

# Water Security in Africa in the Age of Global Climate Change

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*This essay explores the multiple ways in which the nexuses between water scarcity and climate change are socially and historically grounded in ordinary people's lived experiences and are embedded in specific fields of power. Here we specifically delineate four critical dimensions in which the water crises confronting the African continent in an age of climate change are clearly expressed: the increasing scarcity, privatization, and commodification of water in urban centers; the impact of large dams on the countryside; the health consequences of water shortages and how they, in turn, affect other aspects of people's experiences, sociopolitical dynamics, and well-being, broadly conceived; and water governance and the politics of water at the local, national, and transnational levels. These overarching themes form the collective basis for the host of essays in this volume that provide rich accounts of conflicts and struggles over water use and how these tensions have been mitigated.*

Water is both a prerequisite for all life and is crucial to economic and social transformations and stable societies. Neither the human nor the natural world can survive without water. Yet there are increasing concerns among scholars, state officials, and development experts about the alarming misuse of water, which has resulted in almost every major river being dammed and diverted, millions of people denied regular and equitable access to clean drinking water, a rise in waterborne diseases, and unpredictable flooding.

Because aquatic sources are unevenly and irregularly distributed within and between African nations, water has become a contested resource, increasingly privatized and commoditized. The inequities in the use and distribution of aquatic resources have become a source of intensified tension and conflict at local, national, and transnational levels. Consider Cairo's highly publicized warnings that if the construction of the Grand Ethiopian Renaissance Dam results in the diversion of an amount of water flowing into the lower Nile, it will forcibly retaliate against its southern neighbor.<sup>1</sup>

Water scarcity in the Mekong Delta has precipitated renewed tensions between Cambodia, Vietnam, and China, while conflict has intensified between Mexico and the United States over control of the flows from the Rio Grande.<sup>2</sup>

The common refrain that “water is the source of life,” heard in traditional African proverbs and the desperate voices of environmental activists alike, is a clarion warning that we are on the precipice of major ecological crises, that is, unless we redouble our efforts and respond as urgently to this global challenge as we have, at our best, responded to the COVID-19 pandemic.

Climate change has seriously exacerbated these problems. The human-induced crisis – a result of greenhouse gas emissions principally through the unbridled burning of fossil fuels – has led to a heating planet that is threatening lives and livelihoods, particularly of poor people in Africa and other regions of the developing world.<sup>3</sup> The poor have disproportionately borne the impacts of the climate crisis in the form of seasonal weather changes, soaring temperatures, and floods and droughts.<sup>4</sup> Global concerns about the impact of climate change have thrown the spotlight on the availability of secure water sources in the face of frequent extreme weather conditions.<sup>5</sup> Although climate change issues now seem to figure prominently on the agendas of several governments and major cities worldwide, most have generally treated climate change as “more of an ‘issue’ than a real ‘crisis.’”<sup>6</sup> If the depredations of climate change did little to heighten the urgency for states and businesses around the world to find enduring solutions to the challenges of water scarcity, the unexpected virulent COVID-19 pandemic may just have provided the much-needed fillip for authorities to finally make certain that ample responses are put in place. When health officials underscored the centrality of water for washing one’s hands as one prerequisite in the prevention of the spread of the coronavirus, this exposed several countries’ ill-preparedness (from Zimbabwe and South Africa right through to the United States) to provide the most basic resource critical for the maintenance of the health and sanitation of their citizens, after decades of procrastinating to fix urban water infrastructure.<sup>7</sup> But as Leila Harris elaborately discusses in her case study of Accra in this volume, even when and where the state has afforded infrastructure and public services, urban residents often experience them differentially. This harsh reality is true not only in Africa and other parts of the Global South, but also in highly developed nations like the United States.<sup>8</sup> The water crises in Flint, Michigan, and the more recent shortages in Jackson, Mississippi, are cases in point.<sup>9</sup>

This issue of *Dædalus* explores the intensified policy debates and conflicts over water use as well as the efforts to mitigate these tensions. The contributors include scholars from Africa and the Global North who draw on insights from such diverse disciplines as anthropology, environmental studies, history, water engineering, political science/international relations, and law. Taken together, the essays in this issue focus on four critical dimensions of the water crises facing the African continent in an age of climate change: 1) the increasing scarcity, privatization, and commodification of water in urban centers; 2) the impact of large dams on the countryside; 3) the health consequences of water shortages and how they,

in turn, affect other aspects of people's experiences, sociopolitical dynamics, and well-being, broadly conceived; and 4) water governance and the politics of water at the local, national, and transnational levels.

