



# **When the Water Runs Dry:** **Human Rights, Climate Change & Deepening** **Water Inequality in Delhi, India**

Harvard Law School International Human Rights Clinic  
Center for Economic and Social Rights



**HARVARD**  
LAW SCHOOL

INTERNATIONAL  
HUMAN RIGHTS CLINIC

**CENTER** for  
**ECONOMIC** and  
**SOCIAL RIGHTS**

Cover Illustration

A woman lifts a 15-litre jug of water.

All photography by Harshit Chawla.

Design

Tutaev Design

Copyright © 2023 President and Fellows of Harvard College. All rights reserved.

**When the Water Runs Dry:**  
Human Rights, Climate Change & Deepening Water  
Inequality in Delhi, India

Harvard Law School International Human Rights Clinic  
Center for Economic and Social Rights

September 2023



# Contents

---

<b>Abbreviations</b>	2
<b>Acknowledgments</b>	3
<b>Executive Summary</b>	4
Relevant Legal Framework	5
Unequal Enjoyment of the Right to Water	6
Climate Change Deepens Inequality	7
Policy Shortcomings	8
<b>Background: Intersectional Inequality</b>	9
Delhi: A City of Migrants	9
Caste-based Inequality	11
Inequality Between Countries	11
<b>Unequal Enjoyment of the Right to Water in Delhi</b>	14
<b>Availability</b>	14
Unequal Water Availability	14
Climate Change Deepens Inequality	18
<b>Accessibility</b>	20
Unequal Water Accessibility	20
Climate Change Deepens Inequality	23
<b>Acceptability</b>	26
Unequal Water Acceptability	26
Climate Change Deepens Inequality	27
<b>Quality</b>	27
Unequal Water Quality	28
Climate Change Deepens Inequality	30
<b>Policy Response &amp; Activism Efforts</b>	32
<b>International Efforts</b>	32
<b>National and Sub-National Efforts</b>	33
<b>Resources</b>	38
<i>Resource Allocation</i>	38
<i>Resource Generation</i>	40
<i>Privatization</i>	42
<i>Participation, Accountability and Transparency</i>	44
<b>Community Efforts</b>	46
<b>Recommendations</b>	48
<b>Appendix</b>	51



## Abbreviations

---

<b>AAAQ</b>	Availability, Accessibility, Acceptability and Quality
<b>CDBR</b>	Common but Differentiated Responsibilities
<b>CESR</b>	Center for Economic and Social Rights
<b>CVI - WH</b>	Climate Vulnerability Index for Water at the Household
<b>DJB</b>	Delhi Jal Board
<b>DO</b>	Dissolved oxygen
<b>GHG</b>	Greenhouse gas
<b>ICESCR</b>	International Covenant on Economic, Social and Cultural Rights
<b>IHRC</b>	Harvard International Human Rights Clinic
<b>INR</b>	Indian rupees
<b>JJ</b>	Jhuggi Jhopri
<b>NAPCC</b>	National Action Plan on Climate Change
<b>NEP</b>	National Environment Policy
<b>NGO</b>	Non-governmental organization
<b>OPERA</b>	Analytical framework developed by CESR; acronym for “Outcomes,” “Policy Efforts,” “Resources” and “Assessment”
<b>PPP</b>	Public-private partnership
<b>RO</b>	Reverse osmosis
<b>SAPCC</b>	State Action Plan on Climate Change
<b>SDGs</b>	Sustainable Development Goals
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>USD</b>	U.S. dollars

## Acknowledgements

---

This report is the culmination of research undertaken from 2019 to 2022 by collaborative teams from the Center for Economic and Social Rights (CESR) and the International Human Rights Clinic (IHRC) at Harvard Law School. All stages of the research drew on advice from researchers and advocates in Delhi, India. Some of their names are withheld at their request.

CESR and the IHRC extend thanks to the human rights practitioners who guided the research at various stages of this project. Those supervisors included: Mihir Mankad, Tripti Poddar, Alina Saba, Kate Donald and Jayshree Satpute. We are grateful to the scholar-practitioners and UN staff who provided crucial advice on the linkages between climate change, human rights and inequality for prior research that influenced this report. We are also indebted to community members who shared their experiences with us despite the challenges of doing so during the COVID-19 pandemic.

Seven teams of Harvard Law School students served as researchers for this report, working under the supervision of clinical instructor Aminta Ossom. Those teams included: Laura Bach, JD '22; Sara Birkenthal, JD '20 (UC Berkeley); Yunyi Chen, JD '22; Alex Engeriser, JD '20; Isabelle Holt, JD '23; Ayoung Kim, JD '20; Joan Josiah, JD '23; MinJoo Lee, JD '22; Yeana Lee, JD '23; Krupa Appleton, JD '23; Carine Seron, LLM '20; Lauren Shapiro, JD '22; Deepika Singh, JD '24; Alessandra Slayton, JD '22; Parvuna Sulaiman, JD '22; Yixian Sun, JD '22; Katherine Super, JD '23; Afrah Tahir, JD '24; Sarah Tansey, JD '21; Velo-Vincent van Houden, JD '22; Rachel Westrate, JD '21; and Cindy Wu, JD '22. Special thanks are due to Eesha Khan, LLM '22, for providing interpretation and to Reuben Fischer-Baum, a 2021-2022 Nieman fellow at Harvard, for advising the student team on data visualization in the latter stages of the project.



Water storage at the entrance of a home

## Executive Summary

---

In Rajiv Ratan Awas Yojana, a low-income community of 850 families on the edge of Delhi, India, there are two sources of water for domestic use: water that flows from taps and water that the government transports to the area on tanker trucks. Both options are limited. The water from the tap is irregular and flows for short amounts of time. The tanker water arrives during a window of maximum two hours daily.

Neither source is clean enough for drinking or cooking without further filtration. Because of intermittent water flow, tap water should be stored. However, it has high salinity levels and develops a white film when kept to the side. It also comes out of the tap dirty. On the other hand, the vehicle carrying tanker water often has insects. Community members use filters to ensure their water is pure enough to drink.

Women and girls collect water for their families, which means gathering water for different uses and determining how to allocate it efficiently. Lining up for the tanker water is an activity for which they budget one hour a day. Most days, a truck arrives. However, sometimes they need to collect a two-day supply of water. On those days, they carry around 30 Liters of water for their families, an amount falling well below international guidelines on the consumption needed to maintain health and hygiene.<sup>1</sup>



Washing hands at home in Delhi.

The summertime is the worst for demand and supply. That is when the community does not have enough water to fulfill their needs, going up to three days with no supply.

Community members are appreciative that they do not have to purchase water. However, they are dissatisfied with water availability. In their area, the water is free. Still, the amount of water provided is simply not sufficient. It is physically onerous to access. It is unclean and of poor quality.

Climate change lurks in the background as an intensifier of the inequality that this already disadvantaged community faces. Climate change exacerbates water scarcity. Temperature increases heighten the demand for water while rendering the task of obtaining it more arduous. Climate change also affects the taste, odor, appearance and quality of water. Communities in Delhi without access to their own water pipelines and in-home taps, which provide cleaner, more reliable and more abundant water, feel these impacts most acutely.

---

<sup>1</sup> International experts have recommended a minimum usage of 50 Liters of water per person per day to ensure good health and hygiene. Twenty Liters or less per person per day raises high health concerns. See GUY HOWARD, ET AL., WORLD HEALTH ORGANIZATION, DOMESTIC WATER QUANTITY, SERVICE LEVEL AND HEALTH 38 tbl. 11 (2d ed. 2020).



This report describes the relationship between climate change and the right to water in Delhi, India. It pays special attention to the heavy impact that climate change has on women and households in informal settlements in the city, here referred to as unplanned colonies.<sup>2</sup> The report finds that the Indian and Delhi governments have not fulfilled the right to adequate water for Delhi residents. Residents of unplanned colonies in Delhi, in particular, face inequalities in their enjoyment of the right to water. These inequalities are not inevitable. The report ties inequalities in water accessibility, accessibility, acceptability and quality to shortcomings in water management.

Climate change only deepens these inequalities by contributing to the reduction and degradation of surface and ground water supplies in Delhi. Climate change particularly impacts women, who serve as water collectors for their families, by making water collection more grueling and time-consuming. It also increases risks to women's health and safety.

As elaborated in the Appendix below, the research in this report was conducted by following OPERA. OPERA is an analytical framework developed to assist with identifying systemic deprivations of economic and social rights. The OPERA framework led this report's authors to a range of sources, including government reports and reports of non-governmental organizations (NGOs); studies from the fields of anthropology, political science, sociology and meteorology; media reports; government surveys; budgetary and census information; national legislation; legal decisions; international instruments and interviews. The research draws on 200 written sources. The authors also conducted seven interviews with community representatives and 13 interviews with experts on water management, earth science, public health and social budgeting.

## Relevant Legal Framework

Through international agreements, India has committed to combating climate change and ensuring that the right to water is progressively realized. India is a party to the International Covenant on Economic, Social and Cultural Rights (ICESCR), which obliges governments to take steps toward providing an adequate standard of living for all.<sup>3</sup> Nationally, Article 21 of the Constitution provides for the right to life,<sup>4</sup> which the Supreme Court has interpreted to include “the right of enjoyment of pollution-free water.”<sup>5</sup> This interpretation aligns with the UN General Assembly's recognition of the right to water and with the Committee on Economic, Social and Cultural Rights' conclusion that “the human right to water is indispensable for leading a life in human dignity.”<sup>6</sup>

The Committee on Economic, Social and Cultural Rights, which interprets and monitors governments' implementation of the Covenant, has set forth certain criteria to examine the adequacy of government services that fulfill these rights. Abbreviated as “AAAQ,” the Committee examines whether governments' services to communities are available, accessible, acceptable and of good quality.<sup>7</sup> In the case of water, the criterion of availability refers to the sufficiency of water provided by the

<sup>2</sup> “Unplanned colonies” are residential settlements that the Delhi Development Authority did not formally plan and approve at the time of construction. See “Eight Categories of Colonies,” *infra*, at 11. They house much of the urban poor and lower middle classes in Delhi. Almas Haider, *Inequalities in Water Service Delivery in Delhi* 1-2 (Water Integrity Network brief, 2016), available at <https://perma.cc/M3NY-CFX5>. A 2015 study that mapped unplanned colonies in Delhi attributes their locations and growth to a historical absence of city planning. See Patrick Heller et al., *Exclusion, Informality, and Predation in the Cities of Delhi: An Overview of the Cities of Delhi Project* 6-10 (Center for Policy Research Working Paper, 2015).

<sup>3</sup> International Covenant on Economic, Social and Cultural Rights (ICESCR), Dec. 16, 1966, 993 U.N.T.S. 3, A/RES/2200A (XXI); *ratification status available at* <https://perma.cc/8679-W4UK>.

<sup>4</sup> Constitution of India, Art. 21.

<sup>5</sup> Subhash Kumar v. State Of Bihar, AIR 1991 SC 420 (1991) (India), available at <https://perma.cc/Y468-HLN8>

<sup>6</sup> G.A. Res 64/292 (“The human right to water and sanitation”) (July 28, 2010; UN Comm. on Econ., Soc. and Cultural Rights, General Comm. No. 15: the right to water (Gen. Comm. No. 15), U.N. Doc. E/C.12/2002/11 (2002).

<sup>7</sup> Gen. Comm. No. 15, *supra* note 6, ¶ 12.



government and by government-sanctioned providers to households in the State's jurisdiction. The criterion of accessibility refers to the feasibility of obtaining water in terms of both physical effort and economic expense. The question of acceptability encompasses concerns about the aesthetic qualities of the water and concerns about the desirability of the water provided in the specific cultural context. Finally, the criterion that water be of good quality refers to how safe it is to use, especially for domestic purposes.

Under international human rights law, individuals are entitled to a system of water supply and management that enables everyone to enjoy water equally. Governments are obligated to devote the maximum of their available resources to guaranteeing the right to water. Structural discrimination in the provision and enjoyment of water—including on grounds of gender and social status—are prohibited. Fulfilling the right to water should also be sustainable, protecting not only the human rights of present generations to water but also future ones. It follows that governments have an obligation to protect communities from the increasingly negative and unequal impacts that climate change has on water.

### Unequal Enjoyment of the Right to Water

This report concludes that, for residents of Delhi, none of the four criteria assessing the adequacy of water provision have been met, and socio-economic status makes the situation worse. The water available to households in Delhi is variable and location dependent. According to a generous reading of Delhi government statistics, government-supplied, piped water is not available to 18 to 26 percent of the population of Delhi and around 29 percent of the population is estimated to lack water in their households.<sup>8</sup> Water is particularly unavailable to residents of unplanned colonies, most of whom do not have in-home pipes.

For large parts of the Delhi population, water is both physically and economically inaccessible. Residents living in households without in-home taps must rely on water supplied by community tap, tanker truck, tube-well, or borewell, all of which provide an insufficient and unreliable amount of water. A reduced water supply during summer seasons increases both physical and economic costs of obtaining it. Water is also economically difficult to access for poor households, which are compelled to spend a large proportion of their income on it. Past studies suggest that the total costs of accessing water—including purchasing, obtaining, treating and storing it—amount to about 15 percent of income for low-income households without piped access. They amount to around 1 percent of income for wealthy households that do have this access.<sup>9</sup> Similarly, residents of unplanned colonies largely lack the means to invest in clean and reliable water storage infrastructure that would ensure that water is accessible to them during periods of water scarcity.

Whether water is deemed acceptable is a community-specific determination. However, past research suggests that Delhi residents relying on tanker water, in particular, would find their water unacceptable. Most Delhi residents using tanker water who were surveyed as part of a 2016 study reported that their water was unclean and had an odor.<sup>10</sup> In contrast, residents whose households relied on piped water largely found their water to be clean and of good taste, even if it had an odor. A significant portion of those residing in unplanned colonies rely on tanker water for their domestic needs.

---

<sup>8</sup> See Availability, *infra*.

<sup>9</sup> See Accessibility, *infra*.

<sup>10</sup> See USAID, DRINKING WATER SUPPLY FOR URBAN POOR: CITY OF NEW DELHI 30 (2016), available at <https://perma.cc/B2LC-U9RX>.

Finally, public records surveyed for this report concur that water quality in Delhi is relatively poor. A study from the Bureau of Indian Standards found that Delhi had “the most unsafe tap water” of all of India’s state capitals.<sup>11</sup> According to data presented to Parliament, the salinity, fluoride, and nitrate in Delhi’s groundwater are above prescribed limits and increasing over time.<sup>12</sup> In addition, surface water drawn from the Yamuna River, one of Delhi’s primary water sources, is contaminated with dangerous industrial and residential runoff and sewage. Worryingly, residents of unplanned colonies who use tube-wells and borewells for domestic purposes are accessing groundwater that is not safe for consumption.

## Climate Change Deepens Inequality

This report shows that climate change amplifies the unequal enjoyment of the right to water in Delhi. Ninety percent of Delhi’s water supply comes from open-water sources, such as the Yamuna River, with the remainder drawn from groundwater.<sup>13</sup> The effects of climate change—such as declines in overall rainfall, droughts, dust storms and open-water absorption of greenhouse gas and aerosol emissions—reduce and contaminate surface and ground water supplies in Delhi. Rising temperatures and life-threatening heat waves contribute to reduced levels of water in municipal reservoirs.

Temperature increases associated with climate change heighten the demand for water while increasing the physical stressors of collecting it, thus rendering water less accessible. High demand for water and reduced water supply during Delhi’s hotter months lead to shortages that raise the price of the resource. Climate change has caused



Mural near Najafgarh Drain.

declines in summer monsoon rainfall in the geographic region where Delhi sits. Meanwhile, Delhi experiences more frequent extreme weather events, including erratic, high-intensity rainstorms, which occur outside of dry periods. These storms contribute to increasingly prevalent floods, which hinder access to water for residents of Delhi’s unplanned colonies by harming water-bearing infrastructure and impeding physical access to this infrastructure. For women, who are most often tasked with water collection, climate change renders this work more challenging and time-consuming, which has knock-on effects on their educational and livelihood opportunities.

The higher temperatures that accompany climate change affect the chemical composition of water and thus its taste, odor and appearance. This has implications for water acceptability and quality, especially for purposes of potation. Higher air temperatures lead to higher open-water temperatures, which then contribute to lower levels of dissolved oxygen (DO) in water. Lower DO in water can

<sup>11</sup> *Delhi Has the Most Unsafe Tap Water*, THE HINDU, Nov. 17, 2019, <https://perma.cc/M6QZ-3TLK>.

<sup>12</sup> *Nine Delhi Districts Had Contaminated Groundwater in 2019: Jal Shakti Minister*, THE HINDU, Mar. 3, 2020 <https://perma.cc/8XXT-GURL>.

<sup>13</sup> GOVERNMENT OF NATIONAL CAPITAL TERRITORY OF DELHI, “Water Supply and Sewage,” ECONOMIC SURVEY OF DELHI (2020-2021) 235-38, available at <https://perma.cc/6PUW-F8SV>.



negatively affect the chemical composition, taste and smell of water collected from open sources. Flooding, dust storms and open-water carbon dioxide absorption amplified by climate change also degrade water quality by exacerbating pollution and sediment build-up in open water sources. Women tasked with collecting water are therefore more likely to come into contact with poor quality water that puts them at risk of disease.

### Policy Shortcomings

Under India's Constitution, which incorporates the right to water, individual Indian states are responsible for water management. This decentralized governance system creates a fundamental challenge to implementing a uniform water policy, and thus ensuring equal enjoyment of the right to water for all. Numerous national and local ministries govern water, creating a complex water governance framework. Most national-level water policies are non-obligatory in nature. The combination of aspirational national policy and shared, overlapping responsibilities results in ad hoc, inefficient and uncoordinated water policy efforts.

The Delhi government has committed itself to expanded water availability and access. However, many of its plans have not been fully implemented. A promise to provide 20,000 Liters of free water a month to metered households does not equally benefit unplanned colonies that rely on communal water sources. Efforts to extend water pipelines have been piecemeal. In addition, the Delhi government has not sufficiently invested in the improvement of water quality, which means an important component of the right to water remains largely unaddressed. Moreover, certain elements of Delhi's water governance system, like the inability to monitor distributed water, obscure the unequal enjoyment of water rights between communities.

While national budgetary allocations to the water sector are increasing over time, under India's decentralized governance system, allocations made at the national level are not guaranteed to be spent by states and municipalities. The amount of resources Delhi allocates to its water supply varies by year. However, the amounts directed towards communities in unplanned colonies are unreported. At present, the Indian and Delhi governments are not maximizing the resources at their disposal to guarantee the right to water. Both governments assess less in taxes than peer governments when measured as a percentage of national and state GDP. In addition, the Delhi government does not have robust non-tax revenue streams that would sufficiently resource the extension of clean, reliable water to underserved communities. At the same time, national budgetary allocations to climate and environmental initiatives have not increased over time.

As elaborated in the Recommendations below, the Government of India and the Delhi government should redouble efforts to expand and improve the water supply, especially for underserved communities. Generating more resources to do so—including through increased tax and non-tax revenue streams—will be crucial to this effort. The Delhi government should monitor water delivery at the household and community levels and equalize the distribution of water between communities. In addition to focusing on the availability and accessibility of water, it should ensure that water distributed to communities is acceptable to those communities and of good quality. Countries that have contributed the most to historical greenhouse gas emissions have a heightened responsibility to provide adaptation resourcing, which would help with the implementation of these recommendations. In accordance with the principle of Common but Differentiated Responsibilities, the historically high emitters should rapidly increase international financing for climate adaptation, as well as loss and damage, in India. Meanwhile, all governments should cooperate together to guarantee clean water for all, in line with their commitments to advance the 2030 Sustainable Development Agenda.

## Background: Intersectional Inequality

This report analyzes how climate change amplifies unequal enjoyment of the right to water along lines of gender and socio-economic status. It relies on research that addresses how gender intersects with climate change and water in India. Because few sources analyze water accessibility or exposure to climate change as connected to economic status, measured by income, this report considers residence in unplanned colonies as a proxy for lower socio-economic status. However, these are not the only dimensions of inequality implicated by climate change.

### Delhi: A City of Migrants



Low water pressure in a home tap.

Climate change greatly affects migrants in and outside of Delhi. While the full impact of climate change on migrants is outside the scope of this report, it is clear that climate change has a pronounced impact on migrants' enjoyment of the right to water.

Internal migrants constitute a large portion of Delhi's population and a significant proportion of residents in unplanned colonies.<sup>14</sup> Over half of the population migrating

to Delhi come from rural areas ("rural-urban migrants")<sup>15</sup> and are touched by climate change even before their arrival in Delhi. For example, one factor pushing migrants to Delhi in search of work on a permanent or seasonal basis is the negative impact of climate change on agricultural livelihoods through changing weather patterns and increased incidents of drought.<sup>16</sup> Other factors that influence rural migrants' transition to Delhi include educational and livelihood prospects and social factors such as marriage.<sup>17</sup>

<sup>14</sup> Abhijit Banerjee et al., *Delhi's Slum-Dwellers: Deprivation, Preferences and Political Engagement Among the Urban Poor 1* (International Growth Center Working Paper, 2012).

<sup>15</sup> About 60 percent of migrants to Delhi have arrived from rural areas. GOVERNMENT OF INDIA, OFFICE OF THE REGISTRAR GENERAL & CENSUS COMMISSIONER, "Migrants by Place of Last Residence, Age, Sex, Reason for Migration and Duration of Residence," CENSUS OF INDIA (2011). See also Jajati Keshari Parida, *Rural-Urban Migration, Urbanization, and Wage Differentials in Urban India*, in INTERNAL MIGRATION, URBANIZATION AND POVERTY IN ASIA: DYNAMICS AND INTERRELATIONSHIPS 196-97 (Kankesu Jayanthakumaran et al. eds., 2019).

<sup>16</sup> One study surveying 1046 households from Rajasthan, Uttar Pradesh and Madhya Pradesh found that a significant percentage of households cited climate shocks as a stress multiplier pushing people to migrate from their home states. Delhi was a major destination. Ritu Bharadwaj et al., *Connecting the Dots: Climate change, Migration and Social Protection* 15-23 (International Institute for Environment and Development Working Paper, 2021). Another study of inter-state migration within India from 1991 to 2001 found drought frequency to be positively correlated to migration out of rural states. This was especially true for migration out of agricultural communities. Ingrid Dallmann & Katrin Millock, *Climate Variability and Inter-State Migration in India*, 63 CESIFO ECON. STUD. 560, 591 (2017).

