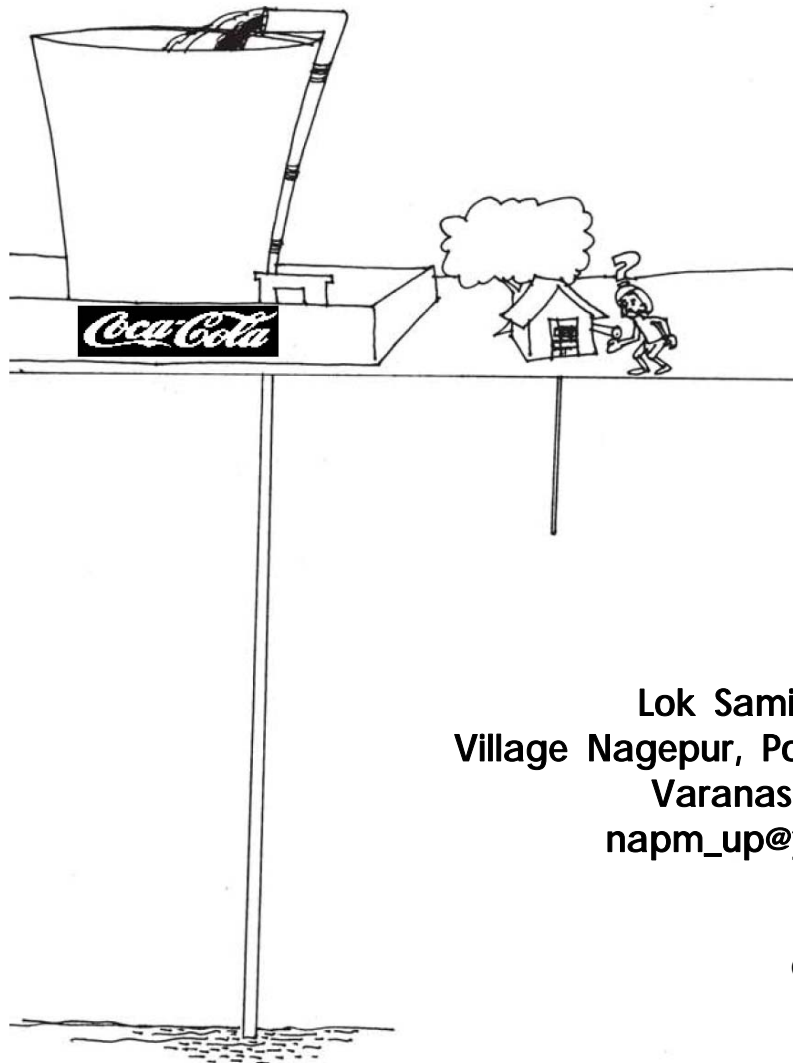


# Decreasing water levels

Status of water table in Mehndiganj and surrounding villages,  
Varanasi, U.P (August 2006)



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# 1 Background

A country faces water crisis when the availability of water falls below 1000 cubic meters per person per year<sup>i</sup>. In India, the current per capita water available is at 1880 cubic meters<sup>ii</sup>. In 1951, this availability was at 3450 cubic meters and by 2050, it is expected to fall to 760 cubic meters<sup>iii</sup>. In wake of the emerging water crisis, the Indian government is pursuing a policy of water privatization pressured by World Bank<sup>iv</sup>, WTO<sup>1</sup>, IMF<sup>2</sup> and other development banks with in the framework of neo-liberal policies introduced since 1991.

This privatization is based on the ideology that commodification of water will result in conservation of water, and is already declared to be an intent in National Water Policy 2002. This privatization has pursued many forms such as privatization of rivers through power sector reforms, and through bottled water and carbonated drinks. Even after the debacle of Enron power privatization<sup>v</sup>, the policy of privatization continues with entry of multinationals Suez Degrement, Vivendi, Bechtel, Coca-Cola, Pepsi, Perrier et al in the water sector<sup>vi</sup>. At the heart of this privatization is the question of the policy impact on the life and livelihood of the primarily agrarian communities of India and their right to clean water, right to life and food, and right to participatory development.

The giant Colas Coca-Cola and Pepsi entered India in 1993 and 1988 respectively and have cornered about 95% of the soft drinks industry. It is estimated that 92% of the cola drinks is made of carbonated water and hence water as a raw material forms the basis for their profit<sup>vii</sup>. Currently Coca-Cola and Pepsi have installed 52 and 38 plants respectively all over India. These plants extract up to 15 lakh liters of water per day from ground out of which three quarters of water is released as waste water<sup>viii</sup>. This huge extraction of water has already dried the region of Plachimada, Kerala where women have been forced to walk far to get drinking water<sup>ix</sup>.

