6 Clean Water and Sanitation: India's Present and Future Prospects

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6.1 Introduction

6.1.1 Sustainable Development Goals and India

Policymakers and academicians across the world have attempted to mainstream *the 2030 Agenda for Sustainable Development*, envisioning a pathway to reconcile the impossible trinity of equity, efficiency and sustainability (Ghosh 2017). The Sustainable Development Goals (SDGs) are aimed at optimizing the different, but interrelated, conjunctions of human–nature, human–human and nature–nature interactions. The importance of 'quality of life' parameters, such as access to healthcare, education, employment opportunities, food, drinking water and sanitation, in the overall development of a nation has been often put to the forefront by economists such as Andrew Oswald (1997) and Amartya Sen (2000). The SDGs reiterate the same, but are an overarching goal in the sense that inter-temporal considerations are also embedded in their objectives, and the financial gaps are huge in meeting these objectives especially for the low-income countries.

Overexploitation and indiscriminate utilization of resources have already led to several regions overshoot 'day zero' in terms of availability of natural resources in one form or other. The policy space between the planetary ceiling and the social institutions is shaped like a doughnut (two concentric circles). It is this region within the planetary and social boundaries where human activity ought to take place. Developmental activities which do not manifest in societal improvement, or positive externalities, can never be self-sustaining (Ghosh 2017). Neither must any developmental activity exceed the planetary boundaries nor should they fall shy of the social foundations (Raworth 2012). These concepts further highlight the importance of inculcating the SDGs in the national development agendas.

The SDGs highlight areas of, both, critical human deprivations and critical natural thresholds—hunger, poverty, diseases, illiteracy, poor sanitation, lack of drinking water, biodiversity loss, marine, soil and air pollution, and climate change. Some goals essentially encompass the human and natural capital stock of the planet, while the other goals aimed at ensuring clean energy, sustained economic growth, infrastructure development, reduction of inequalities, fostering innovation and community and urban planning capture elements of physical and social capital (Ghosh et al. 2019).

The UN Sustainable Development Solutions Network's SDG Index Report 2018 places India at a rank of 112 out of 156 countries (score of 59.1%) in terms of SDGs performance, lagging

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behind the East and South Asia's average regional score of 64.1%. India's large population and geography makes the implementation of human capital inducing objectives such as SDG 6, that is, access to 'clean water and sanitation' a rather arduous task. Despite such impediments, the status of SDG 6 is moderately increasing but is, however, insufficient to reach the 2030 targets according to the report. Recognizing the linkages of SDG 6 with the other goals, a report submitted to the Ministry of Environment, Forests and Climate Change, Government of India in 2015, underscores that the estimated financial gap in India for implementing SDG 6 stands at US$ 123 billion (Technology and Action for Rural Advancement 2015). It is important to note here that efficient implementation of such goals would require more accuracy in the federal governance mechanisms both at the State and Union levels.

6.1.2 Changing Paradigms

The history of development of the present civilization involves the history of the various types of human interventions in the hydrological cycle. This was made possible by human ability to build bigger and bigger engineering structures to modify the flows of streams and rivers. Human control over the aquifers was established through stronger and stronger pumping technologies to take water out from deeper and deeper levels of aquifers. Dams were effectively used for controlling floods and generating hydro-electricity at a very large scale. This offered a reasonable protection against seasonal water shortages and even spatial inequities in water availability. The irrigation canals made it possible for humans to grow food in newer and newer areas as much as it enhanced the growing seasons for crops.

On the other hand, as demand for water for meeting the basic human needs started being satisfied, forces of development started showing its signs. Perhaps, the gravest effect of the escalating urbanization was felt in the agricultural water use, which encountered manifold increase, over the last two centuries, in order to meet needs of the burgeoning urban population. Traditionally, water has been looked at as a resource occurring in 'abundance' in nature, and hence, increasing demand was never seen as posing any potent threat. Hence, the impression that became predominant emanated from the idea that water scarcity is spatial, and more water can be diverted to the water-scarce zones from the water-rich zones, through appropriate supply augmentation plans. In order for 'water to be distributed equitably', the traditional thought process provoked the idea of supply expansion plans through interventions in the natural hydrological flows (Rao 1975). Eventually, water resource planning was generally reliant on linear projections of future populations, per capita demand, agricultural production and levels of economic productivity (Gleick 2000a).

