Executive summary of the study on independent third party assessment of Coca-Cola facilities in India

Introduction

In late 2004, the University of Michigan, Michigan, USA, initiated an enquiry into Coca-Cola's water management practices in India. The University of Michigan and Coca-Cola agreed that an independent assessment would provide the information needed for the University to move ahead with its enquiry. In this context, Coca-Cola and the University of Michigan agreed that TERI, a New Delhi based international research organization, would conduct the assessment guided by an independent Steering Committee to reinforce quality control. It is in this context, during 2006-07, TERI conducted an independent assessment of TCCC's (The Coca-Cola Company) water resource management policies and practices in India.

The assessment was undertaken at two levels.

1. *Level 1: An assessment of regulations and policies related to water resources management* This included an assessment of government regulations as well as TCCC requirements, guidelines, management systems, and compliance mechanisms relating to water resources management and environmental protection.
2. *Level 2: An assessment of select Coca-Cola plants* This included regional (ex situ) and in-plant (in situ) water quality assessment; in-plant water audit; and key stakeholder discussions within a defined area to assess the relevant issues associated with water stewardship. The select Coca-Cola facilities included both company-owned and franchisee plants.

The Third Party Assessment Report is divided into five chapters. The first chapter provides background, scope of work, and the structure of the report. Chapter 2 discusses the approach and methodology followed in conducting the assessments. Chapter 3 reviews the regulatory and governance issues related to water resource management in the country, with a focus on industrial use of water. Chapter 4 (A to F) provides the details of the six plant-specific in situ (plant level) and ex situ (regional) assessments. Chapter 5 puts forth recommendations.

Parties involved and their roles

The University of Michigan acted as a catalyst for initiating the assessment, and participated in initial discussions with TCCC. The University played a key role in determining the scope of assessment. Three primary parties were involved in defining the scope of work of the assessment and establishing protocols to ensure TERI's independence: TERI, TCCC, and the Meridian Institute.

TCCC and Coca-Cola India

TCCC and CCI (Coca-Cola India) negotiated the original scope of work; provided TERI with documented information related to TCCC's and CCI's water resource management practices; and facilitated TERI's access to bottling facilities.

Meridian Institute

The Meridian Institute played the role of a neutral third-party organization to ensure independence to TERI by acting as a neutral convener and facilitator for the parties.

TERI

TERI participated in the preparation of the scope of work within agreed broad parameters; was required to constitute a Steering Committee comprising external experts to oversee the research design and provide strategic direction to the assessment process, conduct the assessment; and prepare the report. The names of the Steering Committee members are provided in Chapter 1 of the report.

Selection of plants

The plant-level assessment focused on the following six Coca-Cola plants (four COBO [company owned bottling operation] and two FOBO [franchisee owned bottling operation]) in India.

- HCCBPL (Hindustan Coca-Cola Beverages Pvt. Ltd), Kaladera, district Jaipur, Rajasthan (COBO)
- Kandhari Beverages, Nabipur, district Fatehgarh Sahib, Punjab (FOBO)
- Sri Sarvaraya Sugars, Sathupalle, district Khammam, Andhra Pradesh (FOBO)
- HCCBPL, Pirangut, district Pune, Maharashtra (COBO)
- HCCBPL, Nemam, district Thiruvellore, Tamil Nadu (COBO)
- HCCBPL, Mehndiganj, district Varanasi, Uttar Pradesh (COBO).

The plants were selected using a process that included ranking regional and plant-level water-related indicators as well as several other key factors to capture the maximum variability of conditions across the plants. The additional key considerations included the following.

- The agro-ecological region in which the plant is located
- At least two plants that are subjects of controversy
- At least one plant that meets its raw water requirements from surface water
- At least one plant that is located in areas where the intensity of pesticide usage is high
- At least one franchisee plant

The assessment team drew upon analyses of secondary data; combined ranking of in situ and ex situ indicators; and guidance from the Steering Committee to help select the six plants for site-specific analyses.

Level I: Regulatory, governance, and policy assessment

The Level 1 regulatory and governance assessment was designed to review the following.

- Corporate level assessment including assessment of TCCC policies, procedures, management systems, and compliance mechanisms relating to environmental protection and water resource management that guide all CCI operations.
- Effluent treatment management policies and adherence to regulations and TCCC requirements or norms.
- Water availability and quality parameters taken into consideration for siting of Coca-Cola facilities in India.
- Assessment of steps taken to ameliorate negative water resource impacts, if any, of Coca-Cola operations in India.

To address the above, the regulatory and governance assessment comprised the following.

- Review of government policies and regulatory requirements including assessment of the compliance of the bottling plants to government regulatory requirements.
- TCCC requirements and guidelines for water usage, and wastewater water disposal including assessment of the compliance of the bottling plants to TCCC requirements and guidelines.
- Assessment of steps taken to ameliorate negative water resource impacts, if any, of Coca-Cola operations in India.

To conduct this portion of the assessment, TERI requested relevant documents and information from various government departments, TCCC, and CCI; reviewed the documents and prepared compliance

checklists; conducted field visits to the six selected Coca-Cola plants and to relevant government agencies to assess the specific requirements and the associated response at these plants. Reports from the selected plants relating to environmental audits, siting, pump-tests, detailed self-assessments, environmental audits, and impact assessments were not shared with TERI for legal and confidential reasons.

Level 1: Findings and conclusions

A) Government policy and regulatory requirements

The latest NWP (National Water Policy) to regulate water use was formulated and adopted in 2002. The policy

- demarcates water allocation priorities in the planning and operation of the systems in the following order: drinking water, irrigation, hydropower, ecology, agro-industries and non-agro-industries, navigation, and other uses. All the study states except Maharashtra accord greater priority to agriculture use of water over industrial use,
- advocates that exploitation of groundwater resources should be so regulated as not to exceed the recharging possibilities and development of efficient water pricing system for use of water.