<sup>17</sup> Ram Singh Bora, *Migrant Informal Workers: A Study of Delhi and Satellite Towns*, 5 MOD. ECON. 562, 571 (2014).



Few households in unplanned colonies have access to in-home taps.

Once migrants arrive in Delhi, they tend to reside in dwelling places where amenities are poor or unavailable in order to minimize their living costs.<sup>18</sup> One study found that nearly half of internal labor migrants live in non-notified slums,<sup>19</sup> a type of unplanned colony where infrastructure is most lacking.<sup>20</sup> Another study of 416 migrant households residing in unplanned colonies found that only seven percent of residents in such colonies had access to a household tap connection.<sup>21</sup> A third study, which comprehensively examined the situation of rural-urban migrants in Delhi,

found that rural-urban migrants have less access to piped water than non-migrants, even when controlling for other social and demographic characteristics.<sup>22</sup>

These factors paint a picture of a population not only over-represented in under-served areas but whose presence in these communities adds further pressure on ever-scarcer resources for all residents of those areas.<sup>23</sup>

### Eight Categories of Colonies

Policy analysts have identified eight categories of colonies in Delhi, which are defined according to their formality, tenure and legality. “Unplanned colonies” are those that the Delhi Development Authority did not formally plan and approve at the time of construction. They include, from least to most formalized: Jhuggi Jhopri (“JJ”) Clusters, Slum Designated Areas, Unauthorized Colonies, JJ Resettlement Colonies, Rural Villages, Regularized-Unauthorized Colonies and Urban Villages. “Jhuggi jhopri” can mean “slum” or “shanty” in Hindi. While households in unplanned colonies are diverse in terms of their land tenure and access to resources, they can be distinguished from planned colonies in that the housing units within are not constructed according to governmental planning norms and lack fully serviced infrastructure such as water pipelines and sewerage systems.

See Center for Policy Research, Cities of Delhi Project Policy Brief: Categorisation of Settlement in Delhi (May 2015).

<sup>18</sup> *Id.* at 568 (2014).

<sup>19</sup> “Non-notified slums” is a term that describes settlements that are not formally ‘notified’ under the 1956 Slum Areas (Improvement and Clearance) Act. Under the Act, settlements that are notified and officially recognized by the Delhi government become “Slum Designated Areas,” which are entitled to certain procedures before eviction. Heller et al., *supra* note 2, at 6-7.

<sup>20</sup> Brogen Singh Akoijam & Anna Salomi Kerketta, *Living Conditions of Internal Labour Migrants: A Nationwide Study in 13 Indian Cities*, 3 INT’L. J. MIGRATION & BORDER STUD. 328, 338 (2017). Only 1.6 percent of internal labor migrants were found to live in notified slums, while 42.7 percent were found to live on dwellings at work or on construction sites. These worksite dwellings were characterized by distinct issues of water accessibility. There, water access is mediated through employers on these dwellings. For more on this issue, see, e.g., Aaradhana J. Dalmia, *Strong Women, Weak Bodies, Muted Voices: Women Construction Workers in Delhi*, 47 ECON. & POL. WKLY. 249 (2012).

<sup>21</sup> Singh Bora, *supra* note 17 at 567.

<sup>22</sup> Gayatri Singh, *Freedom to Move, Barriers to Stay: An Examination of Rural Migrants’ Urban Transition in Contemporary India* 124-136 (2014) (Ph.D. dissertation, Brown University).

<sup>23</sup> See *id.*, at 79; Singh Bora, *supra* note 17, at 568; Digambar Abaji Chimanakar, *Urbanization and Conditions of Urban Slums in India*, 48 INDON. J. GEOGRAPHY 28, 31 (2016); Anju Bala, *Migration in India: Causes and Consequences*, 2 INT’L. J. ADVANCED EDUC. RES. 54, 56 (2017).

## Caste-based Inequality

Social scientists have consistently found that Delhi and other major Indian cities are highly segregated by caste and that Dalits, members of the most marginalized caste, face housing discrimination based on caste and religious identity.<sup>24</sup> Caste, religion and class-based segregation also intersect with gender and other identities to reproduce inequality, including through factors such as higher housing and transportation costs, rent instability and possible evictions.<sup>25</sup> While India officially banned caste-based discrimination in 1976 by enacting the Protection of Civil Rights Act, the caste system is still entrenched in Indian society.<sup>26</sup> When housing is informally segregated along caste and religious lines, access to water is often segregated as well.<sup>27</sup>

## Inequality Between Countries

Climate change is an issue that implicates not just domestic, but transnational, patterns of inequality. Historical processes of economic development—for example, the Industrial Revolutions of today's wealthy countries—relied on the widespread use of production technologies that contributed heavily to global greenhouse gas (GHG) emissions. By the end of the 1990s, high-income countries were producing around 2.5 metric tons of annual carbon emissions per person, while middle-income nations were producing around 0.6 metric tons of GHG emissions. The poorest nations, by contrast, were producing around 0.02 metric tons.<sup>28</sup> Yet, researchers estimate that residents of lower-income countries will feel almost 80 percent of the world's damages from climate change.<sup>29</sup>

Adding to this vulnerability is the fact that much of the world's most impacted countries do not have access to the same internal resources to implement adaptation measures, which are interventions designed to reduce the inevitable negative impact of climate change.<sup>30</sup> A basic indicator of a country's ability to adapt to climate change is its GDP. Generally speaking, the more resources a country has access to, the better it will be able to adjust to impacts of climate change.<sup>31</sup> Without the same resources at their disposal, lower-income countries require additional international resources for these adaptation needs.

<sup>24</sup> See, e.g., Naveen Bharathi et al., *Fractal Urbanism: City Size and Residential Segregation in India*, 141 *WORLD DEV.* (2021); Sukhadeo Thorat et al., *Urban Rental Housing Market: Caste and Religion Matters in Access*, 50 *ECON. & POL. WKLY.* 47 (2015); Trina Vithayathil et al., *Only 'Good People' Please: Residential Segregation in Urbanising India*, 4 *IIC QUARTERLY* 45 (2017).

<sup>25</sup> Vithayathil, *supra* note 24, at 46.

<sup>26</sup> Sharan Bal, *The Caste System and CSR*, 6 *CSR ASIA WKLY.* 6, 6 (2010). Currently, the more marginalized castes are officially documented as Scheduled Castes (SC), Scheduled Tribes (ST) and Other Backward Classes (OBC). *Id.*

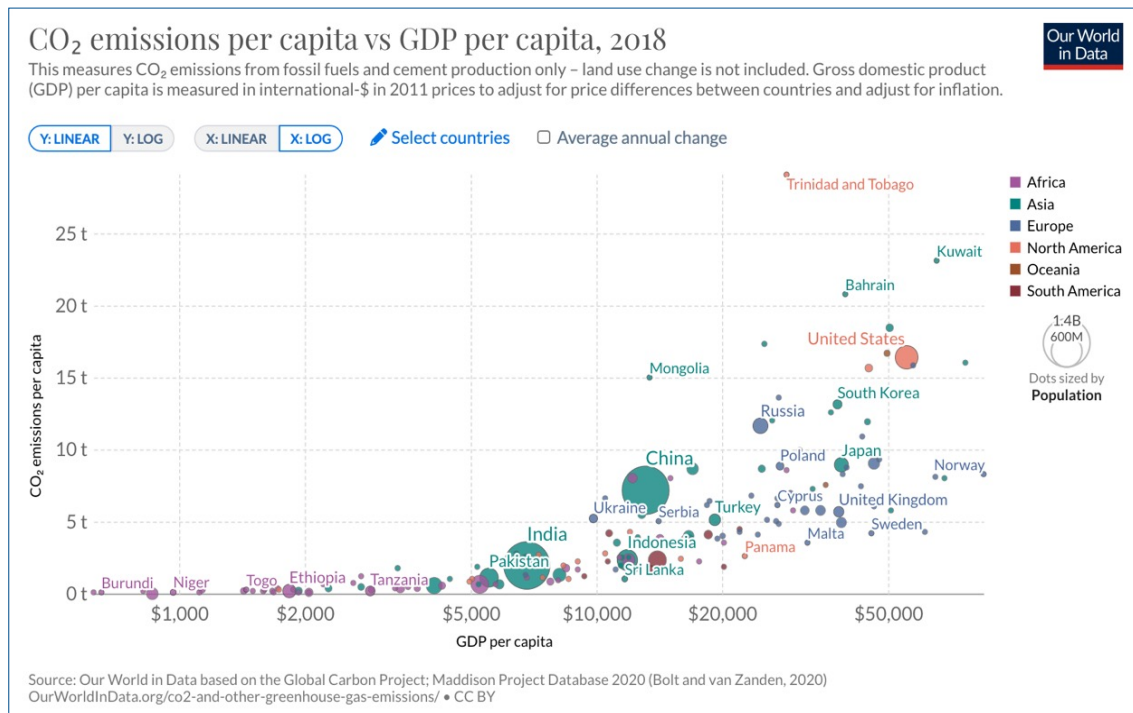
<sup>27</sup> The results of two studies that examined this question in different Indian cities suggest that communities of households from more marginalized castes are likely to face challenges accessing water when they are of a different caste profile than their neighbors or of political leaders responsible for water distribution. See Pinar Keskin, *The Gender of Caste: Identity, Political Reservations and Access to Water Resources in Rural India* (Harvard Kennedy School, Women and Public Policy Program Working Paper, 2010); Naveen Bharati et al., *Residential Segregation and Public Services in Urban India*, *URB. STUD.* 1 (2022).

<sup>28</sup> J. Timmons Roberts, *Global Inequality and Climate Change*, 14 *SOC'Y & NAT. RESOURCES* 501, 503 (2001).

<sup>29</sup> Luca Marchiori & Ingmar Schumacher, *When Nature Rebels: International Migration, Climate Change, and Inequality*, 24 *J. POPULATION ECON.* 569, 572 (2011).

<sup>30</sup> See Anne Parsons, *Human Rights and Climate Change: Shifting the Burden to the State?*, *SUSTAINABLE DEV. L. & POLY J.* (2009).

<sup>31</sup> C. Chen et al., *University of Notre Dame Global Adaptation Index Technical Report*, UNIVERSITY OF NOTRE DAME (Nov. 2015), <https://perma.cc/G7M5-XGUV>.



**Figure 1:** Wealthier countries generally contribute more to GHG emissions. They also have more resources at their disposal to adjust to climate change impacts.

The global governance framework set up to address climate change is also affected by historical inequalities. In 1992, the United Nations Framework Convention on Climate Change (UNFCCC) was adopted with the goal of stabilizing GHG emissions.<sup>32</sup> Building on the UNFCCC, the 2015 Paris Agreement sought to keep global temperature increases to 2 degrees Celsius above pre-industrial levels, with efforts to limit this increase to 1.5 degrees Celsius.<sup>33</sup> However, the Agreement will not reach the UNFCCC’s goals without the world’s heaviest polluters taking proactive steps to remove carbon from the atmosphere, among other mitigation measures.<sup>34</sup> Meanwhile, governments have invested an insufficient amount of international climate financing into adaptation initiatives despite the need to imminently protect against the harms of climate change, particularly in the most affected countries.<sup>35</sup>

Wealthy countries have significant responsibility for this shortfall. The UNFCCC formalized a principle of Common but Differentiated Responsibilities (CBDR) in international climate change policy.<sup>36</sup> The Paris Agreement confirmed the principle.<sup>37</sup> Under CBDR, States that have contributed the most to historical emissions are obliged to lead in the delivery of sustainable climate finance.<sup>38</sup> The historically

<sup>32</sup> United Nations Framework Convention on Climate Change (UNFCCC), May 9, 1992, 1771 U.N.T.S. 107.

<sup>33</sup> Paris Agreement to the United Nations Framework Convention on Climate Change (Paris Agreement), Dec. 12, 2015, 3156 U.N.T.S., T.I.A.S. No. 16-1104.

<sup>34</sup> UNITED NATIONS ENVIRONMENTAL PROGRAM, THE EMISSIONS GAP REPORT 2017, 37 (2017).

<sup>35</sup> See TRACY CARTY & ARMELLE LE COMTE, OXFAM, CLIMATE FINANCE SHADOW REPORT 2018: ASSESSING PROGRESS TOWARDS THE \$100 BILLION COMMITMENT 16-17 (2018); UNITED NATIONS ENVIRONMENT PROGRAM AND COLUMBIA LAW SCHOOL, CLIMATE CHANGE AND HUMAN RIGHTS 32-34 (2015); Josh Gabbatiss, *Analysis: Why Climate-Finance ‘Flows’ are Falling Short of the \$100 bn Pledge*, CARBON BRIEF (Oct. 25, 2021), <https://perma.cc/7HJH-2BEZ>.

<sup>36</sup> UNFCCC, *supra* note 32, art. 3 (1).

<sup>37</sup> Paris Agreement, *supra* note 33, art. 2 (2).

<sup>38</sup> UNFCCC, *supra* note 32, art. 4; Paris Agreement, *supra* note 34, art. 9.





high emitters, which comprise today's wealthy countries, also agreed to support the fiscal priorities of heavily impacted countries so that those countries could enact their own effective mitigation and adaptation measures.<sup>39</sup>

At the 2009 Conference of UNFCCC States Parties, “developed countries” committed to providing USD 100 billion per year to “developing countries” for these ends.<sup>40</sup> However, the developed countries have not fulfilled that commitment.<sup>41</sup> The amount contributed by the original deadline of 2020 fell well short of the goal.<sup>42</sup> Much of the finance has come in the forms of loans, which are ultimately of less value once interest accrues.<sup>43</sup> Moreover, a 2021 report of the think tank Climate Policy Initiative showed that governments and the private sector in Europe and North America have primarily financed adaptation projects domestically rather than in countries experiencing the greatest climate change impacts.<sup>44</sup> Most recently, the States Parties to the UNFCCC agreed to establish a Loss and Damage Fund, which would provide financing to affected States for the unavoidable adverse effects of climate change.<sup>45</sup> However, the Fund will not be operational for some time.

As parties to international human rights treaty agreements, States are obligated to avoid infringing on the human rights of individuals outside of their territories.<sup>46</sup> Thus, wealthy States' failure to remedy climate change harms in India constitute human rights violations in themselves.

This asymmetry presents a unique global challenge, one which calls for a coordinated international response to climate change. Long-term solutions to climate-related water challenges in Delhi therefore demand action from wealthy countries in terms of mitigation, financing of adaptation measures and loss and damage, as well as from the Indian government to protect communities whose rights to equal enjoyment of water are at risk.

---

<sup>39</sup> UNFCCC, *supra* note 32, art. 4 (4)-(7); Paris Agreement, *supra* note 33, art. 9 (3)-(4).

<sup>40</sup> UNFCCC Conference of the Parties, Copenhagen Accord, FCCC/CP/2009/11/Add.1, Decision 2/CP.15 (March 30, 2010).

<sup>41</sup> CENTRE FOR SCIENCE AND ENVIRONMENT, BEYOND CLIMATE FINANCE: CLIMATE AMBITION IN THE GLOBAL SOUTH REQUIRES FINANCIAL SYSTEM REFORMS 13 (2023).

<sup>42</sup> See Gabbatiss, *supra* note 35.

<sup>43</sup> *Id.*

<sup>44</sup> BARBARA BUCHNER ET AL., CLIMATE POLICY INITIATIVE, GLOBAL LANDSCAPE OF CLIMATE FINANCE 2021 29-30, available at <https://perma.cc/7WDK-T5TN>.

<sup>45</sup> UNFCCC Conference of the Parties, Sharm el-Sheikh Implementation Plan, FCCC/CP/2022/10/Add.1, Decision 1/CP.27 (March 17, 2023).

<sup>46</sup> States have extraterritorial obligations when their actions “may influence situations located outside [their] territory, consistent with the limits imposed by international law.” UN Comm. on Econ., Soc. and Cultural Rights, General Comm. No. 24: State obligations under the International Covenant on Economic, Social and Cultural Rights in the Context of Business Activities, E/C.12/GC/24, ¶¶ 25-28 (2017). See also UN Comm. on Econ., Soc. and Cultural Rights, General Comm. No. 14: The Right to the Highest Attainable Standard of Health, E/C.12/2000/4, ¶ 39 (2000); UN Comm. on Econ., Soc. and Cultural Rights, General Comm. No. 12: The Right to Adequate Food, E/C.12/1999/5, ¶ 36 (1999).



## Unequal Enjoyment of the Right to Water in Delhi

---

The United Nations Committee on Economic, Social and Cultural Rights utilizes four criteria to understand the adequacy of government services that fulfill economic and social rights. The four basic criteria—availability, accessibility, acceptability and quality—are the standards by which to assess enjoyment of a socio-economic right. As applied to water, the criterion of availability is a determination about the sufficiency of water available to communities, whether that water is government-supplied or supplied by government-regulated private providers. The criterion of accessibility considers the feasibility of obtaining water, both physically and economically. The criterion of acceptability relates to the water's aesthetic qualities, such as its odor and taste, as well as to the desirability of the water to the community in question. Lastly, the criterion of good quality encompasses safety considerations. This section documents inequalities in the availability, accessibility, acceptability and quality of water based on residency in unplanned colonies. It goes further to highlight how climate change exacerbates inequalities along residency lines and the gendered effects of climate change impacts.

### Availability

International human rights standards oblige governments to progressively guarantee that water is available for personal and domestic uses, including for drinking, washing, cooking and sanitation.<sup>47</sup> Under these standards, water is considered available when there are sufficient government or private water sources to meet the domestic needs of residents. In addition, water is considered sufficiently available when there is a regular supply of water over time.<sup>48</sup> The criterion of availability also considers seasonal changes in water supply according to weather patterns as well as the daily regularity of supply.<sup>49</sup>

### Unequal Water Availability

The available data differs on how much of Delhi's demand for water is met by the municipal water supply. Analysis drawing from a recent government survey suggests that the Delhi Jal Board (DJB), the agency tasked with distributing water in Delhi,<sup>50</sup> supplied enough water in 2019 to fulfill about 74 percent of the city's overall water needs, leaving about a quarter of the city's needs unmet.<sup>51</sup> Another Delhi government report, using data from 2018 to 2019, found that tap water for drinking is available to about 82 percent of households in Delhi.<sup>52</sup> This includes in-home water taps as well as community taps, the latter of which are much more common in Delhi's unplanned colonies.<sup>53</sup> In addition to tap water, the DJB provides water from transportable tankers and tube-wells and borewells to unplanned

---

<sup>47</sup> See Gen. Comm. No. 15, *supra* note 6, ¶ 12 (a). See also *id.*, ¶ 2 (providing that water must be “sufficient,” of an adequate amount “to prevent death from dehydration [. . .] and to provide for consumption, cooking, personal and domestic hygienic requirements”).

<sup>48</sup> MADSEN HOLST JENSEN ET AL., AAAQ AND THE RIGHT TO WATER: CONTEXTUALISING INDICATORS FOR AVAILABILITY, ACCESSIBILITY, ACCEPTABILITY, AND QUALITY 20 (2014).

<sup>49</sup> *Id.*

<sup>50</sup> Rumi Aijaz, *Water Supply in Delhi: Five Key Issues* (Observer Research Foundation Occasional Paper No. 252, June 2020), available at <https://perma.cc/KW5P-8CPV>.

<sup>51</sup> *Id.*

<sup>52</sup> GOVERNMENT OF NATIONAL CAPITAL TERRITORY OF DELHI, “Part-I: Households Characteristics,” REPORT ON SOCIO-ECONOMIC PROFILE OF RESIDENTS OF DELHI (2018-2020) 11, available at <https://perma.cc/BY7A-ZZ8E>.

<sup>53</sup> Around 71 percent of tap water supplied by the DJB is supplied to home taps, however, suggesting that it mostly services planned colonies. *Id.* at 1.

colonies.<sup>54</sup> Tube-wells have narrow piping that reaches into subsurface aquifers. Borewells are similar but penetrate deeper into the earth.<sup>55</sup> Both access water through electric or hand pumping mechanisms.<sup>56</sup> However, these alternative sources are insufficient on their own, as tanker trucks come to settlements for short periods and the well water is not potable.<sup>57</sup>

Government statistics on the availability of water in Delhi—which place the capital’s water availability above that of most other South Asian cities<sup>58</sup>—likely overestimate the number of households with potable tap water and underestimate water losses between water treatment plants and homes. That data also offers limited indicators for equality analyses. Many of the residential meters relied upon to collect data on piped water are defunct. Absent tracking devices measuring water that arrives in homes or districts, officials calculate the total amount of water available using the theoretical maximum capacity of pumps at water treatment plants.<sup>59</sup> Such calculations yield a number that could greatly overestimate the amount of water supplied given that all the pumps counted do not regularly work at full capacity.<sup>60</sup> Concerns have also been raised about more general tallies that divide the total available treated water by the overall Delhi population, since different communities have vastly unequal water use.<sup>61</sup> Unfortunately, no alternative data with a higher degree of reliability is currently available.<sup>62</sup>

In proportion to Delhi’s rapid population growth, improvements in the availability of government-supplied water are not increasing over time. Delhi government data indicates that the number of metered water connections in Delhi increased by about eight-fold from the period of 1967 to 1977 to the period of 2013 to 2014.<sup>63</sup> The number of unmetered water connections increased by approximately 10-fold during the same time.<sup>64</sup> Impressive though these increases seem, the population of Delhi also multiplied by nearly eight-fold during that period, suggesting that increases in water hookups largely tracked population increases.<sup>65</sup>

<sup>54</sup> See Economic Survey of Delhi (2020-2021, *supra* note 13, at 239; Shouraseni Sen Roy et al., *Alarming Groundwater Depletion in the Delhi Metropolitan Region: a Long-term Assessment*, 192 ENVIRON. MONIT. ASSESS 620, 628 (2020); see also Rumi Aijaz, *Bridging Water Demand and Supply Gap in Delhi*, OBSERVER RESEARCH FOUNDATION: URBAN FUTURES (Jun. 24, 2020), <https://perma.cc/EF4L-F7XL>.

<sup>55</sup> *Boreholes and Tubewells*, UN CLIMATE TECHNOLOGY CENTRE & NETWORK, <https://perma.cc/8CWV-5VV5>.