Towards the middle of the last century, serious concerns started to being expressed on the long-term wisdom of following such a strategy that is focused exclusively on the increasing intervention into the hydrological cycle. Despite its impressive short-term successes in providing larger supplies, it is increasingly being realized that addressing the new and emerging challenges is no more possible over the long term, unless some fundamental changes take place in the way humans have looked at water resources so far. The 'business as usual' process has started to be feared as counterproductive. There emerged the need for a fundamental change in terms of a new interdisciplinary paradigm that has been constantly gaining ground over the years. The new ways of managing water on the basis of a holistic knowledge base have increasingly been identified as Integrated Water Resource Management (IWRM).

The origin of such comprehensive efforts to address issues of water management finds its allusion in the 1977 Mar del Plata conference on Water. The Rio Summit in 1992 expanded the agenda to include ecological water needs, which have been adopted in the current context of SDG 6. The Dublin statement reinforced this view. Implicitly, these documents identified 'basic water requirements' and 'sustainable water requirements', where the former essentially refers to drinking water for survival, water for human hygiene, water for sanitation services and modest household needs for preparing food. Unless these basic requirements are fulfilled by the state, large-scale human misery and suffering will contribute to the risk of social and military conflict (Gleick 1996). The latter talks about the usage of water in the purview of environmental limits.

The realization of the need for holistic modes of water management has been reflected in some of the policy actions of the developed world, primarily with the dawning of the ecological concerns (Gleick 2000b). Continued investments in huge engineering interventions are being challenged by those who believe a higher priority should be assigned to projects that meet basic and unmet human needs for water (Gleick 1996). The United States, the country which started the global trend of building large dams, is following '… a new trend to take out or decommission dams that either no longer serve a useful purpose or have caused such egregious ecological impacts so as to warrant removal. Nearly 500 dams in the USA and elsewhere have already been removed and the movement towards river restoration is accelerating' (Gleick 2000a).

The Murray-Darling Basin Commission in Australia is seriously contemplating on extending financial encouragement to farmers for saving on their allocation of irrigation water and to allow the savings to remain instream (Bandyopadhyay and Perveen 2004). In another instance, Chile's National Water Code of 1981 established a system of water rights that are transferable and independent of land use and ownership. The most frequent transaction in Chile's water markets is the 'renting' of water between neighbouring farmers with different water requirements (Gazmuri 1992). Helming and Kuylenstierna (2001), while cautioning against the damages that can be caused by supply augmentation plans, emphasized that '... Demand side management is therefore slowly becoming a new paradigm for water governance'.

6.1.3 Entry Point of This Chapter

One needs to note here that the discussions in Sect. 6.1.2 relate with a holistic paradigm of water management that does not explicitly show up in SDG 6. To be more specific, SDG 6 is more related to human household use and may apparently seem 'anthropocentric' in its delineation. But what is often missed out is that a holistic water management paradigm that looks at water as a 'flow' and not as a stock of resource to be used for storing and consumption as per need is one of the pre-requisites for achieving this goal. The various ecosystem functions and eventually the ecosystem services of a free-flowing system entail various provisioning services as also regulating services like clean water provisioning through natural purification processes. While human interventions are needed to provide for clean water, the nature's ability to do so also needs to be acknowledged, as one addresses SDG 6.

While we are aware of this aspect, it is practically impossible in India to find a 'free-flowing' river, except for some smaller stretches. In this chapter, therefore, that aspect is assumed away. Rather, the critical entry point happens to be the performances of the states in terms of the various initiatives at the level of the citizens. In this chapter, we report on the performances of the Indian states by developing an index on SDG 6 on the basis of various parameters and using statistically determined weights on the basis of principal component analysis. In Sect. 6.2, we talk of the various SDG targets and the initiatives of the central government with respect to this goal in India. In Sects. 6.3 and 6.4, we explain the datasets and methodology and report on the results of the ranks of various Indian states with respect to their performances. Section 6.5 provides the concluding remarks.