Some of these issues were generated by wide-ranging conversations during the two-day colloquium on the theme "Water in Our Future," hosted by the American Academy of Arts and Sciences in Boston, Massachusetts, on June 19 – 20, 2019. Several scholars who participated in this meeting agreed to contribute to this volume and write reflective essays across a number of aspects of water security, including Jackie King (who had recently won the highly prestigious 2019 Stockholm Water Prize), Jennifer Derr, and Mucha Musemwa. We are delighted that other colleagues from Lesotho, South Africa, Zimbabwe, Belgium, Switzerland, Taiwan, and the United States agreed to contribute their research and lived experiences to our project.

While most of the contributors have recently conducted interdisciplinary fieldwork to determine how water scarcity has affected local communities across Africa, all of the contributors stress the importance of understanding the historical factors that have helped shape the current situation. Their investigations reveal that the end of European colonial rule did not mark a radical departure in the water history of the continent. While the power dynamics have shifted somewhat, colonial adulation of large development projects persists, as does the failure to recognize how these schemes often adversely affect the rural and urban poor.<sup>10</sup>

A water crisis sparked by climate change is threatening one-quarter of humanity.<sup>11</sup> A number of authoritative reports, foremost among them from the Intergovernmental Panel on Climate Change, have long concluded that climate change will have dire consequences the world over and will contribute to poverty, environmental degradation, and the further weakening of already fragile governments. The African continent, producing less than 4 percent of the world's greenhouse gases, has already borne the brunt of the externally induced effects of global warming;<sup>12</sup> many of its ecological systems have by now been ruinously transformed and are no longer of any significant value for its inhabitants.

This is, therefore, no longer an imagined possibility, but a lived reality of deleterious effects, especially with respect to access to water supplies, on the livelihoods of any number of people in sub-Saharan Africa. So, too, has water insecurity become an existential crisis for many Africans, although these daily realities hardly ever become headlines like the mega-water crises of Flint and Cape Town. Although the continent has large reserves of untapped water, aquatic resources are distributed unevenly. The major share of Africa's water resources lies in a few large basins such as the Congo, Niger, Nile, and Zambezi Rivers. At the same time, one-third of Africa's people live in regions susceptible to droughts and semi-aridity; intensifying climate change has put an additional 75 million to 250 million people at risk.<sup>13</sup>

Climate change, particularly rising temperatures and changing rainfall patterns, has had a multitude of immediate and far-reaching effects on water resources on the continent, on biophysical environments, and on peoples' daily lives. Among the most visible and deleterious effects of climate change are flooding, cyclones, droughts, drying up of rivers and lakes, and decreased quality of water. Soil erosion and reduced biodiversity have increased food shortages, led to the spread of disease, and exacerbated mass migration, which further compound the destructive effects of climate change in a negative feedback loop.<sup>14</sup>

In March and April 2019, for example, tropical cyclones Idai and Kenneth pounded vast areas of Malawi, Madagascar, Mozambique, and Zimbabwe. They are the most destructive tropical cyclones on record to have shaken Africa and the Southern Hemisphere/Southwest Indian Ocean, inflicting catastrophic losses of life and limb, including about 1,200 deaths and an estimated US\$2 billion in physical damage. This in a region that had already been experiencing long periods of endemic droughts, often leading to water scarcity (and food insecurity) of significant proportions in Zimbabwe, Namibia, Malawi, Mozambique, and Zambia. The 2015–2018 drought in Cape Town assumed legendary proportions as “Day Zero” – when dam water levels might fall past the threshold requiring a total shutdown of the municipal water supply – loomed large for residents.<sup>15</sup> Nothing more vividly reveals the effects of global warming and drought than the desiccation of a large portion of Lake Chad, once among Africa's largest freshwater lakes, covering 45,000 square kilometers in 1960. Fifty years later, it has shrunk to one-quarter of that size.<sup>16</sup>

At the same time, urban water crises due to rainfall variability, as well as aging infrastructure and booming populations, are destabilizing the African continent from Accra to Cape Town and from Bulawayo to the edges of the Sahel. The shortages of potable water have brought to the fore the inadequacies of established water supply strategies, the glaringly unequal waterscapes, and the divisive party politics that all too often perpetuate and deepen the unequal provision of potable water to different classes of city residents.<sup>17</sup>

Climate change will continue to modify the hydrological cycle, alter seasonal patterns, and introduce extreme weather. Severe droughts and floods demand rethinking orthodox strategies of managing water in order to combat the ruinous effects of climate change across the African continent. At the same time, we need to be cognizant of Harry Verhoeven's warning (see his concluding essay in this volume) against conventional wisdom that attributes the water crises almost exclusively to climate change and fails to recognize the resiliency of communities across the continent and their ability to cope with and creatively adapt to changing weather patterns. Climatic impacts and interactions within ecosystems and human institutions remain deeply uncertain and only partially understood. And it is around this uncertainty that the essays in this collection try to articulate why global warming matters, but also how sometimes powerful interests draw on cli-

mate discourses to veil their own developmental failures or offensive political strategies, as Verhoeven warns.