The Coca-Cola plant in Mehndiganj, Arajji Line block was established in 2000 when it bought the operations from the soft drinks manufacturer Parle Kejriwal Pvt Ltd<sup>3</sup>. Since operational, the plant is extracting 5 lakh liters of water per day officially<sup>4</sup> and produce reportedly 2.5 lakh liters of soft drinks. The community feels that the water table in the region has gone down since Coca-Cola started operating in this region and has been waging a non-violent struggle against the plant under the leadership of a movement comprising of National Alliance of Peoples movement, Lok Samiti, Sajha Sanskruti Manch and Gaon Bachao Sangarsh Samiti. This report is a documentation of outcome of a survey that was conducted on the status of water level in the villages surrounding the plant by Lok Samiti.

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<sup>1</sup> General Agreement on Trade in Services (GATS) instituted under World Trade Organization

<sup>2</sup> Institute for monetary funds

<sup>3</sup> Now Parle is the manufacturer of the most popular bottled water brand Bisleri.

<sup>4</sup> The official figure was quoted by Mr.Kalyan Ranjan, public relations manager of Coca-Cola in a public meeting on 23<sup>rd</sup> March 2006. The locals estimate the water withdrawal to be more than 5 lakh liters.

## 2 Socio-Economic Condition

Araji Line block is situated west of Varanasi in Uttar Pradesh of Northern India. The villages of Mehndiganj, Nagepur, Benipur and Bhikaripur are situated about 20 kilometers from Varanasi on the G.T road that connects Amritsar (Punjab) to Howrah (West Bengal).

About 90% of the people in this area are weavers and produce world famous Banares silk sarees. Most of the households contain one or more handloom weaving setups with in their home. The Banares saree is an exploitative market. It takes about 2-3 days to weave a saree and it fetches about Rs700-800. After material and labor costs, a saree may fetch 100-200Rs. These sarees are sold in the market for Rs 3000 or more. There is lot of child labor employed in this industry who are often paid as little as 20Rs. The weavers are men and male children though women contribute supplementary work which is often not paid.

Agriculture is a secondary occupation in the region. Most of the farmers are small and marginal farmers (estimated at 30-40%) with a land holding of less than 1-2 bigha<sup>5</sup>. A sizeable percentage (estimated at 50%) holds up to 30 bighas. A minority constituting mostly upper caste holds major chunks of land holding up to 100 bighas. Rice, wheat, Maize, fodder, mustard, sugar cane and vegetables (brinjals, potatoes, cauliflower, squash, peppers and peas) are the common crops planted in the region. For small and marginal farmers, food is grown for subsistence. Sugar cane is grown for home consumption and a local sugar variety known as 'gud'<sup>6</sup> is made from the canes, unlike other areas of India where sugar canes are mostly market crops. Oil is made from mustard. Excess production of rice and wheat from larger holdings are sold in the markets. Mango, Neem, Papaya and Guava trees abound here.

Caste plays a major role in the communities and their way of life. Communities live together based on caste. With in a village, the Patel community lives in a separate basthi<sup>7</sup> apart from the harijan (dalit) and muslim communities live in separate neighborhood. Musahar and Chamar<sup>8</sup> communities live separately. The harijan communities including musahar and chamar communities do not own any land or weaving implements and work as landless laborers.

Women constitute 50% percentage of the community. Women contribute majority of their labor in agriculture, household work and help in weaving work but their contribution is rarely acknowledged. Girl children are married as early as 14 and have very low literacy level. Women are not allowed to go out and have to wear purdahs in front of other men in their family. Customs and culture are cited towards oppressing women at every turn in their daily life.

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<sup>5</sup> 1 bigha=2/3 of acre

<sup>6</sup> Gud is considered

<sup>7</sup> basthi = neighborhood

<sup>8</sup> Musahars and Chamars are socially and economically at the lowest rung of the ladder in the Indian Caste System.

### 3 Basis of Survey

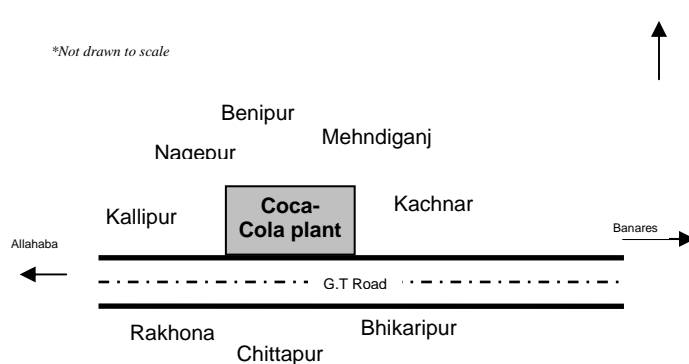
The survey was conducted with following goals.

- Document the existing conditions of wells, hand pumps and bore-wells in the community.
- Analyze the existing ground water situation and trace the changes and reasons behind ground water situation over the last 10 years.
- Document the impact of the Coca-Cola’s water extraction in the ground water situation and water quality.
- Document the reflections on water among the community and the contradictions posed by the Indian government policies on the cultural thinking that has been the basis for water usage with in the community.

