhi Jal Board¹. Households who are unable to receive water through the piped network of the DJB or from the private groundwater vendor rely mainly on water supplied through tankers by the Delhi Jal Board. Households who do receive such water but not adequately, supplement it through the water tankers provided by the Delhi Jal Board.

At the DJB water boosting station at UJjwa, there are 12 water tankers, Figure 6. Ten of these have a capacity of 2800L each and two water tankers have a capacity of 9000L. Each tanker does six trips a day. These are operated by 24 drivers, in two shifts, one each, from 6 am to 2 p.m. and then 2 p.m to 10 p.m. There are three mechanics. There is one person who receives complaints. Water tankers also serve the village from neighbouring Daulatabad.

¹ At the moment, Delhi does not have a Water Policy. The Delhi Jal Board follows a policy of supplying water through tankers in areas that have a demand deficit (USAID 2016). This is based on demand as represented by local representatives. One of the essential services of the DJB is “supply of potable water through tankers on demand” (https://en.wikipedia.org/wiki/Delhi_Jal_Board, accessed on April 6, 2020). It is noted also that in July 2012, the Board decided to privatise tanker management in the city.



Figure 6: Water tankers parked at the water boosting station at Ujjwah (left), DJB staff and drivers of water tankers at the water boosting station at Ujjwah (right)

This system works on a basis of request which in turn is based on complaints, it is like an emergency service. There is however an institutionalized mechanism for securing water from the tankers. Adjacent households in a neighbourhood who require water make a collective request to the MLA. The latter then requests the Junior Engineer to provide a water tanker service to the concerned locality. In usual course, the service of the water tankers that collectively serve a neighbourhood of a group of houses is not paid for, like in the case of the piped water supplied. However, when there is a special function like a marriage or another social occasion and a request is made for a water tanker to serve a specific household, in these instances water has to be paid for. The collective requests for the water tanker are directed at the MLA, while the household level requests for specific occasions are directed at the Junior Engineer directly.

Every day, seven or eight water tankers visit the Rawta village. They are parked at designated spots called "*addas*" (analogous to bus stops). A tanker remains parked at a designated spot for about fifteen to twenty minutes. During this time, households surrounding that *adda* bring in their own pipes and vessels. This includes neighbors who may not have been part of the initial application. This is because providing water is also seen as a *samaajic seva* (social service).

However, two groups of consumers face some discrimination. Households who do not have their own pipes must wait for those with pipes to fill in their containers before they can fill their own. *Baniyas*, a minority group, are often denied access or forced to make do with less. Another issue is that the exact timing of the arrival of the tanker is not known. This means that if someone who wants water from a tanker is away when the tanker arrives, the chance to fill the water that day is missed.

Box 1: Filling water from a tanker in village Rawta, Figure 7.

We arrived in the lane of Manjeet's house and a few women started walking towards us. They started complaining about the water situation. One of them said, water is a big problem here. I asked them when the water tanker would come next. To this they said, "We do not know the time when it would come. If it comes when I am away, I miss the opportunity to fill water. "Another elderly lady said, "you had come here earlier, too and written out testimonies". Just then at about 1035 am, the water tanker drove in. It carried the caption "peyjal", meaning potable water. In a few seconds, people started pouring in with their buckets, pots and containers. People assembled their pots and containers. There were six openings behind the tanker. Each of these had to be connected through a pipe. People walked in with their pipes which were fitted to the taps and in due course the containers started filling. One young man climbed on to the top of the tanker and inserted a pipe over it. This was connected to a large container kept in the courtyard of the house. Six other taps on the rear were fitted with pipes and these were used to make the water flow into the vessels and containers of the residents. The large number of people gathered there to fill the water were women. There were only two men who came in support of their wives. One lady said that she did not have a pipe so would either wait for the others to fill their containers, or would fill them directly from the taps. A lady from the baniya community walked in with two containers. A man said, as if in a taunt, "we will not let Baniyas take water from here". 'I will also see how you don't let us take water from here", she retorted. We could also see some of the water overflowing and it seemed that the water would be wasted. Everything seemed to happen smoothly and without a verbal confrontation or conflict. The tall guy who had climbed the tanker opened the door of his room and invited us in and asked us if we wanted tea, coffee or a cold drink. In about fifteen minutes, the water tanker had been emptied. A man and a woman jointly carried a large container home. source: *Field notes, November 18, 2019.*