In addition, there are two specific laws to regulate water use applicable to states under Indian Union. These are the Water (Prevention and Control of Pollution) Act, 1974 and Rules thereunder as amended in 1998 (referred to as Water Act hereafter) and the Water (Prevention and Control of Pollution) Cess Act, 1977 and Rules there under as amended in 1992 and 2003 (referred to as Water Cess Act hereafter).

The Water Act requires industries to obtain CtE (Consent to Establish) and CtO (Consent to Operate). Under the two consents, the conditions and limits are prescribed for pollution control and wastewater discharge both in terms of quantity and quality by the state pollution control boards. The compliance of six selected plants of TCCC with respect to conditions prescribed in CtE and CtO is provided in Table 1.

Table 1 Compliance with conditions in CtE (Consent to Establish) and CtO (Consent to Operate)

Issues covered in CtE and CtO	*Nabipur (franchisee)*		*Kaladera*		*Mehndiganj*		*Pirangut*		*Sathupalle (franchisee)*		*Nemam*	
	Mentioned in consent	*Compliance*	*Mentioned in consent*	*Compliance*	*Mentioned in consent*	*Compliance*	*Mentioned in consent*	*Compliance*	*Mentioned in consent*	*Compliance*	*Mentioned in consent*	*Compliance*
Limits for discharge of wastewater	√	√	√	√	√	√	√	√	√	√	√	√
Limits for water withdrawal	NA	NA	NA	NA	NA	NA	NA	NA	√	√	NA	NA
Mode of discharge of wastewater	√	√	√	√	√	√	√	√	√	√	√	√
Compliance with standards	√	√	√	√	√	√	√	√	√	√	√	√
Requirement of sampling and flow measurement of wastewater	√	√	NA	NA	√	√	NA	NA	NA	NA	NA	NA
Submitting test reports and environmental statements to pollution control board	√	√	√	√	√	√	√	√	√	√	√	√
Rainwater harvesting, water recycling, and conservation	√	√	√	√	√	√	√	√	NA	NA	√	√

Note: the compliance of all the plants is assessed based on the secondary data provided; results of compliance based on technical assessment that are at variance with the secondary data are presented in Level 2 assessments in sections below

NA: Not applicable (not mentioned as a condition in the consent)

Plants in compliance with government requirements

The assessment, based on secondary data provided by CCI, shows that all the plants except Mehndiganj adopted the land discharge of treated effluent method. The Mehndiganj plant discharges treated effluent into a drain leading to an inland water body. The

data shows that all the plants are in compliance with the standards prescribed by the pollution control boards.

Registration of bore wells in overexploited areas

Amongst the six states included in the assessment, four states namely, Rajasthan, Uttar Pradesh, Tamil Nadu, and Maharashtra, have formulated state water policies, while two states namely, Andhra Pradesh and Punjab, do not have state water policies. So far as state laws on water resource regulation and management are concerned, Andhra Pradesh, Maharashtra, and Tamil Nadu have enacted laws on groundwater use. Rajasthan and Uttar Pradesh are in the process of enacting these laws. As a requirement under the defined state laws on groundwater use, the groundwater extraction sources (bore wells) need to be registered with the groundwater board in notified overexploited areas. While Nabipur (Punjab) and Kaladera (Rajasthan) plant sites fall in overexploited areas, they are yet to be notified as such. As per the requirements of Andhra Pradesh Water, Land and Trees Act, 2002, the bore wells in the Sathupalle plant are registered with the gram panchayat (a local village level democratic administrative unit). Bore wells are not required to be registered at present in the remaining five plant sites.

B) TCCC requirements and guidelines

The assessment of TCCC water resource management practices was undertaken under following areas.

- Siting decision of a bottling plant.
- Water extraction,usage, and wastewater discharge.

Siting decision of a bottling plant

EDD (Environmental Due Diligence) conducted by TCCC, prior to selecting a site or acquiring an existing site for setting up a bottling operation, examines the sources of water availability, restriction with respect to wastewater discharge, and issues of contamination and pollution at the site. While TERI was informed that this requirement for conducting EDD existed, the actual EDD assessments of the six selected plants were not shared due to legal and confidential reasons. Hence, it is not possible to surmise the extent to which long-term water availability for bottling operations were considered while conducting EDDs, or indeed the wider regional impacts considered. A case in point here is the HCCBPL, Kaladera, which was established in 1999 in the Govindgarh block. This block was declared an overexploited block as per the assessment of January 1998 but was not notified as such. In response to queries from TERI, Coca-Cola representatives explained that the company's requirements do not explicitly necessitate the assessment of the effects of HCCBPL, Kaladera, bottling operations on groundwater in the region of operation but focused on ensuring a sustained supply of water for business operations.

Water extraction, usage, and wastewater discharge

Compliance status of water extraction and usage and wastewater discharge with respect to TCCC's requirements and guidelines are presented in Tables 2–4. The compliance status with respect to applicable regulatory requirements is presented in Table 1.