The survey was conducted in eight villages with in 3 kilometer radius of the plant. The following table describes basic information about the villages.

Village Name	Distance from Coca-Cola plant (meters)	Max Distance from Coca-Cola plant (meters)	Population <sup>9</sup>
Nagepur	1000	2000	2284
Bhikaripur	50	1000	2600
Mehndiganj	0	3000	8000
Rakhona*	500	3000	5000
Kallipur*	1000	5000	7000
Chittapur	1500	2000	2000
Benipur*	2000	5000	11000
Kachnar	1000	3000	7500

\*For the villages which extend beyond 3km radius, portions within 3km were surveyed.



The survey was done using traditional survey methodology. Questionnaires were formatted and surveys were conducted from house to house. Sampling was decided on the basis of ownership of water sources (well, bore-well, hand pump). All the individual owners of water sources were

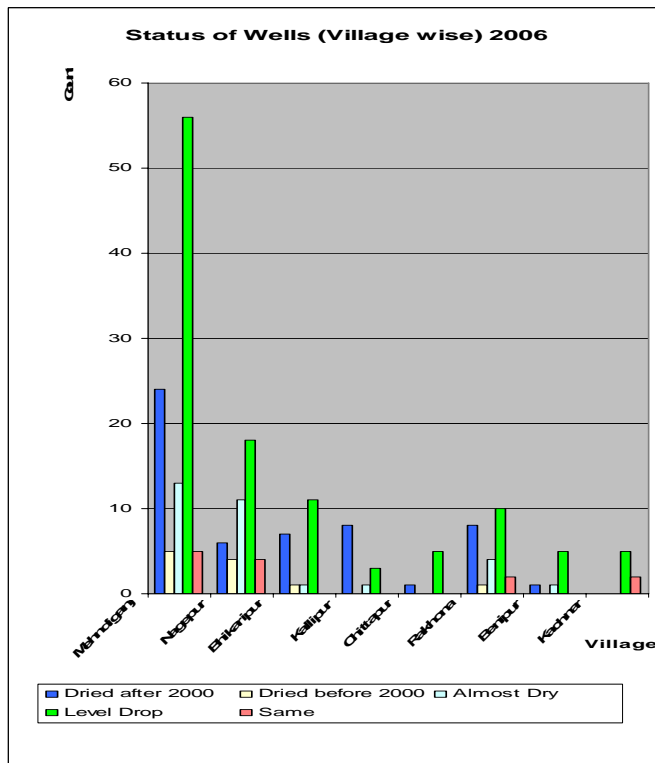
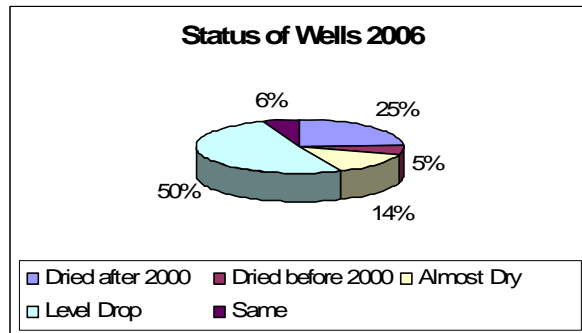
interviewed. Where there was communal or government ownership of the water source, the nearest house was chosen for survey. Surveys were done such that all the above mentioned water sources could be covered. Families were questioned on information regarding water status including the current status of wells, hand pumps, their past status,

<sup>9</sup> From village panchayats based on 2001 survey

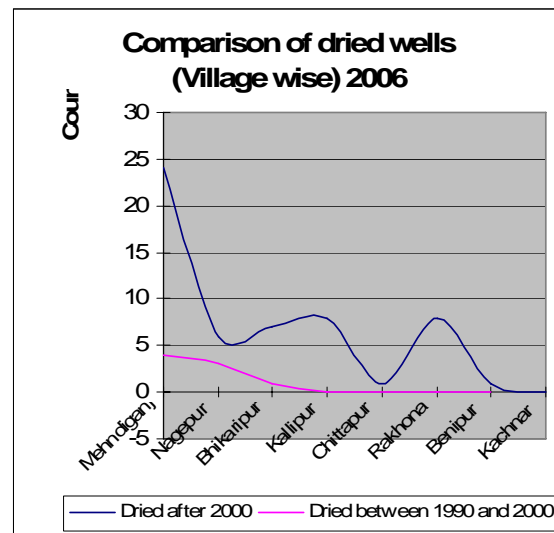
amount of water used from the wells and hand pumps, water quality, the attitude of the community towards water and their opinions on the reasons behind current water situation. The survey was conducted by Arvind, Mahendar, Mukesh, Nandlal Master, Rajesh, Suresh, Urmila P. and Urmila V.

