



PERSPECTIVES

The emerging landscape of water governance in Egypt post COVID-19

Adham Badawy^{a*}, Moustafa Moussa^{b,c}

Adham Badawy

**Corresponding author*

^aDoctoral Student, Department of Earth & Environment,

Boston University, United States;

E-mail: adhamb@bu.edu

ORCID: <https://orcid.org/0000-0002-6852-9061>

Moustafa Moussa

^bAssociate Professor, Faculty of Engineering,

Director of Valley of Science & Technology, Zewail City of Science and Technology, Mataria

Helwan University, Egypt

E-mail: mbadawy@zewailcity.edu.eg

Abstract

The COVID-19 crisis has caused a major reshuffle in the core of water governance principles, including food security, water productivity, self-sufficiency and water allocation to high-value users. The pandemic, as a sudden external driver, impacted such principles; this impact was noticed through the effects of the lockdown on exports of crops and supplies, as well as the reduced labour workforce. This article introduces a framework to analyse the effects of the pandemic on the water sector since traditional indicators and data do not capture the initial shock of the first wave of the pandemic. The framework is operationalized and applied to study the effects of the COVID-19 pandemic on the Egyptian water sector and on how it shapes water governance. The article analyses those changes in the urban water sector and in the agricultural sector. It analyses the effects it has on the urban water system, as the sector moves towards digitalization and safeguarding urban water supplies. In the agricultural sector, Egypt's position on self-sufficiency and food security policy changes in food imports and exports is analysed. Analysing the two sectors will allow us to see how COVID-19 could have changed the present and translated it into possible pathways for future water governance in Egypt. Moreover, the COVID-19 crisis has created opportunities for sustainable water governance in Egypt that can help deal with future crises. In addition, there are slow, creeping effects of climate change that Egypt has experienced when Cairo experienced a severe urban flood. The article draws insights from the past on how COVID-19 has

changed the present and translates them into future pathways for possible water governance in Egypt. Assessment of the reliability of the water sector undergoing crises or pandemic situations is crucial to facilitate decision-making so as to evolve action plans that can maintain the water availability for the people and safeguard essential services.

Keywords: Egypt water governance, water supply, food security, water security, water digitalization, water planning

1. Introduction

Globalization and technological advancements have made the world more connected than ever before, making world economies more vulnerable to the effects of lockdowns. Several countries are having to rethink their global value chains owing to the ripple effects of the pandemic (O'Hara & Toussaint, 2020). This is because trade in agricultural products is essential for increasing national income and reducing the instability of local food supplies (Baldwin & Evenett, 2020). Countries all over the world closed their borders and restricted the exports of crops, medical supplies and other essential goods as national interest and protectionism took precedence over everything else. This is mainly because national interests have been prioritized as a by-product of the COVID-19 pandemic (Ibn-Mohammed et al., 2020).

The pandemic has posed a variety of challenges to many countries that were not ready for them. Lockdowns have been necessitated worldwide, giving rise to many economic and social repercussions. The pandemic can be considered as a major milestone in modern civilization, with long-term implications for policies and the economy. COVID-19 has disrupted global food supply chains and exposed their vulnerability.

The negative effects of the pandemic have caused a severe reduction in GDP in many countries owing to multidimensional environmental and social issues. Socio-economic activities came to a standstill as the lockdown trapped millions inside their homes, borders were shut and manufacturing and travel industries halted (Ibn-Mohammed et al., 2020). The COVID-19 pandemic has brought greater uncertainty than that associated with the financial crisis of 2008–2009 and more comparable to the Great Depression of 1929–1933 (Baker et al., 2020). This includes uncertainty not only of the future but also of information, knowledge, data and risks.

The pandemic has exerted intense pressure on the water sector all across the world (especially in developing countries) in multiple ways; some countries faced water cut-offs during the lockdown owing to the limited availability of workers during restrictions (Warner et al., 2020). This created a health hazard as during a virus outbreak hygiene and access to water are crucial to preventing the further spread of the disease (Zeitoun et al., 2021). It also resulted in new narratives and discussions around the importance of access to safe water, sanitation and hygiene (WASH), especially in the Middle East (El Mouallem et al., 2021). Therefore, it was crucial to maintain a reliable supply of water to citizens to mitigate the effects of the spread of the virus.

