WATER CONFLICTS ACROSS REGIONS AND SECTORS: CASE STUDY OF LATUR CITY

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Water Conflicts across Regions and Sectors

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Acknowledgement

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Section 1: Background

Indian cities are undergoing rapid urbanization and their resource footprints are growing. As the cities grow and demand for natural resources grow, they face competition and conflicts with other users in the region and hydrological basin, resulting in shortages and scarcities in cities. The climate change exacerbates these conflicts.

Water sector is one of the conflict areas for the cities. As the cities are unable to provide sufficient water, the urban users are increasingly dependent on ground water and even in normal years both municipalities as well as the residents are dependent on ground water. While there is some information on municipal use of groundwater available, the private use of ground water is still not known. The cities located in hard rock areas of the Indian peninsula have limited resources of ground water.

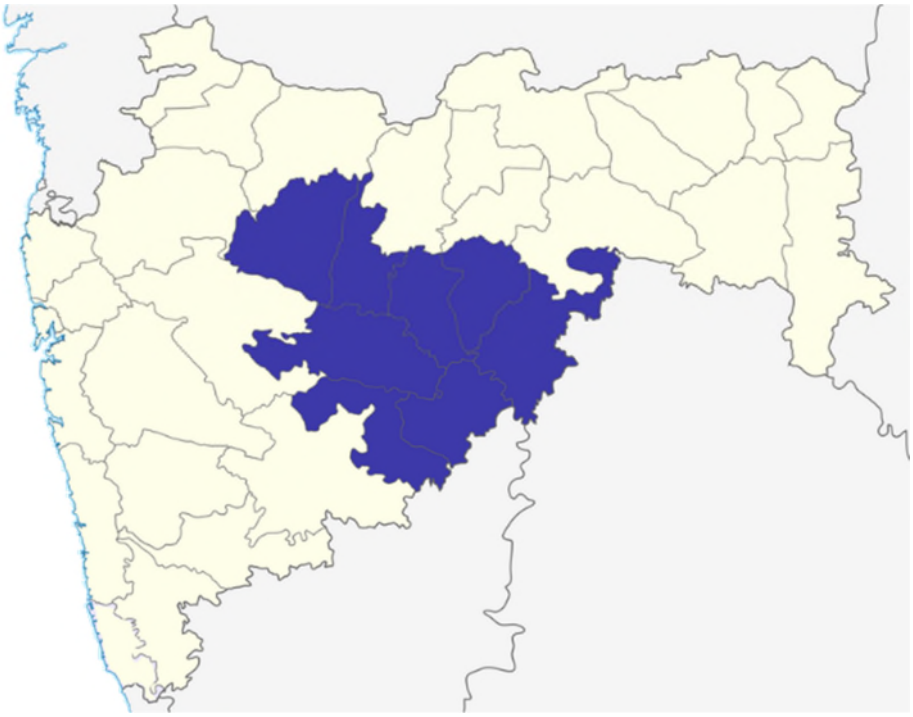
The urbanization results in reduced infiltration due to increase in built up areas and the aquifers also get polluted by lack of sufficient sewerage systems in the core city. The natural recharge from rainfall gets reduced through increase in impervious areas, while recharge from the sewerage across the year increases and it increases pollution. In cities such as Bangalore, the core area with water supply shows raising water table, but in peripheral areas, the water table declines due to over extraction from excessive withdrawal from unserved new buildings.

The 2014 and 2015 monsoons were in deficit in significant parts of the Central India, especially Marathwada. The Marathwada region has seen two years of consecutive drought. This has impacted agricultural, industrial and domestic sectors at regional scale and water supply at City level. This has also created conflicts between city vs region, taluka vs taluka and district vs district. The Case of Latur and other cities in the Marathwada region is presented in this document to highlight these challenges and to explore options for water management across scales and sectors under urbanization and climate variability.

Section 2: Regional Resource Context

Regional Profile: The Marathwada region is located in the southern part of Maharashtra. It was the land occupied by Marathi speaking population in former Hyderabad state in Nizam rule. It contains 8 districts namely Aurangabad, Jalna, Beed, Osmanabad, Nanded, Latur, Parbhani, Hingoli.

Table 2-1: Marathwada Region



It is situated in a hills and plateau region with an altitude of 750 m on its northern end to 380 m on its Southwestern part. The whoe area is covered by Deccan basalts with the thickness of nearly 305 m at Latur, and thickning towards west. Most of this region lies in the upper catchment of easterly flowing Godavari River basin. This region lies in the rianshadow region of Western Ghats. It gets an average annual rainfall of about 600mm on its south western part to about 800mm towrds the eastern fringes. The region is drought prone with high vulnerability in annual rainfall.

Extensive Water Resource Development through Dams and Small Water Harvesitng Structures: About 15.7 percent of cultivated area of district is irrigated. Only 14.3 percent of the area is irrigated to the potential irrigated area created, indicating that the irrigation investments did not result in actual extension of irrigation due to high variablity in rainfall and cornering of irrigation by water intensive crops (DoES,Mahrarashtra, 2013). This region traditionallly depended on open wells but since last three decades, borwells have become most important source of irrgation. Millets and pulses were most common crops in the region, but with water resource development, sugar cane has become the main irrigated crop.

Ground Water Legislation in Maharashtra

*"This groundwater crisis has moved the wheels of an established legislation: The Groundwater (Management and Development) Act of 2009 (GMDA). Under this Act, the Maharashtra Water Resources Regulatory Authority (MWRRA), functioning as the State Groundwater Authority, has issued a public notice for comments in April 2015 to "**Notify**" 76 overexploited and 7 critical watersheds in Districts of Ahmednagar, Amravati, Aurangabad, Buldana, Jalgaon, Jalna, Latur, Nashik, Osmanabad, Pune, Nashik, Satara and Solapur, to prohibit sinking wells deeper than 60 meters."*

Although Maharashtra has India's largest number of large dams, its water lifeline flows under the ground, like most other states. According to Groundwater Survey and Development Agency (GSDA), whopping 71% of the irrigated area in the state is irrigated not by large dams and canal, but through ground water. Experts peg this figure closer to 80%. In India, groundwater-irrigated area has increased 500% since 1960 and India is the largest groundwater irrigating nations in the world.

Source: (SANDRP, 2015)

It has an area of 65,801 sq.km and had a total population of 18.7 million. About 72% of the population is rural, largely depedent on agriculture and allied activties. For the purpose of this report, we focus on Latur, Aurangabad(Marathwada) and Solapur (lying west of the Marathwada) cities, which is facing major conflicts over water between urban and agricultural sectors.

2.1 Latur District Profile

Latur district was separated from Osmanabad district on 15th August 1982. The Latur district lies to the south-east of Maharashtra State, on the border of Karnataka and Maharashtra States. The district lies in between Latitude 17'52" to 18'50" North and Longitude 76 '2" to 77 '18" East. The district lies on Balaghat plateau with altitude range of 540 to 638 m. msl. L. Average annual rainfall for the district is 734 mm. The district has an area of 7,157 sq.kms. The total population of district is 2.454 million persons as per 2011 census, with 74% are rural. Total Municipal Councils in the district are five, namely Latur, Ahmadpur, Udgir, Nilanga, Ausa. The total villages in the district are 943.

