SECTOR REPORT

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(RESEARCH DESK)

WATER MANAGEMENT

Executive Summary:

Ancient cities taking root close to fresh water bodies was not a coincidence; water nurtures civilizations. While this base fact has remained unchanged since ancient times, it has been progressively obscured by developments of the modern age. Increase in population and urbanization have been two significant developments which have intensified the pressure on world water resources. The world's population, which was 2.5 bn in 1950, has increased 150% to over 6 bn in 2000. About half the world's population lives in urban centres today, compared to less than 15% in 1900.

With a weak and inefficient institutional framework, India has been unable to rise to the challenge of managing water resources in the face of the above two factors. Over the past three decades, the per capita water availability in the country has declined two-fifths. The urban water supply system is in need of an overhaul, water treatment capacities have grown at an abysmally low pace, and the area under irrigation needs to grow to feed an ever increasing population. We believe, insufficient regulatory action and not enough emphasis on water management is responsible for the current situation. However, we are beginning to see the first signs of that changing. The Jawaharlal Nehru National Urban Renewal Mission (JNNURM), an initiative dealing with the infrastructure needs of a rapidly urbanising India, has ~38% projects that have been sanctioned till date for improving water supply infrastructure in India. The states of Andhra Pradesh and Karnataka are leading the expansion of irrigation capacities. Hence, while the water situation in India is grim, opportunities have begun to bud. The water industry in the country can be divided into demand management, water supply augmentation & treatment, water infrastructure, and water utilities. Different verticals have varying dynamics.

Water Demand- Supply Dynamics:

According to various sources, India's exploitable renewable fresh water resources are estimated at ~1,100-1,200 bcm. Surface water accounts for a majority of fresh water resources in the country. While the total water resource availability remains constant, the per capita availability of water has declined steadily due to population growth. A per capita availability of less than 1,700 m3/year is termed a water stressed condition, while if it falls below 1,000 m3/year, it is termed as water scarcity condition. Per capita water availability in India stands at ~1,150 m3 /year. While on an average we may be nearing the water scarce condition, on an individual river basin-wise situation, ~45% of Indian river basins are facing water stressed conditions.

The demand on water resources is generally classified according to end users. While agriculture constitutes the largest share of water demand, it is pertinent to note that the share of agricultural water demand is declining in contrast to an increase in the share of

domestic and industrial water demand. We believe, this is a consequence of high industrial growth, coupled with lower growth in agriculture in the past decade.

Steady growth in population over 1973-02 and changing lifestyles have also contributed to the steep growth in domestic water demand. It grew at a CAGR of 14.7% over 1973-02 compared to 6.7% and 4.3% in industrial and agricultural water demand, respectively, over the same period.

The Future:

According to Ministry of Water Resources and National Commission on Integrated Water Resources Development (NCIWRD) estimates, demand for water is likely to increase at a CAGR of ~1.5% and ~1.3%, respectively, from 2010 to 2050. The peculiarity in the case of water is that supply driven by the hydrological cycle remains constant, while demand follows a linear path, driven by population growth, industrial growth, and change in lifestyle.

Driven by the increase in agricultural, domestic, and industrial demand of 64% in 2010E, the water dependency ratio is likely to be at dangerous levels. The declining water demand supply dynamics can be explained by the Environmental Kuznets curve. According to it, in the initial part of economic development, the environment deteriorates as pollution increases. However, after a threshold, when basic needs are met, environment gets priority, which facilitates investments in the same. While India may still be on the upward leg of the Kuznets curve, we believe, we are close to a threshold point from where investments in the water sector are likely to increase. We use the water dependency ratio as a guide to predict the threshold. The increasing water dependency ratio, according to us, implies that we are getting closer to the threshold point.

Water Demand:

Urban/domestic water demand

Water is a state subject, which implies that according to the Constitution of India it comes under the purview of the state government. The 74th Amendment of the Constitution delegated 18 functions, including water supply to urban local bodies (ULB), and accorded constitutional status to these institutions as the third tier of the government. However, without commensurate increase in their revenue-raising powers, ULBs face inordinate fiscal stress, which has rendered most of them incapable of meeting the challenges of a rapidly urbanising society.

Compounding the predicament in the institutional set up is the pace of urbanisation in the country. According to the 2001 census, India’s urban population was 27.8% in 2001, up from 10.8% in 1901. The number of metropolitan cities rose from one in 1901 to 35 in 2001.