Table 2. Compliance with respect to TCCC (The Coca-Cola Company) requirements for water usage

Issues	*Nabipur (franchisee)*	*Kaladera*	*Mehndiganj*	*Pirangut*	*Sathupalle (franchisee)*	*Nemam*
Environmental Due Diligence conducted prior to siting of the plant	DNS	DNS	DNS	DNS	DNS	DNS
Documented water availability assessment	DNS	DNS	DNS	DNS	DNS	DNS
Initial and periodic water utilization assessment	√	√	√	√	√	√
Implement and maintain a process for water utilization	√	√	√	√	√	√
Establish a continuous improvement process for water utilization	√	√	√	√	√	√
Define water utilization objectives and goals in annual business plans	√	√	√	√	√	√

DNS: document not shared by TCCC for 'legal and confidential reasons'

Table 3. Compliance with respect to TCCC (The Coca-Cola Company) guidelines for water usage

Issues	*Nabipur (franchisee)*	*Kaladera*	*Mehndiganj*	*Pirangut*	*Sathupalle (franchisee)*	*Nemam*
Self-assessment – water utilization	DNS	DNS	DNS	DNS	DNS	DNS
Self-assessment – water supply	DNS	DNS	DNS	DNS	DNS	DNS
The data collected during self-assessments to be used to build a water conservation plan	DNS	DNS	DNS	DNS	DNS	DNS
The establishment of a cross-functional team for water resources management	√	√	√	√	√	√

DNS: document not shared by TCCC for 'legal and confidential reasons'

Table 4. Compliance with respect to TCCC (The Coca-Cola Company) wastewater requirements

Issues	*Nabipur (franchisee)*	*Kaladera*	*Mehndiganj*	*Pirangut*	*Sathupalle (franchisee)*	*Nemam*
Meet applicable regulatory requirements	√	√	√	√	√	√
Maintain an effluent quality that will have no adverse effects on fish or other aquatic biota in receiving waters	√	√	√	√	√	√
Maintain and operate treatment facilities in an efficient manner	√	√	√	√	√	√
Compliance with wastewater quality requirements developed by TCCC; plant to get its treated effluent analyzed annually by an accredited laboratory and send the results to the corporate office	√	√	√	√	√	√
A detailed drainage plan of all water and wastewater streams in the facility	√	√	√	√	√	√
Separate wastewater streams for process wastewater, sanitary wastewater, cooling water, and storm water	√	√	√	√	√	√
Prevent the pollution (of) from water and wastewater	√	√	√	√	√	√
Minimize the volume, strength, and hazardous nature of wastewater	√	√	√	√	√	√
Treatment of process water such that it is compliant with TCCC analytical standards; compliant with government effluent discharge standards; conducive to the long-term survival of fish in the treated effluent	√	√	√	√	√	√
Sanitary wastewater to be discharged to a sewer connected or a sewage treatment plant	√	√	√	√	√	√

Treatment of storm water according to government regulations if applicable; else prevent the pollution of water and wastewater streams due to the run-off	√	√	√	√	√	√
Non-contact cooling water may be discharged into the local environment unless otherwise dictated by local laws or regulations	NA	NA	NA	NA	NA	NA
If treated wastewater discharge is through infiltration, prior to infiltration the wastewater must meet TCCC requirements and local regulations	√	√	√	√	√	√
If treated wastewater is disposed through land application, then						
Groundwater must be monitored quarterly within the application area, as well as up- and down gradient of the application area	NMP	NMP	NA	NMP	NMP	NMP
The soil's carrying capacity should not be exceeded such that there is surface run-off	NMP	NMP	NMP	NMP	NMP	NMP

Note The compliance of all the plants is assessed based on the secondary data provided; results of compliance based on technical assessment that are at variance with the secondary data are presented in Level 2 assessments in sections below.

NMP: no monitoring by the plant

The assessment shows that bottling operations have moved towards the land application of treated wastewater. It is suggested that TCCC ensure that all plants fulfil the existing requirements specified and also develop and adopt criteria for the quality of treated wastewater applied on land within the plant premises.

C) Initiatives to ameliorate negative water resource impacts, if any, primarily through corporate social responsibility interventions

TCCC launched a groundwater risk assessment programme in 2004 and all company-owned and franchisee-owned operations in India participated in the assessment. The framework comprised a checklist-based data collation approach on six interrelated categories with respect to water: watershed; supply reliability; efficiency; supply economics; compliance; and social and competitive climate. The checklists serve as a starting point for further investigation and quantitative assessment for evaluating the diverse physical, business, political, and social risks related to water.

With respect to CSR (corporate social responsibility), the company's early activities were designed to build bridges with the local communities and earn goodwill. However, in 2005, TCCC began developing an increasingly structured and systematic 'community engagement framework' designed to enhance community participation and foster workable partnerships with governmental and non-governmental agencies for community development schemes. CCI has also developed its own plan of action until 2010 and has outlined specific roles and responsibilities for the Division (CCI), COBOs and FOBOs related to water management; these include

initiatives on conservation (such as rainwater harvesting), access (including providing drinking water to schools), and awareness (including workshops and demonstrations). The evolving citizenship framework for community engagement is in the form of voluntary guidelines whose implementation is the prerogative of the specific bottling operations. Water-based community initiatives in the six plants include the following.

- Community drinking water initiatives in HCCBPL, Kaladera; SSSL, Sathupalle; HCCBPL, Nemam; HCCBPL, Varanasi; HCCBPL, Pune
- Rainwater harvesting initiatives in all the plants; rainwater-harvesting initiatives for the community in HCCBPL, Kaladera; HCCBPL, Pune; HCCBPL, Varanasi; HCCBPL, Nemam
- Restoration of ancient water conservation structures (*tankas* and *bawris*) by HCCBPL, Kaladera

Level II: Plant-level assessment

The six plant-level assessments encompassed the following.

- *Agricultural practices* Study of agricultural practices in and around the plant area with regard to agricultural input relating to usage and quality of local area water.
- *Raw intake water* Study of sources, quantity, and quality of plant intake water based on primary monitoring and secondary information on selected sites.
- *Process water (treated water used inside for plant processes)* Study of process water quality based on primary monitoring.
- *Effluent discharge* Study of the nature, quantity, quality, sources, and point of discharge and adherence to discharge norms by primary monitoring as well as secondary data information.
- *Water balance* Establishment of water balance at the plant level based on primary survey and measurements.
- *Groundwater* Study of regional groundwater quality based on primary monitoring and groundwater level based on secondary information (study area: within 5 km radius from plant location).
- *Stakeholder perceptions* Stakeholder perceptions capture the views of different stakeholders on the issues of trends in water availability, quality, utilization, and access across the study villages.