Figure 7: Households collecting water from the water tanker

The water provided by the water tanker is used for drinking, much like the water provided by the formal, piped network of the Delhi Jal Board. Also, it is free, much like the latter. However, unlike water made available by the piped network, this water is used for drinking directly, without subjecting it to a prior R.O. treatment.

We find that most water collection from the tanker is by women, except when a pipe has to be inserted over the water tanker, in which case, the man would climb the water tanker to do so, Figure 8. Occasionally, when a larger vessel has been carried, it would be done jointly by the man and the woman.



Figure 8: Man filling water from a water tanker

Through our interviews with the staff of the Delhi Jal Board at Ujjwah, we learnt that areas not well served by the piped water supply are served by the system of tankers. The logic of providing the water tanker supply is to meet the unmet need of piped water supply. “*Yeh to sarkaar ka niyam hai (this is the rule of the law)*”, as was said by a DJB official posted at Nazafgarh, legitimizing the function of the state to ensure the right to water. Each water tanker serves the needs of five to six neighboring houses. The water tanker also supplies water to a school, the police station, ITI and an Engineering college in the vicinity. Government schools are provided water for free, while other buyers are charged. The rate is about 1400INR² for a 9000L tanker.

As noted in the introductory section of this report, the village draws migrant laborers who work in agriculture as well as for construction. The current period of fieldwork included a period of paddy transplanting. Interviews with a group of labourers who work in paddy transplanting suggest that they stay in the house of the *malik*, the land owner who employs them (paddy transplanting is done mainly by men). It is also the obligation of the land owner or their boss to provide them with drinking water. Thus the water that is obtained from the water tankers of the DJB, or through its piped network, is also made available to them. Access to water is tied to land tenure; these migrants lack secure tenure. However, it is considered to be an obligation on the part of their employer to provide water. “*Paani ki koi manaahi nahin hai !*” (there is no forbidding to drink water). These norms around water ensure that there is access to drinking water for migrants.

² At the time of finalizing this report, 1 US Dollar = 71 INR, approximately.

5.2 The informal water regime

The main provider of water in the informal water regime in the village is a resident called Dilbagh. He got into this business about 15 years ago in partnership with another resident of the village. He pumps groundwater from his fields and supplies water to households at the rate of Rs.200 per month. He sells water to about 450 households. Each household's entitlement is 400L per day. When he started this business, he collected Rs.3000 per household as security. Initially he charged Rs.100 per month and gradually increased the price to Rs. 150 and subsequently to INR 200 per month. This increase in price is resisted by the residents of Rawta, who believe that drinking water being a basic necessity should be provided free of any charge.

This water is provided through a semi-covered network of PVC pipes, Figure 9. There is an underground pipe laid by Dilbagh that runs through different parts of the village, and from this pipe, households can also connect via individually owned pipes. His main task is to divert the water in different directions in the village by rotating the valves laid down for this purpose. Water is pumped daily for ten-fifteen minutes to each household. For Dilbagh, this is a side occupation. He is an owner of agricultural land, but gives it out on a tenancy arrangement to a tiller. The income from selling water is supplementary income for Dilbagh over and above his agricultural income. Though as a researcher I was also curious to ascertain the share of the water selling in Dilbagh's total income, I surmised that he would be reluctant to share such details. My first interaction with Dilbagh was on a summer day in April 2019, in fact, on my first visit to Rawta, when he was operating the valves. He often came across as tight-lipped and reluctant to share information; during one of my interviews, he tacitly smirked and said: "*Aaj ka engine chal chuka hai*", (for today the engine has run enough, meaning that that was enough for the day).