The pandemic occurred at a critical phase in the transformation of the water sector into sustainable water management (Sedlak, 2015). This is because the water sector is moving towards sustainable use of the available water resources, based on principles of equity and environmental integrity. This transformation has been developing along with emerging technological advancements worldwide, like artificial intelligence and increased data processing power (Garrido-Baserba et al., 2020). This means that in the next era of water management and governance big data and machine learning will play an important role in achieving higher levels of suitability.

2. Case study: Egypt

Coping with the COVID-19 crisis can create an opportunity for changing the way water is governed in order to make it more resilient and prepared for the slow and creeping effect of climate change (Poch et al., 2020). We need to understand the changes, their root causes and the path towards rebuilding a resilient water sector. Accordingly, this article focuses on Egypt as a case study of a water-scarce country.

Egypt is situated in one of the driest regions on the planet, and its increasing population together with aspirations of economic development is at the heart of the challenges noted previously. In addition, there is increasing uncertainty in the River Nile flows owing to upstream mega project developments. Interestingly, in Egypt, the start of the lockdown coincided with heavy urban flash floods in the country, especially its capital, Cairo (Tawfik et al., 2020). Overflowing streets put its infrastructure to the test. Furthermore, Egypt imposed lockdown restrictions a few days after the flooding events, thus adding to the pressure on its water sector. This was a signal that Egypt needed to build its resilience and reconsider its water management strategies when faced with the combined effects of climate change along with the pandemic.

This article discusses the effects of the COVID-19 pandemic on Egypt with particular reference to the water sector, focusing on two dimensions: urban water supply and the agricultural sector. The study is based on the initial wave of the pandemic when data was scarce and the unknown outweighed the certainty. The following sections set out the framework used to analyse the changes in those sectors. Finally, it argues how Egypt can take advantage of this crisis to make policy shifts and redirect its strategies towards more sustainable and equitable water governance.

3. Conceptual framework

The pandemic can be considered a major milestone in modern civilization, and its effects are widespread. After the initial shock of the pandemic and in its early stages, experts in the water sector could sense the change of narrative but were unclear as to how to measure it. Changes were made in the provision of water and sanitation services and their reliability during the pandemic and also agricultural water use. Especially in Egypt, whose

water sector is complex in nature owing to the overlapping responsibilities of institutions and the various challenges noted previously. In order to assess the change under way, a simplified framework is used as a quick and initial assessment tool. The framework we propose consists of three main elements: **drivers**, **principles** and **characteristics**, which will be explained in detail in what follows:

1. **Drivers** are the main features that push and shape water governance and force it to change. They can be grouped into two categories:
 - ? Internal: Population growth, water scarcity and economic growth.
 - ? External: Climate change, global markets, upstream developments and the pandemic.
2. **Principles** refer to the values and their related targets that each component of the water sector adopts. These principles can trickle down from the global agenda or bottom-up from local conditions. One of the main principles in the international arena, for example, is the principle of water use efficiency and water productivity in SDG 6.4: ‘Substantially increase water-use efficiency across all sectors’ (United Nations, 2020).
3. **Characteristics** are features and properties that define water governance and the water sector. They reflect the form that the sector takes and how it behaves and operates.

In the framework proposed in this article, we make a connection between these three components, conceptualized in Figure 1. The drivers, both internal and external, shape water