<sup>56</sup> Heller et al., *supra* note 2, at 12.

<sup>57</sup> See Quality, *infra*; see also *Leaks in Delhi Government’s Water Supply Pledge?* The Hindu, (August 19, 2019), <https://perma.cc/9AHY-4KUF>.

<sup>58</sup> Yaffa Truelove, *Negotiating States of Water: Producing Illegibility, Bureaucratic Arbitrariness, and Distributive Injustices in Delhi*, 36 ENVIRON. & PLAN. D: SOC’Y & SPACE 949, 950 (2018).

<sup>59</sup> *Id.* at 956-57. Many local governments, including the government of Mumbai, rely on source-level—rather than household level—data. Ramnath Subbaraman et al., *Multidimensional Measurement of Household Water Poverty in a Mumbai Slum: Looking Beyond Water Quality*, 10 PLoS ONE 1, 16 (2015).

<sup>60</sup> According to one scholar, the “functioning of some of the pumps [at water treatment plants] were found to be working only at 57% to 63% capacity.” Truelove, *supra* note 58, at 957. A past government survey, which produced water availability numbers similar to the 2018-2020 data, arrived at these numbers by counting households with water taps. However, access to taps does necessarily translate into additional government water supply. *Id.* at 957-958.

<sup>61</sup> *Id.* at 957.

<sup>62</sup> In 2013, the Comptroller and Auditor General found that the DJB “has no management information system in place to collect and analyse data relating to the requirement of water, production and distribution of potable water.” COMPTROLLER AND AUDITOR GENERAL OF INDIA (CAG), GOVERNMENT OF DELHI, REPORT No.2 OF THE CAG ON SOCIAL SECTOR 96 (2013). The DJB has also itself acknowledged that it does not possess a “complete and correct water supply accounting.” See Economic Survey of Delhi (2020-2021), *supra* note 13, at 245.

<sup>63</sup> According to that data, the number of metered water connections in Delhi increased from 210,931 connections in the 1967 to 1977 period to 1,777,207 connections in the period of 2013 to 2014. GOVERNMENT OF NATIONAL CAPITAL TERRITORY OF DELHI, ECONOMIC SURVEY OF DELHI (2016 – 2017) 361, *available at* <https://perma.cc/SC59-BUZZ>.

<sup>64</sup> The number of unmetered water connections increased from 28,673 connections to 287,108 connections during the same time. *Id.*

<sup>65</sup> *Delhi, India Population*, POPULATIONSTAT (July 8, 2020), <https://perma.cc/A59U-XWUQ>.



For those who have access to taps, the water supply is unreliable: it is not available around the clock, pressure is insufficient, and the water delivery system experiences sudden breakdowns.<sup>66</sup> One scholar observed that, even among connected households, the amount of water provided at any given time is arbitrary and “reliable water fails to reach ample portions of the population.”<sup>67</sup> The vast majority of communities in Delhi can only access their water supply for two to six hours a day.<sup>68</sup> For a considerable portion of the population that lacks water supply from in-home taps, the issue of irregularity is even more pronounced. Only half of the households in Delhi’s unplanned colonies have an in-home source of piped water, for example.<sup>69</sup>

**“There is no clean water available on a regular basis. Sometimes it is available, sometimes it is not . . . There is lots of scarcity.”**

Interview with Varsha, Resident of Bhim Nagar, on Oct. 21, 2021.

The Delhi Water Board Act (1998), which created the DJB, states that the DJB has no official obligation to provide water to any premises “constructed in contravention of any law.”<sup>70</sup> Thus, the DJB has no obligation to provide water to unplanned colonies treated as “illegal” by municipal bodies. This legal dichotomy leads to a disparate supply of water based on settlement classification.<sup>71</sup>

National legislation enacted in the past few years could potentially disrupt this stratification. In 2019, the Indian Parliament passed the National Capital Territory of Delhi (Recognition of Property Rights of Residents in Unauthorized Colonies) Act, which creates a pathway for residents of unauthorized colonies to obtain rights of ownership, transfer or mortgage over their residences.<sup>72</sup> Residents who possess documents specified in the Act may apply for conferral of title to their properties in unauthorized colonies.<sup>73</sup> In principle, this would lead, at a minimum, to the provision of community water taps in unauthorized housing developments that are regularized.<sup>74</sup> While the pace of regularization of Delhi’s unplanned colonies remains slow,<sup>75</sup> around 40 percent of Delhi’s historical unplanned colonies had

<sup>66</sup> Marie-Hélène Zérah, *Household Strategies for Coping with Unreliable Water Supplies: The Case of Delhi*, 24 HABITAT INT’L 295, 296 (2000).

<sup>67</sup> Truelove, *supra* note 58, at 961.

<sup>68</sup> Roy et al., *supra* note 54, at 628 (noting that planned, regularized communities in Delhi usually have tap water supply for only “2 to 3 hours . . . twice or even once a day in the morning or evening times.”); see also Aijaz, *supra* note 54. These assertions were corroborated with the records of the DJB in April 2022. See Delhi Jal Board, *Timing of Water Supply in Delhi*, <https://perma.cc/4TLB-WA44>.

<sup>69</sup> See BIPLAP TRIPATHY & SUBHECHYA RAHA, *WATER CRISIS IN INDIA* 77 (2019).

<sup>70</sup> Delhi Legislative Assembly, *The Delhi Jal Board Act (1998)*, § 9.1.A.

<sup>71</sup> Deya Roy, *Negotiating Marginalities: Right to Water in Delhi*, 10 URB. WATER J. 97, 99 (2013).

<sup>72</sup> The legislation states:

An Act to provide special provisions for the National Capital Territory of Delhi for recognising the property rights of resident in unauthorised colonies by securing the rights of ownership or transfer or mortgage in favour of the residents of such colonies who are possessing properties on the basis of Power of Attorney, Agreement to Sale, Will, possession letter or any other documents including documents evidencing payment of consideration and for the matters connected therewith or incidental thereto. National Capital Territory of Delhi (Recognition of Property Rights of Residents in Unauthorized Colonies) Act 2019, preamble.

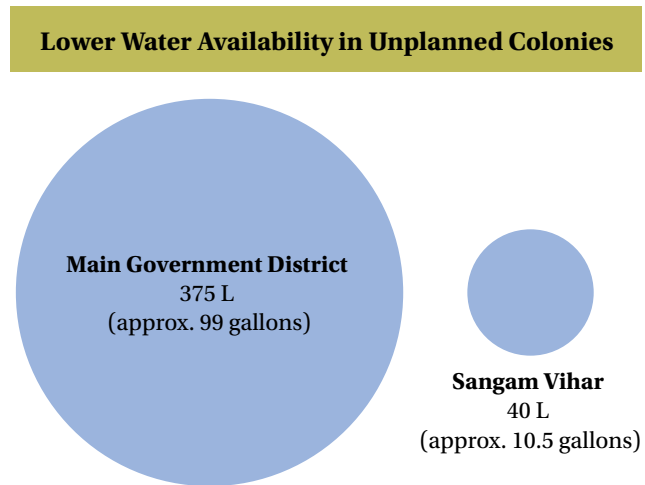
<sup>73</sup> *Id.*, § 3.

<sup>74</sup> Interview with Dr. Joyeeta Gupta, Professor of Law and Policy in Water Resources and Environment, IHE Delft Institute for Water Education (Apr. 15, 2021); Interview with Dr. Rumi Aijaz, Senior Fellow, Observer Research Foundation (May 4, 2021). “Unauthorized colonies” are housing settlements built by private developers outside of the master plan of the Delhi Development Authority, usually on land zoned for agricultural use. Heller et al., *supra* note 2, at 7.

<sup>75</sup> Aijaz, *supra* note 74. Delays in settlement regularization, and in the tap installations that result, are likely attributable to a combination of: inadequate funds devoted to regularization projects, bureaucratic inefficiencies resulting from the fact that the government of the National Capital Territory of Delhi, and not the Municipal Corporation of Delhi, manages water services in Delhi, and the fact that the Union government reviews and influences Delhi’s settlement regularization regulations, but not its water services regulations. *Id.*; see also Government of India, Ministry of Housing and Urban Affairs, Delhi Division, [http://mohua.gov.in/page/delhi-division.php#DD\\_MPD](http://mohua.gov.in/page/delhi-division.php#DD_MPD) (last visit Apr. 22, 2021) (describing the central government’s role in reviewing settlement regularization regulations).

been regularized pursuant to that legislation by 2021, according to the estimates of one expert.<sup>76</sup>

In the meantime, residents of unplanned colonies remain disproportionately affected by water unavailability. For example, one media report recounted that Delhi's main government district and army cantonment areas received on average 375 Liters of water per person per day, whereas Sangam Vihar, an area containing the most unauthorized colonies in Delhi,<sup>77</sup> received on average 40 Liters per person per day.<sup>78</sup> Another study found that the average daily per capita water consumption in Delhi slums was 37.61 Liters.<sup>79</sup> This proved significantly lower than the average daily per capita consumption in the city as a whole, which was 57.98 Liters.<sup>80</sup> It also fell below the consumption level identified by the World Health Organization as sufficient for ensuring general hygiene, which is 50 Liters of water per person per day.<sup>81</sup> Because water collection is a gendered activity in Delhi, women living in unplanned colonies are especially affected by the limited availability of government-supplied water.<sup>82</sup>



**Figure 2:** In 2019, Reuters reported that Delhi's main government district and army cantonment areas received on average 375 Liters of water per person per day. In contrast, Sangam Vihar, an area containing the most unauthorized colonies in Delhi, received on average 40 Liters per person per day.

**Rajiv Ratan Awas Yojana in Baprola Phase II is a colony on the outskirts of Delhi constructed under the government's low-income housing scheme, which has the same name. As a resettlement colony, it houses families that the government relocated from JJ clusters. The water available in Rajiv Ratan Awas Yojana includes both non-potable tap water and DJB-supplied tanker water. However, residents report that "the tanker water only comes for a specific amount of time, and not everyone has access to it."**

**The lack of regular potable water requires residents to filter the water that they use for consumption. On days where the water supply runs short, women in Rajiv Ratan Awas Yojana allocate water by level of priority. "Drinking water is our highest priority," Hema stated. "We use the water for drinking, eating and cooking. We wait two to three days for doing the dishes and showering."**

Group interview with Baprola residents, Nov. 21, 2021.

<sup>76</sup> Interview with Dr. Deya Roy, Environment Policy Consultant (Apr. 20, 2021).

<sup>77</sup> See Shahana Sheikh et al., *Limbo in Sangam Vihar Delhi's Largest Agglomeration of Unauthorised Colonies: A Report of the Cities of Delhi Project* (Center for Policy Research Paper, February 2015).

<sup>78</sup> Mayank Bhardwaj, *In Drought-Hit Delhi, the Haves Get Limitless Water, the Poor Fight for Every Drop*, REUTERS, July 6, 2019, <https://perma.cc/5SSGA-68CH>.

<sup>79</sup> Jagriti Kher et al., *Urbanization, Climate Linked Water Vulnerability as Impediments to Gender Equality: A Case Study of Delhi, India*, in HANDBOOK OF CLIMATE CHANGE RESILIENCE 149, 170 (Leal Filho W. ed., 2019).

<sup>80</sup> *Id.*

<sup>81</sup> Ramnath Subbaramana et al., *Off the Map: the Health and Social Implications of Being a Non-notified Slum in India*, 24 ENV'T & URBANIZATION 643, 651 (2013). Twenty Liters or less of water per person per day is associated with being at high health risk. *Id.*

<sup>82</sup> Roy, *Negotiating Marginalities*, *supra* note 71, at 99.

## Climate Change Deepens Inequality

Climate change has endangered water availability by affecting “all aspects of the hydrological cycle.”<sup>83</sup> The meteorological changes over the Indian and Pacific Oceans caused by global warming have impacted the monsoon cycle that provides India with more than 75 percent of its annual rain.<sup>84</sup> As documented by government scientists, these changes have caused “a significant decline in summer monsoon rainfall over central India and parts of north India” between 1950 and 2015.<sup>85</sup> Declines in rainfall have been particularly pronounced in the region in which the Yamuna Basin and Delhi are situated.<sup>86</sup>

Rainfall deficits during Northern India’s monsoon season cause serious water deficits in the Yamuna River,<sup>87</sup> which is a primary source of water in Delhi.<sup>88</sup> Because of these changes, the geographic region in which Delhi is situated faces more frequent, more severe and longer droughts.<sup>89</sup> The DJB has itself acknowledged that droughts—as well as increased high-intensity storms, flooding and temperature increases—especially threaten water availability in Delhi.<sup>90</sup>

***“ We don’t have enough rain. There is no monsoon. The weather has been changing over time, and the water supply has been affected.”***

*Rani, Group Interview with Baprola residents, Nov. 21, 2021.*

According to the national government, drought incidence per decade in Central and Northern India will continue to increase in the coming decades.<sup>91</sup> These projections hold under both moderate and severe climate change scenarios.<sup>92</sup> In addition to increased pressure on the Yamuna River as a water source,<sup>93</sup> more frequent and intense droughts are likely to further deplete soil moisture and groundwater storage, which will continue to affect populations that rely on groundwater for their water supply.<sup>94</sup>

<sup>83</sup> Kher et. al, *supra* note 79, at 150.

<sup>84</sup> See, GOVERNMENT OF INDIA, MINISTRY OF EARTH SCIENCES, ASSESSMENT OF CLIMATE CHANGE OVER THE INDIAN REGION 48 (2020), available at <https://perma.cc/P23H-XQJC>; see also R. Krishnan et al., *Deciphering the Desiccation Trend of the South Asian Monsoon Hydroclimate in a Warming World*, 47 CLIM. DYN. 1007, 1024 (2016).

<sup>85</sup> See Ministry of Earth Sciences, *supra* note 84, at 198.

<sup>86</sup> See *id.*, at 66; see also Krishnan et al., *supra* note 84, at 1019; RAVEENDRA KUMAR RAI ET AL., THE YAMUNA RIVER BASIN: WATER RESOURCES AND ENVIRONMENT 102-103 (2012) (documenting “declining monsoon rainfall,” a declining “number of monsoon rainy days,” and a “delay in the onset of effective monsoon” over the Yamuna River basin). This comports with other studies finding declines in annual rainfall and annualized monsoon season rainfall over Delhi in particular for the 1971-2000 period. See A.K. Jaswal et al., *Spatial and Temporal Characteristics of Evaporation Trends over India during 1971-2000*, 59 MAUSAM 149, 151 (2008).

<sup>87</sup> See generally Paul Salopek, *India’s Daunting Challenge: There’s Water Everywhere, and Nowhere*, NATIONAL GEOGRAPHIC (Aug. 2020); see also Rai, *supra* note 86, at 91 (cautioning that the “water resources potential of the Yamuna River basin is declining”).

<sup>88</sup> Aijaz, *supra* note 50; see also Economic Survey of Delhi (2020-2021), *supra* note 13, at 235-238; Z. H. Siddiqui et I., *Assessment of Cytotoxic and Genotoxic Effects of Yamuna Water*, 20 WATER SUPPLY 2682, 2683 (2020) (noting that the Yamuna River is the “primary source of water for Delhi.”).

<sup>89</sup> See Ministry of Earth Sciences, *supra* note 84, at 30, 118, 121-122, 136; ABINASH MOHANTY, COUNCIL ON ENERGY, ENVIRONMENT, & WATER, PREPARING INDIA FOR EXTREME CLIMATE EVENTS: MAPPING HOTSPOTS AND RESPONSE MECHANISMS 20-21, 29 (2020); Mahak Agrawal, *Multisector Exposure and Vulnerability to Climate Change in India: Case of National Capital Territory of Delhi, India*, 29 DISASTER PREVENTION & MGMT 761,764 (2020).

<sup>90</sup> GOVERNMENT OF NATIONAL CAPITAL TERRITORY OF DELHI, DELHI JAB BOARD, WATER POLICY FOR DELHI 2 (2016), available at <https://perma.cc/MD3T-Y968>.

<sup>91</sup> See Ministry of Earth Sciences, *supra* note 84, at 131-132; 136; Krishnan et al., *supra* note 84, at 1014 (projecting “a further reduction of monsoon rainfall over north-central parts of India” in the near future under the RCP4.5 climate change scenario).

<sup>92</sup> See Ministry of Earth Sciences, *supra* note 84, at 131-132.

<sup>93</sup> Cf. Aijaz, *supra* note 50.

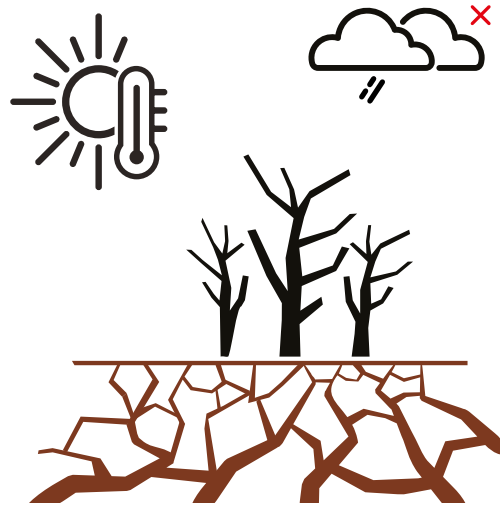
<sup>94</sup> See Ministry of Earth Sciences, *supra* note 84, at 122.

Temperatures in Delhi are also increasing due to anthropogenic climate change. Studies have found consistent increases in the average maximum, minimum, and daily temperatures over the past century in northwestern India, where Delhi is situated.<sup>95</sup> According to the UK-based research institution CarbonBrief, Delhi air has, on average, warmed by 1 degree Celsius since the beginning of the industrial era.<sup>96</sup> Delhi's land surface temperature has increased even more, with the average city-level surface temperature increasing from 32.8 degrees Celsius to 35.9 degrees Celsius between 1986 and 2016.<sup>97</sup> Over the next 30 years, temperatures are expected to rise by another 1 to 4 degrees Celsius across the region in which Delhi is situated.<sup>98</sup> One study projected that average annual air temperatures in Delhi are likely to rise 3.5 to 5 degrees Celsius by 2100.<sup>99</sup>

Delhi has also increasingly experienced extreme heat spikes during the summer.<sup>100</sup> In June 2019, for example the temperature reached 48 degrees Celsius, which was the highest temperature ever recorded for Delhi.<sup>101</sup> June 2019 was also Delhi's second driest month in 26 years.<sup>102</sup> Heat waves are subsequently likely to result in severe health consequences. One scholarly paper found that, under the most aggressive climate change scenarios, over the next 60 years, Delhi will experience one of the highest rises in heat mortality rates in India.<sup>103</sup>

The Delhi water management systems already suffer major gaps in monitoring and storage. Thus, they are unlikely to meet the city's forecasted challenges without reforms and adaptations.<sup>104</sup>

### Climate Change Impacts in Northern India



**Figure 3:** Climate change manifests in many ways in Northern India. Declines in monsoon rainfall, river water deficits, increased droughts, and temperature spikes all impact water availability.

<sup>95</sup> See generally Robert S. Ross et al., *Decadal Surface Temperature Trends in India Based on a New High-Resolution Data Set*, 8 SCI. REP. 1 (2018); Manish Kumar Goyal & Rao Y. Surampalli, *Impact of Climate Change on Water Resources in India*, 144 J. ENV'T ENG'G. 1, 2 (2018).

<sup>96</sup> *Mapped: How Every Part of the World Has Warmed – and Could Continue to Warm*, CARBONBRIEF (Sept. 26, 2018 3:10 PM EST), <https://www.carbonbrief.org/mapped-how-every-part-of-the-world-has-warmed-and-could-continue-to-warm>.

<sup>97</sup> Meanwhile, air temperature in Delhi increased by .2 degrees Celsius during this period. Agrawal, *supra* note 89, at 769.

<sup>98</sup> C. K. Jain & S. Singh, *Impact of Climate Change on the Hydrological Dynamics of River Ganga, India*, 11 J. WATER & CLIMATE CHANGE 274, 277 (2020).

<sup>99</sup> Shagun Mehrotra et al., *Cities, Disasters and Climate Risk*, in CLIMATE CHANGE & CITIES: FIRST ASSESSMENT REPORT OF THE URBAN CLIMATE CHANGE RESEARCH NETWORK 15, 27 (Cynthia Rosenzwei et al., eds., 2011).

<sup>100</sup> Sunil Prashar et al., *Assessing the Resilience of Delhi to Climate-Related Disasters: a Comprehensive Approach*, 64 NAT. HAZARDS 1609, 1612 (2012). The number of days where temperatures have exceeded 35 degrees Celsius in Delhi increased from 1,009 days in the decade between 1959 and 1968 to 1,613 days in the decade of 2009 to 2018. Vishnu Padmanabhan et al., *The Growing Threat of Climate Change in India*, MINT, July 21, 2019, <https://perma.cc/3DKF-3GB4>.

<sup>101</sup> Bhardwaj, *supra* note 78.

<sup>102</sup> *Id.*

<sup>103</sup> See generally Hem H. Dholakia et al., *Predicted Increases in Heat-related Mortality under Climate Change in Urban India* 12 (India Institute of Management Working Paper No. 2015-0502, 2020).

<sup>104</sup> See Goyal & Surampalli, *supra* note 95, at 4018054-2, 4018054-8.