6.2 Water and Sanitation for All

SDG 6 aims to ensure 'availability and sustainable management of water and sanitation for all'. It recognizes that social development and economic prosperity are built upon the foundations

Table 6.1 SDG 6 targets

SDG 6 sub-goals	Objectives
6.1	Universal and equitable access to safe and affordable drinking water
6.2	Adequate and equitable sanitation for all
6.3	Improvement of water quality through reduction of water pollution
6.4	Increase of water-use efficiency across sectors and reduce number of people suffering from water scarcity
6.5	Implementation of integrated water resource management at all levels
6.6	Protect and restore the health of water-related ecosystems
6.a	International cooperation and capacity building in developing countries through waste water treatment, desalination, recycling and reuse technologies, etc.
6.b	Participation of local communities for improvement of water and sanitation

Source: United Nations General Assembly Report (2015)

of sustainable management of freshwater resources. Water resources and sanitation are embedded in most forms of development targets, such as food security, health promotion and poverty reduction, agriculture and industrial growth, energy generation and ecosystem services (United Nations 2018). Table 6.1 illustrates the specific targets delineated under SDG 6.

Water and sanitation are strongly related to public health (Roy and Pramanick 2019). While HIV/AIDS, tuberculosis and malaria attract most attention of international public health community, diarrhoea, a water-borne disease occurring mostly in the poorer nations, alone kills more children in a year than the former three combined (Boshci-Pinto et al. 2008). According to the United Nations, one fifth of the child deaths in the world are in India due to severe diarrhoea. Hygiene, sanitation and water (HSW) interventions can reduce incidences of diarrhoea, ascariasis, cholera, scabies, trachoma, amoebiasis, etc. (Bartram and Cairncross 2010). The benefits of HSW are far greater than these disease-specific statistics. Malnourished children when recovering from diarrhoea are usually vulnerable to pneumonia. This diarrhoea-induced susceptibility is associated with 26% of all childhood pneumonia cases. Reducing incidences of diarrhoea will have secondary impacts in reducing other diseases as well (Schmidt et al. 2009). Reduction in risks to health, especially malnutrition, also results in better school performance by children and timely entry into the labour market (Acharya and Paunio 2008), directly influencing hunger reduction and lowering poverty levels in the long run. It is, thus, evident that hygiene, sanitation and water are foundations of a well-functioning public health system and good health, which accounts for one of the main problems in India's development trajectory. Access to basic sanitary needs will improve the overall health and well-being of people, especially children. Focussing on SDG 6 will improve the performance of other SDG indicators through the interlinkages.

In the context of SDG 6, however, India has progressed a lot from the early 1990s until now. The major problems in this aspect include issues of open defecation, garbage disposal in water resources and non-access to clean drinking water. Although these issues mostly come under the radar of the Ministry of Jal Shakti- formed by merging the erstwhile Ministry of Drinking Water and Sanitation (MDWS) and the Ministry of Water Resources, River Development and Ganga Rejuvenation (MoWR) in 2019- the benchmark schemes implemented by the Government of India to tackle the related issues in rural India include the *Swachh Bharat Abhiyan* (Clean India Campaign), the National Rural Drinking Water Programme, and *Namami Gange* (River Ganga Conservation). The major Union level initiatives in the past two decades on urban water and sanitation needs are outlined in Table 6.2.

6.3 Measuring Progress of SDG 6

Prior to the SDGs, the Millennium Development Goals (MDGs) for 2015 identified access to safe drinking water and basic sanitation as one of its

Table 6.2 Central government initiatives for urban water and sanitation

Initiatives	Objectives
1. Jawaharlal Nehru National Urban Renewal Mission (JNNURM) 2. Ministry of Urban Development—High Powered Expert Committee, 2008 3. 12th Five Year Plan Committee	Urban infrastructure, water supply, drainage
1. Ministry of Urban Development—Advisory Note on Improving Water Supply and Sanitation Services, 2012 2. National Water Policy 2012 3. MoUD and MoHUPA Centres of Excellence and National Resource Centre	Development of water supply and sanitation businesses, service improvement plan, capacity building, reducing leakages in water supply and re-use of water
Steering Committee on Drinking Water Supply and Sanitation, Planning Commission, GOI, 2002	Levy of water charges for maintenance and future improvement schemes, supply of healthy drinking water
1. Swachh Bharat Mission 2. National Urban Sanitation Policy 3. Service Level Benchmarking Initiative 4. National Sanitation Ratings of Cities 5. Central Public Health and Environmental Engineering Organization Manuals 6. Septage Management Advisory 7. Advisory on Water and Sanitation Services	Healthy sanitation practices, awareness and behavioural change in people with regard to urban water and sanitation, waste management and drainage, private sector participation