Three rounds of water and wastewater sampling were undertaken at each plant site during the period January – June, 2007. Samples collected in each round include 5 – 11 regional groundwater samples, and 6 – 10 in-plant samples (plant intake raw water, process water, and wastewater). Sample details can be found in Chapter 4(A-F).

Level II Findings and conclusions

A) Agriculture and local context

Five of the six site areas are rural and heavily dependent on agriculture, with cropping intensity and water use on the rise. Paddy or rice is often the dominant crop with other water-intensive crops like groundnut (in Kaladera) also coming into play. With intensive agriculture and irrigation demands, there has been a considerable increase in the use of fertilizers in these areas. Nemam, near Chennai, has been urbanizing rapidly, with well over 81 percent of the population living in urban areas (Table 5). Less than 20 percent of the area was under agriculture and that percentage is in steep decline.

Table 5 Basic features of plant locations

Plant Site		*Kaladera*		*Mehndiganj*	*Pirangut*	*Khammam*	*Nemam*	*Nabipur*
Name of the Block (an administrative unit)		*Amer*	*Chomu*	*Arajiline*	*Mulsi*	*Sathupalle*	*Poonamallee*	*Sirhind*
Total Population (2001)		294 055	326 488	311 723	127 385	65 952	431 758	90 315
Urbanisation (%)		10	15	0	6	20	81*	40
Population growth (1991–01)		2.84	3.06	3.21	0.36	2.40		1.58
Total Geographical Area (Ha)		89 147	68 361	21 555	103 900	27 447	24 000	30 786
Cropping intensity	Average	1.65	1.69	1.34	1.11	1.14	1.99	1.82
	Trend	Constant	Constant	Slightly increasing	Constant	Increasing	Increasing	Decreasing
Irrigation Intensity	Average	1.39	1.41	1.35	1.3	1.12		1.82
	Trend	Constant	Constant	Increasing	Slightly increasing	Increasing		Decreasing
Source of Irrigation	Diesel	2333 (2001)	722 (2001)	406 (2005)	134 (2000)	38 (1994)	100 (2006)	5740 (2006)
	Electric	306 (2001)	687 (2001)	1950 (2005)	64 (2000)	389 (1994)	1600 (2006)	3276 (2006)
Gross IA/Gross SA	Average	0.64	0.7	0.75	0.03	0.55	N.A.	1.00
	Trend	Constant	Constant	Increasing	Constant	Increasing	-	Constant
Crops Produced	Rabi (November to March)	Wheat, barley, mustard, gram		Wheat, pulses	Wheat, jawar, pulses	Rice, jowar, maize, gram	Paddy, ragi, green gram	Wheat
	Khariff (July to October)	Bajra, groundnut, pulses		Rice, maize, sugarcane, pulses	Rice, sugarcane, pulses, groundnut	Rice, jowar, maize, gram		Paddy
	Zayed (April to June)	Vegetables, green fodder		Vegetables (brinjal, potatoes)				

* Between 1981 and 2001

B) Raw intake water

Five of the six plants source their raw water from deep groundwater aquifers. One plant (that is, Pirangut) sources its water from infiltration wells linked to surface water reservoirs. Figure 1 shows the quantum of raw water use across the six plants, as per the information provided by CCI.

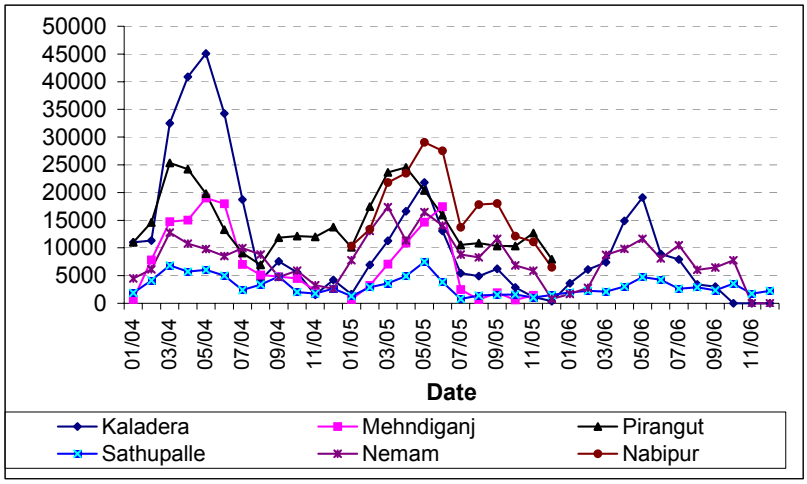

Figure 1. Raw water intake (kl/month) by plants

Note: Discontinuity in the graph in three cases, namely, Pirangut, Nabipur, and Mehndiganj, is due to gaps in data provided.

The water quality sample results obtained for the intake raw water of the six plants (in situ) were compared with the Indian Standard for drinking water (IS 10500: 1991, BIS). Intake raw water of four out of the six plants indicated exceedance of total alkalinity, compared to IS 10500. These were HCCBPL Kaladera, Mehndiganj, Nabipur, and Pirangut. Other parameters exceeding standards included barium at HCCBPL Nemam, Nabipur, and Sathupalle; nitrate, iron, and pH at Sathupalle; lead, aluminium, and turbidity in HCCBPL Pirangut; and fluoride and TDS (total dissolved solids) at HCCBPL Kaladera. Table 6 presents intake raw water quality results of parameters found to be exceeding the prescribed standards for all the six plants. Pesticides were not found to be present in intake raw water used by the plants.