This issue of *Dædalus* draws particular attention to the increasingly urban nature of the challenges Africa faces. Water shortages, whether the result of colonially entrenched patterns of accumulation, incompetence and mismanagement, climatic shifts, or other causes, have become particularly acute in many of the continent's booming centers, such as Lagos, Johannesburg, and Kinshasa. These cities are facing severe shortages of potable water. Urban residents rely on adequate supplies of water for cooking, bathing, and urban gardens, while industries must have regular water supplies to sustain production. Water scarcity has highlighted health vulnerabilities in impoverished populations; the rising incidence of cholera and dysentery resulting from frequent flooding and poor disposal of waste is of particular concern.<sup>18</sup>

Water scarcity, nevertheless, does not inevitably produce crisis, as sociologist Lyla Mehta has pointed out. Instead, embedded in crises of water are crises of power relations: "flows of water are also flows of power."<sup>19</sup> Save for the most recent scholarship, which has begun to provide multiple and detailed meanings of scarcity, there is still a preponderance of popular literature that contains assertions that have dismally "failed to address relational and distributional aspects of water scarcity and their links with prevailing social power relations, which have a tremendous bearing on how water is used or abused."<sup>20</sup> As such, this issue of *Dædalus* seeks to unravel the often hidden yet significant inequities in access to water along the intersections of race, class, gender, and spatial/residential differentiation.

Embedded in the prevailing water scarcity discourse, especially as it relates to processes of urbanization, are critical characteristics designed to ensure the sustainability of the urban-construction project: namely, water commodification, marketization, and privatization schemes.<sup>21</sup> Moreover, many African countries, like others in the developing world, have had to contend with the contradictions inherent in the International Monetary Fund's and the World Bank's neoliberal reforms. In response to these policies, several governments significantly reworked the legal and policy fields in the water sector to create conditions for market-propelled and donor-driven water privatization.<sup>22</sup> Unsurprisingly, privatization and cost recovery have been received with contestation and protest, as they have been abysmally unsuccessful in providing low-income and poor residents with sufficient water supply services within their means. Clearly, the market-determined reforms within the water supply domain became one of the critical factors that helped create patterns of unequal access to water.

In many ways, therefore, there has been what geographer Diana M. L. Rivera, referring to the city of Bogota, has called a :

causal interconnection between the commercialization and transnationalization of the city's public multi-utility company as a strategy to be competitive in a globalized environment on the one hand, and the increasing number of households disconnected from the formal water supply networks particularly in low-income areas for non-payment of bills, on the other hand.<sup>23</sup>

There is a striking resonance between what has transpired in many African cities, such as Johannesburg (Dube Township), Harare, Nairobi, and Lusaka. Unequal access to water for many citizens in African cities and rural areas is, quite often, aided by structures of governance shaped by neoliberal dictates and contradictory state development projects dating back to the colonial period.<sup>24</sup> Consider the situation in energy-starved South Africa. There the parastatal energy company, Eskom, received privileged access to water for its mammoth energy plants, whereas poor people living adjacent to the plants have regularly suffered from acute shortages, since most of the water coming from nearby dams is diverted to Eskom's facilities and nearby coal mines.<sup>25</sup>

More citizens have attempted to navigate this complex situation by accessing water through multiple modalities, from expensive sachet and tanker truck water for drinking needs, to reliance on nearby vendors to fill local storage containers.<sup>26</sup> Many cities, from Accra to the Khayelitsha Township around Cape Town, are also seeking to navigate a "new normal" of nonstationarity of water sources, and highly variable precipitation and surface water runoff that challenge current infrastructures and assumptions related to secure water delivery.<sup>27</sup> This leads to fundamental questions about how the idea of water scarcity or water shortage informs ongoing governance practices, particularly when we recognize the many people who already live in a context of scarcity and uncertainty related to securing water for daily household needs.

Individuals, households, and communities have tried to adapt creatively to the shortage of potable water. Some have dug boreholes in search of clean water below Earth's surface. Others have built jo-jo tanks that they periodically refill with bottled water they have purchased. Both strategies, of course, require capital to which most urban poor do not have access.