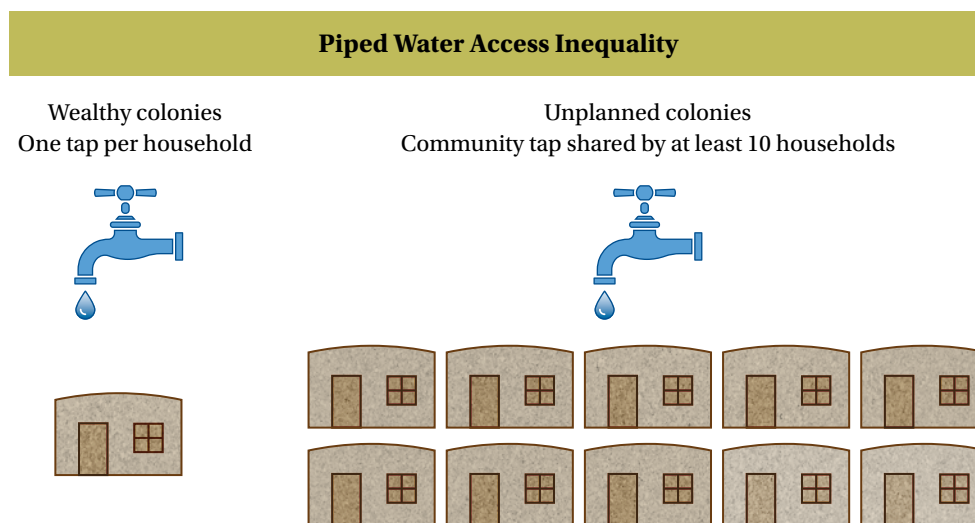
## Accessibility

Under international human rights standards, governments are required to guarantee that water is progressively accessible to everyone within their jurisdiction.<sup>105</sup> Over time, water should be increasingly within physical reach and accessible without physical threats, as well as economically accessible, such that the cost of water does not threaten the realization of other rights.<sup>106</sup>

## Unequal Water Accessibility

In practice, Delhi water is inaccessible in many regards, particularly for women and residents of unplanned colonies. At a minimum, around 18 percent of Delhi residents have no municipal piped water supply and approximately 29 percent of residents do not have tap water within their homes.<sup>107</sup>

The situation is especially grave for residents of unplanned colonies where access to water is unreliable, irregular and unaffordable because the mechanisms for accessing water are more precarious. While water is delivered to wealthier areas of central Delhi by pipe, it is generally delivered to unplanned colonies in the inner city and to housing estates on the outskirts of Delhi by tanker trucks.<sup>108</sup>



**Figure 4:** Unplanned colonies generally have access to communal taps, which are shared by 10 to 30 households.

Residents using a household tap report having more regularly accessible water throughout the year than residents whose households rely on tanker water.<sup>109</sup> Although tankers typically provide at least daily access to water,<sup>110</sup> such access is not guaranteed. In the Savda Ghevra resettlement colony, for example, the main source of water is tankers supplied by the DJB; however, they are accessible only twice a week.<sup>111</sup>

<sup>105</sup> Gen. Comm. No. 15, *supra* note 6, ¶12 (c). See also *id.*, ¶2, providing that water must be “physically accessible and affordable.”

<sup>106</sup> HOLST JENSEN ET AL., *supra* note 48, at 17.

<sup>107</sup> Report on Socio-Economic Profile of Residents of Delhi (2018-2020), *supra* note 52, at 11.

<sup>108</sup> See, e.g., Bhardwaj, *supra* note 78.

<sup>109</sup> SAFE WATER NETWORK, DRINKING WATER SUPPLY FOR URBAN POOR: CITY OF NEW DELHI 21 (2016).

<sup>110</sup> *Id.*

<sup>111</sup> Koen De Feyter et al., *The Right to Water and Sanitation for the Urban Poor in Delhi* 92-94 (Localizing Human Rights Working Paper No. 4, 2016), available at <https://perma.cc/8FTG-E3W4>.



Where there is piped water in unplanned colonies, it is generally from a community tap that is shared by 10 to 30 households, supplying water only for one or two hours.<sup>112</sup> Those residing in unplanned colonies that have access to both water tankers and communal piped water find that the tanker supply is relatively more reliable.<sup>113</sup> The long wait times associated with water retrieval from communal taps can also make these taps less accessible than tanker supply.<sup>114</sup> However, privately owned tanker companies—and so-called “tanker mafias” that assume control over tanker supply in some unplanned colonies—can charge high rates for tanker water, rendering it difficult to access economically.<sup>115</sup>

***“ We want water connections in our homes, so we don’t have to carry out water all the way.”***

***“ We just wish we had a pipeline; that would make our lives easier..”***

Mati & Komal, Group Interview with Baprola residents, Nov. 21, 2021.

Considering the serious shortages in government-supplied water in Delhi, some residents in unplanned colonies rely on groundwater that they extract using tube-wells and borewells.<sup>116</sup> However, this groundwater is already over-extracted,<sup>117</sup> forcing communities that depend on it to dig deeper into the ground when pumps run dry.<sup>118</sup> In addition to this, nearly 8 percent of all households throughout Delhi rely on bottled water.<sup>119</sup> However, bottled water is prohibitively expensive for many residents of unplanned colonies.<sup>120</sup> Water ATMs—automated water dispensing machines—are another, supplemental, market-based mechanism available in limited locations.<sup>121</sup> However, uptake of this service among the poor has been mixed.<sup>122</sup> Finally, a small percentage of residents install illegal water connections at home. However, doing so risks repercussions from civic authorities.<sup>123</sup>

<sup>112</sup> Safe Water Network, *supra* note 109, at 19.

<sup>113</sup> However, the same study found that piped water was supplied for a longer period; a third of respondents reported that it was supplied for over 30 minutes, whereas only 2 percent responded the same of tankers. *Id.*

<sup>114</sup> WOMEN IN CITIES INTERNATIONAL, GENDER AND ESSENTIAL SERVICES IN LOW-INCOME COMMUNITIES: REPORT ON THE FINDINGS OF THE ACTION RESEARCH PROJECT WOMEN’S RIGHTS AND ACCESS TO WATER AND SANITATION IN ASIAN CITIES app. at 145-146 (2011), available at <https://perma.cc/965Z-FH4J>

<sup>115</sup> See generally Matt Birkinshaw, ‘Water Mafia’ Politics and Unruly informality in Delhi’s Unauthorised Colonies,’ in WATER, CREATIVITY AND MEANING 188–203 (Liz Roberts and Katherine Phillips eds., 2018).

<sup>116</sup> Heller et al., *supra* note 2, at 12. See Roy et al., *supra* note 54, at 628; Aijaz, *supra* note 54; Economic Survey of Delhi (2020-2021), *supra* note 13, at 239.

<sup>117</sup> See NITI AAYOG, COMPOSITE WATER MANAGEMENT INDEX: A TOOL FOR WATER MANAGEMENT 123 (2018), available at <https://perma.cc/2H4H-S55M>; Roy et al., *supra* note 56, at 628; Aijaz, *supra* note 56; Economic Survey of Delhi (2020-2021), *supra* note 13, at 239, 257.

<sup>118</sup> See Roy et al., *supra* note 54, at 628.

<sup>119</sup> Report on Socio-Economic Profile of Residents of Delhi (2018-2020), *supra* note 52, at 11.

<sup>120</sup> Catherine Davison, *Under Coronavirus Lockdown, Delhi Slum Residents Struggle to Get Water*, DEUTSCHE WELLE, Sep. 4, 2020, <https://perma.cc/HP8A-VZQ2>.

<sup>121</sup> See generally Anindita Sarkar, *The Role of New ‘Smart Technology’ to Provide Water to the Urban Poor: A Case Study of Water ATMs in Delhi, India*, 4 ENERGY, ECOLOGY, AND ENVIRONMENT 166 (2019), available at <https://perma.cc/EN2Y-D8QB>.

<sup>122</sup> See, e.g., Divya Gandhi et al., *Are Water ATMs the Way Forward?* THE HINDU, May 26, 2018, <https://perma.cc/5T7U-WKYF>. Interestingly, one pilot study in rural villages found that the installation of ATMs led to men going to collect water because men wanted to be seen as the ones paying for it. See Todd Woody, *How High Tech is Helping to Bring Clean Water to India*, YALE ENVIRONMENT 360, Sept. 5, 2013, <https://perma.cc/EBP8-CWBV>.

<sup>123</sup> Kher et al., *supra* note 79, at 161.

Being outside the formal systems of water provision means the poorest often pay more for an equivalent amount of water as that accessed by those with a formal, piped water supply.<sup>124</sup> For example, in the Savda Ghevra resettlement colony, residents access groundwater from borewells with their privately installed electric pumps or through Sarjaval Water ATMs.<sup>125</sup> In the Bhanwar Singh Camp, households informally share free well water; however, residents must pay for the requisite infrastructure.<sup>126</sup>

For lower-income households in Delhi, water purchases are costly. One media report observed that those from privileged classes in central Delhi pay USD 10 to 15 (INR 822.85 to 1235.27) a month for limitless piped water, whereas the same USD 10 covers costs for a small tanker that meets only the weekly quota of a five-person family in an unplanned colony.<sup>127</sup> Beyond the cost of water itself, there are costs associated with obtaining the water, treating it and storing it. A 2019 study of households in Chennai



Inaccessible water distinctly affects women and girls, who are tasked with water collection for their families.

valued such “coping costs”—together with water purchasing costs—at around 15 percent of income for low-income households that did not have piped water access.<sup>128</sup> The value was around 1 percent of income for wealthy households.<sup>129</sup> A 2000 study of Delhi households similarly estimated coping costs at 15 percent for lower-income households and 1 percent for wealthy households.<sup>130</sup> In addition to coping costs, poor communities are sometimes compelled to pay bribes to obtain tanker water, to install a piped supply, or to repair a water pipeline, further straining their resources.<sup>131</sup>

In situations where legal barriers to piped water access are removed, bureaucratic barriers may remain. In Mumbai, for example, a 2014 High Court ruling extended water access to previously unrecognized colonies.<sup>132</sup> However, following the order, residents still had to petition for this access, which was challenging in practice.<sup>133</sup> An NGO assisting low-income petitioners with applications reported that only 7 percent of its clients obtained water connections.<sup>134</sup>

<sup>124</sup> See e.g., Léo Heller, *Report of the Special Rapporteur on the Human Rights to Safe Drinking Water and Sanitation on His Mission to India*, ¶ 36, Human Rights Council, U.N. Doc. A/HRC/39/55/Add.1 (July 6, 2018); De Feyter et al., *supra* note 111, at 92-94.

<sup>125</sup> De Feyter et al., *supra* note 111, at 14.

<sup>126</sup> *Id.* at 131-33.

<sup>127</sup> Bhardwaj, *supra* note 78.

<sup>128</sup> R.K. Amit & Subash Sasidharan, *Measuring Affordability of Access to Clean Water: A Coping Cost Approach*, 141 RESOURCES, CONSERVATION, & RECYCLING 410, 417 (2019).

<sup>129</sup> *Id.*

<sup>130</sup> *Id.* at 412.

<sup>131</sup> Haider, *supra* note 2, at 4.

<sup>132</sup> The Court ruled that, regardless of the property rights of the residents, all had a right to water under Article 21 of the national constitution. Ramnath Subbaraman & Sharmila L Murthy, *The Right to Water in the Slums of Mumbai, India*, 93 BULL. WORLD HEALTH ORG. 815, 815-16 (2015).

<sup>133</sup> See Paroma Wagle, *Securing the Human Right to Water of Slum-dwellers in Mumbai, India: Achievements, Limitations and Institutional Appropriation*, 132 GEOFORUM 1, 5-6 (2022).

<sup>134</sup> *Id.* at 6.

The precarity of housing tenure in unplanned colonies can deter residents from investing to improve water storage or other facilities, lest the government demolish these investments. Likewise, the desire to send remittances to home villages can take priority over investment in water infrastructure.<sup>135</sup> The consequence of having limited capital is a hindered ability to purchase storage tanks or larger containers, water pipes, carts, or water filters, resulting in less adaptability to periods of water scarcity and poor water quality.<sup>136</sup>

### Climate Change Deepens Inequality

Climate change exacerbates water inaccessibility in Delhi through its effect on the reliability and affordability of water. Because of climate change, the acute demand-supply gap observed in the summer is likely to span increasingly larger portions of the year. In the summer, when demand for and consumption of water is high, tap water supply becomes intermittent and water pressure falls drastically.<sup>137</sup> High temperatures and low rainfall lead to declines in government reservoir levels, reducing water pressure and the regularity of municipal water supply.<sup>138</sup> Heat waves that dry up reservoirs also cause communal taps in unplanned colonies to dry up, forcing residents to more heavily depend on tankers to meet their water needs.<sup>139</sup> Then shortages in supply that coincide with peaks in demand push water prices up.<sup>140</sup> A resident of Sangam Vihar interviewed for *Deutsche Welle* reported that her water prices doubled in the summer, constituting 20 percent of her household income.<sup>141</sup>

Water collection in higher temperatures is also more demanding.<sup>142</sup> Greater heat exposes collectors to heat exhaustion and dehydration, making the process of collection slower and stealing time from other activities.<sup>143</sup> These stressors are likely to worsen as climate change bolsters water scarcity and pushes temperatures higher.

Increasingly inaccessible water places heavier burdens on women who are the primary collectors of water in Delhi.<sup>144</sup> A multi-household study examining the connection between climate-linked water vulnerability and gender equality found that women in poor households were highly vulnerable to climate-linked water stressors generally, as reflected by CVI-WH values (an index to quantify vulnerability) ranging between 0.62 and 0.67 (out of 1) across different

***“There are lots of teenage and college-age men [on the route] who are often drunk. They catcall and harass the women who are getting water.”***

Interview with Varsha, Resident of Bhim Nagar, on Oct. 21, 2021.

<sup>135</sup> Jagriti Kher et al., *Vulnerability of Poor Urban Women to Climate-linked Water Insecurities at the Household Level: A Case Study of Slums in Delhi*, 22 *INDIAN J. OF GENDER STUD.* 15, 32 (2015).

<sup>136</sup> *Id.*

<sup>137</sup> Aijaz, *supra* note 501.

<sup>138</sup> Kher et al., *supra* note 135, at 31; Lauren Frayer, *Temps Have Topped 120 in India: How Are They Coping with the Wave?* NPR, June 2, 2019, <https://perma.cc/DW57-NCLG>.

<sup>139</sup> *Id.*

<sup>140</sup> Catherine Davison, *Under Coronavirus Lockdown, Delhi Slum Residents Struggle to Get Water*, *DEUTSCHE WELLE*, Sep. 4, 020, <https://perma.cc/E63V-RPTG>.

<sup>141</sup> *Id.*

<sup>142</sup> Kher et al., *supra* note 79, at 164.

<sup>143</sup> See Diganta Das & Haslindah Safini, *Water Insecurity in Urban India: Looking Through A Gendered Lens on Everyday Urban Living*, 9 *ENV'T & URBANIZATION INDIA* 178, 191 (2018); Zafar Mahfooz Nomani & Rehana Parveen, *Prevention of Chronic Diseases in Climate Change Scenario in India*, 13 *ENV'T JUST.* 97, 98 (2020).

<sup>144</sup> Kher et al., *supra* note 135, at 164; Das & Safini, *supra* note 143, at 178.



regions.<sup>145</sup> The same study found that water collectors in West Delhi's unplanned colonies faced the longest commutes for water because of high population density, poor water supply, and a high tap-to-user ratio.<sup>146</sup> Around 63 percent of households from the West were more than a 15-minute walk from their water source while only around 4 percent of households from the East had an equivalent journey.<sup>147</sup> Women with no in-home water source also had to make several trips a day to collect water in buckets and jerry cans, with some women making more than six trips a day to collect water.<sup>148</sup> Women are compelled to make more trips and travel farther when water is in short supply, such as in the summer.<sup>149</sup>

Most respondents in the study reported limited tap water supply at community water points and unpredictable tanker schedules, which conflicted with the women's income-generating work.<sup>150</sup> Girls' education was similarly disrupted because of the need to skip school to help with water collection or to watch children while their mothers were collecting.<sup>151</sup> The increase in girls' care work burden compromises their right to education. Moreover, inadequate water accessibility also had detrimental downstream effects on opportunities for training and skills development,<sup>152</sup> as well as on women's physical and mental health and safety.<sup>153</sup>

**In Bhim Nagar, which is located in a JJ resettlement colony, women of every age collect water from government-supplied water tankers. This includes women who are pregnant, lactating or caring for infants and young children. Water collection is both time and labor intensive, taking about an hour a day and sometimes requiring the women to scale flights of stairs with the heavy load. However, it is imperative that the women undertake the task without hesitation.**

**Varsha reported: “[Women] know the water will only be available for two to three hours and everyone will be coming [t]here for water, so this is not a matter of choice; they need to get the water on time. Children and girls as young as 12 will go. They do not think about who is going, whoever is free just goes. This is not an option.”**

Interview with Resident of Bhim Nagar on Oct. 21, 2021.

<sup>145</sup> CVI-WH abbreviates “Climate Vulnerability Index for Water at the Household.” It is characterized by six features, not all of which speak to access. They are: *resources* (aims to capture the overall availability of water), *access* (includes the population's access to safe drinking water at a reasonable distance), *human capacity* (the ability of people to manage water), *use* (consumption of water in different sectors), *environment* (reflecting the state of the environment), and *geospatial characteristics* (geographical characteristics of the location that make it vulnerable to climatic stresses and extremes. Kher et al., *supra* note 135, at 157, 171.

<sup>146</sup> *Id.* at 162-63.

<sup>147</sup> *Id.*

<sup>148</sup> *Id.*

<sup>149</sup> *Id.* at 163.

<sup>150</sup> *Id.* at 164.

<sup>151</sup> *Id.* at 153.

<sup>152</sup> *Id.* at 153.

<sup>153</sup> The task of water collection is known to subject women to physical hardship. Women experience back and foot pain from fetching water. Das & Safini, *supra* note 143, at 191. Carrying heavy loads of water over long periods also causes cumulative damage to the spine, neck muscles, and lower back, leading to early ageing of the vertebral column. WORLD HEALTH ORGANIZATION (WHO), GENDER, CLIMATE CHANGE, AND HEALTH 15 (2014), available at <https://perma.cc/LZF4-59CP>. Ninety percent of respondents in the multi-household study on gender equality and climate-linked water vulnerability reported body pain and general tiredness from filling and carrying water every day. Women water collectors were also affected by tensions in the community (e.g., from fights that break out at time of water filling), unwanted social remarks and mental stress. Kher et al., *supra* note 135, at 163-64.

The DJB acquires over 90 percent of its water supply from open-water sources,<sup>154</sup> such as the Yamuna River, which is Delhi's primary water source.<sup>155</sup> The remainder of its water supply comes from groundwater sources.<sup>156</sup> When there are increases in demand for water upstream due to climatological, social and economic factors, there is an incentive for upstream communities to divert Yamuna River flows intended for Delhi to meet that demand.<sup>157</sup> Delhi also lacks the capacity to store its full seasonal allocation of water within the city during the summer months. As a result, Delhi only utilizes half of its seasonal flow allocation during the summer, which is when demand soars.<sup>158</sup>

Higher air temperatures due to climate change are causing the Himalayan glaciers that feed the Ganges River system, in which the Yamuna is a tributary, to melt more quickly. This phenomenon has already caused severe floods in the Ganges River basin.<sup>159</sup> Although climate change causes declines in summer monsoon rainfall, leading to droughts, it also contributes to more frequent extreme weather events, including erratic, high-intensity rainstorms. These rainstorms further contribute to the increased prevalence of floods.<sup>160</sup> Research from the Indian government anticipates that floods in the Ganges River basin will become more prevalent, of longer duration and more intense as time progresses.<sup>161</sup> Other studies project that floodwaters will impact a greater area of ground within the Delhi territory over the course of the 21st century.<sup>162</sup>

***“ The infrastructure is so bad in Bhim Nagar that any amount of rain causes flooding . . . This means all the rainwater is going to waste. There are no taps in Bhim Nagar, and even when it rains, it is so flooded that the water is useless, and people still have to take difficult trips to get the water they need.”***

Interview with Varsha, Resident of Bhim Nagar, on Oct. 21, 2021.

The impacts of frequent, intense flooding on water accessibility are disparately felt by those populations in Delhi with the least capacity to adapt: inhabitants of unplanned colonies concentrated along the Yamuna River banks.<sup>163</sup> Homes in unplanned colonies are often not sturdy or fortified enough to keep floodwater out, which makes them doubly vulnerable.<sup>164</sup> When flooding results in loss of habitation, connectivity to the outside world, and loss of income, it inhibits residents' access to basic resources, including water.<sup>165</sup>

<sup>154</sup> See Economic Survey of Delhi (2020-2021), *supra* note 13, at 235-238.

<sup>155</sup> See Availability, *supra*.

<sup>156</sup> See Economic Survey of Delhi (2020-2021), *supra* note 13, at 238.

<sup>157</sup> Interview with Nitya Jacob, Independent water and sanitation advisor (Apr. 21, 2021); Roy, *supra* note 76.

<sup>158</sup> GOVERNMENT OF NATIONAL CAPITAL TERRITORY OF DELHI, DELHI JAB BOARD, WATER POLICY FOR DELHI 28 (2017), available at <https://perma.cc/YVC7-HZTK>.

<sup>159</sup> Jain & Singh, *supra* note 98, at 278 (“It has been reported that between 2003 and 2009, approximately 174 gigatonnes of water was lost by Himalayan glaciers, which led to severe floods in the Indus, Gang[es], and Brahmaputra rivers affecting millions of lives.”). See also GOVERNMENT OF INDIA, MINISTRY OF WATER RESOURCES, PRELIMINARY CONSOLIDATED REPORT ON EFFECT OF CLIMATE CHANGE ON WATER RESOURCES 68 (2008), available at <https://perma.cc/RD5L-TDHH> (calculating rates of glacier retreat for the Ganges basin glaciers).

<sup>160</sup> See Ministry of Earth Sciences, *supra* note 84, at 118; Mohanty, *supra* note 89, at 12; Kher et al., *supra* note 79, at 150.

<sup>161</sup> See Ministry of Earth Sciences, *supra* note 84, at 16, 133-134, 137; MINISTRY OF WATER RESOURCES, *supra* note 159, at 74 (“As the flood events and intensity are likely to increase due to climate change phenomenon the flood prone area is further likely to increase.”).

<sup>162</sup> See Sanjay Gupta, Report on Impact of Floods in Delhi (Climatrans, Aug. 2017), at 22.

<sup>163</sup> See Neha Bharti, *Floods in Delhi: Causes and Challenges* 14 (The Energy & Resources Institute Draft Report, 2016), available at <https://perma.cc/8HV9-HLVB>.

<sup>164</sup> See Prashar et al., *supra* note 100, at 1621; Bharti, *supra* note 163, at 14.

<sup>165</sup> See Agrawal, *supra* note 89, at 772.