Table 6. Plant Intake raw water quality results for parameters found to exceed the prescribed drinking water standard IS 10500

Test parameter	*BIS 10500: 1991*	*Kaladera*	*Mehndiganj*	*Nabipur (franchisee)*	*Nemam*	*Pirangut*	*Sathupalle (franchisee)*
Total alkalinity; mg/l	200						
Lead; mg/l	0.05; 0.01 (WHO)						
Fluoride; mg/l	1.0						
Total dissolved solids; mg/l	500						
Barium; mg/l	0.7						
Chloride; mg/l	250						
Nitrate; mg/l	45						
Iron; mg/l	0.3						
Turbidity; NTU	5						
Aluminium; mg/l	0.03						
pH	6.5 to 8.5						

Red: Large number of exceedances (detected in all rounds) (> 75 percent samples); Orange: Moderate number of exceedances (40 –75 percent samples); Yellow: One-time exceedance/marginal exceedance (< 40 percent samples); Green: No exceedance

Note: The intake raw water is treated by the plants (as processed water) before it goes into beverage production.

C) Process water

Plant process water quality was compared to the norms prescribed by national standards IS 10500: 1991, and IS 14543: 2001 (for packaged drinking water) as well as TCCC specifications for treated water.

Process water quality was not in exceedance of any of the monitored parameters at three of the six sites (HCCBPL Kaladera, Neman, and Pirangut). HCCBPL, Nabipur was found to be meeting norms for all parameters except nitrite compared to the norms specified under IS 14543:2004. The samples taken at HCCBPL Mehndiganj were also well below the specified standards; however, nitrite showed a one time marginal exceedance compared to the norms specified under IS 14543:2004. At the Sathupalle site pH, after a 0.22 micron filter, was found slightly in excess (towards acidic) of IS 10500, IS 14543 limits. Table 7 presents process water quality results of parameters found to be exceeding the prescribed standards for all the six plants.

None of the pesticides as per the scope of work were found to be present in process water used for beverage production by the plants.

Table 7. Process water quality results that exceed national standards IS 10500: 1991, and IS 14543: 2001

Test parameter	*IS 14543: 2001*	*Kaladera*	*Mehndiganj*	*Nabipur (franchisee)*	*Nemam*	*Pirangut*	*Sathupalle (franchisee)*
Nitrite; mg/l	0.02						
pH	6.5–8.5 (as per BIS 10500: 1991; 14543 : 2004)						

Red: Large number of exceedances (> 75 percent); Orange: Moderate number of exceedances (40–75 percent); Yellow: One-time exceedance/ marginal exceedance (< 40 percent); Green: No exceedance

Note: The pH of ultra-pure water in Sathupalle plant can drop a little below 6.5 as it may absorb carbon dioxide (CO_2) from the atmosphere during grab sample collection or pH measurement, but this does not mean that the water is now grossly contaminated; just a fraction of a ppm of CO_2 will cause the pH to fall. The pH values found in samples range between 6.0 – 6.3 which is possible for reason stated above (ref: American Society of Testing of Materials, ASTM-D 5464-93 (2001)).

C) Effluent discharge

The treated effluent discharge at four of the six plants (namely, HCCBPL Kaladera, Mehndiganj, Sathupalle, Nabipur), mostly met the effluent discharge requirements except for one-time exceedance of bioassay test at two sites (HCCBPL Kaladera and Nabipur) as per the appropriate regulatory standards by CPCB (Central Pollution Control Board), Ministry of Environment and Forests, Government of India, for disposal of treated wastewater on land for irrigation. The quality of the treated wastewater from the ETP (effluent treatment plant) at HCCBPL Nemam indicates exceedance of fluoride as per specified Tamil Nadu State Pollution Control Board limits. Similarly, the quality of the treated wastewater from the ETP at HCCBPL Pirangut facility indicates exceedance of chloride as per specified Maharashtra State Pollution Control Board limits.

On an overall basis, the quality of the treated wastewater indicates effective treatment for most of the parameters vis-à-vis prescribed pollution control board discharge standards.

As compared to TCCC's own treated wastewater quality standards, TKN (total Kjeldahl nitrogen) was found to exceed the limits in all the six plants. In addition to this, one time or marginal exceedances were found for TDS, total suspended solids, and anionic surfactants in HCCBPL Mehndiganj; biochemical oxygen demand, total suspended solids, and iron in HCCBPL Nabipur; and biochemical oxygen demand, iron, and cadmium in HCCBPL Pirangut. Table 8 presents treated effluent water quality results of parameters found to be

exceeding the prescribed standards for all the six plants. None of the pesticides as per the scope of work were found to be present in treated effluent water discharged from the plants.

Table 8. Treated effluent quality results (compared to existing PCB [Pollution Control Board] norms for discharge on land for irrigation and TCCC's [The Coca-Cola Company] requirements for discharge into natural waterbodies; in case of HCCBPL Mehniganj plant PCB norms for discharge into drain have been used)

Test parameter	*CBCP/ SPCB/TCCC*	*Kaladera*	*Mehndiganj*	*Nabipur (Franchisee)*	*Nemam*	*Pirangut*	*Sathupalle (Franchisee)*
Total dissolved solids; mg/l	<2000:TCCC requirement						
Bioassay test	90						
Anionic Surfactants; mg/l	<0.5:TCCC requirement						
Total kjeldahl nitrogen; mg/l	<5: TCCC requirement						
Cadmium; mg/l	<0.02: TCCC requirements						
Total suspended solid; mg/l	<50: TCCC requirement						
Biochemical oxygen demand; mg/l	< 50: TCCC requirement						
Fluoride; mg/l	2.0 (as per SPCB)						
Chloride; mg/l	600 (as per SPCB)						

Red: Large number of exceedances (detected in all rounds) (> 75 percent samples); Orange: Moderate number of exceedances (40–75 percent samples); Yellow: One-time exceedance/marginal exceedance (< 40 percent samples); Green: No exceedance

Note: TCCC requirements for treated effluent discharge to a natural waterbody applies to Mehndiganj plant only. Rest of the five plants discharge their treated effluent on land for which TCCC has yet to come out with specific individual standards. In absence of any specific individual standards for land application by TCCC, the quality of treated effluent for all the plants has been compared in the table above with the TCCC specific standards for discharge into natural waterbodies.