Source: compiled from various MoWR and MDWS reports

targets under the broader goal of 'Ensure Environmental Sustainability'.[1] While both rural and urban India met the MDG targets for improved drinking water, its performance in terms of sanitation was far from satisfactory. Even though households might have had access to an 'improved' source of water, it does not indicate adequate supply of water of acceptable quality.[2] Therefore, performances under the MDGs were not well founded. SDG 6 is a distinct improvement over the MDGs (Wankhade 2016). Not only does it consider infrastructural facilities that ensure clean and safe drinking water and sanitation for all, but it also looks into aspects of governance and efficient utilization of water resources. In other words, it has brought the whole cycle of water and sanitation in the governance discussion.

Green Indian States Trust's seminal study (2007) on freshwater quality outlines some key issues related to surface water and groundwater in India. It highlights the importance of natural capital assessments with regard to water, especially in a country like India where almost 70% of the geographical area is classified as arid and semi-arid. Therefore, data monitoring is crucial in measuring progress of SDG 6 in India. As SDG 6 is multi-dimensional in nature, it would require indexation of the various parameters to a single composite index to make any such analysis meaningful. In order to represent the broad category of targets, some indicators have been chosen to represent the key aspects of the goal-demand, supply, quality, management and governance.

This study entails developing two indices[3] for 'clean water' and 'sanitation' separately, across the 23 states[4] of the country and then discussing

[1]MDG 7 refers to 'Ensure Environmental Sustainability'. Target 7.c. states: 'Halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation'.

[2]According to the Joint Monitoring Programme (JMP), WHO-UNICEF, an 'improved' drinking water source is one that, by nature of its construction and when properly used, adequately protects the source from outside contamination, particularly faecal matter. 'Improved' drinking water sources include piped water into dwelling, public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs and rainwater collection. 'Unimproved' sources include unprotected spring, unprotected dug well, cart with small tank/drum, tanker-truck, surface water and bottled water.

[3]All computations have been performed on Stata 12.0.

[4]The latest available state-wise data for each of the indicator variables have been chosen. The Union Territories and the North Eastern States (except Assam) have been excluded from the study due to unavailability of data.

the intersection of these two scores with the help of a matrix analysis. At the very first stage, the quantified/quantitative indicators reflecting each aspect are taken, and their respective weights in the context of 'clean water' or 'sanitation' are determined by principal component analysis[5] (PCA). For this purpose, it is first necessary to apply transformation functions to the raw data. Subsequently, weights are attached to the transformed values of each indicator. Ghosh et al. (2014) suggest using PCA for weight distribution since it stands out as one of the best practices globally, to enhance statistical robustness in assigning weights. Following this method, weights are attached to different indicators without exposing them to 'subjectivity' and 'sub-optimal representation'. Finally, statistically computed weights and transformed indicator values are aggregated using the additive function to obtain the index scores.

Table 6.3 illustrates the different indicators[6] chosen to measure the status of the 23 Indian states with respect to SDG 6. One of the indicators, Composite Water Index, of the NITI Aayog is essentially a measure of the performance of different Indian states in terms of management of water resources. It depicts the importance of the governance aspect of SDG 6 as several water-scarce states are the top performers. Water Body and Water Withdrawal as a Percent of Water Availability capture the supply and demand side of the water respectively. Subsequently, indicators reflecting adequate sanitation facilities represent the provision of infrastructure for waste management and disposal.

6.4 Results Across Indian States

The data for the 23 Indian states on the above-mentioned indicators have been used to estimate the following two separate indices for 'clean water' and 'sanitation' respectively. Figure 6.1 represents the performance of different states in providing access to clean water. Since it is a baseline study, it reflects a profile of the current status. Gujarat, Jammu and Kashmir, Madhya Pradesh, Andhra Pradesh, Odisha, Maharashtra, Karnataka and Telangana represent the top eight states, while Delhi, Uttarakhand, Haryana, Jharkhand, Uttar Pradesh, Bihar, Kerala and West Bengal represent the bottom eight. Most of the states in the bottom eight are well endowed with water resources as they lie along the Ganges basin, while the better performing states are relatively water scarce. Gujarat, Maharashtra, Madhya Pradesh, Andhra Pradesh, Karnataka and Telangana have suffered from severe droughts in recent years. This drives the focus of water issues in India from an endowment perspective towards better management and governance of water resources.