The distinctive dust storms—called Andhi—that affect Delhi in the pre-monsoon months may also have indirect consequences on water accessibility for people without in-home tap water.<sup>166</sup> These storms impact visibility, and could hinder water tankers traveling to unplanned colonies. Delhi-based climate experts expect higher air temperatures resulting from climate change will amplify these dust storms in the future.<sup>167</sup>

## Acceptability

By ratifying the International Covenant on Economic, Social and Cultural Rights, governments commit to ensuring that the water available for personal and domestic use is also acceptable for these purposes.<sup>168</sup> Acceptability refers not only to the general aesthetic qualities of water but also to culturally informed preferences that render certain uses of water socially, morally, or legally permissible for a particular community.<sup>169</sup> Measuring water’s acceptability largely involves subjective value judgments, but this does not make the criterion any less significant.<sup>170</sup> Water deemed unacceptable can be unsafe or, even though it is safe, undermine confidence in its source, leading individuals to choose a more aesthetically acceptable, but less safe, source of water as an alternative.<sup>171</sup>



Families collect water from a communal tap.

## Unequal Water Acceptability

Determining the acceptability of water requires an analysis of the perceptions of communities as to their water’s appearance, odor and appropriateness. Thus, findings on this element of the right to water are necessarily context specific. The results of a 2016 survey suggest that residents who are supplied piped and bottled water would find this water moderately acceptable for their use while tanker water would be seen as even less acceptable.<sup>172</sup> In that survey, 97 percent of households in a resettlement colony using piped water believed their water to be clean.<sup>173</sup> Seventy-seven percent said the water tasted good. However, 95 percent said their piped water smelled bad.<sup>174</sup>

<sup>166</sup> See Mayank Aggarwal, *Dust storms may increase in India due to climate change*, MONGABAY, May 8, 2018, <https://perma.cc/J5JR-J5ZD>.

<sup>167</sup> *Id.*

<sup>168</sup> Gen. Comm. No. 15, *supra* note 6, ¶ 12 (b). See also ¶ 2, providing that water must be “acceptable.”

<sup>169</sup> Holst Jensen et al., *supra* note 48, at 18. An example is a community that refuses to drink water from a borewell positioned close to a graveyard. Government provision of borewell water from such a site would not be acceptable. *Id.*

<sup>170</sup> *Id.*

<sup>171</sup> WHO, GUIDELINES FOR DRINKING WATER QUALITY 219 (4<sup>th</sup> ed., 2017), available at <https://perma.cc/BZ9Q-NKAS>.

<sup>172</sup> See USAID, *supra* note 10.

<sup>173</sup> *Id.*

<sup>174</sup> *Id.*

In a locality where most residents received water from tankers, only 43 percent of respondents found the water to be clean, and 57 percent observed it to be muddy at some point. Eighty percent believed that the water smelled bad and most reported only somewhat good taste.<sup>175</sup> Another locality relying on tanker water had similar numbers.<sup>176</sup> In contrast, in a colony where half of the respondents consumed bottled water, 75 percent said that this water was clean, and 77 percent said it tasted good.<sup>177</sup> Nevertheless, 90 percent of respondents indicated that the bottled water smelled bad.<sup>178</sup>

### Climate Change Deepens Inequality

Climate change outcomes, such as increased temperatures, open-water carbon dioxide absorption and severe weather events like flooding and dust storms, will affect the characteristics of water in Delhi and thus how acceptable Delhi residents find their water.<sup>179</sup> Water holds less oxygen at higher temperatures, which can affect the taste, odor, or appearance of drinking water.<sup>180</sup> Water with low DO levels may taste and smell like rotten eggs because it cannot process hydrogen sulfide into hydrogen sulfate.<sup>181</sup> Further, as explained by the World Health Organization, “[d]epletion of [DO] in water supplies can . . . also cause an increase in the concentration of ferrous iron in solution, with subsequent discoloration at the tap when the water is aerated.”<sup>182</sup>

Given water supplied to unplanned colonies is often not piped but arrives by tanker and tube-well, residents of those settlements are less likely to find their water acceptable. In a 2019 study surveying women from unplanned colonies, 68 percent of respondents reported dissatisfaction with the water available to them.<sup>183</sup> Twenty-five percent mentioned the muddiness of the water as displeasing.<sup>184</sup> Twenty-three percent cited hard water as being unsatisfactory and 14 percent observed that their water had an unpleasant smell, color or taste.<sup>185</sup>

### Quality

Governments ratifying the ICESCR commit to progressively ensuring that the water available to those in their jurisdiction is of good quality.<sup>186</sup> Water must be safe for use, meaning it is free of pathogens, chemicals and other hazardous materials that constitute a threat to public health and welfare.<sup>187</sup> This can be measured through testing for contaminants.

<sup>175</sup> *Id.*

<sup>176</sup> In that locality, 43 percent of respondents observed cleanliness; 47 percent observed at least occasional muddiness; 70 percent reported water smelling bad; and 57 percent reported taste that was somewhat—rather than fully—good *Id.*

<sup>177</sup> *Id.*

<sup>178</sup> *Id.*

<sup>179</sup> Agrawal, *supra* note 89, at 772-75.

<sup>180</sup> See Jain & Singh, *supra* note 98, at 280-281; Rai, *supra* note 86, at 259; Water Science School, dissolved Oxygen and Water, U.S. GEOLOGICAL SERV. (June 5, 2018), <https://perma.cc/2QBT-BWP9>; WHO, Guidelines for Drinking Water Quality, *supra* note 171, at 225.

<sup>181</sup> “Dissolved Oxygen,” UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, <https://perma.cc/SN7V-VACF>; see also WHO, Guidelines for Drinking Water Quality, *supra* note 171, at 225-26.

<sup>182</sup> WHO, Guidelines for Drinking Water Quality, *supra* note 171, at 225.

<sup>183</sup> See Kher et al., *supra* note 79, at 149, 166.

<sup>184</sup> *Id.*

<sup>185</sup> See *id.*

<sup>186</sup> Gen. Comm. No. 15, *supra* note 6, ¶ 12 (b). See also ¶ 2 (providing that water must be “safe” and “reduce the risk of water-related disease”).

<sup>187</sup> Human Rights Watch, *The Human Right to Water: A Guide for First Nations Communities and Advocates* (2019), <https://perma.cc/9ZL2-RQNW>.

## Unequal Water Quality

The DJB tests municipal drinking water quality in eight zonal labs of the National Capital Region. The tests specifically aim to determine whether water is “bacteriologically/chemically unsatisfactory.”<sup>188</sup> DJB labs rarely report unsatisfactory water quality results.<sup>189</sup> However, there are reasons to question the DJB’s data collection methodology and process, making it likely that this data overestimates water quality. A study from the Bureau of Indian Standards released in November 2019 described Delhi’s water as “the most unsafe tap water” among India’s 21 state capitals.<sup>190</sup> The Delhi government has also implied that tap water in Delhi is not potable unless secondarily treated with a reverse osmosis system, or by boiling the water.<sup>191</sup>

**Before the installation of a second pipeline and a community tap, the water in Bhim Nagar was of such poor quality that it risked the health of the community.**

**People ended up getting lots of infections, such as UTIs [urinary tract infections], burning, itching and rashes, because of the dirty water,” Varsha said. “Cleanliness generally was an issue, but especially for women and specifically for feminine hygiene, this was a big issue.”**

**“There were actually lots of tuberculosis cases and throat infections that popped up because people were drinking this [poor quality] water.”**

Interview with Resident of Bhim Nagar on Oct. 21, 2021.

Piped water in unplanned colonies is also more susceptible to contamination because of pipe placement.<sup>192</sup> When pipes are extended, they must be laid close to the surface and are sometimes exposed, making them susceptible to contamination from breakage or tampering.<sup>193</sup> Further, bureaucratic disorganization plagues government initiatives to install water pipelines in unplanned colonies. Sometimes the DJB will undertake a new piping project, but other times, the Union Ministry of Urban Development and Poverty Alleviation or Delhi Development Authority will plan colonies without consulting the DJB first.<sup>194</sup>

In light of these serious water quality challenges, many residents in Delhi’s unplanned colonies have installed domestic reverse osmosis units to filter out impurities.<sup>195</sup> However, this solution further drains money from households that are already resource constrained. Those who are unable to purchase water purification units are at greater risk of contracting diseases like diarrhea and typhoid.<sup>196</sup>

<sup>188</sup> See, e.g., Delhi Jal Board, Office of the Director, Surveillance of Water Quality on Dtd. 02.03.2020, <https://perma.cc/L8LB-2UHK>.

<sup>189</sup> For example, in a three-day period between August 21st and 23rd, 2020, only 0.4% of DJB labs reported water quality to be unsatisfactory. *Id.*

<sup>190</sup> Delhi Has the Most Unsafe Tap Water, *supra* note 13.

<sup>191</sup> Economic Survey of Delhi (2020-2021), *supra* note 56, at 258.

<sup>192</sup> Jacob, *supra* note 157; Roy, *supra* note 76.

<sup>193</sup> Roy, *supra* note 76.

<sup>194</sup> *Id.*

<sup>195</sup> Nisar Khan, *Access of Water Supply in the Unauthorized Colonies of Delhi*, 5 INT’L J. ADVANCED INNOVATIVE RES. 123, 125 (2018), available at <https://perma.cc/9833-WRTQ>.

<sup>196</sup> INGA T. WINKLER, THE HUMAN RIGHT TO WATER: SIGNIFICANCE, LEGAL STATUS AND IMPLICATIONS FOR WATER ALLOCATION 135 (2012); Khan, *supra* note 195, at 125-26.



The consequences of these diseases can mean life or death for residents.<sup>197</sup> Moreover, given their principal role in water collection, women are especially likely to come into contact with poor quality water that puts them at risk for disease.<sup>198</sup>

**Residents in Rajiv Ratan Awas Yojana must filter their tanker water with purifiers to be able to drink it.**

*“If you store it for a day, it catches ‘lace’ [a film lattice of salt crystals].”*

*“The water is very bad, it’s very dirty... The tanker that has water in it also has insects. The water from the RO [the in-home water filter] also has insects.”*

Hema, Group Interview with Baprola residents, Nov. 21, 2021.

The DJB also monitors groundwater quality to ensure its potability.<sup>199</sup> However, experts and the DJB itself recognize that groundwater sources, including tube-well water, in many parts of Delhi are of poor quality.<sup>200</sup> Depending on location, that water can have unsafe levels of fluoride and salinity, and even nitrate and arsenic.<sup>201</sup> According to government data, groundwater exceeded the designated salinity limit of 3,000 micro mhos per centimeter in seven out of Delhi’s 11 districts.<sup>202</sup> In addition, fluoride, nitrate and arsenic were above the cutoff levels of 1.5, 45 and 0.01 milligrams per Liter, respectively.<sup>203</sup> At the same time, there are also risks attached to the use of tanker water, which can be contaminated if proper cleaning procedures are not followed.<sup>204</sup>

As explained by an expert consulted for this report, households in Delhi’s unplanned colonies can generally only access water of poorer quality than what is delivered to Delhi’s planned colonies.<sup>205</sup> This is due in part to the unplanned colonies’ more significant reliance on groundwater, which is usually unfit for consumption due to pollution and brackishness.<sup>206</sup> Groundwater has a high concentration of chemicals



Standing water in Najafgarh Drain.

<sup>197</sup> Bhasker Tripathi, *Diarrhoea Took More Lives Than Any Other Water-Borne Disease In India*, INDIA SPEND, Apr. 30, 2018, <https://perma.cc/ZV3Y-RZ7X>; DASRA & FORBES MARSHALL, SQUATTING RIGHTS: ACCESS TO TOILETS IN URBAN INDIA 7 (2012), available at <https://perma.cc/RH94-2SQH>.

<sup>198</sup> K. Duncan, *Global Climate Change, Air Pollution, and Women’s Health*, 99 TRANSACTIONS ON ECOLOGY & ENV’T 633, 635 (2006).

<sup>199</sup> *Id.* at 239.

<sup>200</sup> *Id.* at 234, 257; Aijaz, *supra* note 50; Jacob, *supra* note 157.

<sup>201</sup> Economic Survey of Delhi (2020-2021), *supra* note 13, at 234, 257; Aijaz, *supra* note 50.

<sup>202</sup> Press Release, Ministry of Jal Shakti, Filling Up of Urban Aquifers (Mar. 31, 2022), <https://perma.cc/KK5X-3298>.

<sup>203</sup> Nine Delhi Districts Had Contaminated Groundwater in 2019: Jal Shakti Minister, *supra* note 12.

<sup>204</sup> USAID, *supra* note 10, at 18.

<sup>205</sup> Jacob, *supra* note 157.

<sup>206</sup> See Roy et al., *supra* note 54, at 628; Aijaz, *supra* note 54; Khan, *supra* note 195, at 125.



and leaked sewage.<sup>207</sup> However, residents in some unplanned colonies rely on groundwater for domestic purposes.<sup>208</sup>

The status of surface water in Delhi is also concerning. The Yamuna River—from which the DJB sources a significant proportion of the water supply—is “the most polluted water body” in India<sup>209</sup> and among the “most polluted rivers in the world.”<sup>210</sup> The Yamuna River contains a dangerous mixture of toxic chemicals, plastic, fecal matter, human and animal remains, “gaseous sludge,” cleaning products, oil and heavy metals.<sup>211</sup> Recent reports suggest that at least 460 million gallons of wastewater and fecal sludge empty directly into the Yamuna River each day.<sup>212</sup> Strikingly, the Central Pollution Board has published data showing that portions of water from the Yamuna River contain a concentration of 1.1 billion fecal coliform bacteria per 100 milliliters of water.<sup>213</sup> The standard for bathing is 500 coliform bacteria per 100 milliliters.<sup>214</sup>

Upstream states bear some responsibility for the precarious situation of the river. As explained by an expert consulted for this report, Delhi must trust that other states will not pollute the water that flows into Delhi. However, pollution does in fact flow from upstream states into the Yamuna.<sup>215</sup> For example, significant amounts of ammonia-rich fertilizer are discharged from upstream farms into the Yamuna River, and this runoff seriously degrades the water that ultimately reaches Delhi.<sup>216</sup>

## Climate Change Deepens Inequality

Climate change has, and will continue to have, devastating impacts on the quality of water in the Ganges and Yamuna systems. Numerous factors contribute to the dangerously polluted state of the Yamuna River, including poor sewage and water treatment infrastructure, river bathing and riparian religious practices and harmful activities by riparian factories and farms.<sup>217</sup> There is no doubt, however, that climate change exacerbates the degradation of the river system.

Floods can degrade the quality of river water by increasing the amount of surface runoff flowing into the river. Increased runoff results in additional discharge of surface pollutants—including trash, dirt and pesticides sprayed on low-lying vegetation and crops—into the river.<sup>218</sup> In addition, increased air temperatures lead to temperature increases in open water sources,<sup>219</sup> which in turn affects their quality. The Delhi stretch of the Yamuna River already faced extremely low levels of DO in 2003, and

---

<sup>207</sup> Heller et al., *supra* note 2, at 12.

<sup>208</sup> See Roy et al., *supra* note 54, at 620.

<sup>209</sup> See Siddiqui et al., *supra* note 88, at 2683.

<sup>210</sup> Prashar et al., *supra* note 100, at 1612.

<sup>211</sup> See Siddiqui et al., *supra* note 88, at 2688.

<sup>212</sup> PTI, *Delhi: Absence of Sewer Lines in 1500 Unauthorised Colonies Major Reason of Pollution in Yamuna*, THE INDIAN EXPRESS, Nov. 25, 2018, <https://perma.cc/4XZ9-8HTK>. See also Siddiqui et al., *supra* note 88, at 2688 (“According to an estimate, there are 21 major drains in Delhi, which carry around 850 MGD [millions of gallons per day] of sewage daily. Out of this, only 390 MGD is treated in the sewage treatment plants (STPs), and the remaining 460 MGD of untreated sewage, mostly industrial effluents, falls directly into the River Yamuna.”)

<sup>213</sup> Julie McCarthy, *Can India’s Sacred But ‘Dead’ Yamuna River Be Saved?*, NPR, May 11, 2016, <https://perma.cc/3BWB-7PZY>.

<sup>214</sup> *Id.*

<sup>215</sup> Jacob, *supra* note 157.

<sup>216</sup> *Id.*

<sup>217</sup> S. Muralidhar, *The Right to Water: An Overview of the Indian Legal Regime*, in THE HUMAN RIGHT TO WATER 8-9 (Eibe Riedel & Peter Rothen eds., 2006). See also Aijaz, *supra* note 50; Rai et al., *supra* note 86, at 246-253, 267, 294-305.

<sup>218</sup> See Jain & Singh, *supra* note 98, at 280; Rai et al., *supra* note 86, at 247.

<sup>219</sup> See generally Jean C. Morrill et al., *Estimating Stream Temperature from Air Temperature: Implications for Future Water Quality*, 131 J. ENVIRON. ENGIN. 1 (2005).



since then the proportion of the Yamuna River facing similarly low levels has consistently expanded.<sup>220</sup> Declining DO levels in the Yamuna are likely due to a combination of water temperature increases and continued discharge of organic pollution.<sup>221</sup> Rainfall deficits further impair river DO levels by reducing river flow rate.<sup>222</sup>

Greenhouse gas emissions directly degrade the quality of open water sources. As described in a study on the effects on India's rivers, "excess CO<sub>2</sub> present in the atmosphere [ ] dissolved in rainwater, result[s] in the formation of carbonic acid (H<sub>2</sub>CO<sub>3</sub>)."<sup>223</sup> When acid rain comes in contact with rock surfaces along riverbanks, it can accelerate erosion, leading to larger sediment and silt buildups in rivers.<sup>224</sup> Polluted water during rains can lead to blockages in water treatment facilities and contribute to repeated shutdowns at water treatment plants.<sup>225</sup>

---

<sup>220</sup> See Rai et al., *supra* note 86, at 249, 345-347.

<sup>221</sup> Cf. Siddiqui et al., *supra* note 88, at 2688. See also Rai et al., *supra* note 86, at 249, 354 ("The river in its 500 km stretch from Delhi to the Chambal confluence is not fit for its designated best use even in the monsoon season when sufficient dilution is available. The pollution is predominantly organic in nature. Therefore, the depletion of oxygen is the major impact on the polluted stretch of the river which disturbs the river ecosystem to a large extent.").

<sup>222</sup> See Rai et al., *supra* note 86, at 338.

<sup>223</sup> See Jain & Singh, *supra* note 98, at 278.

<sup>224</sup> *Id.*

<sup>225</sup> Roy, *supra* note 76. See also Aijaz, *supra* note 54.

## Policy Response & Activism Efforts

Under international human rights law, governments are required to take actions that are deliberate, concrete and targeted to fulfill economic and social rights. The steps taken can include legislative, judicial, administrative, financial, social and other measures.<sup>226</sup> The United Nations Committee on Economic, Social and Cultural Rights, which provides advice to governments on fulfillment of their socio-economic rights obligations, has indicated that government commitments are an important first step in this regard. However, implementation of those policy commitments is equally important.<sup>227</sup>

International human rights standards require policymaking processes to be not only effective but also participatory and transparent.<sup>228</sup> Further, governments are expected to devote “maximum available resources”—or, all means at their disposal—to progressively fulfilling economic and social rights.<sup>229</sup> This section documents policy shortcomings that contribute to the unequal enjoyment of the right to water in Delhi.

### International Efforts

India has taken some steps at the national and international levels to protect existing and future communities from climate change and to guarantee equal enjoyment of the right to water. At the international level, India is a State Party to the International Covenant on Economic, Social and Cultural Rights (ICESCR), which obliges governments to take steps toward providing an adequate standard of living for all.<sup>230</sup> The UN Committee on Economic, Social and Cultural Rights has interpreted Articles 11 and 12 of the ICESCR to include a right to water.<sup>231</sup> Parties to the Covenant are obliged to devote the maximum of their available resources to guaranteeing human rights to public services, including to water.<sup>232</sup> India is also a party to the Convention on the Elimination of All Forms of Discrimination Against Women, which



DJB-supplied water tanker. Translation: “Delhi Jal Board, Delhi Government.”

<sup>226</sup> See, e.g., Gen. Comm. No. 15, *supra* note 6, ¶¶ 45-59.

<sup>227</sup> See *id.*, ¶ 37 (f); Gen Comm. No. 14, *supra* note 46, ¶ 30; Gen. Comm. No. 12, *supra* note 46, ¶ 14.

<sup>228</sup> See, MARIA SOCORRO I. DIOKNO, *Human Rights (PANTHER) Principles in Development Planning*, in HUMAN RIGHTS BASED APPROACH: DEVELOPMENT PLANNING TOOLKIT 3-11 (2011), available at <https://perma.cc/V2YQ-N2CN>; Office of the High Commissioner for Human Rights, *Human Rights and Poverty Reduction: A Conceptual Framework* 18-20 (2004), available at <https://perma.cc/G3FP-9TXA>.

<sup>229</sup> ICESCR, *supra* note 3, art. 2 (1).

<sup>230</sup> ICESCR, *supra* note 3, arts. 11-12.

<sup>231</sup> Gen. Comm. No. 15, *supra* note 6.