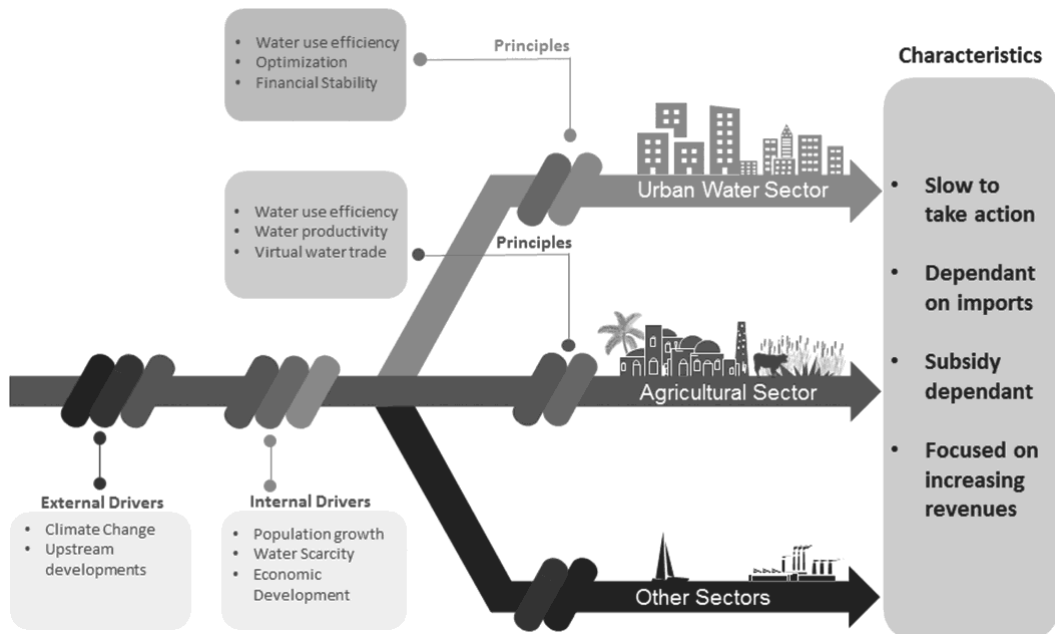


Figure 1. Conceptual framework connecting drivers, principles and characteristics of the water sector

governance and force it into change. The drivers not only reallocate water but also reshuffle the principles that guide every dimension of the water sector. Thus, when those principles are implemented, they shape the overall outlook of the sector. This picture has multiple characteristics that define the sector and the way it performs in the face of a crisis or challenge.

In this article we highlight the effects of COVID-19 on water governance in Egypt by examining how the pandemic, as a driver, reshuffled several principles in terms of their priority and importance for national governments. We are then confronted with a decision as to whether to undertake these changes over a short or long period.

In order to operationalize the framework, we used several data sources. We also analysed the narratives and policy actions that reflect the change in behaviour and priorities. Moreover, we used data on new projects and investments from the government through news reports and official statements as well as national statistics, besides analysing the views of various experts and scientists. The limited availability and accessibility of data on the water sector in Egypt have been exacerbated by the pandemic and the challenge in monitoring its pace and multidimensionality.

4. Analysis

The water sector in Egypt is undergoing continuous development and has always been perceived as the mainstay of the country's development and survival. Inevitably, therefore, this sector strongly relies on water savings and water use efficiency, which is promoted not only locally but, most importantly, also internationally in the SDGs indicators (United Nations, 2020). The Egyptian government thus invests in a more water-efficient and productive sector, in the knowledge that external factors like climate change can exacerbate the existing challenges (Tawfik, 2019). The pandemic put additional pressure on the water sector, which had already come under strain from the heavy flash floods that hit the country, especially the urban centres. This was a signal that Egypt was a victim of both climate change and the pandemic (Tawfik et al., 2020).

The framework outlined in the previous section has been operationalized in a way that highlights the effects of the pandemic on two sectors related to water governance in Egypt: The first is the urban water sector, which suffered more under the impact of the pandemic than did the other sectors. This was because of increased demands and lockdown restrictions affecting service provision. The second is the agricultural sector in Egypt, which has been undergoing extensive development in recent years and whose development narrative as a result of the pandemic has been somewhat altered, as will be discussed in the sections to follow.