## 4 Status of Wells

In all the eight villages, 223 wells were surveyed. The questions on the wells included the current and past water levels, the depth and existing condition of the well, water quality and water usage. The graph on the right shows the overall status of the wells surveyed in the region. *Around 44% of the wells (Count: 97) have dried or in the process of drying out<sup>10</sup>. 25% of the wells dried after 2000 when Coca-Cola became operational compared to 5% before.* Some of these wells are more than 100 years old<sup>11</sup>. The number of wells that dried



between 2001 and 2006 increased seven times compared to previous decade (1990-2000).

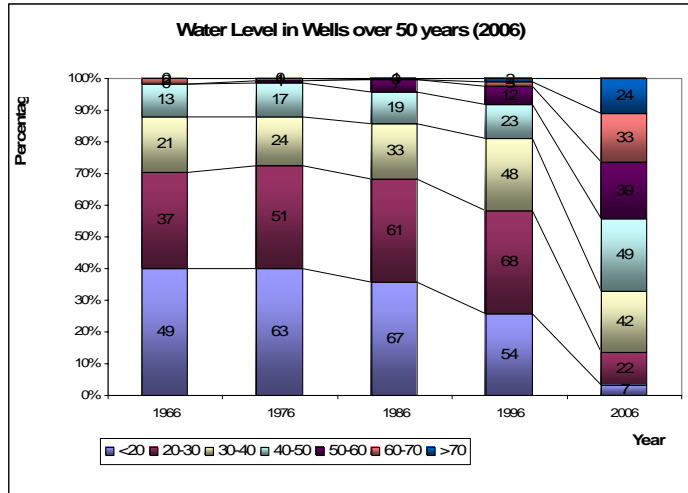


<sup>10</sup> A well is considered to be in the process of drying out if its current water level is less than 5 feet

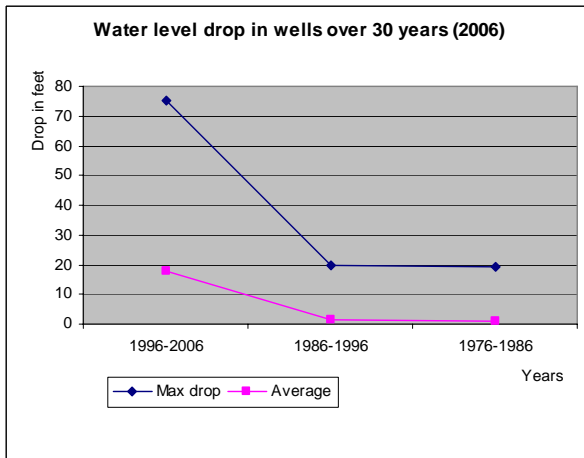
<sup>11</sup> Folklore has it that one of the well was constructed when travelers came to the village, constructed the well to quench their thirst and left it for the community.

The graphs above show the disaggregate data of wells per village. In all villages, increasing number of wells have dried or almost dried. Kallipur area is the worst affected with 8 out of 12 wells having gone dry after 2000. In Kallipur and Rakhona communities, the percentage of wells that have dried or drying since 2000 is at 75% and 50%. In Mehndiganj and Nagepur, the percentages are at 36% and 43% respectively.

50% of the wells have seen decrease in water level. The drop in water level has increased within last 10 years (1996-2006) compared to previous 10 years (1986-1996). The percentage of wells with water level at 40 feet<sup>12</sup> or less was at 86%-89% between 1966 and 1986<sup>13</sup>. In 1996, the percentage of wells which had water level at 40 feet or less was at 80%. By 2006, the percentage is mere 32%. In 68% of the wells, the water level is at more than 40 feet. In 10% of the wells, currently the water level is at 70 feet or higher (In 1996, the percentage was mere .05%). Less than 3% of the wells have water at less than 20 feet now compared to 23% 10 years ago.



The average drop in water level between 1996 and 2006 is 18 feet compared to the previous decade (1986-1996) where the water level drop was 1.6 feet (See graph on left). According to central ground water board, the water level drop in many parts of Uttar Pradesh has been recorded at 3.3 feet in a decade<sup>x</sup>. In villages Rakhona, Kallipur, Chittapur, the drop in water table in last 10 years range from 28 to 35 feet and in the rest of the villages, the drop in water table ranges from 10 to 18 feet.



About 28% of those interviewed said that the quality of water in the wells has changed over past few years. Changes cited included red/mud colored water, increased saltiness in water. Reason for change included drop in water level, dirty water entering from outside during rain and because of Coca-Cola.