One oft-suggested way of adapting to greater rainfall variability is the construction of ever bigger hydro-infrastructure. In the second half of the twentieth century, worldwide construction of large dams increased exponentially. From approximately five thousand in 1950, the number rose to exceed fifty thousand by the year 2000.<sup>28</sup>

The international community has provided material, ideological, and discursive support for these mega-projects, which would supply badly needed energy to the continent. The World Bank lauded dam-building initiatives and remained



the largest financier of dams until the early 2000s, funding more than six hundred dam projects in ninety-three countries over the last half-century.<sup>29</sup> Many engineers, economists, state officials, and representatives of the dam industry celebrated these mega-projects as icons of development and proof of man's capacity to dominate the biosphere.

Africa was swept up in the "dams' revolution." European colonial governments initiated major hydroelectric as well as irrigation projects in the name of modernization and prosperity, especially in the "developmentalist" years after World War II.<sup>30</sup> African nationalist leaders of all political persuasions and their postcolonial successors followed suit with unbridled enthusiasm.<sup>31</sup> During the second half of the twentieth century, African governments constructed more than one thousand dams, including twenty mega-projects such as the Akosombo Dam in Ghana, the Lagdo Dam in Cameroon, the Kanji and Bakolori Dams in Nigeria, the Kossou Dam in Côte d'Ivoire, and the Masinga Dam in Mozambique. By the end of the twentieth century, South Africa alone had more than 550 dams in operation.<sup>32</sup> Hydroelectric dams in Africa may be among the most enduring colonial legacies. They persist in ways that laws or traditions or patterns of life do not. They stand fixed in the landscape, changing the world around them while they themselves prove stubbornly resistant to significant change.

As in other parts of the world, the construction of large dams in Africa often had deleterious consequences. Mega-dams at Kariba, Aswan, Akosombo, and Cahora Bassa flooded hundreds of thousands of hectares of fertile farmland.<sup>33</sup> Thousands upon thousands of farmers, old and young, poor and rich, women and men, were displaced as a result. The Aswan Dam alone uprooted 120,000 people in Egypt and Sudan, while more than 80,000 Ghanaians were compelled to abandon communities adjacent to the Volta River; in the area of the Kariba Dam, 57,000 Gwembe Tonga were left homeless.<sup>34</sup>

In these and many other cases around the continent, the physical, social, and cultural worlds of displaced peoples were turned upside down. People located downriver from the dams also found their livelihoods in peril and critical natural resources degraded. Damming permanently alters a river's flow regime, particularly the timing and extent of flooding along its banks. This disruption jeopardized long-established agricultural production systems that depended on seasonal flooding to enrich alluvial soils. The destruction of downriver fishing industries, an increase in waterborne diseases, erosion of the shoreline and coast, degradation of aquatic ecosystems, and declines in riparian animal and plant life occurred as a result of dams across Africa. Among the conclusions of a highly influential report by the World Commission on Dams in 2000 was that "in too many cases an unacceptable and often unnecessary price has been paid to secure these benefits [of dams], especially in social and environmental terms, by people displaced, by communities downstream, by taxpayers and by the natural environment."<sup>35</sup>

After a short hiatus in the construction of hydroelectric projects following the scathing conclusion of the report by the World Commission on Dams, governments, with the support of bilateral and occasionally multilateral partners, began building dams with a newfound zeal, much of it owing to the emergence of new financiers, as the essay by Jyhjong Hwang in this volume evidences. Over the last fifteen years, dozens of major projects have been completed, or are under construction, in Sudan, Ethiopia, Rwanda, and Tanzania.<sup>36</sup> In Ghana, the Bui Dam across the Black Volta was finished in 2013.<sup>37</sup> Construction on another project, the Pwalugu Dam on the White Volta, began in April 2020.<sup>38</sup> There is also renewed interest in building the massive Grand Inga Dam in the Congo, which, proponents argue, could provide cheap energy to a vast region stretching from South Africa to Southern Europe.<sup>39</sup>

But even with the most sophisticated technology of the time, dams do not always function as engineers predict. Hydrologists and engineers have in recent years expressed concern about the stability of the aged walls of the Kariba Dam. If the dam walls break – which is debated as much locally as in international newspapers – about three million residents will lose their homes, livestock, and possibly their lives.<sup>40</sup> At the time of its construction in the late 1950s, it attracted worldwide attention as the largest infrastructure project of its kind. Today, Kariba has resurfaced as a symbol of the unintended consequences of megalomaniacal infrastructure projects.<sup>41</sup> After more than sixty years in operation, it has aged to fragility. Over decades of operation, the water coming out of the sluice gates has carved out a deep underwater plunge pool; if it gets too big, the dam's foundation will be washed out. If the dam breaks, 40 percent of the electricity capacity of twelve countries in Southern Africa would be destroyed.<sup>42</sup> The recent collapse of dams in India and Brazil, which left a toll of death and destruction, is a powerful warning of what might occur at Kariba or other dam sites in Africa.<sup>43</sup>

**S**eventy percent of the earth embodies water, yet a significant part of the global population regularly experiences dire challenges of accessing clean potable water because water resources are unequally apportioned. In sub-Saharan Africa alone, 29 percent of the population suffers from lack of access to clean and nearby water resources, let alone electricity, with women and girls bearing the brunt of water collection from distant places.<sup>44</sup> This unequal access to water and hydroelectricity raises critical questions about notions of scarcity, water governance, and the politics of water.