This district lies in upper watershed of Manjara River, which is a tributary of East flowing Godavari River basin. It is totally lies in Deccan trap basal region with black cotton soils. Average annual rainfall for the district is 769.7 mm with 82% of the rainfall contributed from South West monsoon. The district has an average of 42 rainy days per year. During last decade the rainfall deficit was reported in three years. Last two years were consecutive drought years.

Table 2-2: Annual Rainfall in Latur District

Year	Rainfall (in mm)	% of Average rainfall
2006	806	105%
2007	837	109%
2008	709	92%
2009	526	68%
2010	1,010	131%
2011	721	94%
2012	762	99%
2013	847	110%
2014	434	56%
2015	406	53%

100 %

Source: GSDA; Note: 2015 - Till 31st Oct 2015

2.2 Agricultural Pattern

The total cultivable area is 657,500 ha, while net sown area is 529,000 ha with cropping intensity of 130%. The area irrigated by canals is only 5800 ha and by wells is 50,000 ha. (MAU, 2011). With highly variable rainfall, most water harvesting structures do not get filled up regularly or are used for irrigating the Monsoon crops only. However, other sources report 73,000 ha under canal irrigation, which doesn't seem to be realistic (Maharashtra SDB, 2010-2011).

Latur had only about 23,000 ha under sugarcane cultivation in 1998 (DES, 2015). It increased to 33,000 ha by 2011. In whole Maharashtra total area under sugarcane cultivation was only 34,000 ha in 1962, which increased to 337,000 ha by 2000 (Hansra & Vijayaraghavan, 2003). In Osmanabad district (original district, before bifurcation of Latur with aggregated data) The Sugarcane area increased from mere 6,200 Ha in 1966 to 97,400 ha in 2011. By 1998, it had crossed 50,000 ha. (ICRISAT, n.d.). The cropping area statistics is presented in the following table.

Table 2-3: Cropping pattern Latur District (2011)

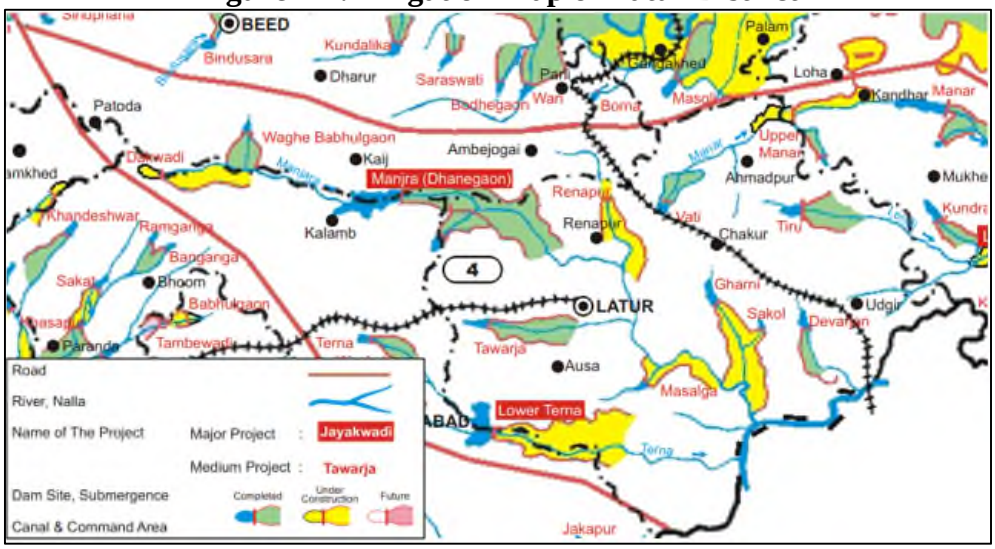
Crop	Area ('000 ha)	% of total	Crop	Area ('000 ha)	% of total
Soybean	155.3	24%	Wheat	27.4	4%
Sorghum	169.7	26%	Gram	43.1	7%
Pigeon pea	70.9	11%	Safflower	8.5	1%
Black gram	66.9	10%	Sunflower	11.7	2%
Green gram	24.9	4%	Sugarcane	33.5	5%
Sunflower	14.1	2%	Orchards	23.9	4%
			Total	650	100%
Source: (MAU, 2011)					

Sugarcane and orchards are the main irrigated crops. Even though sugarcane occupies only 5% area, it supports 12 sugarcane industries. As the sugarcane requires more than 1.2 to 1.5 m of irrigation, most of the groundwater is used for this crop. Wheat is also irrigated crop, but requires much less irrigation compared to sugarcane and orchards. All other crops are mostly rain fed.

2.3 Unreliable Water Resources

Being situated in the upper catchment of Manjara River (a tributary of Godavari River), only about 10% of the district is irrigated by surface water sources. Even before entering this district the water resources are tapped by dams upstream reducing the reliability of water availability during drought years.

Figure 2-1: Irrigation Map of Latur District



The total surface irrigated area from surface water sources is 5,800 ha as per the Agricultural contingency plan (MAU, 2011), but is reported the command area of all surface projects to be 88,390 ha and the net irrigated area is 73,399 ha as per the Irrigation department (State databank, 2011). If that is true, the sugarcane cultivation of 33,500 Hector Meter (ha.m.) can be achieved totally from the surface irrigation.

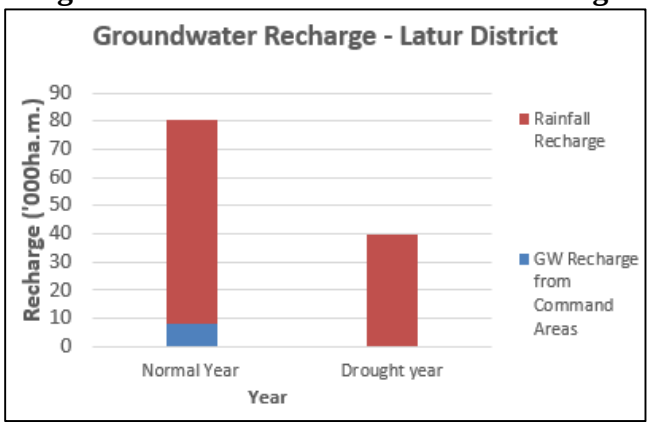
Figure 2-2: Nearly empty Dhanegaon Dam (28th Jan2014)

It may be noted that most of the dams do not fill completely during most years. For example, in the 30-year life of Dhanegaon dam, it was filled fully only four times. Even the existing command area the surface water, may not provide assured irrigation due to small catchment area and many small and medium reservoirs upstream. In normal years, the surface irrigated area may go up to 80,000 ha, but it falls down to zero during droughts, such as this year (2015), when the dam levels are below sill levels. In such cases, the ground water is the only source left for year round crops such as sugar cane and orchards.