D) Water balance

The water audit that was carried as part of the assessment in all the six plants has included primary measurements of water intake, water used in process, and water discharge. The audit revealed that all the six plants are operating within the acceptable range of less than 10 percent of unaccounted for water losses. The components of the continuity equation (that is, inlet, outlet, and change in storages in the plant) are in conformation with each other at all of the six Coca-Cola plants studied.

Detailed water resource modelling and assessment conducted for Kaladera plant site shows that the annual groundwater extraction from the aquifer that feeds the HCCBPL, Kaladera, is overexploited, that is, 135 percent of the annual natural recharge rate. Agriculture (irrigation) accounts for more than 100 percent of the annual groundwater use. Albeit good recovery of the drawdown is expected in the aquifer zone, continuous daily extraction by the Coca-Cola

plant in the successive months of March, April, May, and June has added to the stress on the localized state of the aquifer, that is, in addition to irrigation withdrawals. The water level in Kaladera is declining due to a cumulative impact of below normal rainfall, droughts, and groundwater withdrawals by agriculture and industry. Thus, the water withdrawals by the HCCBPL, Kaladera, need to be viewed in the context of the already overexploited condition of the aquifer wherein the overall withdrawal is already over and above the total recharge.

E) Groundwater

The regional groundwater situation in the six plant locations shows that two plant locations, namely, Kaladera and Nabipur, fall in the groundwater overexploited zones, where regional groundwater use is more than the natural groundwater recharge. Three plant locations, namely, Mehndiganj, Pirangut, and Sathupalle fall in 'safe' groundwater zones. Nemam falls in 'critical'[1] groundwater zone.

Regional or ex situ groundwater quality was compared to the national standards IS 10500: 1991. The regional water quality assessment at all of the plant sites showed exceedances of parameters such as total alkalinity, coliforms, and lead. In addition to this, fluoride, TDS, barium, *Escherichia coli*, and iron were found to exceed the standards in five out of six plant sites. Other than the above parameters, few samples in one or two villages at each site were found to contain nitrate, nitrite, turbidity, pH, chloride, nickel, manganese, selenium, and aluminium exceeding the water quality standards. Three out of six sites (Kaladera, Nemam, Sathupalle) reported the presence of pesticides in one of the groundwater samples.

Regional water quality assessment of four out of six sites (Kaladera, Mehndiganj, Nemam, and Sathupalle) revealed that villages located in the immediate vicinity of the plant showed the excess presence of certain parameters. However, since this assessment here could not relate the regional groundwater quality to the operations of the Coca-Cola plant, there is a need to carry out a further detailed study to establish/rule out the reasons for such presence.

Table 9 presents regional groundwater quality results of parameters found to be exceeding the prescribed standards around all the six plants.

[1] Groundwater development categories are prescribed by the Central Ground Water Board, Ministry of Water Resources, Government of India. Category 'Safe' refers to groundwater situation in an area (defined as a district [an administrative sub-division of a state] or block [an administrative sub-division of a district]) where groundwater use is less than 70 percent of the groundwater availability (estimated from groundwater recharge); 'Critical' refers to a situation where use is between 90 and 100 percent of the availability and water tables are showing a long-term declining trend (a period of ten years); 'Over-exploited' refers to situation where groundwater use is more than 100 percent of the availability and water tables are showing a long-term (period of ten years) declining trend.

Table 9. Regional (ex situ) water quality results[2] (The table provides exceedence against standards and not an exposure assessment)

Test parameter	*BIS 10500: 1991*	*Kaladera*	*Mehndiganj*	*Nabipur*	*Nemam*	*Pirangut*	*Sathupalle*
Total alkalinity; mg/l	200	Khannipura, Disan, Kaladera, Durga ka Bas	All villages	All villages	Vellavedu, Korattur, Nochimedu	Coca-Cola & private infiltration well	Jagannathapuram, Sathupalle, Kakarlapalle, Bethupalle
Lead; mg/l	0.05; 0.01 (WHO)	Kaladera, Disan, Khannipura	All villages	All villages	Nemam, Korattur, Gudapakkam	All sources	All villages
Feacal coliform/100 ml	Absent	Durga ka Bas, Khannipura, Disan, Kaladera	All the villages	Kharodi	Vellavedu, Korattur, Gudapakkam	Urawade Reservoir	Jagannathapuram, Sathupalle, Bethupalle, Kakarlapalle,
Total coliform per 100ml	10	Khannipura, Kaladera, Disan, Durga ka Bas	All the villages	Kharodi	Nemam, Vellavedu, Korattur, Gudapakkam	Private Infiltration well & Urawade R.	Jagannathapuram, Sathupalle, Bethupalle Kakarlapalle,
Fluoride; mg/l	1.0	Khannipura, Disan, Kaladera, Durga ka Bas	Bhikharipur	Kharodi	Korattur, Nochimedu		Sathupalle, Kakarlapalle, Bethupalle
Total dissolved solids; mg/l	500	Khannipura, Disan, Durga ka Bas, Kaladera	Chhoti Khajuri, Mehndiganj, Kachnar, Bhikharipur	Nabipur, Kharodi Jalberi Galan	All villages		Sathupalle, Kakarlapalle, Bethupalle
Escherichia coli	Absent	Durga ka Bas	Khajuri, Mehndiganj, Kachnar Bhkharipur		Gudapakkam	Urawade Reservoir	Jagannathapuram, Kakarlapalle,Bethupalle
Barium; mg/l	0.7 (as per WHO)	Disan, Kaladera, Khannipura	Mehndiganj, Kachnar	All villages	All villages		All villages
Chloride; mg/l	250	Disan	Kachnar		Gudapakkam		Sathupalle
Nitrate; mg/l	45	Kaladera	Kachnar		Gudapakkam		Sathupalle, Kakarlapalle
Iron; mg/l	0.3	Khannipura, Disan, Kaladera, Durga Ka Bas	All villages		Nemam, Korattur, Nochimedu	Urawade Reservoir	Sathupalle, Kakarlapalle
Turbidity; NTU	5	Khannipura, Disan, Kaladera			Nochimedu	All sources	
Manganese; mg/l	0.1		Mehndiganj, Kachnar	Nabipur,Saidpura Kharodi	Nochimedu		
Calcium; mg/l	75		Kachnar, Karnadadi Bhikharipur,	Nabipur, Kharodi	Korattur, Nochimedu, Gudapakkam		Sathupalle, Bethupalle Kakarlapalle,
Selenium; mg/l	0.01			Jalberi Galan			
Aluminium; mg/l	0.03			Kharodi, Jalberi Galan	All villages		
Sulphate; mg/l	200				Korattur, Nochimedu		
Endosulfan-1; µg/l	0.1 (IS 14543-2004)				Gudapakkam		
Endosulfan-2; µg/l	0.1 (IS 14543-2004)				Gudapakkam		
Nickel; mg/l	0.07 As per WHO				Gudapakkam		Sathupalle, Kakarlapalle
pH	6.5 to 8.5						Sathupalle
Atrazine; µg/l	0.1 (IS 14543:2004						Bethupalle
Nitrite; mg/l	3	Disan, Kaladera					
2,4-DDE; µg/l	0.1	Durga ka Bas					
2,4-DDT; µg/l	0.1	Durga ka Bas					