Similarly, Fig. 6.2 represents the index scores for provision of sanitation facilities. Goa, Delhi, Kerala, Gujarat and Telangana are the best-

[5]Calculation of weights for each of the seven indicators under SDG 6 has been conducted by principal component analysis (PCA), to rank the states. This methodology has been chosen over a simple average technique to understand the dominant patterns in the data set in terms of weights that should be assigned to each parameter. Now, let us define the weight attached, by PCA, to an indicator '*m*' in 'clean water' or 'sanitation' index as ω_m where $\omega_m = [\max\{\text{component}^1, \text{comp}^2, \ldots\ldots, \text{comp}^m\}]^2 *$ explanatory power of [max{comp1, comp2,…,comp *m*}]. Each of the weights has been scaled up to sum up to 1 (100%) for both 'clean water' and 'sanitation', in order to avoid under representation.

[6]The data collected across 23 Indian states, owing to either the population size or geographical area in most cases, have inherent scale biases. The variables have been converted into per unit format (to remove the relevant scale bias). Further, all the data points have been normalized by the following formula to range from 0 to 1 (unit free). Now, for the negative indicators, the complement of 1 for their respective normalized values has been taken, so as to convert them into a positive indicator. This has been done so as to form a uniform, unit and direction free, composite index score for 'clean water' and 'sanitation' respectively.

$$Y_{kj} = \frac{y_{kj} - \min_j\left(y_{kj}\right)}{\max_j\left(y_{kj}\right) - \min_j\left(y_{kj}\right)}$$

where y_{kj} denotes the value of the component indicator k of 'clean water' or 'sanitation' for state *j; Y_{kj}* denotes normalized value of the component indicator k of 'clean water' or 'sanitation' for state *j;*$\min_j\left(y_{kj}\right)$ denotes the minimum value of the row vector of y_{kj} values across the states; $\max_j\left(y_{kj}\right)$ denotes the maximum value of the row vector of y_{kj} values across the states; with '*k*' denoting an indicator, it is defined by the closed set $k = [1, 3]$ for 'clean water' and $k = [1, 4]$ for 'sanitation' and '*j*' denoting a state, which is defined by the closed set $j = [1, 23]$

Table 6.3 Indicators of clean water and sanitation in India

SDG 6 components	Target category and indicator chosen	Data source
Clean water	6.a. Composite Water Index Score (2016–2017)[a]	NITI Aayog, June 2018—Composite Water Management Index: A Tool for Water Management[b]
	6.6. Water Body (2018)[c]	School of Oceanographic Studies, Jadavpur University (2018)
	6.4. (Complement of) Water Withdrawal as a Percent of Water Availability (2012)[d]	Q. No. 2131, Dated: 24/07/2014, Ministry of Water Resources, River Development and Ganga Rejuvenation, Lok Sabha & Lok Sabha Unstarred Question No. 4426, dated 03.05.2012
Sanitation	6.b. (Complement of) Slum Population (2011)[e]	Registrar General of India, Census of India, 2011
	6.2. Number of Households Having Access to Water for Toilets (2016)[f]	Swachhata Report, 2016 (MOSPI)
	6.2. Wards Having Access to Liquid Waste Disposal for Community and Public Toilets (2016)[g]	Swachhata Report, 2016 (MOSPI)
	6.2. Solid Waste Disposal—Total Waste Processed (2016)[h]	Swachhata Report, 2016 (MOSPI)

[a]Originally expressed as composite water index scores, the values have been normalized to range from 0 to 1. The missing value of Delhi is substituted by the average values of its neighbouring states that are Haryana and Uttar Pradesh. The missing value of West Bengal is substituted by the average of its neighbouring states—Odisha, Jharkhand, Bihar, Sikkim and Assam. The missing value of Jammu and Kashmir is substituted by the average values of its neighbouring states that are Himachal Pradesh and Punjab