4.1. Urban water sector

The urban water supply and sanitation sector in Egypt is complex in nature as it caters for one of the fastest growing populations in the world (Enterprise, 2019). This makes sustaining water supply and sanitation services very challenging and attempting to

interfere with and improve the system all the more so. Population growth is thus one of the biggest drivers of the sector, along with climate change and upstream developments that can affect the availability of water resources. Several developments and projects have been implemented by the Egyptian government in order to improve the service and expand its coverage (The Ministry of Planning and Economic Development, 2021). Water supply and sanitation services are heavily subsidized as water companies have limited resources available to invest in large infrastructure projects (Global Water Intelligence, 2017; Oxford Business Group, 2018). Egypt also faces challenges on the quality, efficiency and sustainability fronts of WSS service delivery. Efforts in this regard have focused on increasing the number of metered connections and reducing levels of non-revenue water. High staffing ratios coupled with low bill collection rates and low tariffs remain unresolved issues (Mumssen & Triche, 2017).

It is vital for decision makers to make an assessment of the reliability of water supply services in times of crisis or pandemic situations in order to lay out an action plan that can safeguard the availability of water and the conservation of essential services (Kalbusch et al., 2020). The pandemic, as an external driver, has affected the sector in various ways. First, the lockdown and restrictions allowed only limited personnel and half the total capacity to work at any given time (Mabrouk, 2020). These restrictions highlighted the essential workers that are critical to maintaining the systems like water and waste water services. Water and waste water treatment plant operators and technicians and pumping station operators were all essential for sustaining water and sanitation services, which, besides being fundamental to daily sustenance, are critical during a pandemic, when extra care to maintain hygiene and handwashing is needed. This proved extremely helpful as many water companies are overstaffed, with consequential effects on their financial performance. Re-evaluating those jobs and their significance for the sustainability of the service can reorient the urban water sector to focus more on principles like efficiency and optimization for workers than on network efficiency and non-revenue water alone.

Second, the lockdown made collection of water bills more challenging, placing a financial strain on water companies, which are highly dependent on subsidies and any revenue stream from collected bills or new connections. Rather than focusing on water saving or optimization, the sector was driven to adopt new mechanisms for collecting bills, as in emergencies and during lockdowns fewer water bill collectors were available and applications for new connections significantly decreased. Prepaid water metres proved to be essential as their bills are collected in advance, providing cash flows for utilities in order to secure stocks of chemicals and equipment for operation.

Many experts have long argued the need for digitalization in the sector; however, the pandemic was the main driver that accelerated the transformation into a digitalized urban water sector. The pandemic has acted as a catalyst for the digital transformation of the urban water sector, as after the first three months since the start of the lockdown the holding company for water and waste water announced the availability of a digital application for the payment of water bills. The mobile application (HCWW-125) allowed users to pay water bills and also informed them about maintenance and scheduled shut-downs, in addition to serving as a platform for communicating complaints (Abd El Naser, 2020).

Third, as a consequence of the pandemic, many countries resorted to closing their borders and preventing the export of chemicals and equipment needed for the operation of treatment plants and pumping stations. The lockdown has brought to light a new dimension of the principle of water security as securing chemicals for the operation of plants has placed an extra burden on water companies; having reserves of those chemicals and equipment would make the sector more resilient to such sudden shocks.

4.2. *Agricultural sector*

Egypt's agricultural sector has been developing in recent years despite several challenges like water scarcity, food security and maximizing water and land productivity. Yet the pandemic put the sector to the test in order to absorb its effects, especially restricted imports and limited access to labourers. Export restrictions imposed by some countries have disrupted trade flows in respect of staple foods such as wheat and rice. In March 2020, and by 6 July, 21 countries had announced or introduced (temporary) export restrictions covering almost 4% of the caloric value of globally traded food (Laborde et al., 2020). As many countries closed their borders and restricted crop exports, the Egyptian agricultural sector seized the opportunity to increase its agricultural exports as restrictions are limited owing to the pandemic. Egyptian exports reached 3 million tonnes before the middle of the year (Gamal 2021) The pandemic also highlighted the importance of national food security: As countries stopped exporting their produce, other countries that were fully dependent on agricultural imports were placed at risk. Meanwhile, the main principles in the global agenda for agricultural development that focused on efficiency and productivity, producing more with less water, have been reshuffled. COVID-19 is showing how the SDGs and the principles of development are not resilient to such global drivers. Many of the targets will not be met by 2030; Goal 2: Zero Hunger and clean water and sanitation are both threatened by COVID-19 (Naidoo & Fisher, 2020).