Figure 9: Section of the informal semi-covered network of PVC pipes developed by the private water seller.

The attitude and response of the formal providers of water supply, DJB, towards the private groundwater vendor was expressed as such. The Junior Engineer entrusted with Rawta village under his jurisdiction expressed the view that the provisioning of water by the private groundwater vendor is illegal, and needed to be checked. However, when confronted with the question of why the DJB does not interfere in this provisioning, the response was simply that it is not part of DJB mandate, and that even when the DJB has to install a water extraction device, permission has to be sought from the relevant authority.

When there is a dispute between the seller of the groundwater and the buyer, the former alleging that the intended quantity of water has not been delivered, there is an interesting way in which it is resolved. The seller comes to the house of the buyer and asks that he fills a canister of a capacity of 400L. This serves as a check that the target quantity is delivered.

Box 2: The institutional arrangement for private water selling

There is an interesting story to the genesis of this institutional arrangement. Many years ago, the village Panchayat³ (local council) gathered to find a solution to the problem of water scarcity in the area. It was then agreed that Dilbagh and his partner would lay down a network of pipes to carry water from village Badsa to Rawta. This system worked for some time; however, the residents of Badsa resented it. Subsequently, Dilbagh installed a submersible in his agricultural fields and laid down infrastructure to transport the water to residents of Rawta. It is interesting to note that Dilbagh and his partner operate this system without any license or formal approval from the government. This system of water provisioning is availed by different social groups, including the lower castes that live at the periphery of the village. In contrast to the piped water supply of the DJB, however, this water is paid for at the rates mentioned above. When asked about the norms of the partnership, Dilbagh said that everything is shared as fifty-fifty. “*Dukh bhi fifty-fifty, sukh bhi fifty-fifty* (all sorrow is shared in half; and so is all joy)”. The costs of pumping are shared equally as are the sale proceeds of the water. In the initial years, the pumping was through a diesel pump-set. They now use an electric pump-set. When electricity supply is shut off, a diesel operated generator is used. Dilbagh's partner died recently, but the partnership continues with the family of the deceased.

This activity is important and constitutes an important source of water supply especially for those living downstream of the piped water supply system, who do not receive adequate water supply or find its timing inconvenient. During the field interviews, many respondents said that they were unserved by the piped water supply network but depended heavily on the water tankers or on the

³ It is important to note that the village has not had a statutory Panchayat since 1986, when it was replaced by an urban governance structure, while Dilbagh has been providing water for the last fifteen years or so. The reference to the Panchayat then would have been to a non-statutory basis of legitimacy and authority. The ‘panchayat’ in that case would have referred simply to a gathering of the village folk with a social rather than statutory legitimacy.

water pumped and provided by Dilbagh. One respondent also said that the water supplied by Dilbagh was used for drinking in his household after subjecting it to R.O. treatment.

In addition to the above, there are private vendors who operate R.O. plants in neighboring villages and visit Rawta and based on monthly contracts, supply water to houses, shops, workshops and restaurants in lieu of a modest payment. For instance, Sumit, a shop keeper pays Rs.300 a month (Rs.10 per day) for filling a water canister kept at his shop, which is used by him as well as by his customers for drinking. Similarly, the owner of a *dhaba*, village road-side eating joint, also availed of this service. This water does not need to be treated. Sumit says that the water is potable and chilled. Another actor in the informal modes of water provisioning is a private seller who came to the village on a tempo with a water tank on it: he carried a 2000L tank; he had a monthly deal with households. He supplied 20L of water daily to 100 households at the rate of Rs.450 a month.

5.3 Understand the key modes of water conflict and cooperation

In this section, we explore aspects of conflicts and cooperation between the formal and informal water regimes (See also the Appendices on this for a summary). Different modes of water provisioning within the formal water supply regime complement each other.