[b]The Composite Water Management Index (CWMI) uses data collected at central and state level from 2016 to 2018. Their findings show that the water scarce states (Gujarat performs best) perform much better in terms of the CWMI than the relatively water abundant states (Meghalaya performs worst)

[c]In order to capture the total water availability in a state, we have used the total area under water bodies as a measure. These figures were originally in hectares which have been converted into square metres and then the per capita values have been calculated (as per Census 2011) to remove scale biases. This data set has then been normalized to range from 0 to 1

[d]Individual data for ground water availability and ground water withdrawal have been obtained from the mentioned sources. Water withdrawal as a percentage of water availability for each state has been calculated from the given data sets. These figures have then been normalized to range from 0 to 1. Andhra Pradesh values have been used as a proxy for Telangana. The normalized values have been subtracted from 1 to convert into its complement to make the score positive

[e]Originally expressed figures are in percentage of total urban population. The values have been normalized to range from 0 to 1. The value for Andhra Pradesh has been used for Telangana. The normalized values have been subtracted from 1 to convert into its complement to make the score positive

[f]Original figures were expressed in percentage. These values have been normalized to range from 0 to 1

[g]Original figures were expressed in percentage. Missing value for Delhi has been replaced by the average of Uttar Pradesh and Haryana, while missing value of Goa has been replaced by the average of Karnataka and Maharashtra. These values have then been normalized to range from 0 to 1

[h]Original figures are expressed as percentage of waste processed. We have normalized these data to range from 0 to 1

performing states, while Chhattisgarh, Bihar, Odisha, Andhra Pradesh and Jharkhand represent the poorest five performers. Impact of inadequate sanitation facilities contributed to an increasing prevalence of malnourishment and stunting among children in Jharkhand, Bihar and Uttar Pradesh (Manisha 2018).

These indices, individually, suggest the existence of widespread inequalities across states in terms of providing access to clean water and sanitation. Very few states have been able to undertake holistic planning in order to achieve the basic objectives. It is interesting to observe that Delhi, which was the poorest performer in terms of providing clean and safe water, is one of the

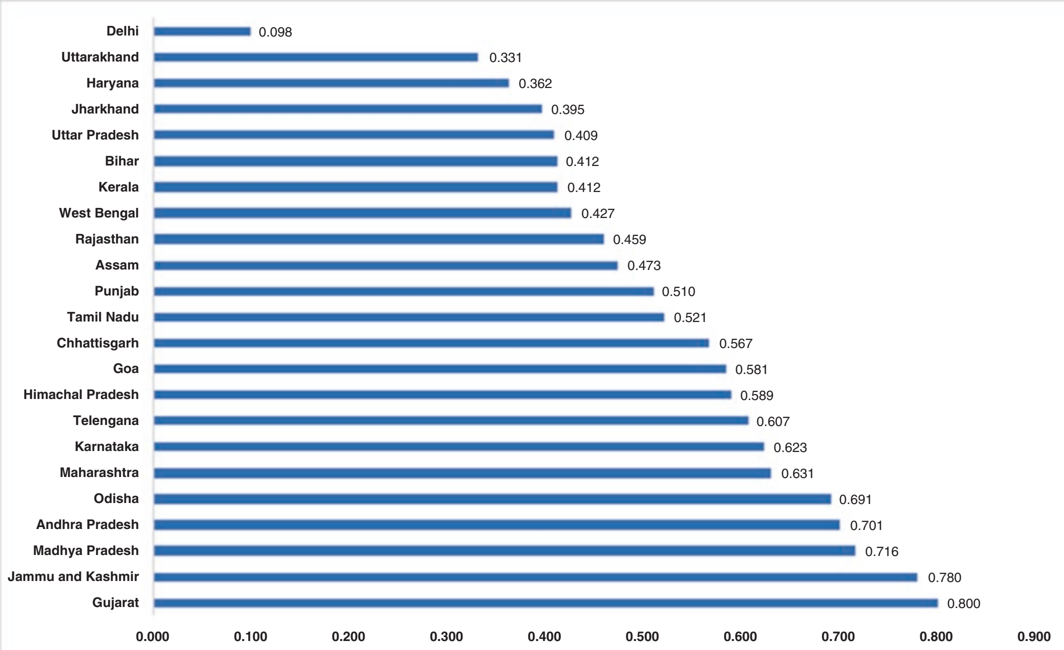

Fig. 6.1 Providing access to clean water. (Source: Computed Index Scores)

highest ranked states in terms of providing access to sanitation facilities. Gujarat, on the other hand, has been relatively outstanding in both parameters.