During the pandemic, Egypt intensified its efforts to secure strategic crops like wheat, of which the country has become their biggest importer (A.Moneim, 2020). The government secured 1.6 million tonnes of locally produced wheat during the first 3 weeks of its harvest, doubling the amount of wheat it had secured the previous year. The ministry of supply and internal trading is studying the feasibility of constructing massive silos for key strategic crops like wheat in seven governorates, at an estimated cost of 1.3 billion dollars. This project would create in the country a strategic storage capacity of those crops for 8 to 9 months (Gamal, 2020).

The pandemic has highlighted the importance of national food security and self-sufficiency, concepts that were challenged by globalization and free trade. It raises the question about water and where it should flow: Should the water go towards producing high-value crops and exporting them and importing water-intensive crops, or should water flow towards crops that contribute to national food security and provide a buffer for external crises (like the pandemic). The core ideas of virtual water trade (Allan, 1997) between countries and water flowing from countries that are water rich to those that are water scarce – through products (Hoekstra, 2003) – has been challenged as the pandemic has

compromised all four pillars of food security: availability, access, utilization and stability (Laborde et al., 2020). It has thus disrupted global markets and food trade, undermining their resilience and reliability for countries' food security.

5. Discussion

The COVID-19 pandemic and its unique characteristics served to shake the steady state of the water sector, which was shaped by slow-creeping drivers. Most of these drivers usually work their effects on the sector gradually, and even in the case of climate change, which many researchers claim to be in need of immediate action, none is taken promptly. Since the cause–effect relationship is distant in time and slow paced, it does not trigger immediate and urgent action, as in the case of climate change or increasing water scarcity. The change in the water sector, which has been occurring over decades, was not easily identified until the pandemic caused a sudden shock. The shock made it possible to re-evaluate the guiding principles and the characteristics of water governance in Egypt. Experts in the water sector exchange experiences and views on its steady-state slow development. This occurs as its performance is usually assessed and compared under the steady-state conditions of the slow-creeping external and internal drivers. The epidemic thus made it possible to observe a change in the water sector in a short time, a change whose effect could either be short term or protracted.

With a view to examining this change, a framework was developed by the authors and applied to the Egyptian water sector in order to unbundle the process of change in the sector as a link between drivers, principles and sector characteristics. The previous sections have used two lenses to observe how the COVID-19 pandemic has reshuffled several principles that shape water governance in Egypt. The pandemic has come as a sudden and unforeseen external driver to the water sector. The coronavirus has also created a sudden change to the system compared with the usually slow-creeping effects of population growth and climate change. It has revealed the need to rethink our society in order to prepare for future challenges such as climate change as well as further outbreaks. Accordingly, water systems must be further developed to deal with such a total reimagining of infrastructure and digitalization (Poch et al., 2020).

We argue that the process of adaptation to the pandemic can provide a unique opportunity to develop the water sector; to make use of a crisis to prepare for adverse climate change. The pandemic has been described as an opportunity to further establish the digital transformation of the water sector, which can be a new paradigm for sustainable and equitable water use. The effects of the pandemic have been analysed and described. But we recognize that it can transform the water sector, shown in Figure 2. This can be done by building on the strengths highlighted by the pandemic and overcoming the limitations and weaknesses. We attempt to recognize the change without using the same indicators used to assess the performance of the water system under its steady-state conditions and drivers. The epidemic has revealed that countries can 'change drastically in order to adapt to new realities' ('Time to Revise the Sustainable Development Goals,' 2020). Thus, it is