As noted in earlier sections of this report, the piped water supply from the DJB is available only on alternate days and in the late evening or at night. Besides, it is over appropriated by residents who live in the upstream parts of the village, as they divert the water for irrigating and also store it in large underground storage tanks, or canisters. This leaves several households inadequately covered in the lower reaches; besides, households that are at an elevation are at a loss as it is difficult to pump water at an elevation. This void is filled by the water tankers sent by the DJB. As one respondent said in the course of fieldwork “*tanker ki vajah se poorti ho jaati hai (because of the water tankers we are able to meet our water requirements completely)*”. When we look at drinking water in relation to other domestic uses, we find that the water supplied by Dilbagh and his partner further completes the picture. With a greater diversity of sources, the incidence of conflict around water appears to be reduced, as reported by several respondents. “*Jab killat nahin hai paani ki, to phir jhagda kis baat ka (when there is no shortage of water, why would a conflict arise)*”, as heard from one respondent during the fieldwork. Furthermore, it is important to note that in the upstream parts of the village almost all the drinking water needs are met by the piped water distribution network. The reliance on tankers increases as we move downstream. Some of the households interviewed in the upstream parts of the village did not depend on water tankers at all.

What we also notice in the context of formal modes of water provisioning are conflicts of interest. Given the context of over appropriation of water by some households upstream within the formal water regime, many respondents living downstream were asked why they did not resent it, or raise their voice. A common response to this was “*awaaz uthaane se tho jhagdaa hi hoga (if we raise our voice, it will only create conflict)*”. Thus within the context of the formal water supply, there

is a conflict of interest between the upstream and downstream residents, which does not spill over into an overt conflict. This relates to the unequal power relations between the different social groups because of which conflicts of interest do not become more serious conflicts. Juxtaposing the settlement pattern with the water distribution network (Map 1, annexure), we find that the upstream parts of the village are inhabited prominently by the Jaats, the social group that is socially, numerically and economically powerful, while the lower castes tend to be concentrated at the downstream parts of the village. This may explain why this inequitable pattern of water appropriation is allowed to persist, as lower castes may find it difficult and costly to confront the higher castes. Avoiding conflict seems to be a social norm that prevents conflicts of interest from spilling over into explicit conflicts.

Within this mode of provisioning of formal water supply, we notice some conflicts of interest as well when water is delivered through tankers. When a water tanker is parked at a water collection point in the village, there are seven outlets. Residents are expected to bring in their pipes through which they transfer water to their vessels and buckets. Residents who do not have their own pipes, must wait for the others to fill in their containers, before they can fill their own. Further, here, in a *jaat* dominated village, the *Baniyas*, or the business community, being in a minority, face some discrimination. This was experienced twice in the fieldwork, once during an interview with a Puluswal family (numerically powerful among the *jaats*) and second, during a direct observation of a water collection activity from the water tanker of the DJB. While the water tanker was parked at a designated spot, a *baniyaa* woman came to fill in her pot. A *jaat* man said, '*Baniyon ko paani nahin bharne denge* (we will not let the *baniyas* fill water)'; to which, the lady responded, "*Dekhni hoon kaise nahin bharne doge* (let me see how you stop me from doing this)" (see also Box 1).

Turning to the informal water regime. Conflicts can occur between the private vendor of groundwater and the buyers of groundwater. For example, the groundwater vendor initially charged Rs.100 per month per household, and has gradually increased it to Rs.200 per month. This is generally resisted by the buyers of the groundwater; however they seem to tolerate it and accept it as this is an important source of water for their domestic needs (other than drinking). Perhaps the real reason for this is the dependence on the groundwater vendor as the tubewell from which he pumps the groundwater is located in a *dher*, where the groundwater is less saline than elsewhere in the village. Thus relations of power – regularized relations of autonomy and dependence (Giddens, 1984) - between the seller and buyers of groundwater prevent conflict escalate and are generally played out as conflicts of interest.