Red: Extremely widespread (> 50percent samples + > 75 percent villages); Orange: Moderately widespread (> 50 percent samples + 40–75 percent villages; < 50 percent samples + > 75 percent villages); Yellow: Thinly widespread (one-time exceedance/ marginal exceedance); Green: No exceedance

[2] The intake raw water is treated by the plants (as processed water) before it goes into beverage production

F) Stakeholder perceptions

Stakeholder perceptions capture the views of different stakeholders on the issues of trends in water availability, quality, utilization, and access across the study villages. The section only records the views as presented by different stakeholders in the course of FGDs (focused group discussions) and key stakeholder interviews. It does not aim to make judgements nor draw conclusions based on these recorded perceptions.

In all but one of the six sites (that is, Nemam), there were consistent concerns expressed about water availability and quality. Depending upon the economic context, nature of the surrounding community, and the causes of the water quality and quantity problems identified by various stakeholders ranged from implications of intensive agriculture and irrigation; lack of rain and other weather patterns; draw down and wastewater practices of the local Coca-Cola facility; extraction by and effluent from other local industries; and combinations of the above.

Comparative analysis of stakeholder perceptions across six plant sites shows that the concerns expressed about groundwater availability, quality, wastewater discharge, and extractions by agriculture, industry, including Coca-Cola, are relatively higher for two out of six plant sites, namely, Kaladera and Mehndiganj, followed by Sathupalle, Nabipur, and Pirangut. In general, the community perceptions were found in conformity to the results obtained from the detailed technical assessment of groundwater resources.

The stakeholders also recorded concerns related to unregulated water extraction by Coca-Cola plants, especially in case of Kaladera. Community perceives that Coca-Cola has deep bore wells that continuously withdraw water from groundwater aquifers unlike bore wells used for irrigation that are relatively shallow and do not get regular supply of electricity. The study also consistently found quality problems with 'raw water' in the villages. The perception also indicated mixed views with regard to Coca-Cola's wastewater discharge and treated wastewater quality, especially in Mehndiganj followed by Sathupalle, Nabipur, and Pirangut.

Recommendations

General recommendations

Plant siting

- The company's assessment of water availability in the vicinity of a bottling operation should be from a perspective that is wider than business continuity. Operating in India for Coca-Cola could mean operating in many water-stressed localities. Even if each Coca-Cola facility can become water neutral, there will be other economic activities (that is, other industries and intensive agricultural production) that will characterize the regional context in which they would operate and which will generate other environmental and water stresses (for example, water drawdown and water contamination) that are beyond Coca-Cola's control. Therefore, while establishing a plant, water availability should be assessed from a long-term and ecosystem point of view, keeping in mind risks arising out of present and future (potential) competing demands in the area. Detailed investigations should be conducted prior to the siting of a bottling operation. The investigations, taking watershed as a unit of planning, should include comprehensive hydrological and groundwater modelling along with consultations with all the relevant stakeholders including government agencies like groundwater boards, water resources department, pollution control board, communities and so on.
- Siting policies need to recognize and respect the existing (formal and informal) riparian rights. For instance, the informal rights of the farmers to extract groundwater for irrigation need to be respected. This has also been acknowledged in the national and most state water policies that give precedence to domestic and agriculture demands vis-à-vis industrial demand for water. This aspect is relevant particularly in case of areas that are critical or overexploited (as per the norms defined by the Central Ground Water Board, Government of India) and/or have been experiencing irregular and low rainfall.
- TCCC and CCI should consider transitioning its current advisory committees on environment to include a broader focus on sustainable development. This should mirror a corporate evolution that allows it to integrate environment with social and economic development in its activities in a tangible, measurable, and accountable manner.

Water quality

- The plants generally meet the government regulatory standards but they need to also ensure full compliance with the existing wastewater requirements specified by TCCC. This compliance should be ensured at the earliest.