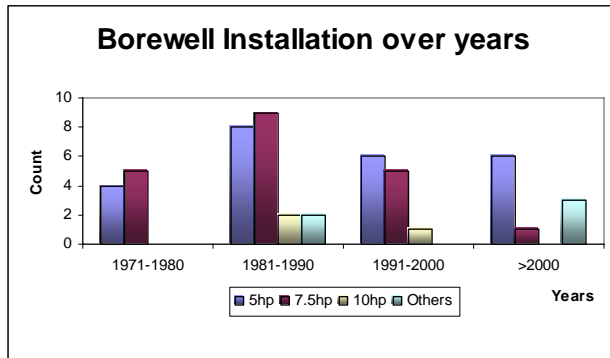
<sup>12</sup> Level of water from the ground

<sup>13</sup> Information extrapolated by estimating the rate of change between the level at the construction of the well and level in 1996.

## 4.1 Bore-wells

There are 73 bore-wells surveyed in the region out of which 9 have dried till 2006.

Between 1990 and 2000, four bore-wells dried. From 2001 till 2006, same numbers (4) have already dried.

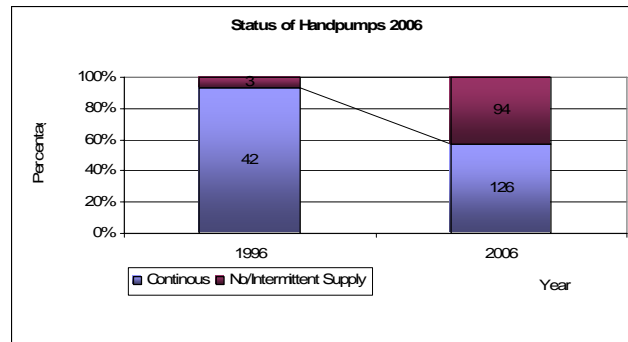


The graph on the left shows the number of bore-wells installed with in last four decades. Years 1981-1990 saw the maximum number of bore-wells installed. In 1991-2000, 15 bore-wells were installed. Between 2001-2006, 11 bore-wells have been installed. Less than 10 percent of bore-

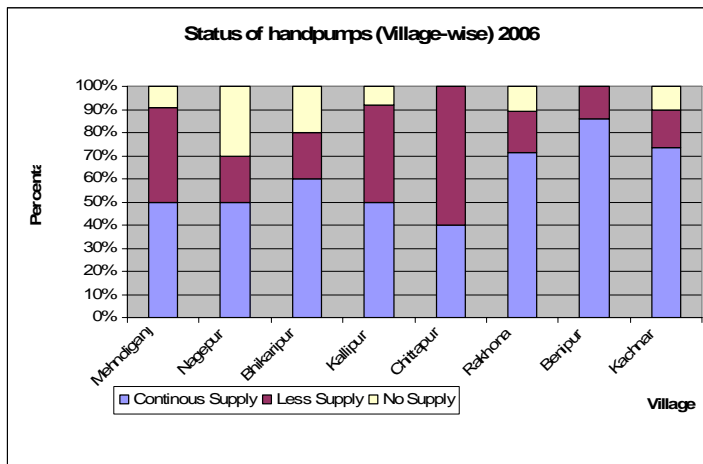
wells are run with generators. 28 of the bore-wells have 5 hp motor. 23 of them are fitted with 7.5hp motor and 3 of them with 10 hp motor. Bore-wells are usually operated during summer when there is no water and during winter when wheat is sowed.

## 5 Status of Hand pumps

The graph on the right shows the status of hand pumps between 1996 and 2006. In 1996, there were 45 hand pumps in the region out of which 7% of the hand pumps were not operational or operating intermittently. *By 2006, the number of hand pumps increased to 220 out of which 43% the hand pumps have either dried or are operating intermittently.* Out of 94



hand pumps, 27% (25) are completely dried and 73% (69) have problems pumping water especially during summer months.



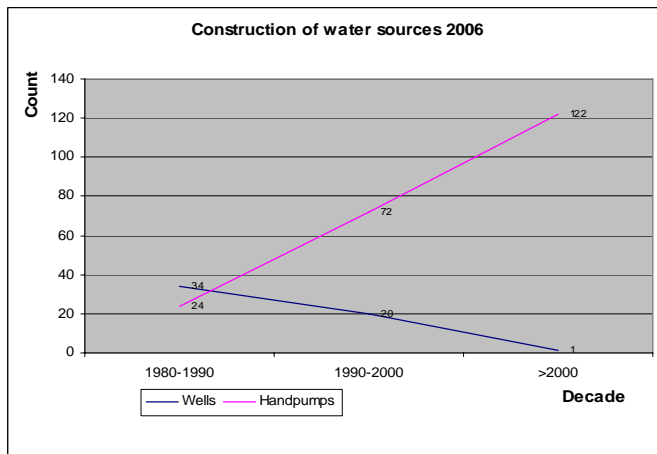
The graph on the left shows the disaggregate data on the status of the hand pumps. In villages closest to the plant, (Kallipur, Mehndiganj, Nagepur, and Kallipur) the number of hand pumps which have water problems is almost at 50-60%.