<sup>232</sup> ICESCR, *supra* note 3, art. 2 (1). See also Center for Economic and Social Rights, *Topic One: Governments’ Obligations to Invest ‘Maximum Available Resources’ in Human Rights* (COVID-19: Recovering Rights Briefs, 2020), available at <https://perma.cc/W8NN-ATTB>.



explicitly includes the right to water.<sup>233</sup> As a party to these treaties, India must respect, protect and fulfill the right to water.<sup>234</sup> This means, as an initial matter, it must refrain from interfering with any enjoyment of the right to water.<sup>235</sup> The government should regulate water services provided by third parties so that water is affordable, accessible, safe and available to communities equally.<sup>236</sup> In addition, the government should take deliberate, concrete and targeted steps towards promoting the right to water and ensuring sufficient and safe water for all.<sup>237</sup> Moreover, India is tasked with guaranteeing that the right to water is enjoyed without discrimination of any kind.<sup>238</sup>

India has committed to helping fulfill the UN Sustainable Development Goals (SDGs).<sup>239</sup> All UN Member States adopted the SDGs in 2015 as a core component of the global 2030 Agenda for Sustainable Development.<sup>240</sup> Relevant goals include: the goal of ensuring clean water and sanitation for all (Goal 6), the goal of achieving gender equality (Goal 5) and the goal of reducing inequalities (Goal 10).<sup>241</sup>

Further, India is a State Party to the United Nations Framework Convention on Climate Change (UNFCCC), under which governments cooperatively agreed to mitigate the effects of climate change through management of GHG emissions and concentrations.<sup>242</sup> As a developing country under the UNFCCC, India was not initially obligated to make commitments to reduce GHG emissions.<sup>243</sup> However, in 2015 and 2016, India signed and ratified the Paris Agreement, in which governments made pledges aimed at limiting global temperature increases to 1.5 to 2 degrees Celsius above pre-industrial levels.<sup>244</sup> The Indian government has pointed to its National Environment Policy (NEP) and the National Action Plan on Climate Change (NAPCC) as the policy frameworks through which it will achieve sustainable development.<sup>245</sup> The government has also highlighted a state-level policy effort, the State Action Plan on Climate Change (SAPCC), of which Delhi is a participant.<sup>246</sup>

## National and Sub-National Efforts

Nationally, the Supreme Court of India has interpreted the constitutional right to life as including a right to clean water.<sup>247</sup> However, legislation does not exist which would elaborate corresponding duties, such as guarantees of a minimum quantity of water per person per day. In addition to the Constitution, as mentioned above, India gives effect to its commitments under international climate

---

<sup>233</sup> Convention on the Elimination of All Forms of Discrimination against Women, Dec. 18, 1979, 1249 U.N.T.S. 13, A/RES/34/180, art. 14(2) (mentioning water supply as part of the right to adequate living conditions); CRC, Art. 24(2)(c) (including clean drinking water as means to combat disease and malnutrition); *ratification available at* <https://perma.cc/D7RG-JSKE>.

<sup>234</sup> Gen. Comm. No. 15, *supra* note 6, ¶ 20.

<sup>235</sup> *Id.*, ¶ 21.

<sup>236</sup> *Id.*, ¶ 24.

<sup>237</sup> *Id.*, ¶¶ 25-28.

<sup>238</sup> *Id.*, ¶ 17.

<sup>239</sup> See Prime Minister Narendra Modi, Government of India, Statement at the UN Summit for the Adoption of Post-2015 Development Agenda (Sept. 25, 2015).

<sup>240</sup> G.A. Res. 70/1, U.N. Doc. A/RES/70/1 (Sept. 25, 2015).

<sup>241</sup> See UNITED NATIONS, THE 17 GOALS, <https://perma.cc/7GKC-M98Y>.

<sup>242</sup> United Nations Framework Convention on Climate Change, May 9, 1992, S. Treaty Doc No. 102-38, 1771 U.N.T.S. 107; *ratification status available at* <https://perma.cc/B2SB-GRBS>.

<sup>243</sup> *Id.*

<sup>244</sup> See Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104; *ratification status available at* [available at https://perma.cc/KT8M-4DVY](https://perma.cc/KT8M-4DVY).

<sup>245</sup> GOVERNMENT OF INDIA, MINISTRY OF ENVIRONMENT, FOREST, AND CLIMATE CHANGE, INDIA'S INTENDED NATIONALLY DETERMINED CONTRIBUTION: WORKING TOWARDS CLIMATE JUSTICE (APR. 2018) 7, *available at* <https://perma.cc/M2EB-SEW8>.

<sup>246</sup> GOVERNMENT OF NATIONAL CAPITAL TERRITORY (NCT) OF DELHI, DEPARTMENT OF ENVIRONMENT, DELHI STATE ACTION PLAN ON CLIMATE CHANGE (AUG. 2017), *available at* <https://perma.cc/52SX-KFEM>.

<sup>247</sup> Subhash Kumar v. State Of Bihar, *supra* note 5.



change treaties through the NEP and NAPCC. The NAPCC includes commitments to ensuring water security and more sustainable habitation.<sup>248</sup> Delhi was required to—and did—develop its own territory-specific action plan to implement the NAPCC objectives.<sup>249</sup>

Under India's Constitution, responsibility for water resource development and management rests with individual Indian states, which have full authority over water within their boundaries.<sup>250</sup> However, the national government provides financial resources to state governments to implement national-level water projects.<sup>251</sup> The national government also has the power to regulate inter-state rivers and river valleys when the Parliament declares that national regulation and control would be in the public interest.<sup>252</sup> In addition, various national-level institutions promulgate regulations and guidelines related to water governance. For example, the Bureau of Indian Standards establishes technical standards for the quality of potable water.<sup>253</sup>

### Two Levels of Water Governance

Two layers of government govern water rights in Delhi. First, the national Union Government of India (here referred to as the national government or Indian government), controls the national budget and issues non-binding policy recommendations to Indian states about water management. Second, the government of the National Capital Territory of Delhi (here referred to as the Delhi government), implements policy and provides water to residents through the Delhi Jal Board. Delhi is not a state but has partial statehood as the capitol territory and therefore does not sit within the government structure of any other state.

See Constitution of India, art. 246 & 7th schedule; “About Us,” Delhi Jal Board, <https://perma.cc/368E-D4E8>.

Several national and subnational water policies have been issued that aim to harmonize states' approaches to water, to conserve water supply and to ensure equitable distribution of water. However, India has struggled to achieve its objectives related to national water management for several reasons. One challenge is that the precise boundaries of the national and state governments' respective water management responsibilities are unclear. This hinders vertical government coordination on water management.<sup>254</sup> In addition, there are numerous national agencies with jurisdiction over aspects of water management, and coordination between these agencies is a major challenge.<sup>255</sup> Lastly, many of the policies are aspirational in nature and do not set out implementation responsibilities.<sup>256</sup>

<sup>248</sup> The goals include: (1) “promoting solar energy,” (2) “enhancing energy efficiency” and fuel economy, (3) making places of habitation more sustainable, (4) ensuring water security, (5) protecting the Himalayan region (6) promoting reforestation throughout India, (7) making Indian agriculture more sustainable, and (8) promoting “strategic knowledge [of] climate change.” Jan Beermann et al., *Climate Action in Indian Cities: An Emerging New Research Area*, 13 J. INTEGRATIVE ENVIRON. SCI. 55, 57 (2016).

<sup>249</sup> See Delhi State Action Plan on Climate Change, *supra* note 246.

<sup>250</sup> Masood Ahmed & Eduardo Aralal, *Water Governance in India: Evidence on Water Law, Policy, and Administration from Eight Indian States*, 11 WATER 1, 5, 23 (2019).

<sup>251</sup> *Id.* at 1. For instance, although states are responsible for implementing drinking water regulations, they often receive financial and technical support from national governmental agencies. *Id.* at 23.

<sup>252</sup> Constitution of India, 7th schedule, List 1-Union List, ¶ 56.

<sup>253</sup> Rai et al., *supra* note 86, at 268.

<sup>254</sup> See Adani Azhoni et al., *Adapting Water Management to Climate Change: Institutional Involvement, Inter-institutional Networks and Barriers in India*, 44 GLOBAL ENVTL CHANGE 144, 150 (2017).

<sup>255</sup> See *id.*; Mohd Danish Khan et al., *Water Environment Policy and Climate Change: A Comparative Study of India and South Korea*, 11 SUSTAINABILITY 3284, 3289 (2019).

<sup>256</sup> See generally Azhoni, *supra* note 254.

Such challenges have affected implementation of the 2012 National Water Policy, which proposed water-related reforms, such as river basin-level planning.<sup>257</sup> Similar obstacles arise with respect to various water missions, which are projects established by national government ministries with goals that range from universalizing the available government water supply to conserving water sources and improving water quality.<sup>258</sup>

## Availability

The Delhi government has taken some steps to increase the overall supply of water available to residents. In line with a campaign promise of universal access to clean drinking water, the government announced, in 2020, increased funds to construct water pipelines in unauthorized colonies. It stated that the water budget would increase by around 70 percent.<sup>259</sup> The government also promised that every metered household would receive up to 20,000 Liters of free water a month.<sup>260</sup> As of March 2021, the DJB reported



Borewell in an unplanned colony.

that 600,000 consumers had benefitted from this policy.<sup>261</sup> In 2020, the Delhi Finance Minister reported that piped water had been newly supplied to over 1,500 unauthorized colonies.<sup>262</sup>

However, the free water scheme raises equity concerns.<sup>263</sup> Under that scheme, more well-off households in planned settlements with in-home taps would each receive 20,000 Liters of free water

<sup>257</sup> See Vijay Paranjpye & M S Rathore, *India Water Partnership, Position Paper on Understanding and Implementation of National Water Policy of India – 2012*, 8 (2014), available at <https://perma.cc/6VXP-WRAX>; Azhoni et al., *supra* note 254, at 150 (citing the non-committal language of the policy as an implementation barrier). Initiatives undertaken pursuant to the 2012 National Water Policy include the preparation of a draft National Water Framework Bill and the launch of a web-based Water Resources Information System. See Government of India, Ministry of Jal Shakti, *Draft National Water Framework Bill* (2016), <https://perma.cc/ZE9T-8AMW>; India Water Resources Information System, <https://perma.cc/UC49-8WND>.

<sup>258</sup> One example is the National Water Mission, which seeks to conserve water and promote equitable distribution across and within states, as well as to integrate water resource development and management. Suman Apparusu, *Evaluation of National Water Mission Using Global Water Partnership Toolbox*, in *INDIA INFRASTRUCTURE REPORT 2011*, 370 (Piyush Tiwari & Ajay Pandey eds., 2011). The Atal Mission for Rejuvenation and Urban Transformation, part of the central government's Ministry of Housing and Urban Affairs, aims to provide basic services such as water supply to urban households, especially for the poor. Government of India, Ministry of Housing and Urban Affairs, *Atal Mission for Rejuvenation and Urban Transformation: The Mission*, <https://perma.cc/F47C-28CH>. The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) links federal grants to specific projects aiming for reform of water governance for select cities, including Delhi. Government of India, Ministry of Urban Employment and Poverty Alleviation & Ministry of Urban Development, *Jawaharlal Nehru National Urban Renewal Mission: Overview*, <https://perma.cc/VE7R-3K6E>. Moreover, the Jal Jeevan Mission of the Hydropower Ministry seeks to provide piped water that is safe to every household. Government of India, Ministry of Jal Shakti, *About JJM*, <https://perma.cc/HQ2N-SUWG>.

<sup>259</sup> Delhi Government Finance Minister, *Budget Speech 2020-2021*, ¶ 59, available at <https://perma.cc/FGK5-55G5>.

<sup>260</sup> *20K Litres of Water Free, but a Litre More and You Pay for It All*, *HINDUSTAN TIMES*, Dec. 31, 2013, <https://perma.cc/A2XP-EE6R>.

<sup>261</sup> *Economic Survey of Delhi (2020-2021)*, *supra* note 13, at 234.

<sup>262</sup> *Delhi Budget Speech 2020-2021*, *supra* note 259, para 54; see also *Economic Survey of Delhi (2020-2021)*, *supra* note 13, at 234.

<sup>263</sup> Vijaya Pushkarna, *Delhi Report Card 3: Enough 'Free Lifeline Water' for All, but Quality and Impact under Scanner*, *CITIZEN MATTERS* (Feb. 3, 2020), <https://perma.cc/XM29-AXA3>.

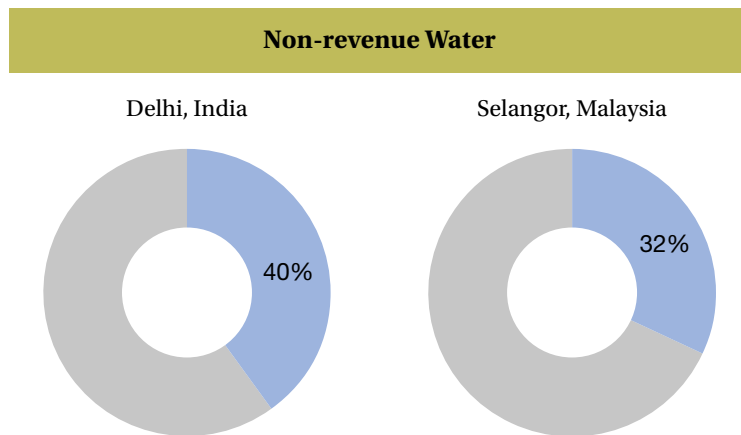
per month. However, residents of unplanned colonies sharing a single tap with a wider community would not benefit to the same extent.<sup>264</sup> Further, residents with no access to the government's piped water supply would be prevented from benefiting from the scheme altogether.<sup>265</sup>

In the past, pipeline expansion campaigns have fallen short of announced goals. In some cases, the DJB was only able to complete a fraction of the pipelines planned.<sup>266</sup> In other cases, pipelines were constructed but remained dry, or provided variable water supply to different colonies.<sup>267</sup>

To increase surface water availability, the Delhi government has signed pacts with Uttarakhand and Himachal Pradesh to build new dams along the Yamuna. This would enable the sharing of captured waters among those river basin states.<sup>268</sup> The DJB has addressed water resource deficiency by seeking to bolster and restore groundwater supplies and by promoting rainwater and wastewater harvesting.<sup>269</sup> In addition, it is aiming to prevent leakages that diminish the amount of water supplied through public pipelines by as much as 40 percent.<sup>270</sup>

While there has been progress in the installation of rainwater harvesting systems, which facilitate the storage of rainwater for later use, uptake has been slow, particularly for private buildings. Delhi's amended Water and Sewer Regulations require public and private buildings on plots of 100 square meters and above to harvest their rainwater.<sup>271</sup> Municipal-level regulations further mandate that all Delhi government buildings must include rainwater harvesting installations.<sup>272</sup> The DJB reported that, as of March 2021, all DJB installations were fitted with rainwater harvesting systems, as were 77 percent of Delhi's educational institutions.<sup>273</sup>

However, rainwater harvesting regulations are not enforced in



**Figure 5:** According to the Delhi government, about 40 percent of water supplied by the DJB becomes “non-revenue water,” which is water that is stolen, diverted, or lost to leakage without remuneration to the DJB. This level of non-revenue water is high, even for a developing country. Sources: Economic Survey of Delhi (2020-2021); Yazid, et al.

<sup>264</sup> *Id.*

<sup>265</sup> Jasmine Gambhir & Osheen Tripathi, *Urban Water Pricing: Optimal and Populist*, 7 INT'L RES. J. MANAGEMENT SOC'Y & HUMAN. 315, 326 (2016).

<sup>266</sup> See, e.g., *Around 130 Colonies In Delhi Won't Get Piped Water Supply Anytime Soon*, NDTV, July 16, 2019, <https://perma.cc/2UMJ-5WFZ>.

<sup>267</sup> *Leaks in Delhi Government's Water Supply Pledge?*, *supra* note 57.

<sup>268</sup> See Aijaz, *supra* note 50. The Delhi government has also constructed and commissioned a parallel channel in one of the Yamuna canal systems that feeds Delhi in order to help minimize in-transit leakage of water from the canal. See Economic Survey of Delhi (2020-2021), *supra* note 13, at 239-240.

<sup>269</sup> See Economic Survey of Delhi (2020-2021), *supra* note 13, at 234, 239.

<sup>270</sup> *Id.* at 251.

<sup>271</sup> *Id.* at 247-248.

<sup>272</sup> *Id.* at 249.

<sup>273</sup> *Id.* at 249.

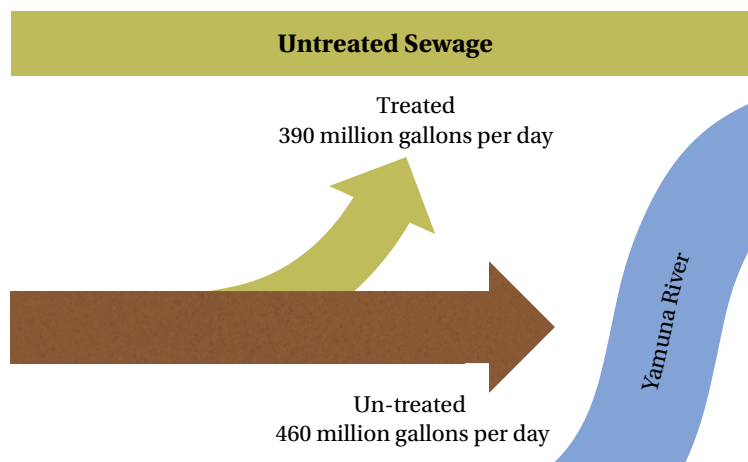


many instances.<sup>274</sup> In addition, many buildings covered by the regulations are households that lack the funds or the stormwater piping, storage and recharging systems to comply with the ordinances.<sup>275</sup> Households in Delhi’s unplanned colonies not only lack those resources, but also lack stable roofing on which to mount rainwater harvesting systems. Unsecure household tenure serves as an additional disincentive to investing in rainwater harvesting systems in unplanned colonies.<sup>276</sup>

According to the Delhi government, about 40 percent of water supplied by the DJB becomes “non-revenue water,” which is water that is stolen, diverted or lost to leakage without remuneration to the DJB.<sup>277</sup> This level of non-revenue water is high even for a developing country.<sup>278</sup> As a comparator, for the largest state in Malaysia, 32 percent of its water was “non-revenue” in 2015.<sup>279</sup> The government attributes these losses to households in unplanned colonies stealing piped water.<sup>280</sup> While residents in unplanned colonies may be responsible for some piped water diversions, residents of unplanned colonies consume small amounts of water per person, which would suggest that there are other, more prominent causes. Other contributing factors include water loss from leakages in old, worn-down public piping, water theft by industry and inaccurate or nonfunctional meter accounting.<sup>281</sup>

## Quality

While the Delhi government has undertaken a variety of projects aimed at increasing water supply, its efforts to improve the quality of existing water resources have been relatively limited. According to a government planning report, as of March 2021, the DJB has laid interceptor sewers along three major drains in Delhi, which have trapped about 158 million gallons per day of sewage that would have otherwise run into the Yamuna River.<sup>282</sup> A study from 2020 put the total amount of treated sewage in Delhi even higher, at 390 million gallons per day. However, the study noted that the river remained polluted by about 460 million gallons of untreated sewage per day,<sup>283</sup> which would mean over fifty percent of the sewage present remained untreated. Most of that sewage came from industrial effluents.<sup>284</sup>



**Figure 6:** According to a 2020 study, Delhi treatment plans are able to treat about 390 million gallons of sewage per day. However, about 460 million gallons of sewage per day go untreated into the Yamuna River.

<sup>274</sup> Jacob, *supra* note 157.

<sup>275</sup> *Id.*

<sup>276</sup> *Id.*

<sup>277</sup> See Economic Survey of Delhi (2020-2021), *supra* note 13, at 234, 251.

<sup>278</sup> *Id.* at 251.

<sup>279</sup> Nor Azlina Mohamad Yazid, et al., *Economic and Efficiency Indicators in Non-Revenue Water (NRW) Performance*, 8 INT’L J. CIV. ENGINEERING 1419, 1423 tbl. 1 (regarding the state of Selangor).

<sup>280</sup> See Economic Survey of Delhi (2020-2021), *supra* note 13, at 251.

<sup>281</sup> See Economic Survey of Delhi (2020-2021), *supra* note 13, at 245, 251; see also Jacob, *supra* note 157.

<sup>282</sup> See Economic Survey of Delhi (2020-2021), *supra* note 13, at 256.

<sup>283</sup> See Siddiqui et al., *supra* note 88, at 2688.

<sup>284</sup> *Id.*



Efforts to improve water treatment facilities have also lagged. As of March 2021, the Delhi government reported that treatment plants with the capacity to handle an additional 90 million gallons of water per day were being commissioned or were currently under construction.<sup>285</sup> However, the additional treatment capacity entailed would fall well short of the demand for water in the city. Refurbishing old plants would also present logistical challenges since engineers would likely need to idle them in the process, thereby depriving Delhi of significant water supply for the period of refurbishment.<sup>286</sup>

## Resources

### Resource Allocation

Resource allocation and expenditure in India involves budgetary policies at national and sub-national governmental levels. A centralized, unified budget for improving the water supply and adapting to climate change does not exist. States have discretion not to follow the national government's proposed schemes, which means the resources allocated to improving water supply in the national government's budget may not ultimately go towards improving water supply in practice. Additionally, states that are unable to spend the money dispersed to them by the national government in a designated period lose the unspent portion of their allocation.<sup>287</sup>

Policy analysts who monitor the public budget for its potential to achieve social goals have concluded that public spending on social services is insufficient in India.<sup>288</sup> Combined public spending on social services by both the national and state governments rose from below 7 percent of GDP in 2018-2019 to 8.8 percent of GDP in the national budget estimates for 2020-2021.<sup>289</sup> However, according to analysts, the amount allocated was still "below the level of budgetary support for social sectors not just in most of the developed countries but also in a number of large developing countries."<sup>290</sup>

Allocations for water supply and sanitation have increased over time. In an annual budget speech summarizing forecasted expenditures for 2021-2022, the national Minister of Finance announced the launch of the Jal Jeevan Mission, which aims to guarantee universal water supply in all 4,378 urban local bodies in India.<sup>291</sup> Support for the Jal Jeevan Mission would represent an increase of over 300 percent in budgetary allocations to water services.<sup>292</sup> The Minister's budget speech also outlined substantial increases in the budget of the Department of Drinking Water and Sanitation from INR 215.18 billion (USD 2.61 billion) in 2020-2021 to INR 600.3 billion (USD 7.30 billion) in 2021-2022.<sup>293</sup>

Although its allocation differs from year to year, at the sub-national level, the Delhi government generally allocates a similar amount to water as the average amount allocated by other Indian states. In 2021-2022, for example, Delhi allocated 2.6 percent of its budget to water while other Indian states, on average, allocated 2.4 percent of their budgets for these purposes.<sup>294</sup> This appears to be in line

---

<sup>285</sup> See Economic Survey of Delhi (2020-2021), *supra* note 13, at 237.

<sup>286</sup> Roy, *supra* note 76.

<sup>287</sup> See Interview with Trisha Agarwala and Dr. Jyotsna Goel, researchers, Center for Budget and Governance Accountability (Apr. 20, 2021).

<sup>288</sup> CTR. FOR BUDGET AND GOVERNANCE ACCOUNTABILITY, *Budget in the Time of the Pandemic: An Analysis of Union Budget 2021-22* 7-8 (2021), <https://perma.cc/8SPM-R34D>.

<sup>289</sup> *Id.* at 7 (2021).