In terms of overall performance in providing 'clean water and sanitation', Fig. 6.3 represents the 'clean water–sanitation' matrix. The intersection between water and sanitation issues shows the placement of the Indian states in terms of SDG 6. The states have been classified in terms of four categories, with A and D representing the worst and best respectively[7] (A, B, C and D are arranged in ascending order of performance in terms of both 'clean water' and 'sanitation' indices).

Performance keeps improving as one moves from the top-left grid to the bottom-right grid of the matrix. The top-left corner grid is empty suggesting that almost every state has been successful in providing at least a basic minimum level of clean water and sanitation in synchronization with the MDGs. Gujarat fares as the best performer of the SDG 6. The states can be classified into four categories in terms of SDG 6 performance—*Under Performers (Grids AA, AB, BA, BB)*, *Better Water Facilities (Grids AC, AD, BC, BD)*, *Better Sanitation Facilities (Grids CA, CB, DA, DB)* and *Top Runners (Grids CC, CD, DC, DD)*. The states belonging to these categories are as follows:

- *Under Performers*: Jharkhand, Bihar, Rajasthan, West Bengal, Assam, Uttar Pradesh and Punjab
- *Better Water Facilities*: Chhattisgarh, Andhra Pradesh, Odisha, Maharashtra, Jammu and Kashmir and Madhya Pradesh
- *Better Sanitation Facilities*: Uttarakhand, Haryana, Tamil Nadu, Delhi and Kerala
- *Top Runners*: Himachal Pradesh, Telangana, Karnataka, Goa and Gujarat

[7] Categories have been identified based on the following:

A: $X_j < (\mu - \sigma)$;
B: $(\mu - \sigma) < X_j < (\mu)$;
C: $(\mu) < X_j < (\mu + \sigma)$;
D: $X_j > (\mu + \sigma)$;

where μ is the mean and σ is the standard deviation of X_j, and X_j refers to the state-wise computed index values for 'clean water' and 'sanitation' and '*j*' denoting a state, which is defined by the closed set $j = [1, 23]$.