Groundwater: The "Net Annual Ground Water Availability for the district was estimated to be about 72,014 ha. meters, which is about 7 cm or about 10% of the annual rainfall. The contribution from ground recharge from command areas is only 8,300 ha.m. These estimates are based on annual average rainfall and during drought periods, the recharge will be proportionally less to the rainfall or even less due to higher evaporation losses. For example,

with 56% of the rainfall in 2014, the natural recharge is estimated to be only about 40,000 ha m.

Figure 2-3: Annual Groundwater Recharge



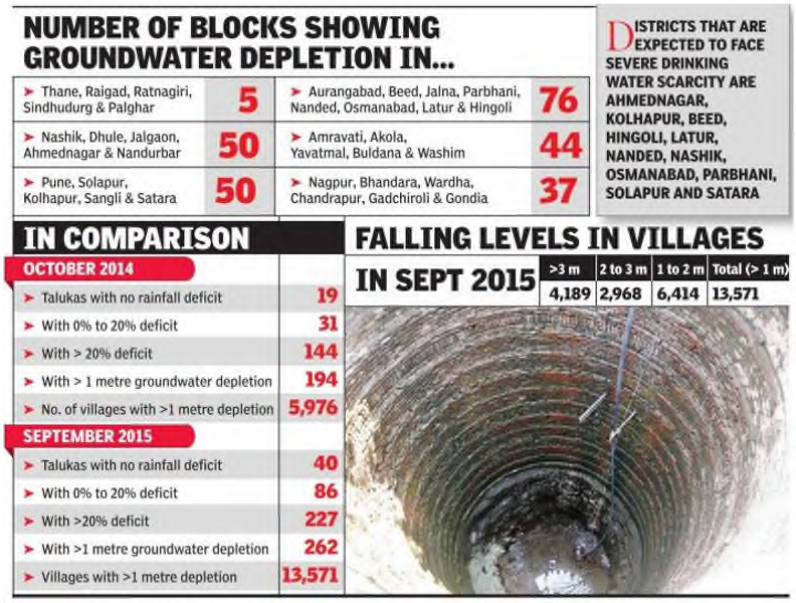
As the aquifers have storage equivalent to many years of rainfall, they will provide water for irrigation, but groundwater decline is inevitable. As the people chase groundwater through deeper borewells, the older groundwater with higher salinity is tapped, damaging the soils and crops on long run. The farmers as well as urban users are drilling borewells in the range of 150 to 200 m as the water table is declining. The farmers often end up "chasing the water table", but end up spending more and more for groundwater, as the following case shows:

The 'Borewell Man'

Harishchandra Yerme, a farmer from village Jagalpur (Taluka Jalkot, Dist. Latur) has 22 ha of land. His taluka is known for rainfall deficit most years. Due to lack of sufficient water resources, farmers in his area do not grow sugarcane. Since last decade, he has shifted to horticulture. He owns a garden of sweet lime & oranges. He has two open wells due to ground water table decline, the wells were no longer able to provide water for irrigation. To save his farm, he started drilling bore wells. First two bore wells went dry then he started drilling more bore wells. In last 8-10 years, **Harishchandra drilled a total of 60 borewells.** (15 bore wells in a single year is his highest). Now all his sixty bore wells are dry and he is purchasing water from commercial water tankers.

In Latur city, the deeper aquifers are reportedly having water with the total dissolved solids of more than 2000 ppm and is unfit for direct domestic use. Ground water quality is adversely affected by nitrate contamination in 62% of the samples collected in May 2011 (CGWB, 2013). The Groundwater Survey and Development Agency has declared 76 blocks in the Marathwada (TOI, 2015) to be facing serious groundwater decline.

Figure 2-4: Water Situation in Marathwada



Ground water is unevenly distributed and borewells can create the local decline in water tables, especially in Sugarcane growing areas. The scarcity of drinking water in sugarcane growing areas and urban areas is probably due to high withdrawal rates.

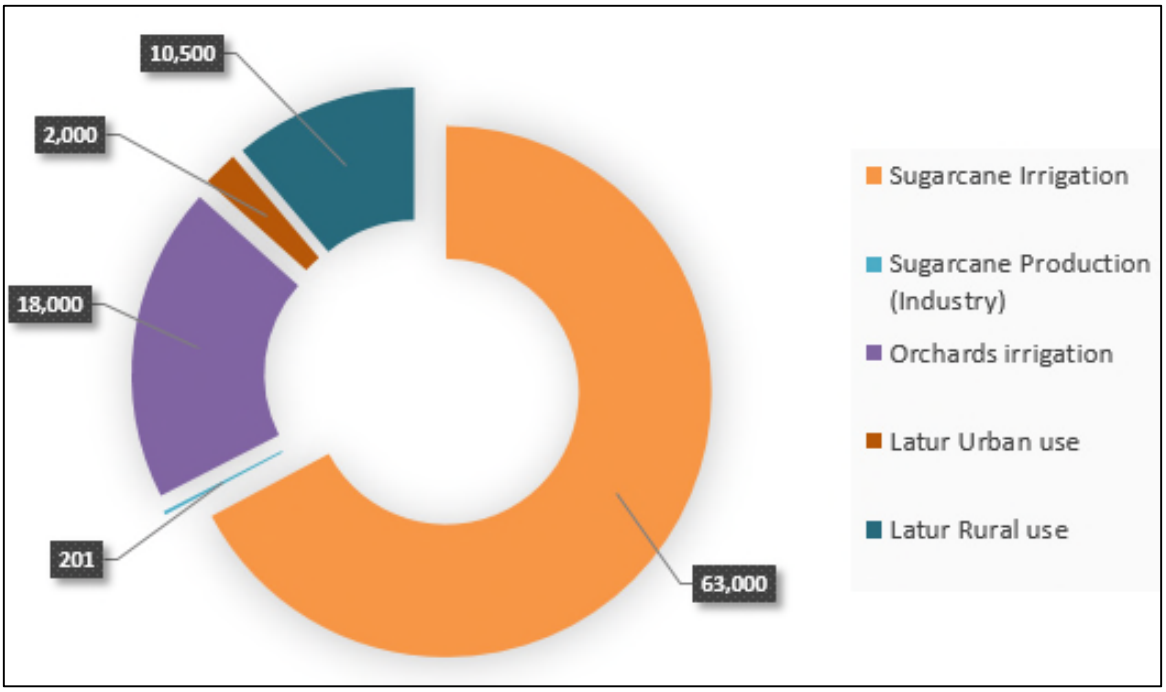
2.4 Water Demand

As per the GSDA statistics, irrigation demand is about 52,215 ha m. (GSDA, 2012). Sugarcane requires about 25 irrigations with average 7.5 cm of irrigation (or 1.875 m per year) (CACP, 2015). About 63,000 ha.m. of water is required for sugarcane cultivation in 33500 ha alone (87% of the ground water recharge).