A conflict can also occur between the vendor and the buyer of the groundwater, when the latter alleges that the stipulated quantity of water is not delivered. The vendor has an interest to resolve these conflicts by visiting the house of the buyer and asking him to fill a canister of the stipulated amount, Figure 10. This serves as a verification that the intended quantity is delivered.



Figure 10: Canisters used for storing water

The inadequacy of the water supplied through the formal water regime - through the piped network - creates conditions for cooperation among the residents of Rawta village to supplement it with the provisioning of water through the water tankers. While this cooperation starts in Rawta there is an interesting connection with regional actors. Neighbors come together to collectively make an application to the MLA, who then urges the Junior Engineer to provide a water tanker. This water tanker then regularly serves the group of households who have made the collective request.

Here as well however we notice the role of power relations between the MLA and the residents of the village. The MLA depends on the residents for electoral votes, and the latter mobilize this to secure water for their household needs. Thus this form of cooperation between the residents and the MLA materializes because of the power relations between the two sides. During interviews with a Puluswal family, with whom the researcher had developed close social ties, they suggested that as elections approached, the MLA became more compassionate and sympathetic to their water woes.

6. Conclusion

Piped water supply conjures images of secure water supply, of water reaching every door-step. Research in Rawta suggests that there is more complexity to the perceived convenience of formal,

piped water supply. Water is made available through a wide diversity of technologies or artifacts and accompanying institutional arrangements in Rawta. The formal and informal modes of water delivery complement each other, leading to a situation of *poorti* (or fulfillment). However, we notice different forms of conflict, cooperation and conflicts of interest both within the functioning of these modes of water delivery as well as between the modes of water delivery.

The institutionalization of various water practices is embedded in local power relations, i.e. in regularized relations of autonomy and dependence between the various actors (Giddens 1984). While analysing cooperation, we could classify it as *horizontal* cooperation (neighbours getting together to make a joint application for water to the MLA), as well as *vertical* (between residents and the MLA, an agreement to provide for water in lieu of electoral votes). Another example of horizontal cooperation is when the village residents got together to find a collective solution to the water problem through the Panchayat, a meeting that culminated in a decision that Dilbagh and his partner would jointly develop a mechanism for providing water.

7. References

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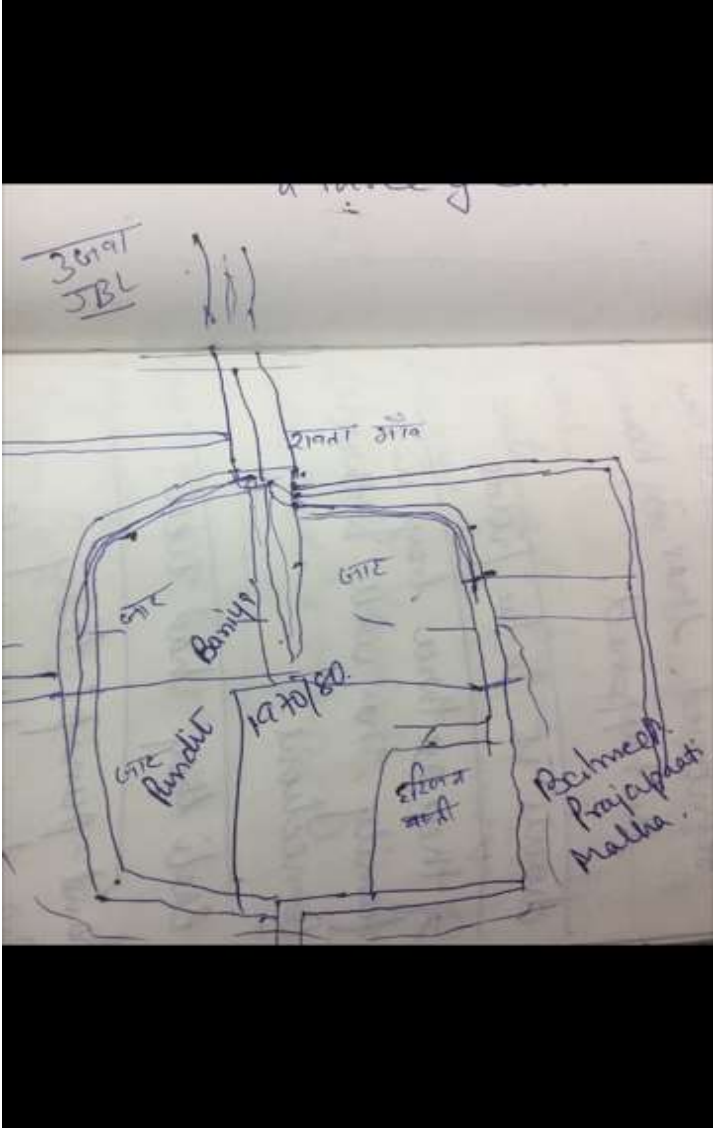
Table 1: Key models of drinking water supply