Currently, ~30% of India's population lives in urban areas and by 2030 this is likely to increase to ~40%. Given the sheer size of the country's human capital, India is already the second-largest urban system in the world. Most problems encountered in the urban water supply sector in India have their genesis in the above two factors. We classify the two problems as macro issues afflicting the sector, while there are a host of micro issues resulting from the above. Of the various micro issues faced in the urban water supply sector, the gravest ones are those of poor financial management indicated by high operating ratios, unmetered connections, water availability and quality.

Operating ratio: The average operating ratio (operating expenses/operating revenue) for Indian water utilities is at ~1.63x, implying higher expenses than revenues. While this reflects low productivity, more importantly, it reflects the subsidised character of urban water supply in India. Additionally, high operating ratio reflects lower number of metered connections. However, about one-third of urban water utilities (including Chennai 0.44x, Mumbai 0.49x, Bangalore 0.8x) have an operating ratio of less than 1x. The worst performers on this metric are Indore at 5.33x and Kolkata at 4.73x. Interestingly, Kolkata does not charge tariff for urban water supply, leading to a high operating ratio.

Unmetered connections: On an average, only ~25% of water connections are metered in urban India. A few water utilities like those in Bhopal and Mathura do not have water metering at all. This results in high unaccounted for water (UFW) and high operating ratio.

Water availability: According to a study by the Asian Development Bank on Indian utilities, average water supply in urban areas is ~4.3 hours/day. However, variance across different cities is substantial. Chandigarh has the longest available supply of ~12 hours/day, while Rajkot has a duration of ~0.33 hours/day, followed by Indore at ~0.75 hours/day. Health risks increase when water supply is less than 24 hours, due to contamination of water distribution pipes as a vacuum is created due to absence of water in pipes. Studies point to higher wastage in the absence of 24-hour water supply as water taps are left open even after storing water, thus increasing wastage. Lack of 24-hour supply also impacts the lower strata of the population as they have limited storage facilities. It is pertinent to note here that costs to consumers and utilities are lesser with 24-hour supply. Delivering ~123 litres/capita/day (average daily consumption per capita for urban areas) for one hour requires larger pipes than delivering the same amount of water over 24 hours. The urban water supply situation is grim and we expect regulatory changes to drive reforms in the sector.

Agricultural water demand:

India has total land of ~3.3 mn km2. The total cultivable area is ~1.85 mn km2, ~56% of the total area. The total land under cultivation has grown at 18% per year between 1950 and 1970, while it grew 2% per year from 1970 to 1990. The total cultivated area was estimated at 1.4 mn sq km in 1995. Agricultural demand for water is driven by the increase in area under

irrigation. The area under irrigation in India has increased at a CAGR of ~5.05% over 1962-00.

According to NCIWRD, India's population is expected to be ~1,346- 1,586 mn by 2050. Based on this, the country's total food requirement is estimated between 382 mn tonne and 449 mn tonne. Wastage, feed requirement, and seed requirement is estimated at 12.5% of food grain production.

Thus, food grain production must double to ~420 mn tonne from the current ~210 mn tonne to meet the projected requirement. Thus, on an average, food grain production needs to be enhanced by ~5 mn tonne per year. Accordingly, targeted growth of 25 mn tonne in food grain production is to be achieved in the Eleventh Plan.

Currently, the average yield rate of food grains in the country is at ~2.5 tonne per ha in areas under irrigation and ~1 tonne per ha in rain-fed areas. Therefore, with the introduction of irrigated agriculture, it can be presumed that there will be a net increase in food grain production by ~1.5 tonne per ha. As per the 16.5 mn ha target set for the Eleventh Plan for creation of irrigation potential, it is likely that food grain production will be enhanced by about 25 mn tonne when the created potential will be put into actual utilization. Consequently, with population increase driving demand for food grains, the demand for water for agricultural needs is likely to be on an uptrend. However, like the urban water sector, the irrigation sector also has its set of challenges. The focus of the irrigation sector in developing countries like India has been on the supply side till now. The future merits a change in orientation towards proactive demand management under the auspices of the integrated water resources management (IWRM). However, this calls for a paradigm shift, which is easier said than done. Measures such as enacting new water laws, forming basin organisations out of erstwhile regional water departments, and proclaiming water as an economic good are simply not enough. Instead, the situation calls for radical initiatives such as enforcing the recently-drafted water laws, comprehensive water resource management at the basin level, and using price mechanisms to give priority to high-value users. Currently, the so-called IWRM initiatives in India have been unable to change the situation at the ground level. The new age irrigation framework demands promotion of the micro-irrigation technology like drip irrigation (to save water, decrease fertiliser consumption, and increase productivity), subsidies to farmers (bolstered by spreading awareness), and promoting sustainable irrigation methods.