The orchards will require at least about 0.75m of irrigation annually, which is about 18,000 ha.m. The total water requirement for the agriculture is about 81,000 ha.m. This account more than the net ground water recharge. Since sugarcane is an annual crop, and nearly 40% of it is ratoon crop (from the previous year's crop) its water demand will not reduce significantly during drought years, unless the borewells dry and the crop has to be abandoned.

The annual drinking water requirement of the Latur district (at 135 lpcd including livestock demands) is about 12,500 ha.m. The Latur city itself needs about 2,000 ha.m. annually.

Figure 2-5: Water Demand of Latur District (2012)



With a total water demand for agriculture and drinking water about 93,500 ha.m. during normal years, the ground water resources of 72,000 ha.m. cannot meet these demands. The remaining is accounted by the surface water.

Even if surface water resources are available, the net recharge from surface is only 8,000 ha.m. Both these sources are uncertain and depend on the rainfall, while ground water, if conserved, can provide for immediate needs during droughts. With continued deficit the groundwater decline is observed over last decade. The observed changes in water table is presented in the following Table.

Table 2-4: Table Showing water level in the observation wells in Latur District (in m.)

Taluka	No. of Observation Wells	Ave. water level in last 5 yrs (October)	Ave. water level October 2015	Change in last five years
Ahmadpur	15	3.24	7.50	-4.26
Ausa	15	5.63	8.84	-3.21
Chakur	7	2.71	6.38	-3.67
Latur	18	4.42	7.63	-3.21
Nilanga	17	4.45	8.14	-3.69
Shirur Anantpal	5	3.51	8.36	-4.85
Renapur	11	3.22	6.62	-3.40
Udgir	9	3.11	6.30	-3.19
Jalkot	4	2.98	6.60	-3.62
Devni	8	2.81	5.20	-2.39
Total	**109**	**3.60**	**7.15**	**-3.55**
Source: GSDA 2015				

With the fall in ground water level of nearly 3.55 m, it is certain that groundwater is being over exploited in regional scale. It is not restricted to urban taluka of Latur alone.

2.5 Water Use for Sugarcane in Maharashtra

It takes an average of 2,068 litres of water for cultivating the crop and an additional amount for the factories to produce a kilo of sugar in the state*(Maharashtra)* compared to 1,044 litres in UP, according to a study done by the South Asia Network on Dams, Rivers and People. This works out to be about 1.2 m of irrigation considering a yield of 60 Tonne of sugarcane per hectare and 10% sugar production. As the spread of the sugarcane crop increased and the number of factories swelled in during the last 20 years, the crop ended up consuming a whopping 71% to 72% of the irrigated and well water available in the state. (SANDRP, 2015)

On an average a factory that can crush about 2,500 tonnes of cane per day (tpcd) needs 25 lakh litres of water per day (1,000 litres/tonne of sugarcane). Besides co-generation of electricity, which is integrated in most large factories, needs 2,000 litres of water per MW per day and distillation to make alcohol (primarily ethanol) takes up additional water. (Sugar News, 2015). With modern technologies, about 80% of the water from sugarcane juice can be recovered by condensation. However, only recently the sugar mills are thinking about retrofitting their factory for water recycling.

Ban on Sugarcane crushing?

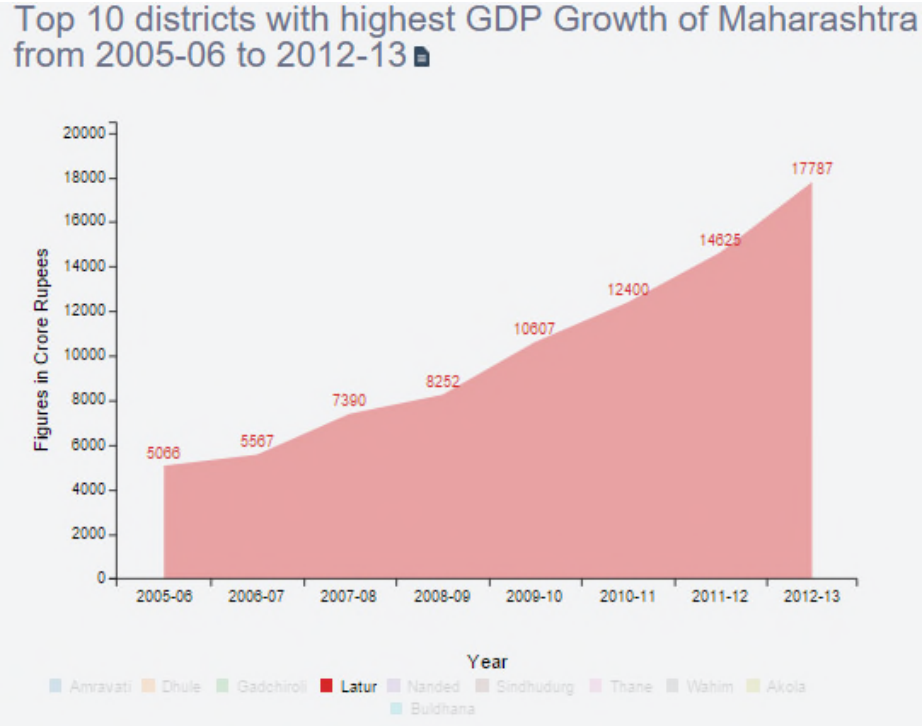
The state government announced in August that it may consider banning sugarcane crushing in Marathwada to protect drinking water supplies. This announcement, made by revenue minister was met with uproar and scepticism. Although significant and needed, this blanket announcement lacked the backing of any proper plan or answers to what will be happen to sugarcane standing on two lakh hectares in Marathwada and about one lakh hectares in Solapur," said Parineeta Dandekar of South Asia Network on Dams, Rivers and People (SANDRP).

Source: (Sugar News, 2015)

2.6 Role of Sugarcane in Latur's Economy

Latur had a GDP of Rs. 5,066 crores in 2004-2005 and Rs. 17,787 crores in 2012-2013 with 251.11% change. (GoI, 2015).

Figure 2-6: GDP Growth of Latur District



A tonne of sugar adds about 3,500 Rs. to the district's economy from transportation, processing and ethanol production, a by-product of the sugarcane agro-industrial value chain. It works out to be about Rs. 700 Crores. Also it provides employment for about 5,000 people directly in sugarcane factories.

The sugarcane cultivation requires about 33,000 Rs. per ha of labor (Rao, 2014). It equals about Rs 111 Crores annually. With diversification of industries, the role of sugar in economy has reduced. to about 4% only. However, sugarcane cultivation provides year round employment in this otherwise predominantly single crop growing area with cropping intensity of 130%.

Summary:

Latur district is located in semi-arid drought prone zone with high variability in rainfall. The water resources are highly developed in the region. Flow from the upstream catchment is modulated by dams. Most dams have only a fraction of the total catchment available as free. During the drought years, the reservoirs do not fill and this increases unreliability of irrigation form these sources.