Issues of water shortages and distribution are embedded in specific biophysical landscapes, historical contexts, and fields of power. The rationale for privileging White settlers in relatively water-abundant Rhodesia over their rural Black counterparts was far different from the state strategy of building big irrigation projects in Egypt and the Sudan at the expense of the rural and urban poor.<sup>45</sup> As previous-



ly noted, government officials promoted large hydroelectric projects deemed essential for industrial and rural development in countries as diverse as Ghana and Mozambique.<sup>46</sup> In both countries, women, who often had to spend two to three hours a day fetching water, and young children, who are particularly susceptible to waterborne diseases, have paid the heaviest price.

The politics of water are not only critical at the local and national levels but affect transnational relations as well. South Africa's effort to appropriate water from the Lesotho Highlands and from neighboring Namibia has been a source of growing tension. Control of aquatic resources has, at times, strained relations between Egypt, Ethiopia, and Sudan. Some of the most highly publicized dams in Africa – the Aswan High Dam, the Kariba Dam, and the Lesotho Highlands Water Project – also cut across territorial frontiers, precipitating competing water claims.<sup>47</sup> Since Burkina Faso built the Bagre Dam upstream on the White Volta in 1992, spilling during the rainy season has caused devastation to riverine communities.<sup>48</sup>

Mega-water projects, often couched in terms of advancing cooperation between countries in harnessing water and energy, regrettably leave or promise to leave local people more impoverished than before. In his recent essay, “Killing the Holy Ghost: How the Musina-Makhado SEZ Will Parch the People of Zimbabwe,” journalist Kevin Bloom exposes how a deal struck between the Pretoria and Harare governments, through the Zimbabwe–South Africa Joint Water Commission, with financial and other help from Beijing, seeks to develop the R145 billion (US\$9.6 billion) Musina-Makhado Special Economic Zone (SEZ) industrial project on the banks of the Limpopo River. It would have its own 3,300-megawatt coal-fired power station, as if planners were oblivious to the effects of global warming. The project will draw water from the Tokwe Mukosi Dam in Zimbabwe, built 250 kilometers from the South African border. It was built to provide irrigation and electricity for the sugar plantations as well as African peasants and small-scale farmers to alleviate water scarcity problems in the semi-arid Masvingo Province. Bloom notes that the draft Environmental Impact Assessment (EIA) concedes that climate change will have detrimental effects for both Zimbabwe and the SEZ, which intends to siphon water from Zimbabwe for its operational requirements. While the EIA report states that water will be drawn from the Tokwe-Mukosi, it is silent on the thousands of Zimbabwean locals who were displaced when the dam breached during a disastrous flood in 2014, resulting in a litany of alleged state-sponsored abuses documented by Human Rights Watch.<sup>49</sup> Only time will tell how water destined for the SEZ in South Africa will undermine water security for Zimbabwean farmers and their sugar plantations.

**T**he contributors to this issue of *Dædalus* share the concern that without local, national, regional, and global commitments to creating more equitable access to water, the effects of water insecurity on the urban and rural

poor will continue to be devastating. The authors drill down on the deleterious effects of water scarcity on the daily lives of farmers and urban dwellers, women and men, old and young, across the African continent. Their research highlights the vulnerability of the underclasses whose voices have long been silenced by those in power and their economic allies, whose dreams of development would only benefit themselves. The authors raise the troubling question: development for whom?

In her essay, “Everyday Experiences of Water Insecurity: Insights from Under-served Areas of Accra, Ghana,” Leila Harris shows how the urban poor in Accra live through the “everyday” occurrence of nonavailability or scarce provision of water. She stresses that water scarcity and insecurity are not impending crises exacerbated by climate change, but have long been a challenging reality for many. Based on long-term multi-sited and multi-method research, Harris focuses on regulatory challenges and risks associated with a fixation on built infrastructure, as opposed to the ongoing realities of water insecurity experienced by marginalized communities and concomitant effects on social life. The experiences of the urban poor in Ghana are evident in metropolises throughout the continent.