Industrial water demand:

Approximately 80% of the water used by industry is for heating and cooling, which is discharged after use as waste water or effluent. The balance is used directly in a variety of manufacturing processes. Practically all industrial uses end up polluting the water used, and only a small fraction of the water used is actually consumed. Industry, therefore, uses a huge

amount of water and contaminates it heavily and ends up with the problem of having to dispose it of. The highest consumers of water include thermal power plants, pulp and paper, textiles and iron and steel industries.

As water has become scarce, agricultural, industrial, and domestic demand is competing more for a limited supply. The agriculture sector continues to dominate water use owing to its importance in the Indian economy, while industrial demands are increasing as the sector continues to grow. Data on industrial water usage varies significantly amongst various sources. According to MoWR, industrial water use in India stands at about 40 bcm in 1999. Whereas according to the Central Pollution Control Board (CPCB), in 2000, Indian industry consumed about 10 bcm of water as process water and 30 bcm as cooling water. According to the World Bank, the water demand for industrial use and energy production will grow at 4.2% per year, rising from 67 bcm in 1995 to 228 bcm in 2025E. There have been cases in the past where industries had to be shut down due to shortage of water.

In a study undertaken by the Confederation of Indian Industry and the World Bank in 2003, to find out what constituted good investment climate in various parts of India, it was found that water availability is one of the major infrastructural bottlenecks companies in Tamil Nadu face. The study covered 1,099 manufacturing companies in four sectors—textiles, garments, consumer electronics, and pharmaceuticals— in 10 states and listed water as one of the major bottlenecks for future industrial growth in the country. In 2002, companies like Harihar Polyfibres (Karnataka) and the Indian Rayon plant (Nagda) shut shop for a few day due to non-availability of water.

Investment opportunities in water:

Most of the activity in the water sector is happening in verticals of water infrastructure and water supply augmentation. The concept of private water utilities is still at nascent experimental stages in India. Demand management is likely to be taken up in the later stage of the water investment cycle as higher efficiencies can be obtained from upgradation in water infrastructure, while water supply augmentation can vastly increase the quantum of water supply.

Opportunities in urban/ domestic water demand

The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) launched in December 2005 is an attempt towards addressing the institutional shortcomings afflicting urban planning and infrastructure. JNNURM is likely to catalyze reforms and hence, further investments in the urban water supply sector over the long term.

Jawaharlal Nehru National Urban Renewal Mission (JNNURM)

It is estimated that ULBs will require total investments of ~INR 1,205 bn over 2005-12 to upgrade urban infrastructure.

Of the total investment requirement, ~INR 500 bn is likely to be provided as grant by the Union government over a seven year period. However, for accessing Union government grant, ULBs are obliged to initiate a set of mandatory reforms listed under JNNURM. The total investment is proposed to be shared among the Union government, state governments, and ULBs in the ratio of 35:15:50 for Category A cities, 50:20:30 for Category B cities, and 80:10:10 for Category C cities. As of May 2008, projects worth ~INR 285 bn were sanctioned under JNNURM. Water supply projects at ~INR 108 bn form a substantial chunk of the projects approved.

JNNURM has the potential to address the issues impacting the urban infrastructure sector. To access Union government grants, ULBs need to implement mandatory reforms from the first year of the project, while at least two optional reforms need to be undertaken each year from 2005-12.

Opportunities abound in the urban water supply sector as India takes first tentative steps towards capacity build up. A few leading contractors addressing water supply projects have emerged over the years. While there are a few leading players in the water supply EPC business, as of now, water supply EPC business forms only a small percentage of their total sales. Hence, investors are likely to end up buying a basket of business opposed to solely water supply EPC business. Leading players in the water EPC business are likely to benefit from the impending capacity expansion in water supply and water treatment projects. However, we believe the pre qualifications criteria in the above projects is not stiff and hence, a larger universe of EPC players can participate in the water supply capacity expansion plans in the country.