<sup>290</sup> *Id.*

<sup>291</sup> Government of India Minister of Finance, Budget Speech 2021-2022, ¶ 33, available at <https://perma.cc/YD6K-8NR3>.

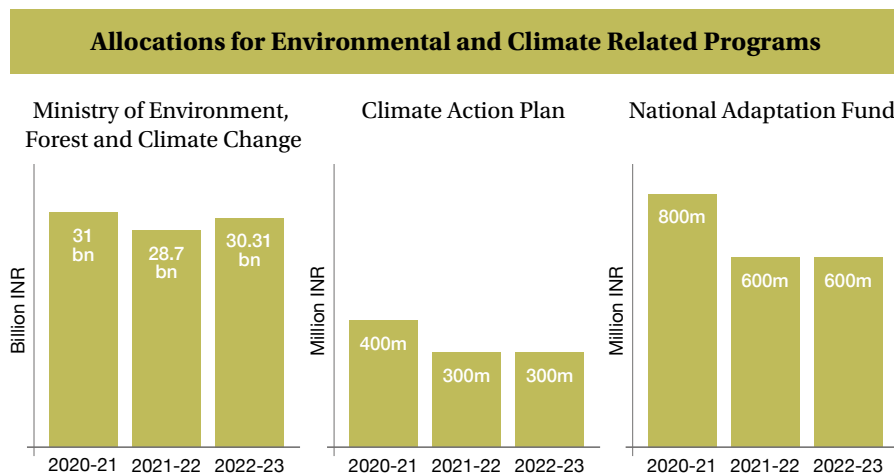
<sup>292</sup> Center for Budget and Governance Accountability, *supra* note 288, at 35-36.

<sup>293</sup> India Budget Speech 2021-2022, *supra* note 291, Annexure-I.

<sup>294</sup> PRS Legislative Research, Delhi Budget Analysis 2021-2022, 5, available at <https://perma.cc/T3JG-YPV8>.

with historical practice.<sup>295</sup> It is possible, however, that this allocation does not benefit all communities equally. For example, a 2011 study by civil society monitors found that, in JJ clusters, the Delhi government was allocating a mere INR 30 (USD .36) per resident to water supply.<sup>296</sup>

In contrast to spending in the water sector, national government allocations for environment and climate-related programs have not increased over time. For example, the budgetary allocation for the Ministry of Environment, Forest, and Climate Change was INR 31 billion (USD 376.74 million) in 2020-2021.<sup>297</sup> It dropped to INR 28.7 billion (USD 348.79 million) in 2021-2022 before going up slightly to INR 30.3 billion (USD 368.23 million) in 2022-2023.<sup>298</sup> Observers attribute the drop to small cuts across the board to various wildlife conservation and protection plans.<sup>299</sup> In 2021-2022, there were also funding cuts to three programs incorporating climate change initiatives.<sup>300</sup>



**Figure 7:** Budget allocations for environment and climate-related programs have not increased over time.

The Climate Change Action Plan allocation went from INR 400 million (USD 4.86 million) in 2020-2021 to INR 300 million (USD 3.65 million) in 2021-2022.<sup>301</sup> It held steady at INR 300 million for the 2022-2023 budget.<sup>302</sup> Similarly, allocation for the National Adaptation Fund went from INR 800 million (USD 9.72 million) in 2020-2021 to INR 600 million (USD 7.291 million) in 2021-2022 before holding steady at INR 600 million in the budget of 2022-2023.<sup>303</sup> Only four years earlier, the National Adaptation Fund had been allocated as much as INR 1.1 billion (USD 13.37 million).<sup>304</sup> Observers have expressed

<sup>295</sup> *Id.*; PRS Legislative Research, Delhi Budget Analysis 2019-2020, 5, available at <https://perma.cc/Z7N5-YDVL>.

<sup>296</sup> Women in Cities International, *supra* note 114, app. at. 175.

<sup>297</sup> GOVERNMENT OF INDIA, UNION BUDGET (2021-22), MINISTRY OF ENVIRONMENT, FORESTS AND CLIMATE CHANGE, available at <https://perma.cc/FNW5-MAJB>.

<sup>298</sup> *Id.*; GOVERNMENT OF INDIA, UNION BUDGET (2022-23), MINISTRY OF ENVIRONMENT, FORESTS AND CLIMATE CHANGE, available at <https://perma.cc/CNM7-FW7R>.

<sup>299</sup> Labanya Prakash Jena & Vijay Nirmal Gavarraju, *Is India's National Budget Green Enough?* CLIMATE POLICY INITIATIVE, Mar. 16, 2021, <https://perma.cc/EY9W-7Y82>.

<sup>300</sup> Union Budget (2021-22), *supra* note 297. The National Mission for Green India saw its allocation reduced from 311 crore in 2020-2021 to 290 crore in 2021-2022, while the national afforestation program allocation dropped from 246 crore in 2020-2021 to 235 crore in 2021-2022. *Id.*

<sup>301</sup> Union Budget (2021-22), *supra* note 297.

<sup>302</sup> Union Budget (2022-23), *supra* note 298.

<sup>303</sup> Union Budget (2021-22), *supra* note 297; Union Budget (2022-23), *supra* note 298.

<sup>304</sup> GOVERNMENT OF INDIA, UNION BUDGET (2018-19), MINISTRY OF ENVIRONMENT, FORESTS AND CLIMATE CHANGE, available at <https://perma.cc/JDU4-C45T>.

concern about these cuts, noting that India’s climate change action plan requires more vigorous and urgent funding than what is being devoted to it.<sup>305</sup>

## Resource Generation

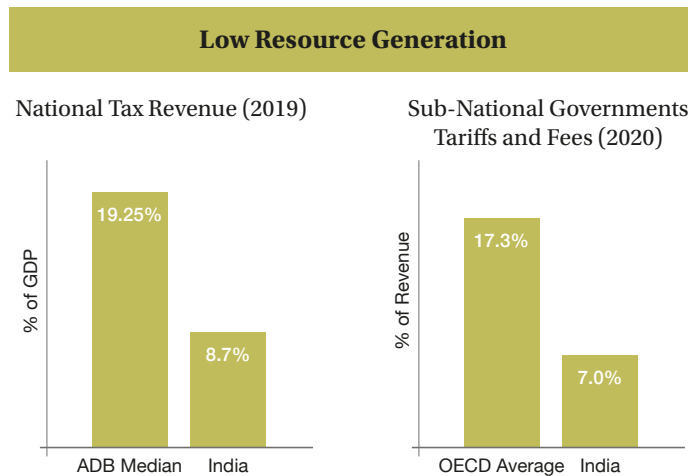
The governments of India and Delhi are not generating sufficient resources to fulfill the right to water, especially in the context of climate change threats. Tax and non-tax revenue streams are relatively low for both governments.

In 2019, for example, India’s tax revenues were equivalent to 8.1 percent of the overall GDP.<sup>306</sup> This was much lower than the tax revenues generated by other governments participating in the Asian Development Bank (ADB). Almost half of the economies reporting to the ADB generated taxes equivalent to 20 percent or

more of their overall GDP.<sup>307</sup> The only country in the ADB that ranked lower than India was Myanmar at 7.0 percent. The highest ranked nation, New Zealand, generated tax revenue equivalent to 32.3 percent of its GDP.<sup>308</sup>

Likewise, Delhi’s tax revenues are relatively low compared to other Indian states. In 2018-2019, Delhi ranked 19th in terms of internal tax revenue as a percentage of state GDP.<sup>309</sup> That year, its tax revenue represented 4.73 percent of state GDP, whereas for other states, tax revenue represented 6.69 of state GDP.<sup>310</sup>

Theoretically, revenue generated from non-tax sources could supplement tax revenues to enable the financing of water and climate change initiatives. For example, Delhi could charge user fees for water that would discourage wasteful water consumption while generating revenues to cover the operating costs of water utility services.<sup>311</sup> A global survey of water tariffs in 308 cities suggests that higher tariffs would likely help lower consumption and the risk of water shortages.<sup>312</sup> Water utility agencies



**Figure 8:** Tax and non-tax revenue streams that would support water services are low. Sources: Asian Development Bank (2019); OECD/UCLG World Observatory on Subnational Government Finance and Investment (2022).

<sup>305</sup> See Prakash Jena & Nirmal Gavarraju, *supra* note 299; Akshit Sangomla, *Union Budget 2020-21 Spares Little For Climate Mitigation*, DOWNTOEARTH (Feb. 1, 2020), <https://perma.cc/P4VA-QYR6>; TWC India Edit Team, *Budget 2020: Does India's Monetary Policy Respond to Global Climate Crisis?*, WEATHER CHANNEL (Jan. 31, 2020) <https://perma.cc/WJ3X-PNLB>.

<sup>306</sup> ASIAN DEVELOPMENT BANK (ADB), KEY INDICATORS FOR ASIA AND THE PACIFIC 2020, 197, available at <https://perma.cc/WQU4-G2MJ>.

<sup>307</sup> *Id.* at 194.

<sup>308</sup> *Id.* at 197.

<sup>309</sup> GOVERNMENT OF THE NATIONAL CAPITAL TERRITORY OF DELHI, ECONOMIC SURVEY OF DELHI (2019-2020) 64, available at, <https://perma.cc/HJU6-JBME>.

<sup>310</sup> *Id.* at 65. While the source is not explicit, this is assumed to be an average figure.

<sup>311</sup> Suresh Chand Rai, *Water Management for a Megacity: National Capital Territory of Delhi*, 25 WATER RESOURCES MGMT. 2267, 2274 (2011).

<sup>312</sup> David Zetland & Christopher Gasson, *A Global Survey of Urban Water Tariffs: Are They Sustainable, Efficient and Fair?* 29 INT'L J. WATER RESOURCES DEV. 327, 337 (2013).



can assess the fees in two different ways: through water taxes based on property values, or through water charges based on water consumption (i.e., water tariffs).<sup>313</sup>

In 2021, the national government accepted a recommendation of a tax advisory body to enact a graded water tariff nationally, according to which higher consumption of water would entail higher charges for the resource.<sup>314</sup> The function of this tariff would be to address what the body labeled “inappropriate water pricing,” or water pricing that fails to deter wasteful water consumption.<sup>315</sup> The call for graded water tariffs was also reflected in the National Water Policy 2020.<sup>316</sup>

However, in the past, the government has generally kept water tariffs low and revenue collection has not been efficient.<sup>317</sup> Consequently, most urban water pricing failed to cover operating and management costs for water utility services in India, with water and sanitation departments operating at a deficit.<sup>318</sup> With all states’ water utilities operating at a deficit, they depended heavily on borrowing from the private sector and multilateral agencies.<sup>319</sup>

In comparison to other states, Delhi’s water tariffs are especially low. A 2012 study showed that water charge recovery rates were 30 percent in Delhi compared with a 60 percent average in India; this was apparently due to political pressure to keep water bills low.<sup>320</sup> Since 2010, with limited exceptions, the DJB has managed its own operational expenses from its own resources, which are insufficient for effective functioning.<sup>321</sup>

The decentralization of government systems complicates revenue generation that would finance climate change adaptation and improved water services. With multiple layers of government involved in water governance, often the national government lacks information to oversee how much a state or municipal government invests in water infrastructure.<sup>322</sup> The states themselves often lack the consolidated data for current and future investment in water infrastructure because such data is dispersed among various ministries, public-sector companies and municipal entities.<sup>323</sup> Thus, technical, administrative and managerial coordination is necessary for progress.<sup>324</sup>

Another challenge for resource generation and allocation is India’s general attitude of fiscal conservatism and austerity. One expert consulted for this report noted a general hesitation toward fiscal deficit. According to the government’s fiscal rules, only three percent of the national budget must be maintained as a deficit.<sup>325</sup> This constricts the amount of revenue available for expenditure for initiatives aimed at reducing gender inequality and adapting to climate change.<sup>326</sup>

---

<sup>313</sup> Sonia Ferdous Hoque, *Urban Water Sector Reforms in India: Financing Infrastructure Development through Market-based Financing and Private-Public Partnerships* 19 (Lee Kuan Yew School of Public Policy Working Paper No. PP 12 – 05 IWP, 2012).

<sup>314</sup> Moushumi Das Gupta, *Use More, Pay More – Graded Water Tariff Likely Soon As Govt Accepts Finance Panel Suggestion*, THE PRINT, Feb. 2, 2021, available at <https://perma.cc/PPPL5-58PY>.

<sup>315</sup> *Id.*

<sup>316</sup> *Id.*

<sup>317</sup> Ferdous Hoque, *supra* note 313, at 19.

<sup>318</sup> Dajun Shen & V. Ratna Reddy, *Water Pricing in China and India: A Comparative Analysis*, 18 WATER POL’Y 103, 114.

<sup>319</sup> *Id.* at 115.

<sup>320</sup> Matt Birkinshaw, *Murky Waters: Infrastructure, Informality & Reform in Delhi* 105 (June 2017) (Ph.D. dissertation, London School of Economics and Political Science).

<sup>321</sup> *Economic Survey of Delhi (2019-2020)*, *supra* note 309, at 81.

<sup>322</sup> Cecilia Tortajada, *Policy Dimensions of Development and Financing of Water Infrastructure: The Cases of China and India*, 64 ENVTL. Sc. & POL’Y 177, 182 (2016).

<sup>323</sup> *Id.*

<sup>324</sup> *Id.* at 185.

<sup>325</sup> Interview with Dr. Lekha Chakraborty, Professor, National Institute for Public Finance and Policy (Apr. 11, 2021).

<sup>326</sup> *Id.*

## Privatization

Many Indian municipalities are unable to meet the growing public demand for water.<sup>327</sup> Coupled with the reality of limited funds from state governments, urban water utilities have turned to the private sector for alternative sources of funding.<sup>328</sup> Such a strategy is reflective of a wider push for the privatization of utility services throughout the Global South,<sup>329</sup> where the cost of urban infrastructure for rapidly growing populations requires substantial financial and technical resources.<sup>330</sup>

International human rights law does not require governments to implement public-only models of water service delivery when fulfilling the right to water.<sup>331</sup> However, governments continue to bear obligations even when private service providers are the entities that supply water. The UN Committee on Economic, Social and Cultural Rights has indicated that water should be treated as a social and cultural good, and not primarily as an economic good.<sup>332</sup> This means that governments should ensure that water is equally enjoyed as a matter of right, and not solely based on a household's ability to pay for it. Under international human rights standards, governments should regulate private water providers to ensure that the resource is affordable, accessible, sufficient, safe and acceptable.<sup>333</sup> Governments are also obligated to impose penalties on private water providers that fail to comply with public water regulations.<sup>334</sup>



The Najafgarh Drain, which originally extended from the Sahibi River, ultimately feeds into the Yamuna River.

The Indian government has actively encouraged private sector involvement in water supply since the mid-1990s.<sup>335</sup> A 2002 study funded by the World Bank suggested that the DJB privatize such functions as water distribution, billing collection, maintenance and grievance processes.<sup>336</sup> This recommendation led to the 2004 Delhi Water Reform Project, which sought to distribute water supply services to

<sup>327</sup> See, e.g., WATERAID, DRINKING WATER STATUS AND SANITATION IN INDIA: COVERAGE, FINANCING AND EMERGING CONCERNS 31 (2005), available at <https://perma.cc/59FZ-SXE3>.

<sup>328</sup> Ferdous Hoque, *supra* note 313, at 7-9.

<sup>329</sup> Uma Dey Sarkar & Bikramaditya K. Choudhary, *Reconfiguring Urban Waterscape: Water Kiosks in Delhi as a New Governance Model*, 10 WATER, SANITATION & HYGIENE FOR DEV. 996, 998. See also Birkinshaw, *supra* note 320, at 44 (describing the push for the privatization of water involving international institutions like the World Bank and UN agencies).

<sup>330</sup> Birkinshaw, *supra* note 320, at 44. See generally Tortajada, *supra* note 322.

<sup>331</sup> Catarina de Albuquerque (Independent Expert on the issue of human rights obligations related to access to safe drinking water and sanitation), *Human Rights Obligations Related to Access to Safe Drinking Water and Sanitation*, ¶ 63, Human Rights Council, U.N. Doc. A/HRC/15/31 (June 29, 2010). See also Gen. Comm. No. 15, *supra* note 6, ¶ 50.

<sup>332</sup> Gen. Comm. No. 15, *supra* note 6, ¶ 11.

<sup>333</sup> *Id.*, ¶¶ 23-24.

<sup>334</sup> *Id.*, ¶ 24. See also Gen. Comment No. 24, *supra* note 46, ¶ 14.

<sup>335</sup> Meine Pieter van Dijk, *Financing Water and Sanitation in India – Bonds, BOTs and Reforms*, 24 WATER LINES 11, 11-12 (2005); See Dey Sarkar & Choudhary, *supra* note 329, at 1002.

<sup>336</sup> *Id.*



private corporations.<sup>337</sup> In 2012, the DJB entered a public-private partnership (PPP) with a consortium of domestic and multi-national water corporations in an effort to achieve clean water supply and reduce losses in selected areas.<sup>338</sup> In 2020, the DJB also announced a “One Zone One Operator” policy, under which the city would be divided into seven or eight zones.<sup>339</sup> Private operators appointed to each zone would be responsible for the “operation, maintenance, and management of water supply and sewerage networks” for a period of ten years on a contract basis.<sup>340</sup>

The private sector is also involved in Delhi’s water sector through the provision of water ATMs. As mentioned above, these are self-contained, automated water vending machines that store clean water.<sup>341</sup> Consumers access the water as they would an automated teller machine.<sup>342</sup> Water ATMs are operated by private corporations, such as Sarjaval, a social enterprise associated with the Piramal global conglomerate.<sup>343</sup> In exchange for operating the ATMs at their own cost, owners like Sarjaval are allowed to draw the necessary groundwater free of cost.<sup>344</sup>

On its face, the introduction of the private sector appears to be an innovative solution that increases the availability of water. However, privatization may maintain—or even amplify—inequality in several ways.<sup>345</sup> For instance, service providers may resort to the removal of public standposts or community taps—important sources of free water for the poor—in the process of establishing in-home connections.<sup>346</sup> In addition, a private company’s focus on supplying water in a selected area could provoke the diversion of water from other areas. Even within the selected area, private companies may not prioritize expansion of their infrastructure network to homes that lack a piped connection.

For example, the 2012 pilot program, which took place in Malviya Nagar and Vasant Vihar, did not service three unauthorized colonies in Malviya Nagar that host nearly a quarter of the population in the project area. Those colonies lacked a pre-existing metered water supply network.<sup>347</sup> According to a senior engineer leading the pilot program, implementation was slow in part because of the difficulty in obtaining land use permissions from the relevant government agencies and municipal corporations, as well as from the fact that the utility did not have enough water to ensure round-the-clock water supply for the entire area.<sup>348</sup>

---

<sup>337</sup> Vandana Asthana, *The Urban Water Reform Project: A Critical Discourse Analysis of the Water Policy Making Process in Delhi, India*, 13 WATER POL’Y 769, 772-773 (2011).

<sup>338</sup> Nivedita Khandekar, *Jal Board’s Private Pill for Every Ill Irks Experts*, HINDUSTAN TIMES, Aug. 14, 2012, available at <https://perma.cc/5HVU-NHYL>.

<sup>339</sup> *Process to Provide 24x7 Water to Delhi Households Has Begun: Kejriwal*, HINDUSTAN TIMES, Sep. 27, 2020, available at <https://perma.cc/2VUJ-V398>.

<sup>340</sup> *Id.*

<sup>341</sup> Dey Sarkar & Choudhary, *supra* note 329, at 1003.

<sup>342</sup> *Id.*

<sup>343</sup> *Id.* at 1004.

<sup>344</sup> *Id.*

<sup>345</sup> See, e.g., Water Privatization-Commercialization Resistance Committee, *Privatization of Water Services: Myth and Reality 24* (July 9, 2012) (booklet, reviewing communities and civil society’s efforts and rationale against privatization of water over the last two decades), available at <https://perma.cc/9D2E-R8H8>; Ravi Kaushal, *People of Delhi Have Been Fooled in the Name of 24x7 Water Supply*, NEWS CLICK, Oct. 16, 2020, available at <https://perma.cc/EU3K-BMMR>; Asthana, *supra* note 327, at 778.

<sup>346</sup> See Sujith Koonan & Preeti Sampat, *Delhi Water Supply Reforms: Public-Private Partnerships of Privatisation?* 47 ECON. AND POL. WKLY. 32, 37 (2012).

<sup>347</sup> *Id.* at 35, 37, 39.

<sup>348</sup> *Delhi’s Ambitious Water Supply Scheme May Turn to Be Pipe Dream as Pilot Project Reveals Challenges*, FIRSTPOST, June 23, 2019, available at <https://perma.cc/XH99-LUWL>.

***“It is [t]he Government that has the power and obligation to resist the temptation of investing in and prioritizing only neighborhoods where interventions are less expensive and complex.”***

Catalina de Albuquerque, UN Special Rapporteur on the rights to water and sanitation (2008-2014), Report to the UN Human Rights Council on human rights responsibilities in the context of non-State water provision, A/HRC/15/31, ¶ 40.

While serving as UN Special Rapporteur on the human rights to safe drinking water and sanitation, water expert Léo Heller raised concerns about for-profit service providers failing to extend services to unserved or underserved areas, which leads to a continued need for public investment.<sup>349</sup> His predecessor, Catarina de Albuquerque, had previously pointed out that a community’s lack of legal tenure could also disincentivize service providers from providing utility networks in unplanned areas.<sup>350</sup> Both UN experts have recommended that governments require private providers to target marginalized communities when defining contract obligations.<sup>351</sup> Governments should further facilitate extensions to areas that are underserved by providing guarantees against forced evictions, formalizing the legal status of the settlements or genuinely negotiating with affected communities about resettlement.<sup>352</sup>

Privatization may also contribute to price inequality. A 2020 study of water ATMs in four Delhi resettlement colonies found that the ATMs replicated inequalities that were already present in those communities.<sup>353</sup> The price for the water distributed at ATMs was a factor, since the ATM water cost INR 0.5 (USD 0.0061) per Liter, making it drastically more expensive than the price of DJB-piped water, which cost INR 0.00015 (USD 0.000018) per Liter.<sup>354</sup> Higher income households within the communities were largely the ones accessing the ATM water.<sup>355</sup> Price can also be a factor in private pipeline expansion programs. For example, in Mehrauli, an area covered by the 2012 pilot scheme, some residents who were covered by the scheme reported inflated bills.<sup>356</sup>

The involvement of the private sector also raises equity concerns by reducing transparency and accountability for water service provision. Because companies do not have the same responsibilities to communities as governments do, privatization can mean communities have less information about how their water is managed. Additionally, communities may have fewer avenues for influencing water management decisions than they would have in purely public systems.