Around 6.9 lakhs of water is drawn per day supporting the

basic needs of 1871 families. A family draws an average of 365 liters per day which is used for drinking, domestic and livestock maintenance. 32% of the people interviewed felt that water quality has changed. Most of them attributed the change in water level to Coca-Cola and its pollution underground. Other reason also included drop in water level.

In the last 10 years, there has been an increase in the number of hand pumps installed which can be attributed to the wells drying in the region. Between 1991 and 2000, 72 hand pumps were installed. Between 2001 and 2006, 122 hand pumps have been installed compared to one well that was constructed within the same period. While wells have a depth of normally 40-80 feet (very few wells reaching up to 100 feet), the hand pumps usually have a bore depth of 120-200 feet. Thus as water table goes down, the community is increasingly relying on hand pumps for its domestic needs in the region. The implications of this change are dealt with in more detail in next section.

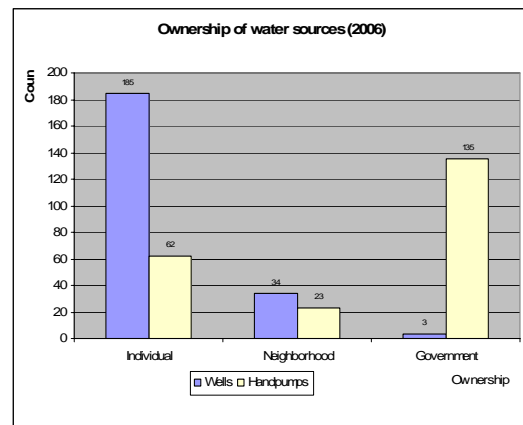
## 6 Water as commons or commodity



The graph on the left shows the change in patterns of water source for the community. Twenty years ago, wells were primary source of water for drinking and domestic usage. As wells are drying increasingly, hand pumps replace the construction of wells. Between 2001 and 2006, 122 hand pumps were installed as opposed to 1 well constructed with in the same period. An increase of 66% has

been observed in the installation of hand pumps over previous decade.

Most of the wells in the community (See graph right) are individually owned (83%) or communally owned (16%). The hand pumps are increasingly installed and owned by the government. 60% of the hand pumps have been installed by the government while 28% are owned individually, 11% are owned communally and 1% installed by Coca-Cola company for the community.



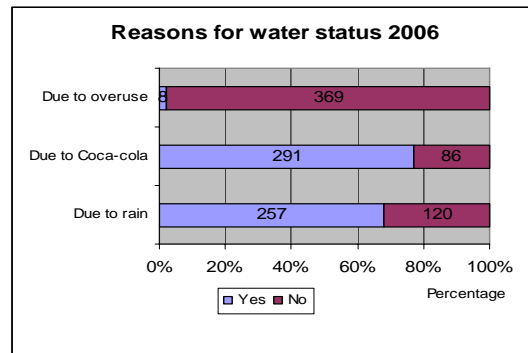
*This trend of increasing dependence on the hand pumps could be because of decreasing water levels which preclude the construction of shallow wells and the increasing dependence on the state for provision of water. The implication of this change is in the self reliance of the community for its needs. The transfer of ownership of water from*

communal relationship to state's control increasingly could result in neglect and abuse of natural resources. For e.g., when government owned pumps go on repair, they are not usually repaired by the community.

Both the wells and hand pumps that are individually owned are more often used communally for their drinking and domestic needs<sup>14</sup>. *There is no charge associated for using these wells or hand pumps.* The attitude of the community towards water is as commons. Water is not treated as a commodity to be traded for profit. Culturally, in this region even today, guests are greeted with water. This is in contrast to the Indian state policy which treats water bodies as a state asset<sup>x1</sup> and the multinationals and the international institutions which treat water as commodity.

## 7 Reasons behind change in water status

When asked about reasons behind the current status of water in their villages, an overwhelming 76% of the people opined that the presence of Coca-Cola was the major contributor to the decrease in water table. 68% of people said that lack of rains in the last 3 years also contributed to the decrease. The contribution of the rainfall in the decrease water table is analyzed in the next section.



### 7.1 Rainfall patterns and water table decrease

India gets 80% of its rain from the southwest monsoon which starts in June and ends in September. Eastern Uttar Pradesh subdivision where Arajji Line block is located, receives its rainfall mainly from this monsoon. The monthly rainfall data for India and the subdivision is recorded by the Indian Institute of Tropical Meteorology.

Year	JJAS* Rainfall (Cm)	LPA ** (Cm)	Percentage (JJAS/LPA)
1987	759.8	853	89
1988	743	852.1	87
1989	697.3	850.7	82
2002	662.5	849.3	78
2003	850.7	849.3	100
2004	746.8	848.5	88

Data Source from Indian Institute of Tropical Meteorology All India Monthly Rainfall Series (1871-2004)  
\*June-July-August-September \*\*Long Period Average

Considering rainfall between 2001 and 2006, India experienced severe drought<sup>15</sup> in 2002 and moderate drought in 2004(Refer table).