Over the last three decades, Zimbabwe has been in the throes of economic collapse and the resultant breakdown of social services. One distinct marker of this deterioration has been the worsening provision of water and sanitation services in Zimbabwe’s urban centers. Mucha Musemwa, in “Urban Struggles over Water Scarcity in Harare,” examines how urban residents in Harare have had to contend with water shortages dating back to the colonial era, but which manifest in increasingly acute forms today. This scarcity is situated in a region with relatively good rainfall. Since independence in 1980, the ruling Zimbabwe African National Union–Patriotic Front (ZANU-PF) party has regularly blamed the perennial contemporary water crises on the economic sanctions imposed on Zimbabwe and on twenty-first-century global warming. By contrast, Musemwa documents that scarcity lies in the environmental, historical, and structural injustices occasioned by colonial segregationist architects of the Rhodesian settler society in the late nineteenth and twentieth centuries, as well as the woeful governance track record by the postcolonial ZANU-PF state. As water shortages have increased, inequalities between residents have deepened and struggles between urban residents and politicians over access to water have intensified. In the process, residents have had to resort to protests against urban authorities and have turned to creative, but usually unreliable and unsafe, ways of obtaining water for survival.

Matthew Bender explores the interrelationship between water access, resiliency strategies, and the impending climate crisis in contemporary Tanzania in his essay “Water for Bongo: Creative Adaptation, Resilience & Dar es Salaam’s Water Supply.” He approaches his subject from a historical lens, asking how the history of water access resiliency, in both rural and urban Tanzania, can inform strate-

gies for mitigating future shortages. Bender contends that in much of the country, users have long developed creative strategies for managing periodic scarcity. In addition to technologies like irrigation canals, boreholes, and cisterns, they have also adopted practices such as multiple sourcing. This is true for urban spaces as well, like the fast-growing metropolis of Dar es Salaam, where the lack of reliable, affordable, public water has encouraged users to rely on their own ingenuity for water provision. Bender's essay indicates the potential for these strategies to inform present and future water planning, and to address impending water scarcity due to climate change. In the process, it also challenges the divide between rural and urban that has long shaped water planning.

In her comparative essay on water scarcity and health in urban Africa, Julie Livingston demonstrates that water is the cornerstone of public health. She, like Bender and Musemwa, reveals that many of Africa's largest cities have unreliable water supplies and this shortage is escalating as a result of the urban boom. Clean water is essential for healthy food preparation but urban residents often have no alternative but to consume contaminated water, which causes recurring illnesses and heightened morbidity. Many postcolonial governments have made efforts to improve access to potable water the cornerstone of their public health policies. Nevertheless, a wide array of waterborne illnesses persist, including cholera and typhoid. They disproportionately affect the most vulnerable urban residents: babies, the elderly, and the destitute. The commodification of water has simply highlighted the sharp economic divides between those who can purchase bottled water and those who cannot.

The spread of debilitating, and sometimes deadly, waterborne diseases has been further exacerbated by the dam revolution throughout the African continent. The mammoth Aswan Dam and the integrated system of irrigation canals constructed to promote cotton cultivation and year-round agriculture are cases in point. In her essay on parasitic diseases, "The Dammed Body: Thinking Historically about Water Security & Public Health," Jennifer Derr documents how the building of Egypt's Aswan Dam in 1902 precipitated a dramatic increase of schistosomiasis. Based on household studies, researchers estimate that approximately 60 percent of peasants who farm adjacent to the canals came to suffer from the disease. The canals proved to be the ideal habitat for the tiny freshwater snails that carried the parasites. In addition, cultivators were also infected with hookworm in large numbers, as a result of the increase in the moisture level of the soil. The dam had other indirect effects on the health of the riverine population. As diets shifted toward corn as their basic foodstuff, because its growing cycle mimicked that of cotton, many suffered from pellagra, which results from an overreliance on the grain.

In his essay "Ghana's Akosombo Dam, Volta Lake Fisheries & Climate Change," Stephan Miescher shifts the angle of vision to the countryside to ex-

plore the effects of the Akosombo Dam and the recently completed Pwalugu Dam on water use and water security for people living along the Lower Volta River. In the 1950s and 1960s, the promoters of Ghana's first dams, Akosombo and Kpong, emphasized the need for generating electricity to modernize and industrialize the new nation.<sup>50</sup> The planners of the Pwalugu Dam have embraced a different rhetoric of water management under increasingly difficult circumstances. Due to climate change, the northeast and upper-east regions, where Pwalugu is located, have endured droughts that have devastated local agriculture. The new dams will enable the establishment of an irrigation scheme covering an area of 24,000 hectares to produce rice and maize as well as provide water supply during the dry season, while also offering flood control.