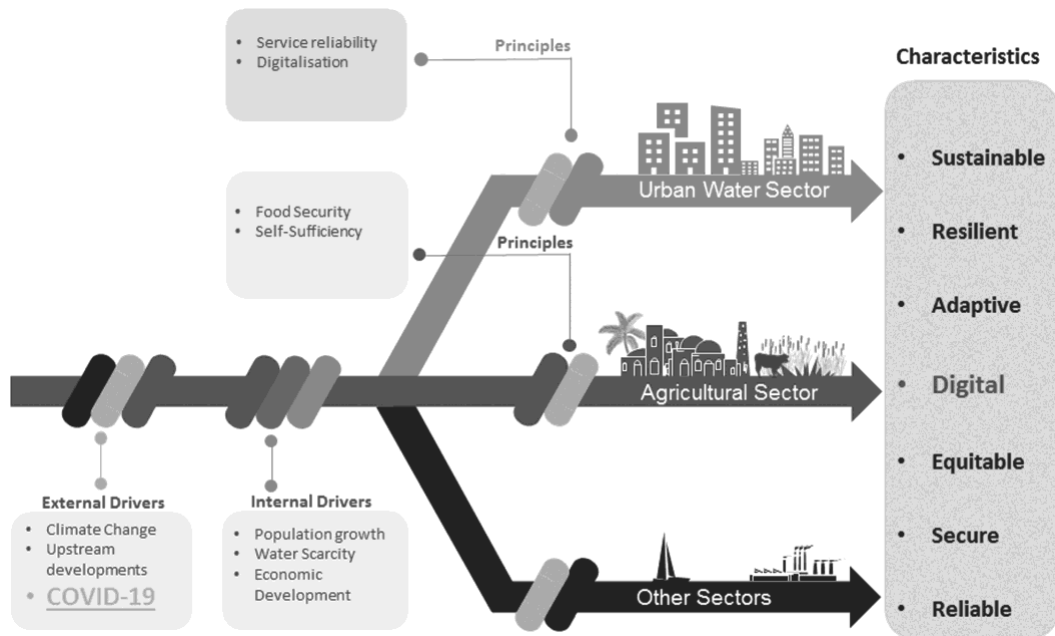


Figure 2. Potential transformation of water sector owing to COVID-19

important to rise to the occasion and use the crisis as a vaccine to increase the resilience and adaptive capacity of the water sector, not only for sudden shocks but also for the slowly creeping ones.

6. Conclusion

The COVID-19 pandemic has taken the world by shock, disrupting daily lives and causing a global lockdown. Several countries closed their borders, restricting the export of food and goods. COVID, as a sudden shock, tested the stability of the sector and acted as a driver that reshuffled its principles, thus shaping its characteristics. It was sensed and observed by experts but not measured or described until later, as the aftermath of the pandemic was getting clearer. The lockdown also meant that countries imposed restrictions on workers and labourers, thus limiting the manpower available.

In this article, a framework was developed to identify and observe the effect of the pandemic on the water sector. Through the framework the change was analysed by looking at three dimensions: drivers, principles and characteristics. The framework was operationalized by collecting information through narratives and news in view of data limitations and irregularity because of the pandemic, as well as the short time available to capture it.

The article highlighted the change effected by the pandemic on the water sector in Egypt, by looking at the urban water sector and the agricultural sector. The article traced

how the narrative changed in the sector, thus reshuffling several core principles that were prominent in the international water arena. It presented a framework to analyse and recognize the change occurring in the water sector owing to the sudden shock caused by the epidemic. It analysed how the pandemic served to reshuffle the core principles that shape water governance and eventually characterize it. Principles like virtual water trade and water use efficiency lost merit against calls for food security, self-sufficiency and resilience. It was also shown how the pandemic served as a catalyst in the digital transformation of the country's water sector, as the urban sector moved to digitalization in a matter of mere months, defying expectations before the pandemic struck that it would have needed years. This transformation will surely affect water governance in Egypt as it may lead to a more optimized water sector.

We argue that even though the pandemic had massive negative global impacts, the water sector could make use of it to prepare for the adverse effects of climate change and population growth. This is especially true of Egypt, as it is on track to reach its aspirations of economic development, a key pillar of which has always been water. The crisis can shape water governance in Egypt towards sustainable and equitable water use.

Finally, we invite experts, scientists and researchers to use, adopt and adapt the framework and open a discussion into how change in the water sector can be identified and observed, especially when it comes as a sudden shock. It is essential to inherit such frameworks in the sector in order to diversify the rationale in water governance against mono-planning in preparation for future shocks and drivers. The assessment of the reliability and resilience of the water sector in crisis or pandemic situations is crucial so that the decision-making process can evolve action plans to maintain the availability of water for the people and safeguard essential services.

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