In Delhi, private actors, including ATM operators, are given de facto control over natural resources with little to no regulatory oversight over questions like the amount of water extracted or the disposal of wastewater.<sup>357</sup> An analysis of the 2012 PPP pilot programs, for example, concluded that the

<sup>349</sup> Léo Heller (Special Rapporteur on the human rights to safe drinking water and sanitation), *Human rights and the Privatization of Water and Sanitation Services*, ¶ 25, UN Doc. A/75/208 (Jul. 21, 2020).

<sup>350</sup> de Albuquerque, *supra* note 331, ¶ 41.

<sup>351</sup> *Id.*, ¶ 63 (b); *see also* Heller, *supra* note 349, ¶ 58 (f).

<sup>352</sup> CENTRE ON HOUSING RIGHTS AND EVICTIONS, *MANUAL ON THE RIGHT TO WATER AND SANITATION* 118 (2008).

<sup>353</sup> Dey Sarkar & Choudhary, *supra* note 329, at 1007.

<sup>354</sup> *Id.* at 1004.

<sup>355</sup> The study found that, as income levels increased, so did residents’ reliance on private sources of water. *Id.* at 1003.

<sup>356</sup> Neha Lalchandani, *Water May Change the Tide in Mehrauli Constituency*, THE TIMES OF INDIA, Nov. 1, 2013, available at <https://perma.cc/88AB-88B3>.

<sup>357</sup> *See generally* Dey Sarkar & Choudhary, *supra* note 329.



programs were developed without proactive consultations with the residents of the project areas.<sup>358</sup> As it turned out, the government had delegated away consultation duties.<sup>359</sup> In response to criticism of the 2020 “One Zone One Operator” policy, DJB’s leadership promised to retain its monitoring powers while the private operators focused on water delivery.<sup>360</sup>

## Participation, Accountability and Transparency



Najafgarh Drain.

Residents have few opportunities to influence the budget-making process in India and Delhi such that more resources would be allocated to expand the water supply in underserved areas. At the national level, the Ministry of Finance consults civil society organizations for feedback on budget proposals.<sup>361</sup> There is also a prescribed period during which the public can comment on draft budgets that are tabled in Parliament.<sup>362</sup> However, the time that is allotted for this commentary is limited. In addition,

as explained by an expert consulted for this report, it is difficult for interest groups to predict when sectors relevant to them will be subject to discussion.<sup>363</sup> The economic survey, which is a situational analysis outlining budgetary needs according to sector, does not analyze the same sectors every year.<sup>364</sup>

The mechanisms for influencing the national budget in India are also not readily accessible to the public. However, India is not alone in this regard. A 2019 survey comparing how well countries perform in terms of budget accountability ranked India 53rd among the 117 countries it surveyed.<sup>365</sup> The level of information India provided to the public about how the government generated and allocated resources was deemed average. Budget analysts who authored the survey also found India to be slightly more transparent than the average country in terms of publishing budgetary information.<sup>366</sup> However, the information that the government provided fell short of that what was needed to support informed public engagement with the budget.<sup>367</sup>

---

<sup>358</sup> See Koonan & Sampat, *supra* note 346.

<sup>359</sup> *Id.* at 36-38.

<sup>360</sup> *Process to Provide 24x7 Water to Delhi Households Has Begun: Kejriwal*, *supra* note 339.

<sup>361</sup> Chakraborty, *supra* note 325.

<sup>362</sup> *Id.*

<sup>363</sup> *Id.*

<sup>364</sup> *Id.*

<sup>365</sup> Open Budget Survey 2019: India 2 (Apr. 30, 2020), available at <https://perma.cc/NK8W-9Z6V>.

<sup>366</sup> *Id.* An OECD study of 48 countries in Asia-Pacific similarly found that India was among only 20 percent of surveyed countries in the region that had evaluation tools to track budget transparency in the water sector. OECD, *Water Governance in Asia-Pacific* 16, 43 (March 26, 2021).

<sup>367</sup> Open Budget Survey 2019: India, *supra* note 365, at 2.



India fell below the global average in terms of offering forums for the public to debate the budget. While there were opportunities for the public to weigh in during the process of budget formulation, there was effectively no way for residents to affect budget approvals, implementation and evaluation.<sup>368</sup> Tracking expenditures related to climate change adaptation and the water supply may be especially challenging in India—as it is in other countries—since projects related to climate change and domestic water provision are usually part of broader programs. For example, resources set aside to tackle climate change are often allocated to programs promoting sustainable development in general. They are thus difficult to disaggregate.<sup>369</sup> Likewise, policy schemes addressing water supply are generally grouped within water, sanitation and hygiene initiatives (WASH).<sup>370</sup> Even when climate change is the sole purpose of a program, separating out costs attributed to climate change adaptation versus mitigation proves difficult.

Some studies suggest that the relatively limited inclusive budgeting policies which do exist in India at the national level are not replicated at the sub-national level, which makes it even more difficult to follow implementation of water policy. One observer noted that most municipal laws fail to provide opportunities for public participation, and budget documents are often difficult for the average resident to understand.<sup>371</sup>

In addition, researchers in a 2016 study noted that municipal governments often do not comply with national-level legislation that aims to guarantee public disclosures and public participation.<sup>372</sup> Therefore, proposals made at the municipal level related to water tariffs can go forward without public consultation or public input.<sup>373</sup>

## Community Efforts

In Bhim Nagar and Rajiv Ratan Awas Yojana, community members have successfully advocated for better access to water. While their enjoyment of adequate water remains limited, they have seen some improvements. In Rajiv Ratan Awas Yojana, for example, community members conducted vigilant advocacy with their local legislative representative and with the DJB to address issues like poor supply times.<sup>374</sup>

“In Baprola, we had enough water at first coming into our storage tanks and we could fill them up, but now that doesn’t happen anymore,” Mati explained. “The issue began when they started supplying water at very bad times.”<sup>375</sup>

Community members agreed that complaining “a lot” achieved results. “The water supply has gotten better over time because we have complained to the DJB,” Komal reported. “We have worked on this issue. We have phoned a lot,” she said.<sup>376</sup>

---

<sup>368</sup> Open Budget Survey 2019: India, *supra* note 365, at 7.

<sup>369</sup> ELISABETH RESCH ET. AL., MAINSTREAMING, ACCESSING AND INSTITUTIONALIZING FINANCE FOR CLIMATE CHANGE ADAPTATION 4 (2017).

<sup>370</sup> Gupta, *supra* note 74; Agarwala & Goel, *supra* note 287.

<sup>371</sup> Sirkanth Viswanathan, *Municipal Budgets Can Make a Real Difference to Citizens’ Lives: Here’s How*, THE INDIAN EXPRESS, March 3, 2021, available at <https://perma.cc/8AN8-3XVY>.

<sup>372</sup> Frederick Lee et al., *Urban Domestic Water Pricing in India and China*, 18 WATER POL’Y 68, 80.

<sup>373</sup> *Id.*

<sup>374</sup> Group interview with Baprola residents, Nov. 21, 2021.

<sup>375</sup> *Id.*

<sup>376</sup> *Id.*



In Bhim Nagar, community representatives filed an action with the Delhi High Court, which argued that the failure to lay new pipelines and fix faulty ones in their camp violated their right to life under the Indian Constitution.<sup>377</sup> The suit resulted in the extension of a water pipeline that provided a new community tap to the camp.

However, this litigation led to reprisals. The local state representative (Member of the Legislative Assembly) responded by threatening residents, stating that they should “get their water from the Court instead.”<sup>378</sup> When a new pipeline was laid, the representative retaliated by closing off water to the new community tap. Eventually, the DJB built a second pipeline in the area, restoring water access to the community.<sup>379</sup>

While the community has undertaken extensive steps to increase their water sources, governments should do more to ensure that all residents are not only equipped to face present water shortages but also the future effects of climate change in their communities.

---

<sup>377</sup> Interview with Resident of Bhim Nagar, Oct. 21, 2021.

<sup>378</sup> *Id.*

<sup>379</sup> *Id.*

## Recommendations

### To ensure the right to water in the context of climate change, the Indian government should:

- **Set out minimum guarantees of water availability** that correspond with the constitutionally recognized right to clean water. Regardless of the property rights of residents, the government should guarantee per capita daily water provision that meets World Health Organization standards for ensuring personal health and hygiene.
- **Reduce housing precarity** in order to encourage investment in community and household-level water infrastructure. Continuing to formalize the legal status of unplanned colonies and providing guarantees against forced evictions will incentivize the purchase of equipment that responds to water quality and water availability threats.
- **Clarify national and state government responsibilities** in terms of water management and make water policies obligatory. The overlapping responsibilities between national and state government agencies hinders coordination and slows action. In addition, the discretionary nature of water policies means that, while some promising policies have been announced, their implementation is not guaranteed.
- **Progressively increase national budgetary allocations** to environment and climate-related programs. The government should not regress in its funding of programs that mitigate climate change.
- **Continue to increase the resources allocated** to improving the water supply. These and other concrete steps are needed to guarantee communities' rights to water using maximum available resources. Maximizing resources involves comprehensive resource generation, resource allocation and resource expenditure. Example means of equitably generating resources include: progressive taxation and revenue raising methods, acquisition of development finance through grants, strengthening financial management systems, prioritizing funding the needs of marginalized communities and making budget allocation procedures transparent.
- **Enhance mechanisms for public participation** in the public budgeting process. This would empower communities to provide direction and oversight over programs that would tangibly affect their lives. Expanding forums for public comment and the time periods for providing that comment would improve participation. Involving communities in publicizing the budget and in evaluating budget implementation would increase transparency.



Collecting water from a communal tap. Translation: "This water is for cooking. Please don't waste water."

## The Delhi government and municipalities should:

- **Monitor water service delivery at household and community levels** in addition to monitoring sum totals of distributed water. Examining water provision within communities will provide more accurate assessments of the water supply, taking into account any losses between treatment plants and users. It will also enable the government to observe unequal distributions of water between communities.
- ;
- **Monitor the acceptability and quality of water** provided to communities—in addition to the availability and accessibility of water—to meet criteria corresponding to obligations under the ICESCR.
- **Expand and purify water resources.** Enforcing existing rainwater harvesting requirements for public buildings would significantly increase the water supply. Building aquifer restoration capacity within Delhi agencies would bolster groundwater resources. Investing in infrastructure for water storage would help preserve seasonally allocated water for use in hotter months. In addition, efforts to enhance the quality of water in Delhi should be undertaken.
- **Investigate whether financial allocations to water service delivery vary by community** and remedy any differential investments in water provision and infrastructure. Regulate water services so that water is equally affordable, accessible and safe for all. Equalizing water resourcing would advance progress towards Goal 5 (gender equality), Goal 6 (clean water for all) and Goal 10 (reduced inequalities) of the SDGs.
- **Publicize budget allocations for water infrastructure.** Provide opportunities for meaningful public participation in state and municipal level budgeting and in deliberations on climate and water policy. Increasing budgetary transparency corresponds with India's commitment to Goal 16 of the SDGs (building effective, accountable and inclusive institutions for all).
- **Explore tax and non-tax revenue streams** that would resource the extension of clean, reliable water to underserved communities, in line with the obligation under ICESCR to devote maximum available resources to fulfilling socio-economic rights.

## The governments of countries with historical responsibility for GHG emissions should:

- **Abide by the principles of equity and CBDR** at the heart of the UNFCCC and the Paris Agreement. Countries that have historically contributed to significant GHG emissions have a heightened responsibility to provide adaptation resourcing, including for implementing the recommendations above. They should also be at the forefront of financing mitigation and loss and damage.
- **Rapidly increase equitable international financing for climate adaptation**, as well as loss and damage, in India. While efforts to mitigate climate change are crucial, an insufficient amount of international climate financing is currently directed to adaptation. The Loss and Damage Fund, announced at the 27th UNFCCC Conference of States Parties, is not yet operational. Meanwhile, there is an urgent need to protect communities in Delhi from the harms of climate change.



- ***Deliver on the commitment made through the Copenhagen Accord*** at the 15th UNFCCC Conference of States Parties. To avoid a breach of trust, developed countries should be providing at least USD 100 billion per year retrospective to 2009 for the mitigation and adaptation needs of developing countries. States should also make new climate change resources available, which are not withdrawn from Official Development Aid funds. Sufficient, predictable and sustainable means of financing are key to effective climate change initiatives.

### **All governments should:**

- ***Cooperate in the areas of data gathering, capacity building, innovation, financing and governance*** in order to guarantee water for all. The 2023 UN World Water Development Report identified such partnerships as crucial to delivering universal water access. In addition, all UN Member States have committed to partnering together for sustainable development (SDG Goal 17). Moreover, international cooperation is required to achieve Goal 5 (gender equality), Goal 6 (clean water for all) and Goal 10 (reduced inequalities) of the SDGs.
- ***Restructure international tax governance arrangements*** to increase public funding for public services, including for water services. Governments should work together to elaborate the UN Tax Convention, which would address illicit financial flows as a systemic, global drain on the public resources required to fulfill human rights.

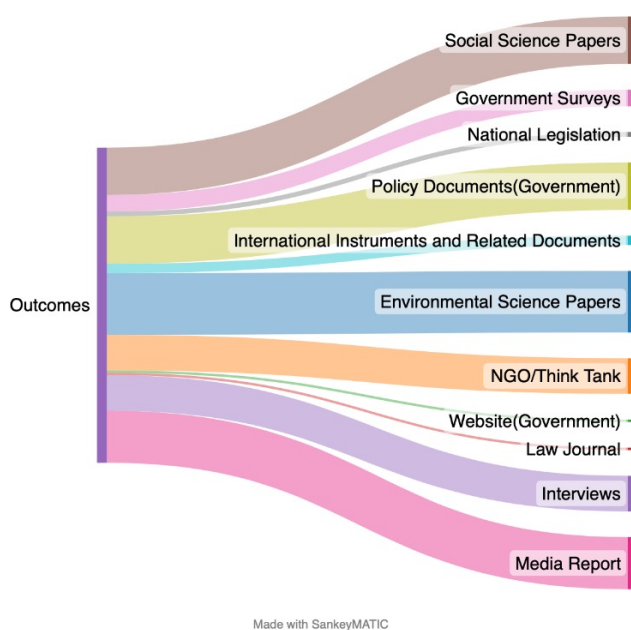
## Appendix

### OPERA Framework

The research in this report was conducted by following OPERA, which is an analytical framework developed in 2012 by the Center for Economic and Social Rights to assist with identifying systemic deprivations of economic and social rights (also called “socio-economic rights”).<sup>380</sup> The OPERA framework prompts researchers to gather information corresponding with the human rights standards in the International Covenant on Economic, Social and Cultural Rights. The name, OPERA, abbreviates the four dimensions of the framework, which focus on: Outcomes, Policy Efforts, Resources and Assessment. The framework also identifies questions to be answered to measure each dimension systematically. It further suggests methodological tools that could be useful for answering those questions.

“Outcomes” relates to the situation on the ground. The outcomes dimension answers questions about focus communities in terms of their enjoyment of a socio-economic right. “Policy Efforts” are the measures taken by governments that have a bearing on enjoyment of the right in question. “Resources” examines the way governments raise, allocate and spend funds to implement relevant policy efforts. “Assessment” is a determination of the adequacy of the efforts taken by the governments to fulfill the right at issue, taking into account broader contextual factors.

Using the OPERA framework led this report’s authors to a range of sources, including government and NGO reports; studies from the fields of anthropology, political science, sociology and meteorology; media reports; government surveys; budget and census information; national legislation; legal decisions; international instruments and interviews. The authors relied largely on secondary sources at the preliminary stage of research before consulting primary sources—particularly interviews with experts and community representatives—to build confidence in their findings.



**Figure 9:** ‘Outcomes’ Sources.

To understand “outcomes,” researchers look for relevant socio-economic indicators and disaggregated data to show general levels of enjoyment of a right and any disparities in enjoyment of that right. They also compare data over time to measure progress. While anecdotal community input can be included in an outcomes analysis, researchers generally aim to locate sources that point to realities experienced by wide segments of the population and on a system-wide basis. Both qualitative and quantitative sources are useful for this analysis. In this report, the authors primarily relied on government reports, social science papers, science articles, media reports and NGO reports to understand the “outcomes” experienced by communities.

<sup>380</sup> CENTER FOR ECONOMIC AND SOCIAL RIGHTS, THE OPERA FRAMEWORK: ASSESSING COMPLIANCE WITH THE OBLIGATIONS TO FULFILL ECONOMIC, SOCIAL AND CULTURAL RIGHTS (2017), available at <https://perma.cc/3MLA-EGXU>.

To understand “policy efforts,” researchers look for legal and policy commitments that reflect governments’ efforts to fulfill a right. It is important that both stated commitments and implementation of government policy are explored. Researchers also regularly examine the role that communities could and do play in the policymaking process. In this report, the authors primarily relied on international instruments and their accompanying monitoring documents, government documents and environmental science studies to understand “policy efforts.”

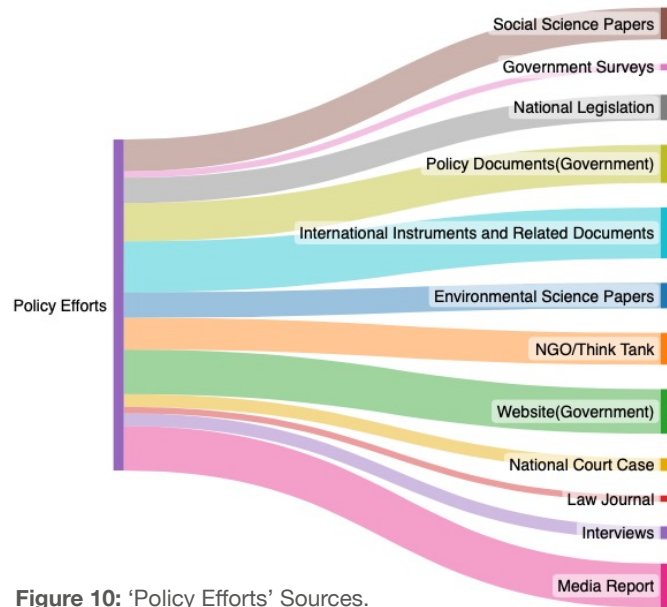


Figure 10: ‘Policy Efforts’ Sources.

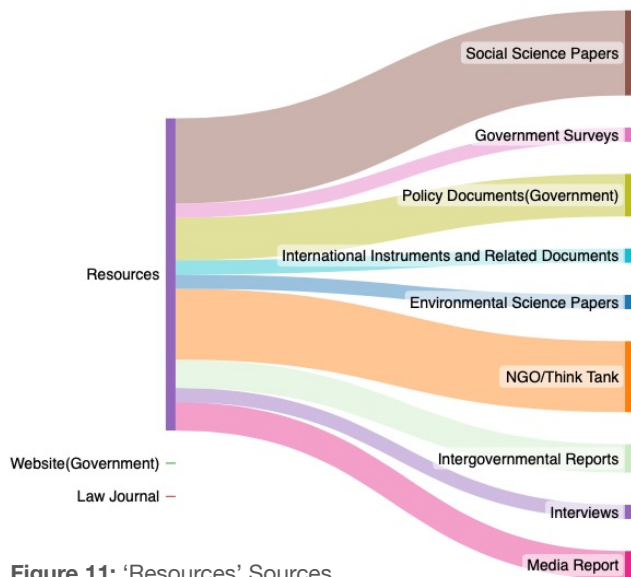


Figure 11: ‘Resources’ Sources.

To understand “resources,” researchers look for documentation of how government funds are raised and spent. Researchers should investigate whether expenditures are equitable and whether government funds are increasingly devoted to guaranteeing the right at issue. Whether communities play a role in influencing and auditing budgets is another important factor. Here the authors primarily relied on publicly available government budget information, think tank and NGO reports, economics papers and other policy documents to understand “resources.”



Assessment involves evaluation of the sufficiency of the policy efforts undertaken and of the resources generated and allocated based on any other contextual factors. It is also important to determine whether there are other factors that constrain government choices. However, constraining factors are not pre-determined. They could be internal or external. They could involve private or public stakeholders. They could be present or historical realities. However, it is important that researchers make an assessment about whether governments have met their human rights obligations with such constraints in mind.

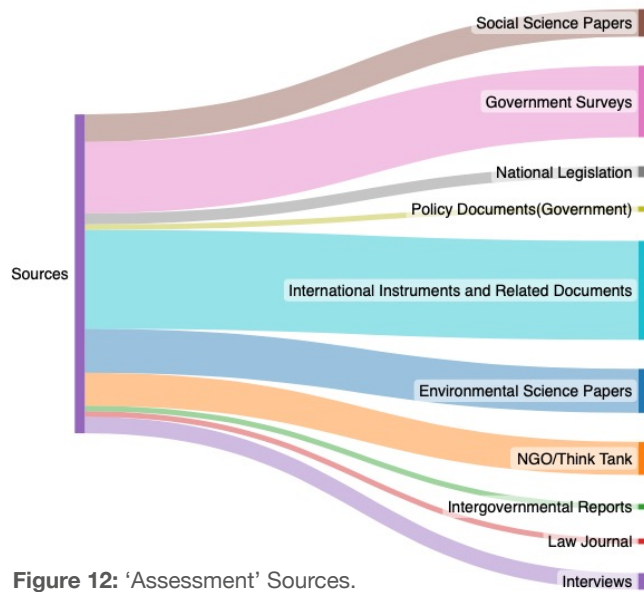


Figure 12: 'Assessment' Sources.

OPERA provides a coherent structure around which to build persuasive advocacy aimed at linking systemic inequalities to governments' policy decisions. The framework enables researchers to pinpoint structural failures that result in inadequate or unequal enjoyment of human rights by focus communities. OPERA also prompts researchers to consider helpful benchmarks—such as comparisons to similarly situated governments or communities—to determine the adequacy of government actions. This report is the first time that the OPERA framework has been used to explore human rights disparities and accompanying responsibilities in the context of climate change.