Opportunities in irrigation water demand

Irrigation capacity expansion involves investments in the field of water transmission and distribution and water storage. The water transmission and distribution market is by and large dominated by EPC players. Due to low entry barriers the industry has the characteristic of being extremely fragmented and local in nature. Further, weak fundamentals and poor record in implementing projects of government department addressing irrigation across the state and central levels have been a barrier to entry of larger organized players. However, large organized players are present in the water storage market.

Opportunities in industrial water demand:

Water treatment and recycling

According to the Central Pollution Control Board (CPCB), the total waste water discharged by all major industrial sources is 83,048 mn litres per day (mld). As per CPCB, only ~21% of the total waste water generated is treated. While the waste water generated per capita has

increased over the years, the water treatment capacity has not kept pace. Consequently, the amount of untreated water has been on the rise over the years, which presents an immense opportunity for the water treatment market. Also, the industrial waste water treatment market is expected to grow further on account of growing investments in the high water polluting sectors such as chemicals and petrochemicals, metal processing, power and food processing.

Apart from the above, water is also treated to make it useable for equipment such as boilers, cooling water systems, and heat exchangers. The purpose of the treatment is to minimize the adverse effect of impurities in the feed water. Over a period of time, the quality of water available for the industry has deteriorated which has led to an increasing demand for treatment facilities. A United Nations report in its World Water Forum at Kyoto (Japan) in March 2003 ranked India third from the bottom (out of 170 countries surveyed) in terms of water quality for its inability and lack of commitment to improve the situation.

Non-availability or irregular supply is expected to drive industries to look at recycling of water for sustainability. Water recycling requires only incremental investment to enable the treated waste water to be re-used/recycled by the industry rather than discharge it. Researchers believe that if every source of waste water is carefully monitored in an industry, it will be possible to segregate easy to treat waste streams from the difficult to treat streams, thereby recycling easily treatable wastes instead of combining all waste together for a final “end of the pipe” treatment. The overall cost of treatment could come down substantially and also the amount available for re-use/re-cycle would increase substantially if this approach is made standard practice.

Opportunities exist in the water treatment and recycling space; as also in the product and EPC segments. The high end product segment is dominated by multinational companies or their joint ventures like GE, Veolia, among others. In addition, there are companies which provide end-to-end solutions in water treatment.

Conclusion: Rays of hope

While the water situation in India is grim, reforms on the regulation front have begun to take shape and its success can throw huge investment opportunities. The investment opportunities in the water industry can be classified as those driven by water demand management, water supply management, water infrastructure upgradation, and water utilities management. The water supply management opportunity could have a potential of ~INR 60 bn over the next ten years, while the potential of water infrastructure upgradation is likely to be ~INR 900 bn over the next five years, driven by irrigation infrastructure upgradation.

While the number of companies serving the water industry in India abounds, it is difficult to identify public companies that have a substantial chunk of revenues coming from the water

market. The potential for the water industry in India is immense; however, the current exposure to water industry in the listed space is limited. We continue to like companies with some presence in the water segment, as they can scale up their exposure to the water industry when the opportunity arises over the medium to long term. Preference plays on urban water demand and water treatment and recycling space compared to irrigation, given the increasing investment in urban renewal and improvement in environment consciousness of corporate India. However, given the sheer size of the irrigation sector compared to urban water treatment and recycling, it is likely to result in higher growth for companies addressing the irrigation space.

The water industry in India is in a nascent stage. Investor confidence is likely to increase as progress on the regulatory front gathers momentum. The industry is set to realize its potential over the medium to long term as pressure to control the rapidly deteriorating dynamics of water is already showing on the regulator.

Industry Structure:

The water supply contractors industry can be split into three categories:

- Large players: Hindustan Dorr Oliver, Ion Exchange, Thermax, Patel Engineering.
- Medium sized players: Aquatech, Fontus Water.
- Smaller unorganized players: Over 500.

Additionally, in the past few years, many large international players like Veolia Water, etc., have entered the market.

> "How is it that water, which is so useful that life is impossible without it, has such a low price, while diamonds, which are quite unnecessary, have such a high price?" — Adam Smith

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