The massive Cahora Bassa hydroelectric project was completed on the Mozambican stretch of the Zambezi River in 1974, the year before the end of Portuguese rule. Allen Isaacman in "Cahora Bassa Dam & the Delusion of Development" documents how from its inception, the hydroelectric project, designed to provide cheap energy to apartheid South Africa, had a catastrophic effect on the lives of the approximately half-million people who depended on the river and its delta for their livelihood and for the tens of thousands who were forcibly relocated when the dam's lake was created. Despite the traumatic history of Cahora Bassa, the postcolonial government is committed to a colonial-era plan to build a second dam approximately 60 kilometers downriver from the first one. In many respects, Mphanda Nkuwa, as the dam project is called, looks like a replay of the colonial past. The postcolonial state of Mozambique justifies the dam in language largely unchanged from the days of Portuguese rule. The overarching economic imperative driving the dam is the same: cheap energy for South Africa. According to environmentalists, Mphanda Nkuwa is being pushed through without proper impact studies. And as with Cahora Bassa, decisions on Mphanda Nkuwa have generally occurred behind closed doors. Impacted communities have had little meaningful say in what is to befall them. The Mozambican government has deferred the start-up date for the new project, depending on external funding most likely from China and a commitment from the South African government to purchase the bulk of the electricity. In the process, farmers living near the proposed dam site have been in suspended animation for nearly two decades as the state periodically pursues these negotiations.<sup>51</sup>

Mozambique is not the only African state seemingly wedded to grandiose visions of hydrodevelopment: the Nile Basin is not only home to Egypt but also to Sudan and Ethiopia, which have launched ambitious dam programs of their own. For decades, Ethiopia has been coined by natural scientists and its own bureaucracy as "Africa's water tower" because of the extraordinary levels of rainfall that land on its northern, central, and southern highlands. Harry Verhoeven's essay, "The Grand Ethiopian Renaissance Dam: Africa's Water Tower, Environmen-

tal Justice & Infrastructural Power,” analyzes the Grand Ethiopian Renaissance Dam (GERD), which since the start of the project in 2011 has escalated tensions in Northeast Africa and challenged Egypt’s historical hegemonic position in the basin. The GERD was and is intended to help expand the reach of the Ethiopian state, domestically and internationally: its reservoir is not only supposed to hold record quantities of water, but it is also intended to help provide the foreign currency necessary to help the nation industrialize and for the state to deliver public services to Africa’s second-largest population. Yet, as so often is the case with mega-projects, the GERD has been politically disruptive not only to riparian neighbors such as Egypt, but it has also altered the balance of power in Addis Ababa itself. Verhoeven explores how the project has intensified internal conflict among the ruling party leadership and fanned ethno-regional differences between the winners and losers of economic development. The project that was supposed to bring all Ethiopians together under a nationalist banner of environmental justice has been weaponized by elites jockeying for power in ways that threaten the survival of Ethiopia.

The stakes of the nexus between domestic state-building and redrawing international relations are not as existential and prone to violent escalation in Southern Africa, but they are nonetheless crucial to questions of human security and political influence. The Lesotho Highlands Water Project transfers water to South Africa under prescribed terms set out in the project’s treaty. Climate change has, however, adversely affected water resources in Lesotho, thereby threatening water transfer to South Africa. Oscar Mwangi’s essay, “Hydropolitics versus Human Security: Implications of South Africa’s Appropriation of Lesotho’s Highlands Water,” examines the relationship between climate change, hydropolitics, and water security in the context of South Africa’s appropriation of Lesotho’s water. Using securitization theory as a framework, Mwangi argues that climate change and its impacts upon water in Lesotho are real but that the country’s political elite has sought to instrumentalize the specter of environmental hazards to enforce the unpopular commodification of water. So-called existential threats are constructed on the basis of diplomacy rather than domestic socioenvironmental concerns.

Whether in the reform of South Africa’s water laws or in the work of the World Commission on Dams or through the declarations of the World Water Congress – such as the Melbourne Declaration in 2000 – governments, nongovernmental organizations, and social movements have repeatedly constructed sets of principles designed to frame the governance of water resources. Beginning with the creation of the “Water Law Principles,” issued by the Department of Water Affairs and Forestry as the Mandela government’s first step to water law reform in post-apartheid South Africa, and continuing with the work of the World Commission on Dams and subsequent international declarations, Heinz Klug, in “Between Principles & Power: Water Law Principles & the Governance of Water in Post-Apart-



heid South Africa,” explores how these appeals to principle have attempted to shape the governance of water in Southern Africa and beyond. From the delivery of water services to the management of transboundary water resources, the gap between the principle, practice, and politics of water grows ever wider. Finally, his essay draws attention to the relationship between water law reform, the framing of the international legal regime, and the impact of the dramatically changing hydrological environment across Southern Africa.