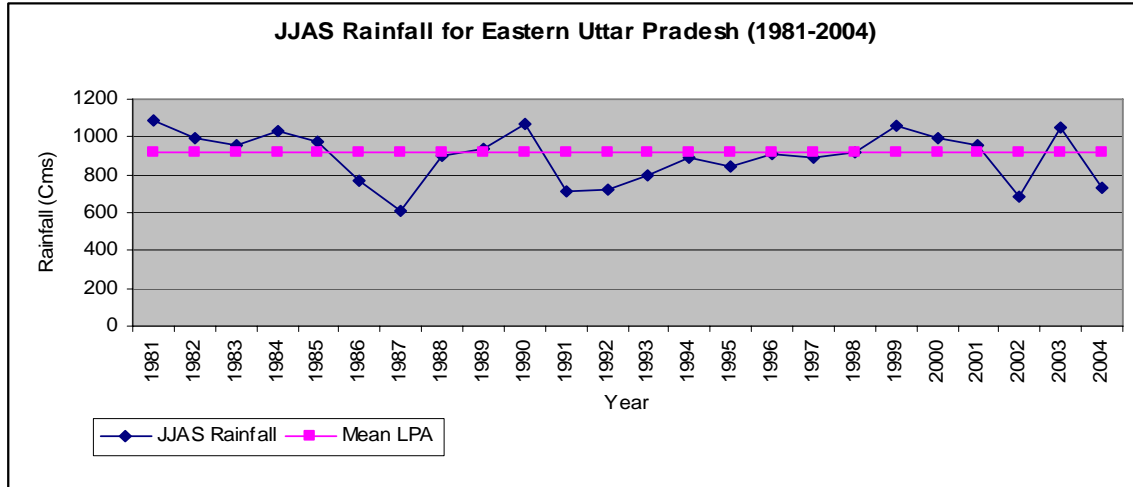
Between 1987 and 1989, there

<sup>14</sup> 54% of the individually owned wells and 48% of the Individual hand pumps have communal access.

<sup>15</sup> According to Indian Meteorology Department, a region is in drought when it receives less than 90% of long period average rainfall computed from 1871 until the specified year.

was consecutive drought situation with monsoon falling below 90% of the long period average. Comparing the water table with in these two periods, in 1986-1996, the level of water drop was at 1.6 feet while 1996-2006 experienced a drop of 18 feet<sup>16</sup>.

Considering the Eastern Uttar Pradesh sub-divisional rainfall water data between 1871 and 2004(See graph below), the region experienced drought on 2002 and 2004 when the region received less than 800 cm of rainfall during the JJAS period.



\*Data Source from Indian Institute of Tropical Meteorology Subdivisional Monthly Rainfall series (1871-2004)

The region also experienced less rainfall between 1991 and 1993 when the rainfall was less than 800 cm. Again it can be seen that drop in water level was negligible in 1986-1996 period compared to 1996-2006 period. Based on this, it can be concluded that while drought may have exacerbated the water crisis in the region it is not the primary cause of the disappearing water level.

## 7.2 Increasing demands

Domestic, agricultural and industrial usages constitute the major demands of water which are analyzed for increase in demands over water.

The decadal growth of the population with in last two decades has been at 25.5 (1981-1990) and 25.8% (1991-2000) in Uttar Pradesh<sup>xii</sup>. The drop in water for periods 1976-1986 and 1986-1996 is at 1.1 feet and 1.6 feet. Assuming the same growth for the current decade, the drop in water table cannot exceed more than 2.6 foot. However, the drop in water table for 1996-2006 is at 18 feet.

A preliminary study was conducted among the community to understand the changes in agricultural pattern. For the small and marginal farmers, agriculture constitutes subsistence farming. Rice, wheat, pulses, and fodder are grown with in these fields. Ten years ago, vegetables were also grown due to better water availability and larger landholdings but nowadays these are not grown in smaller fields. Medium and large farmers grow rice, wheat, potatoes, sugarcane and vegetables such as loushi (squash),

<sup>16</sup> Graph Water level drop in wells over 30 years, pp 6

baigan (brinjal), gobi (Cauliflower), mirch (Peppers), matter (peas) etc. Grains are usually grown both for subsistence and as cash crops. Vegetables are grown mainly for market. Sugarcane, a water intensive crop was abandoned after a sugar mill which existed in the region was closed 8 years ago. Sugarcane currently is grown mainly for subsistence to produce 'gud' brown sugar which is considered more nutritious. Hence the change in agricultural pattern has been either same or even positive (with the drop of sugar cane) as far as water usage is considered. The number of bore-wells in the region is also indicative of change in patterns of irrigation. The number of bore-wells installed increased by 22% between decades 1980s and 1990s<sup>17</sup>. Between 2001 and 2006, the number of bore-wells installed has increased by 15%. At the same time, considering the water level drop with in these periods, the water level dropped from 1.1 feet to 1.6 feet i.e 45%. Assuming the same rate of drop due to increased bore-wells, the water level drop in the region cannot exceed 2.5 feet in a decade whereas the actual decrease is 18 feet. Hence while agriculture has resulted in water table decrease in Mehndiganj as has been the case in India, the drop of 18 feet in water level in Mehndiganj is higher than the drop that could be expected from increase in agricultural usage.