Ground water is also highly developed by thousands of farmers resulting in decline in water table and groundwater chasing. Sugarcane has become the most important cash crop, relying mostly on groundwater. Reliance on groundwater for sugarcane irrigation is unsustainable and can impact other uses such as drinking water,

2.7 Impact of sugarcane farming on city water Supply

The irrigated agriculture in semi-arid hard rock regions impact the city water supply through many ways. Firstly, the surface water usage for irrigation empties up the reservoirs, on which the city water supply is dependent. During the years of drought there is little or no water stock left during the previous summers and the dams do not fill up. Secondly, the borewells in the neighborhood of the cities dry up due to over extraction, resulting in water scarcities in the peri-urban areas. Thirdly, tanker supplies relying on borewells become costlier as the scarcity increases and the tankers have to source from more distant sources. Fourthly, the demand for irrigation of upper watersheds result in building smaller reservoirs upstream, resulting in reduction of free catchments for the downstream dams on which the cities rely on.

Section 3: Latur City Profile:

Latur city is a district headquarters of Latur district. It is known for its agricultural production like Toor Dal (lentil), soya bean & sugarcane. It's a second largest city as well as business & education center after Aurangabad in Marathwada Region of Maharashtra State. Latur City Municipal Corporation (LCMC) was formed in 2011, and has an area of 3,256 ha. It has a population 382,940 persons in 2011. It also has a floating population of 25-30,000 persons.

3.1 Water Demand and Sources

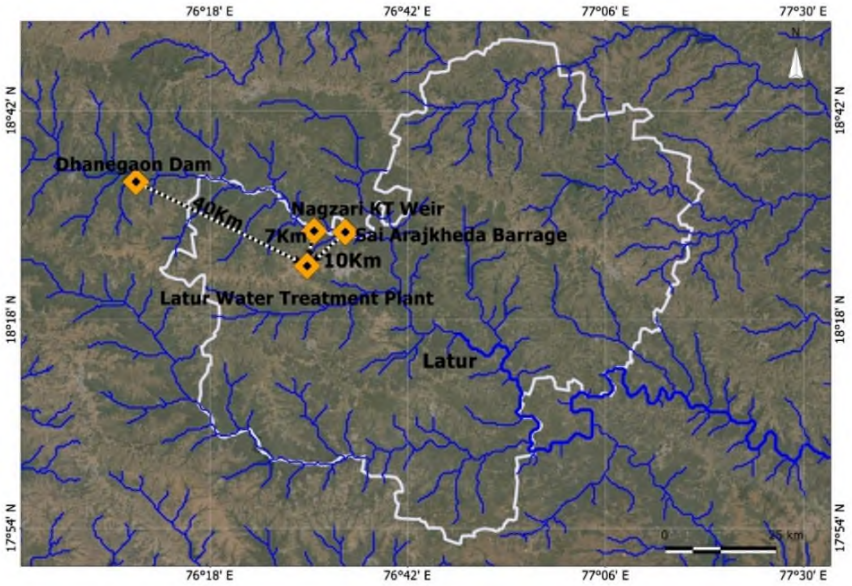
Latur city has an annual demand of 20 m.cum (2,000 ha.m) at the rate of 50 MLD. Two decades back, when the population was below 0.1 million, Nagzari & Sai were the only two water sources for the city. Latur MIDC had laid the water supply pipeline from Dhanegaon Dam. As city started expanding, the Municipal Corporation started taking water from MIDC. In 2003, LCMC laid its own water supply pipeline from Dhanegaon to Latur City. LMC has undertaken a source augmentation project. There has been rehabilitation of old water works and distribution systems expansion. The main sources are:

Table 3-1: Water Sources for Latur

Source	Water volume (m.cum/year)	Distance from City water treatment plant (in km)	Reliability
Nagzari Barrage	3.48	7.3	Seasonal
Sai Barrage.	0.22	10.5	Seasonal
Dhanegaon Dam (Manjara)	16-17	40	Dries during droughts

All these sources are located along the Manjra River and the two former sources are downstream of the Dhanegaon dam (located in Beed district upstream. Dhanegaon dam was built in 1980s.

Figure 3-1: Location of water Sources of Latur



Entire catchment of Dhanegaon dam is located in the rain shadow zones and it overflowed only for four times in last 30 years. Hence Latur city always suffers water crisis. Also, there are many small reservoirs/tanks dams on this river upstream, which divert/store water and only after they fill up, Dhanegaon dam can get sufficient water.

There are few sources of water like Limboti Dam in Nanded District (100 km from City) and Bhandarwadi Dam available in 30-50 km distance Latur city. Latur is situated on the higher elevation than all other possible water sources within 50-100 km range. So even if these sources have some amount of surplus water, it cannot be easily supplied due to high to Latur city as pumping water from these sources to Latur city is necessary.

3.2 City's Water Distribution

The City has ten elevated reservoirs with the total capacity of 269 million liters. In addition to that there are 650 community borewells and 350 hand pumps in the area which mostly serves dense slum settlements or where supply lines are not laid.

Out of about 76,000 households only about 70% of households were covered by the piped water supply, while the distribution network coverage is about 90% of the area. (CEPT, 2013). The supply is one hour, once in two days during normal years.

During the months of acute scarcity, LCMC provides water through hired water tankers. This year (2015) LCMC deployed 70 small tankers (with 6,000 liters capacity) and 5 large tankers (with 12,000 liters. capacity).

This year (2015) it has already reduced to once in 10 days in the month of November and expected to reduce to once in 15 days in December. Those who have running borewells (mostly connected to rainwater recharging systems) are better off, but these borewells are at least 150 m deep and the water has TDS of more than 2000 ppm, thereby requiring household RO systems to make it drinkable.

From last two years due to low rainfall, storage of water in the dam is below sill level & LCMC actually providing water by pumping it from pits created in siltation at sill level. For last one year, city gets water three times a month and from March 2015, twice in a month.

3.2.1 Failed Privatization of Water Supply Scheme

In 2008, Latur Municipal Council tried to introduce PPP model in the form of water supply management contract with a private company. A special purpose vehicle named called 'Latur Water Supply Management Company' (LWSMC) was formed and the entire water supply scheme with existing infrastructure was handed over to LWSMC. Citizens strongly opposed the introduction of private agency in water supply sector & considering increasing oppose from citizens.

The contractor was to pay MJP a fixed monthly sum in lieu of the right granted to it during the term of the agreement. Finally, in 2012, local & state administration declared that the project is cancelled and Latur City Municipal Corporation would manage water supply of the city. But the activists & organizations, who opposed privatization, did not rely on this. They still think that in future attempt to privatize water supply will be made when scarcity situation is over.

3.2.2 Impacts on Households

Due to water scarcity and supply once in ten days, people are forced to store large amounts of water in all sorts of vessels, tanks and drums. This has resulted in mosquito breeding and this year the dengue has continued to persist up to now even after the onset on cold season.