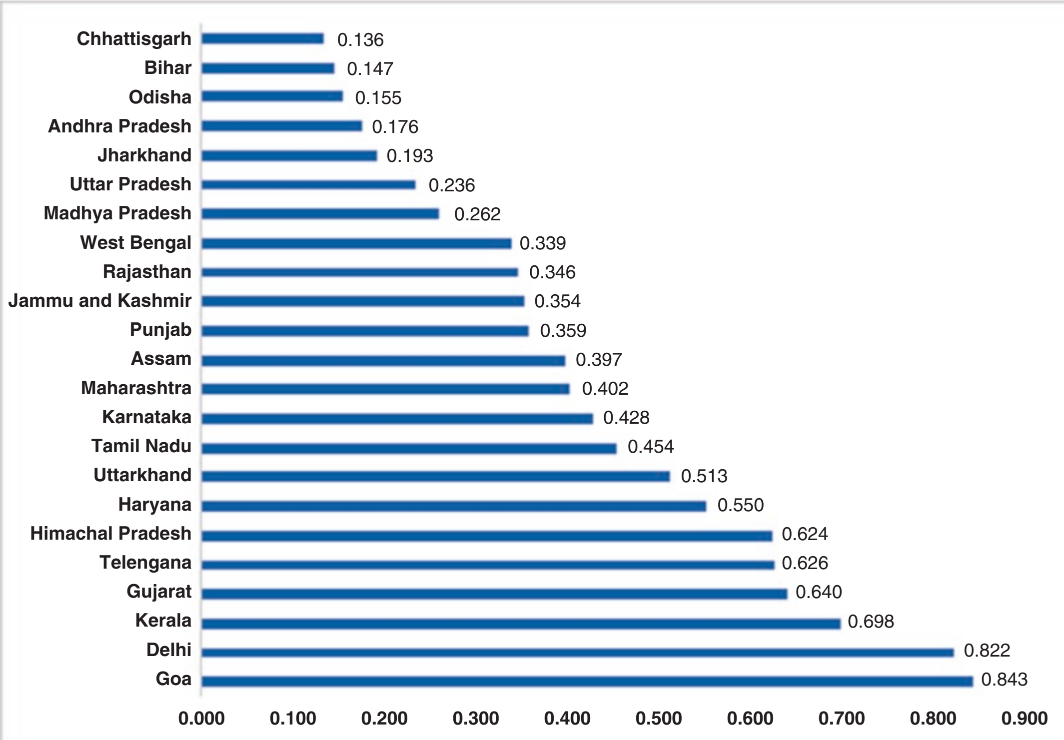

Fig. 6.2 Providing access to adequate sanitation facilities. (Source: Computed Index Scores)

SDG 6		CLEAN WATER			
		A	B	C	D
SANITATION	A		Jharkhand, Bihar	Chhattisgarh	Andhra Pradesh, Odisha
	B		Rajasthan, West Bengal, Punjab, Assam, Uttar Pradesh	Maharashtra	J&K, Madhya Pradesh
	C	Uttarakhand, Haryana	Tamil Nadu	Himachal Pradesh, Telengana, Karnataka	
	D	Delhi	Kerala	Goa	Gujarat

Fig. 6.3 Clean water and sanitation matrix (authors' computation)

6.5 Concluding Remarks

This chapter is a modest attempt to rank states in terms of their performances with respect to SDG 6 that essentially covers two dimensions: clean water and sanitation. Though often clubbed together as they are generally important cornerstones of local government's responsibilities, they may occur independently. This is prevalent from the classification that shows states with good performance in water supply, but not being good performers in sanitation, and vice versa. There are 11 states in such categories. On the other hand, one needs to note here that the entire idea of ranking states in terms of their SDG performance is yet another attempt to promote 'competitive federalism' in the same vein in which the 'ease of doing business' rankings are conducted. However, one needs to note here that these ranks are across the Indian states in relation to each other, and as such, India's performance in the context of SDG 6 has not been too encouraging in the global context. The newly formed ministry, Jal Shakti, can take a leaf from this exercise. At the same time, it is important that a holistic approach to water governance is undertaken keeping in mind the ecosystem functions and services that the water body renders. At a basin scale, the idea of 'free-flowing rivers' needs to be adopted by the new body to the extent possible. A secure hydrological future requires keeping water instream through demand management.

On the other hand, as argued by Ghosh et al. (2019), almost all the SDGs are embedded in one form of capital or the other, that is, human (SDGs 1–5: reflecting on poverty, hunger, health, education and gender equality), physical (SDGs 8 and 9: employment, growth, industry, innovation and infrastructure), natural (SDGs 14 and 15: life below water and land respectively) and social (SDGs 10 and 16: social institutional variables, etc.). In this context, SDG 6 contributes to the important factor of human capital, as stated earlier. All these are factors of creating enabling business environment Ghosh et al. (2019). As such, there is a two-way causality between business performance and SDGs. While the role of the private sector and multilaterals is being seen as important drivers for achieving SDGs globally, many private organizations are transcending the unidimensional goals of short-term profit maximization and focusing on sustainability parameters in an attempt to create a long-term business strategy.

The Business and Sustainable Development Commissions Report 2017 identifies immense business opportunities associated with the SDGs and estimates their aggregate global potential value in 2030 at US$ 12 trillion in current prices. More than half of these business solutions reside in developing economies such as India with large markets. International public–private, public–public, private–private partnerships leveraging on individual comparative advantages are the way forward to incentivise projects and successfully implement projects relating to clean water and sanitation. Apart from financial assistance from the Multilateral Development Banks, many Multi-National Companies in this sector such as AquaFed, Cargill and P&G are actively collaborating with state and non-state actors in developing nations for drinking water and sanitation facilities. For example, according to the US Council for International Business, Gap Inc. has partnered with Swasthi Health Resource Centre in building water filtration plants in rural India which already caters to approximately 5000 households and 29 schools in 30 villages across India. Another policy which holds much water in contemporary India is pricing water across all urban regions for efficient utilization and progressive distribution of funds for areas that are lagging behind in terms of water and sanitation facilities.

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