- It is also suggested that TCCC should also specifically develop and adopt criteria for the quality of treated wastewater applied on land within the plant premises. TCCC and CCI need to develop additional requirements (standards) covering treated wastewater quality. For instance, the presence of faecal coliform and several other physico-chemical pollutants in the treated wastewater in almost all the plants calls for an urgent and stringent definition (and implementation) of standards and practices as well as source identification. Absent or weak governmental regulations and norms should be countered by strong Company policies and self regulated norms. Apart from good stewardship, this is necessary to safeguard soil, groundwater, and water bodies in the vicinity of the plant operations from getting adversely impacted in the future and affecting business.
- Hydraulic loading rates as prescribed by the state pollution control boards for land application of treated effluent could not be verified at any of the sites as mentioned in the site-specific reports. Hence, the ETPs need to be redesigned/ modified and flow-measuring devices need to be installed both at the inlet and outlet of the ETP for all the plants.

Audits and reviews

- A system of annual social audits needs to be established to monitor in a transparent manner the corporate efforts for improving the quality of life in the areas surrounding the plant.
- Coca-Cola's senior executives should ensure that the company's business managers become responsible and accountable for corporate- and facility- water, environmental, and sustainable development goals as well as government and company compliance programmes. One possible mechanism to accomplish this could be to integrate these expectations into business managers' annual performance reviews.

Corporate social responsibility

- CSR initiatives need to be both sensitive to community needs and concerns. They also need to be able to better anticipate challenges that may arise in the future. In this context, a comprehensive, clear, and corporate policy on CSR needs to be enforced. This may require drawing upon a new framework for CSR in India to establish measurable benchmarks for facility, national, and perhaps global CSR. In conjunction with this, the company should establish a facility and national-level audit of these activities every three years and consider forming a special external advisory group to advise, assess, and review the programme and its components.

- CSR interventions designed for the benefit of the local communities must lead to the development of sustainable physical and social infrastructure. Stand-alone, periodic activities will make very little impact. For instance, the plant could focus on major long-terms programmes (in coordination with local governments) for provision of safe drinking water to rural communities. Similarly, the linkage of health and water could be addressed by focusing on the regional water quality results. In brief, the company should: (1) make its water programme more transparent to local communities and interested stakeholders, and accountable at the facility and country level; and (2) serve as an important catalyst for greater awareness and activities within the eco-region and watersheds within which it is operating. Appreciating the fact that wider regional issues cannot be the responsibility of a single company, TCCC may wish to consider catalysing public-private-community initiatives around such issues.
- The company needs to strengthen its reputation with local communities by taking local economic, social, and cultural norms and aspirations into account in its business, environment, and CSR programmes. Greater participation by facility managers in local community social networks, for example, might sensitise managers about special needs that could differ from one village to the next. Locating plant managers in communities where they speak the same language as the villages, for example, can enhance opportunities for communication and mutual understanding.

Water conservation

- The company should accord high priority to conservation of water and its enhancement in all its activities. It should ensure that all water conservation/enhancement measures are relevant to the perspectives and needs of the region in which they are located and that their effectiveness is sustainable over the life of the plant. There is a need to promote efficient use of water and conservation practices in joint collaboration with other stakeholders in the region such as irrigation and local government.
- In general, TCCC should try to be net water positive with respect to its own operations from a watershed perspective, especially in water stressed areas.
- It was obvious during the assessments across various plant sites that the state governments in India have not been able to value their water resources appropriately. The water use charges levied by various state governments render this important input into the production process virtually free. This fact too is resented by the communities that believe that the setting up of water intensive units, such as a Coca-Cola

plant, does not add value to the local area. TCCC should define a strategy wherein it is able to offset this anomaly through appropriate and commensurate interventions that should, ideally, result in a stream of benefit flows to the community.

Plant-specific recommendations

Kaladera

From the detailed assessment undertaken in the Kaladera watershed, it is obvious that the area is overexploited and it is highly unlikely that the water situation would improve to a level as to make its availability a non-issue. The reasons for this may be many and contributing factors may include, apart from the HCCBPL's operations, the existence of other industries, changes in cropping patterns, and rainfall. It was beyond the scope of this study to look at contributions, or indeed the chronology of establishment, of these other industries. Nor was it in the sprit of the assessment to attribute the issue to other stakeholders.

What emerges, however, is that the plant's operations in this area would continue to be one of the contributors to a worsening water situation and a source of stress to the communities around.

Water contingency measures as adopted by the plant seem to rely heavily on rainwater recharge structures, which in turn depend on rainfall in the region. Since the rainfall is scanty, the recharge achieved through such structures is unlikely to be meaningful.

In such a scenario, TCCC has to evaluate its options for HCCBPL, Kaladera, such as:

- Transport water from the nearest aquifer that may not be stressed (could be at quite a distance from the existing plant)
- Store water from low-stress seasons (may not exist!)
- Relocate the plant to a water-surplus area
- Shut down this facility

Mehndiganj and Nabipur

In addition to the general recommendations, there is a need to take note of the fact that while in Mehndiganj, the water tables have been depleting and the aquifer may move from a safe to semi-critical situation, in Nabipur, the state of the aquifer has already moved from critical to overexploited condition (refer Chapter 4B and 4C). In both the areas, water-intensive crops such as rice are predominantly

cultivated for a major part of the year and riparian rights need to be respected.

Since the movement towards water-stress situation is fairly recent, it may be prudent that the company focuses on proactively joining hands with farmers, local governments, and other stakeholders to develop and implement measures for improving the water scenario. Most state governments in India are today open to the public–private partnership model to implement infrastructure development projects. This model may be explored for options such as supplying piped drinking water to communities (the Pirangut example clearly demonstrates the impact such an initiative has on perceived stress release); setting up of water-harvesting structures; establishing sprinkler and drip irrigations systems; as also setting up social infrastructure such as educational or health institutions.

Independent third party assessment of Coca-Cola facilities in India