Water regimes	Model 1 - Water supply (state based)	Model 2 - Water supply (Private)
	Formal regime	Informal regime
Actors	DJB, residents of Rawta, water tanker operators, local MLA, Junior Engineer of Delhi Jal Board, Delhi Jal Board Staff.	Dilbagh, dilbagh's partner, residents of Rawta
Technology	Pipes, DJB water tankers Household storage canisters, underground water storage structures, pumping and boosting devices within households.	Water pumping device in Dilbagh's plot of land (gher), PVC pipes and valves, storage containers
Institutions	Collective application to MLA for a water tanker, request of MLA to DJB JE for providing water tankers, Risk for discrimination against minority groups in appropriating water from tanker, Risk for discrimination against those who do not have private plastic pipes to take water from tanker. Routinization of spots for water tankers being parked in the village, Absence of a price for water provided by the tanker to serve households collectively, price for meeting individual household water tanker needs.	Supply of 400 lpd @Rs200 per month, fixed duration of daily pumping

Table 2: Conflict, conflict of interest and cooperation for drinking water supply

Water supply models	Conflicts or conflicts of interest (based on actors, technology and institutions)	Cooperation (based on actors, technology and institutions)
<p>Model 1 (Water Provisioning by the DJB) (state based)</p>	<p>Local: conflict of interest between upstream and downstream water users in the provisioning of piped water supply</p> <p>Conflict of interest between minority groups(baniyas) and majority groups (Jaats) in taking water from the tanker,</p> <p>Conflict of interest between those who have their own pipes and those who do not, in taking water from the tanker.</p> <p>City-region:</p> <p>Provincial:</p> <p>National:</p>	<p>Local: cooperation between neighbors in making an application to the Delhi Jal Board for providing water tanker</p> <p>City-region: cooperation between local residents and MLA in provisioning of water tanker and securing electoral votes</p> <p>Provincial:</p> <p>National:</p>
<p>Model 2 Water Provisioning by the Private groundwater vendor (market based)</p>	<p>Local: conflict of interest between Dilbagh and water consumers of Rawta in the face of a price hike by the former</p> <p>Conflict when the water consumers claim that the daily water release by Dilbagh is not as per the stipulated amount.</p> <p>City-region:</p> <p>Provincial:</p>	<p>Local: cooperation between Dilbagh and his partner in jointly providing water to Rawta residents</p> <p>Historical agreement mediated by Panchayat between Dilbagh and village residents</p> <p>City-region:</p> <p>Provincial:</p>

	National:	National:
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Map 1: Distribution of the piped water supply provided by the Delhi Jal Board

source: made by Residents of village Rawta

The top two quarters of the village represent the upstream parts of the village, dominated by the *Jaats* (and some *baniya* households). These over appropriate the water. The lower two quadrants are inhabited by Pundits, Balmeek, Prajapati and others. These parts are poorly served by the formal piped water supply of the DJB. They rely much more on the private groundwater vendor and water tankers.