Water scarcity taught households to save water

Prathmesh Apartment in Vishal Nagar, a newly developed posh area of Latur city. There are around 12 flats in building. This building was constructed and handed over in 2010. Apart from municipal water connection, building has one bore well (125-meter depth). This bore gets dry when there is no sufficient rain. From January 2014, this bore well is dry and residents are purchasing water from commercial water tankers since last 23 months. They spend Rs. 400 per day for tanker.

Now society's maintenance charge is Rs. 500 per month and water charges are Rs. 1500 per month. To minimize the water usage, they have closed flush valves in toilets of all flats. Everyone has installed RO purifiers in their homes. Society made it compulsory to all tenants to use the drained water from RO purifiers for bathroom and washing purposes. The water scarcity taught people to reduce the usage of water.

The citizens have protested violently against the municipal Mayor in October. The citizens have taken a variety of protests since last several months. Since last month the water supply was not provided regularly, even though the roster was for once in 10 days.

Protests against water scarcity 2015.

Acute water shortage gripping Latur in Marathwada today led a group of residents of this town to stage a novel protest: bathing on the steps of the municipal corporation headquarters in the city. The protest was spontaneous and no political party or social organisation was associated with it, claimed one of the social activists from Latur participating in it. "Several people of Latur, fed up with getting municipal water supply once or twice a month, staged this protest to draw the authorities' attention to the acute water shortage," the activist said.

The protest comes even as divisional commissioner Umakant Dangat announced a Rs. 48 crore plan to lay a new pipeline to bring water from Ujani dam in Solapur to Latur via Osmanabad. Source: (Mid-day, 2015)

Water intensive businesses also suffer from water crisis. The following case provides a snapshot of water crisis for commercial establishment.

Market Impact of water scarcity on Laundry Business

Venkat Waghmare, owner of the Latur's oldest and biggest laundry owner is facing a water scarcity from last two years. He requires approximately 5,000 -6,000 litters of water every day. He has a bore well from last 15 years. Bore has a depth of 100 meters and had sufficient yield for running his laundry business. He also installed roof top rain water harvesting 6 years back. But due to consecutive three years of droughts, his bore well started drying up since January 2014. He is buying water from a commercial water tanker since last 20 months. He is paying Rs. 500 every day for the tanker, which is additional expense, but as his business requires lots of water, he has no other alternative. Up till now, Venkat has spent almost 0.3 Million rupees for water.

3.3 City Groundwater Balance

The city has an area of 3,256 ha and natural recharge with no land use modification will be about 227 ha m. This is about 11% of the city's domestic water demand. The average per capita water availability from the city's water supply is only 60 lpcd. This include about 3 mld sourced from borewells by the municipal borewells and serve mainly the poor households (110 ha.m./year). As there is constant water crisis in the city from last few decades, rapidly growing city & agglomeration is surviving on ground water as a major coping mechanism. If a demand gap of 40 lpcd is considered (aggregating domestic, industrial and commercial uses) the total requirement from groundwater will be about 554 ha.m./year.

As there is no functioning authority to control and regulate water extraction from bore wells, the exact number of bore well is not known. But the estimated number of bore wells in the city is around 70,000, which seems to be an exaggeration or include nonfunctional borewells. Due to this large number of bore wells, the water table is declining rapidly. Moreover, the drought situation for consecutive two years has worsened the water table situation. As per the ground water survey Development agency of GoM (GSDA), during last four years, water table is declined by more than 5 meters. At present, despite of government's restriction of 60 m depth, all new bore wells have to drill beyond 100 m, because up to 60 m, success rate is almost zero. The borewells meet part of the unmet water demand of the households.

3.4 Water Harvesting Attempts

During 2004 -2007, campaign for rooftop rainwater harvesting was run effectively in Latur City. During that period, almost 5,000 buildings installed roof top rainwater & recharging systems to recharge bore wells. Even after 8-10 years, at majority places, the system of water collection & recharging is functioning.

Water harvesting reducing impact of water scarcity

Since last few decades, Latur city is facing episodes of droughts almost every alternate year. City expanded rapidly in last two decades and there is a lag between expansion of city & expansion of public water supply system. Due to that, even in the normal years, more than half of population is using ground water. During the mass campaign for roof top rain water harvesting was carried out in 2004-2007. During that period, more than 5000 borewells were fitted with rain water recharge systems.

Mr. Mohan Pardesi, member of Rotary Club Latur, was one of the first 100 people who constructed water harvesting system in their house. He also runs a small edible oil extraction unit in his house. As his factory, oil shop and residence are in same building, his water requirement is large. His bore has a track record of running for 8-10 months only in a year. From April 2004, after completion of water harvesting structure, his bore well is running year-round even during the severe droughts. Majority of bore wells where the water harvesting is done, are functioning even in such a severe condition.

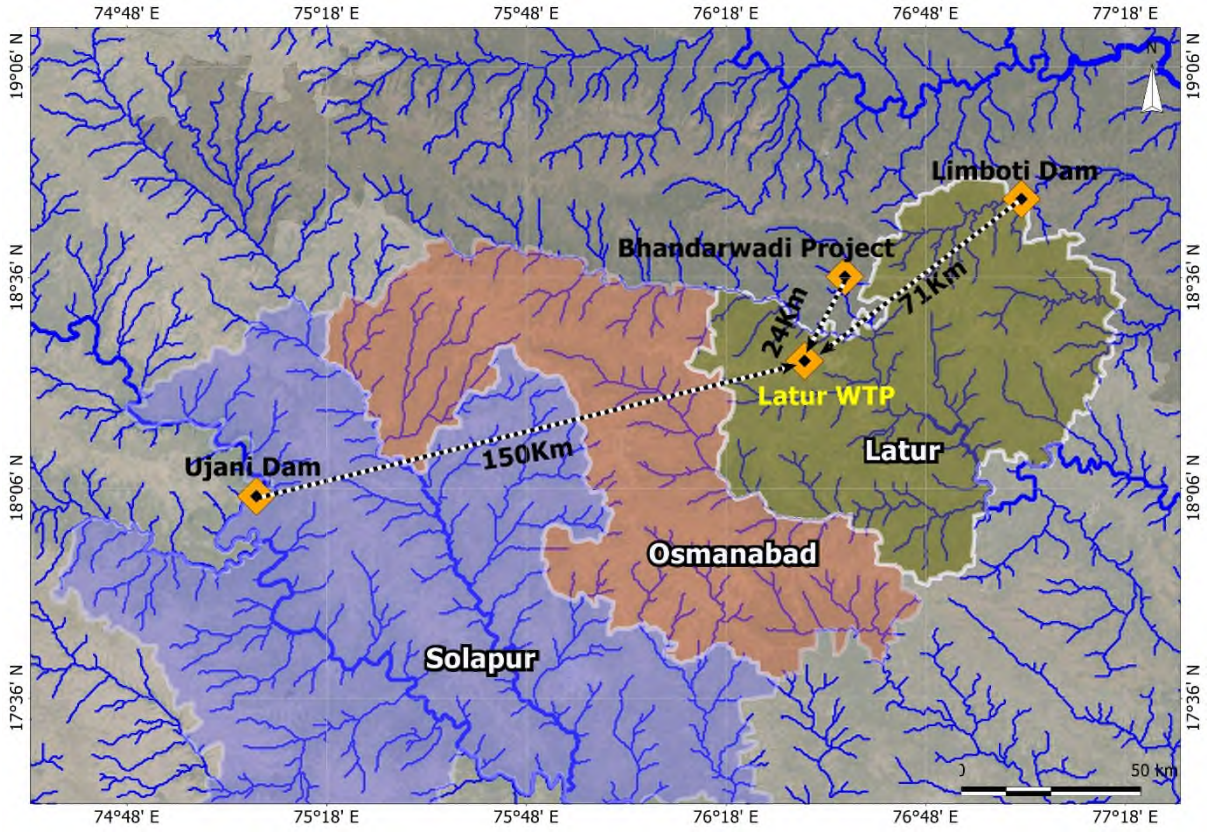
Despite Latur city is getting just half of annual average rainfall for consecutive two years, at least a significant proportion of those bore wells are functioning for almost 8-10 months in a year.