Out of three industries based in this region namely, Hindustan Coca-Cola Beverages Pvt Ltd, Parle Pvt Ltd (Biscuits) and Jayco Industries Pvt Ltd (Tire), the maximum usage of water is consumed by the Coca-Cola plant which uses heavy duty generators to withdraw 5 lakh liters of water per day from two 25hp bore-wells. Comparing the changes in water level drops over last 30 years and the changes in the rainfall, population, agricultural trends and the industrial usage, while population and agricultural demands have changed with drought and decreasing water table, most significant increase in usage has come from the industrial usage especially Coca-Cola plant as opined by the community.

## 8 Conclusion

According to Central Ground Water Board, the water level in various parts of U.P has decreased at 10cm per year (3.3 feet in a decade). Several blocks in U.P have faced more than 20cm decrease in water table per year. However Araji Line Block is not one of them. Hence it can be inferred that the decrease in water level in Araji Line Block is within 10cm per year. Comparing the data within last two decades, the population increase has been at a constant rate of over 26%. The number of bore-wells installed in the region has been at 22% and 15%<sup>18</sup> with in the last two decades The water table decreased by 1.6 feet in the previous decade at a rate of 45% increase in water table drop. However in 2006, the water table has decreased by 18 feet at the rate of 1000% increase over previous decade. The population increase and the increase in bore-wells in the region does not account for this dramatic change in water level.

Though Industrial water usage in India is only at 3%, this is the fastest growing sector in terms of water demands<sup>xiii</sup>. While the national average of Industrial water usage<sup>19</sup>

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<sup>17</sup> See graph Bore-well construction over years pp 7

<sup>18</sup> 15% represents wells constructed between 2001 and 2006

<sup>19</sup> This water usage does not account for the pollution of fresh water sources by industries. It is estimated that renewable world water resources have reduced by 20% due to domestic and industrial pollution.

remains low, the localized over-exploitation of water by any one industry tends to create a water scarcity in the region. This can be seen in the case of Coca-Cola's water extraction with in Mehndiganj area where the water level is dropping at an alarming rate of 55cm per year compared to a drop of 5cm per year over the previous decade.

For the community of Mehndiganj, subsistence agriculture forms an essential way of life and livelihood. With in this culture, access to water is a basic need and an inalienable right and is integrated to right to food, right to life and livelihood. When domestic or international industries come to rural areas, their need for natural resources must take into account, the local availability and sustainability. In the case of Coca-Cola plant, this has clearly been not followed where Coca-Cola has exploited the ground water resources and polluted surface water bodies<sup>xiv</sup>. This exploitation has resulted in the community's increasing dependence on the state to support their water needs. At the same time, within the paradigm of water privatization, the responsibility of the state is being dismantled by international institutions. With their self-reliance stripped away and structural dismantling of the state's services, the price for development of India is being paid by current and future generation of Mehndiganj and the surrounding villages and rural India.

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**Cover Design Art Work:** Basheer, Chennai

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<sup>ii</sup> Rahul Nayar, Dry Days Ahead (2003), [http://www.domain-b.com/economy/general/200306june/20030614\\_dry\\_days.html#major](http://www.domain-b.com/economy/general/200306june/20030614_dry_days.html#major)

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<sup>vii</sup> Perumatty Grama Panchayat v State of Kerala 2004(1) KLT 731

<sup>viii</sup> Perumatty Grama Panchayat v State of Kerala 2004(1) KLT 731

<sup>ix</sup> Dr. Vandana Shiva, Building water democracy: People's victory against Coca-Cola in Plachimada, pp. 10

<sup>x</sup> Activities of CGWB (Central Ground Water Board) Lucknow -

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<sup>xi</sup> National Water Policy (2002), Ministry of Water Resources, pp 1

<sup>xii</sup> Census Data: Census of India 1991, 2001

<sup>xiii</sup> Chandrika R., Rajesh Rao, "Emerging water scarcity – myths, problems, solutions", pp 7

<sup>xiv</sup> Lok Samiti Varanasi, To protect our right over our water - Story of the movement against Coca-Cola in Mehndiganj, Varanasi U.P, pp. 7-9