The rapidity with which the international context of water resources development in Africa is changing is also the focus of Jyhjong Hwang’s essay in this collection, “An Offer You Can Refuse: A Host Country’s Strategic Allocation of Development Financing.” She stresses the transformative role played by Chinese development finance, especially in the last twenty years as the World Bank and other multilateral donors have tightened conditionality pertaining to support for big dam and other development projects. Hwang’s essay nonetheless goes beyond arguing that China’s “no questions asked” policy is leading to a resurgence of environmentally troubling projects.<sup>52</sup> Drawing on an incisive case study from Liberia under the government of Ellen Johnson Sirleaf (2006 – 2018), she highlights the importance of African agency and the ability of African governments such as Johnson Sirleaf’s to shape the design and outcome of development projects to a degree that much of the extant literature continues to underestimate. Her conclusion is thus optimistic: new sources of donor funding might be leveraged for more inclusive use of and deliberation over water resources in an era of growing scarcity.

The final section in the volume poses the question: how can we do a better job of building dams in ways that are sensitive to the poor and their ecological environments and include them as equal partners in all future projects that impact their livelihoods? Jackie King and Cate Brown in “Africa’s Living Rivers: Managing for Sustainability” shed light on new thinking that is emerging in support of responsible dam development and what new considerations must be made to move away from the destructive path of the high modernist era when dams were built without due regard to proper environmental impact assessments. King and Brown stress that the massive global building program of dams and other water infrastructure in the last century were meant to support water security, food security, and new sources of energy. The decisions to construct were made primarily on engineering, economic, and political grounds – social and ecological inputs at that stage were at best rudimentary and often missing. The hidden costs of development were not understood at the time but have emerged ever more strongly over the last thirty years. They observe that rivers are degrading and dying; hundreds of millions of people in developing countries who depend on healthy rivers for their livelihoods are suffering or at risk; and wildlife are failing as their watery destinations disappear. Some countries and global funders are still tied to the

“business as usual” approach, perhaps through a lack of awareness of what is now possible in terms of new kinds of information. They may still see the environment as a commodity to be used at will, rather than as our essential support system that is increasingly and ever more rapidly degrading. The new call to “leave no one behind” is not working. We need to move from a mindset of entitlement and exploitation to one of respect, equity, and balance.

New thinking is emerging, encapsulated in “the ecosystem approach” or “nature-based solutions.” Such an approach requires that the management of human needs be based on a deep understanding of the natural resources being exploited. Specialists such as river ecologists and resource economists are bringing new thinking and methods into water planning and management, and properly costing out water developments alongside the benefits presented by developers and funders. This is not to halt development but to help governments make more informed and balanced decisions, and to empower all stakeholders to better understand what the future could hold and negotiate for the future they want.

In his conclusion to this issue of *Dædalus*, Harry Verhoeven, in “Climate & Water in a Changing Africa: Uncertainty, Adaptation & the Social Construction of Fragile Environments,” reflects on not only a changing climate and changing understandings of water security, but also on an Africa in transformation: how do its evolving political structures, economic networks, and social compacts influence its relationship to the environment, locally and globally? Synthesizing the key insights from the essays in this collection with his own analysis, Verhoeven argues that the dominant thinking about climate change and water security continues to be simplistically preoccupied with ideas of Africa as a victim of exogenous (and nefarious) transformation. This bypasses the long track record of many of Africa’s populations dynamically adapting to extremely difficult circumstances and various African imaginaries of what climate and water security entail. It also fails to think through questions of political participation and social contestation, including the troubling ways in which African forms of knowledge about the environment have historically been marginalized and the continent has been integrated in global circuits of accumulation and power. How various African populations experience the interplay between science, authority, and institutions was and is central to explaining the discontents with “development” and “adaptation” in the twentieth and early twenty-first centuries, and they will remain significant going forward. This imperative, Verhoeven writes, entails

the need to listen to, critically engage with, and foreground African ideas about climate and water in all their diversity and multilayered complexity. There is no scenario in which African societies adapt successfully to climatic change and do not simultaneously radically reimagine both their relationship with the outside world and with each other, including the institutions of control and exclusion at home.<sup>53</sup>

This collection of essays is by no means an exhaustive treatment of the important subject of water security and water in Africa in the age of climate change. All the contributions focus on local lived social, ecological, and economic realities, as well as domains of power in several countries on the African continent. The constraints of space have made it impossible for us to explore related topics such as the state of Africa's forests, the economics and politics of desalination, and the so-called blue economy.<sup>54</sup> But it is our earnest hope that the topics and debates covered herein will trigger interest in the other dimensions we were unable to attend to as we continue to reflect on the implications about "Water in Our Future" in Africa in the face of climate change.

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