Section 4: Conflicts and Options

Latur district depends on water from inter-district dams such as Dhanegaon, which is located near the boundary with Karnataka. Downstream district of Bidar in Karnataka is also suffering from serious water crisis since last two years.

The proposed water pipeline from Ujani dam has to pass through Sholapur and Osmanabad districts. With the whole Latur and part of Osmanabad district suffering from water crisis, the villages en-route are likely to demand for water.

Figure 4-1: Ujani Dam: Distant Source for 0.4 Million City



4.1 Dealing with Droughts: Searching for Distant Sources

In summer, administration was discussing to run railway tankers for water supply from Ujani dam for Latur. Nowadays, proposal of laying a pipeline from Ujani Dam (nearly 160 km as crow flies from City) is under consideration.

It would require pumping over a height of about 100 m and gravity flow at the tail end. If materialized, this would be an inter-basin transfer from Krishna basin to Godavari basin.

Railway Tanker Option – Knee-jerk Action

This year, the crisis hit hard – dams went from 50% of their storage capacity to 35%, and finally in early September, levels plunged into the negative. At first, they mulled extending to Latur a pipeline from Osmanabad district in the state's south, which was getting water from Ujani dam in Solapur district. Osmanabad was connected to Ujani by the pipe in 2013, which was dependent on tankers. Today, it has been technically allocated technically allotted 10 MLD water than it needs. The problem was that the pipeline would take months to be laid. The city didn't have that much time.

As the drought worsened, officials in Latur came up with what seemed like a novel idea – transporting water by rail from Ujani dam instead of relying on a pipeline. It would fill them at Pandharpur with water from Ujani dam, send them to a point near Latur, where the water could be treated and piped into the city. The plan would serve only Latur city, not other water-starved areas in Latur district. At an estimated cost of Rs. 3.75 crore for just one month, the idea did not seem worth it.

Even if the state was willing to put in the money and clear trains to implement the railway plan, this option remains unfeasible as a long-term solution. The government claims it will cost only Rs 4 crore – nowhere near the Rs 22.5 crore Latur district projects for operating a rail line for just six months.

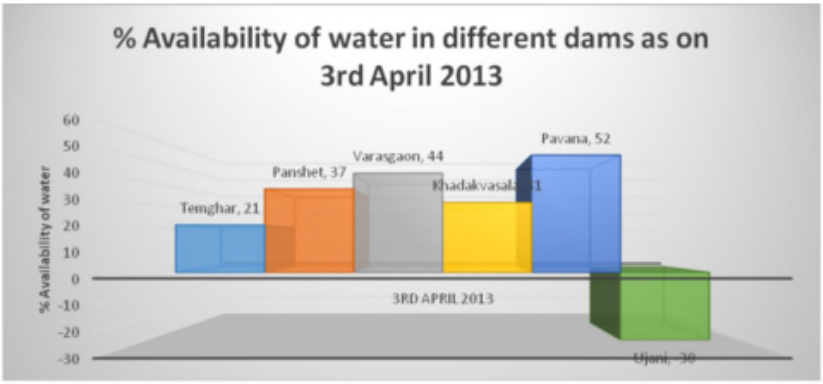
Source: (Chari, 2015)

The Karnataka state located downstream is also laying claim to water from Ujani to provide water to 189 riparian villages. As per the Bachawat committee report on inter-State sharing of water between Karnataka and Maharashtra, the latter was legally bound to release 42,500 ha.m (15 TMC ft.) of water to Karnataka in phased manner. There are also few sources of water like Limboti Dam in Nanded District 100 km from City) and Bhandarwadi Dam located about 30-50 km distance from Latur city. Bhandarwadi is located downstream of Dhanegaon and may not fill up during droughts. Competition and conflicts over both these sources are likely as they have many upstream reservoirs and catchment lies totally in drought prone region. They also require pumping.

4.2 Ongoing Conflicts over Ujani Dam

The Ujani dam has many upstream dams with large command areas under sugarcane cultivation. The inflow in to Ujani dam depends on the release of upstream dams, especially during drought years. It often goes below the live storage level in summers as the figure shows.

Figure 4-2: Water Availability In Bhima River Dams

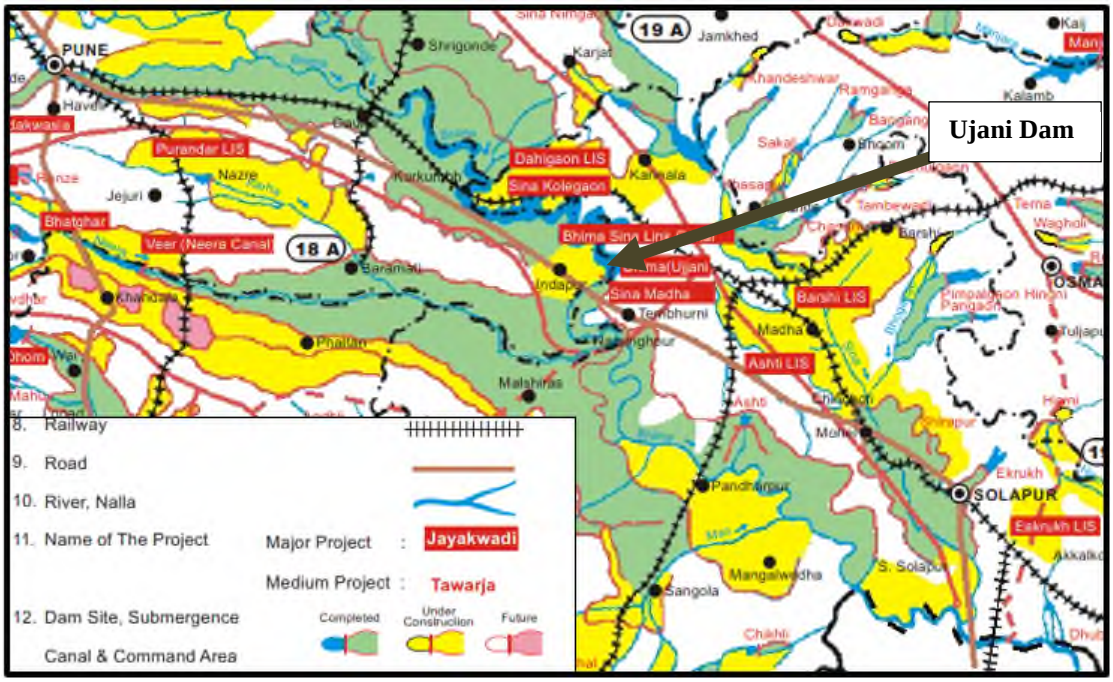


Source: (SANDRP, 2013)

While all upstream dams had sufficient water, Ujani dam was running in deficit. “This situation raises question on the equity of our water sharing practices; not just on inter-state but even also on inter-district ones” (SANDRP, 2013).

Even the City of Pune and Osmanabad are also the competitors to the Bhima water, even though the demand from these cities is minuscule considering the total yield of the Bhīma River (Times of India, 2013). Pune has surplus water than the CPHEEO norms. Extensive irrigation development (existing and planned) without considering the droughts has resulted in creating increasing competition over water from Bhima river.

Figure 4-3: Bhima River: Competition from multiple cities



Conflicts over Sectors and Regions

The agricultural sector is the largest consumer of water, accounting for more than 80% of water during normal years. The sugar industry is also a major consumer with a demand of nearly 200 ha m, which has to be pumped from the dams, which are already below the sill level. Since the sugar industry is politically powerful they are able to get water from various sources. Also, since sugarcane farmers are totally reliant on the payment from the sugar factories and sugarcane is a perishable crop, the number of stakeholders (at least 25,000 farmers) and stakes increase exponentially. The sugarcane payments are the order of 450 crores per annum and it is nearly impossible to stop sugarcane cultivation unless more attractive options are available for farmers.

The upstream of most of the rivers are tapped by building new dams. As many of these dams are located in different districts, there are ongoing disputes against releasing the water to downstream dams. Also the downstream states are claiming water, especially during the drought years. These disputes often lead to major conflicts and law and order issues to be dealt by the state government and courts.

Drought Can Result in Law and Order Problems in Maharashtra

The drought in Maharashtra can result in law and order situation if the government does not address it properly, said Nationalist Congress Party (NCP) chief Sharad Pawar, calling the drought in the state 'unprecedented'.

"The situation is exceptionally dangerous. I fear that the drought can become a law and order issue. I have not seen a situation like this in my 50 years in public life. We need to plant till July as food is not a problem but drinking water and fodder is big issue," he said.

The Tata's own five dams in Pune district region. When asked about using water from Tata dams for drinking water purpose, Pawar said that electricity can be purchased from other regions, but it is difficult to get drinking water from other places.

Source: (Economic Times, 2015)

4.3 Challenges

The water supply systems have been developed based on the premise that water is available as long as the city is able to invest on distant resources. The 21st Century water management requires understating of the water resource constraints and seeing solutions informed by these constraints. The municipalities have to make radical shift in their world views to enable this.

The current capacity and knowledge of the municipalities are limited due to lack of autonomy, funds and history. Only after the 74th amendment, the water supply functions were partially devolved, and the privatization is seen as a solution to lack of capacity, which unfortunately did not work, as the case of Latur shows.

As the city grows, the water scarcity is likely to grow, as there are no sufficient sources to meet the demands. Since sugarcane is one of the most important crops, providing year round employment to many in rural areas, crop shift may be difficult.

The conventional models of city water supply cannot work in the drought prone region with uncertain water resources. The main challenge is to arrest further water resource development including ground and surface water resources.

There is significant opportunity to improve water use efficiency in sugarcane cultivation especially through use of drip system for irrigation. While it can improve water use efficiency, it can potentially increase area under sugarcane from saved water, especially since income from sugarcane much higher than any other crops. As the number of farmers increase by fragmentation, the farmer will tend to increase their incomes from smaller farms to sustain.

The GSDA has several efforts to introduce farmer group managed water management. Droughts are opportunities to introduce such collective efforts. This will require large scale social mobilization, which is currently beyond the scope and capacity of the GSDA alone.

The rural and urban systems cannot be dealt as two separate systems as they are closely linked through water resources. The surface water resources, agriculture, industry and water supply (rural and urban) are dealt as separate siloes by three different departments. This has resulted in sugar cane cultivation in villages facing acute drinking water supply and tankers being used.

4.4 Options

Integrated water management encompassing agriculture, industry and urban water supply sectors needs to be explored. This would require multi-stakeholder engagement and would need platforms for engaging them. Also the water resource and usage across scales and sectors need to be done to start the multi-stakeholder engagement.

Climate change is likely to exacerbate the water sector significantly in semi-arid regions. To avoid maladaptation, it is necessary to understand climate change dimensions of water resources, develop scenarios and convert them to easily understandable language to engage multiple stakeholders.

Payment for ecosystem services is an option that needs to be explored. This would first require rationalization of water tariff system followed by generating enough revenue or funding from state/national governments and other sources to support it. The source level interventions are necessary to solve the water crisis.

Promotion groundwater conservation, and rainwater harvesting and recycling etc. are essential and it will require mobilization of users and dissemination of technologies. The efforts would require awareness building, training of masons and plumbers and regular research & development including auditing of ground water. Formation and **Technology Support Center (TSC)** to address water, energy and other basic services is essential. The municipality and GSDA can support this organization through basic grants as well as contracts. This institution can also access CSR funds from industry. A federation of such city level institutions will be able to leverage the work being done by them as well as advocacy with other stakeholders. The TSC can take up following tasks:

- Industry, farmers, urban households, municipality are main stakeholders in water sector. These stakeholders have high diversity in education, skills, priorities and world views. The TSC can design and implement communication strategy to engage with them and media can play this role.
- Training of Architects, engineers and construction workers on water conservation, energy saving, recycling etc.
- City water balance and water budget needs to be done to understand the current challenges and options. There are several options beyond conventional water supply systems, which include water recycling and reuse, rainwater harvesting, improving efficiency of water use at household levels. These would require both technologies as well as social engineering methods. Multiple sources and water saving solutions need to be used to build resilience to water supply system.

The water is actually used by thousands of households, commercial users and industries. It is necessary to sensitize them to reduce use, recycle and reuse and also to explore nonconventional sources such as rainwater and treated waste water. Sensitizing, encouraging and empowering them is essential. It is suggested that local resource and use monitoring and water budgets at ward/ colony levels may be done through TSCs with support of GSDA. These events can be widely publicized through linking them with annual post-monsoon festivals and prizes can be distributed to the best performers. Capacity building of the urban local bodies to change paradigms of water management is urgently necessary. Engagement with citizens as well as stakeholders at regional levels will require different knowledge and skills, which need to be built through restructuring of the ULBs and capacity building.

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