

# Digital Finance in the Real Economy: Water

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Digital finance can help make universal access to clean, affordable water a reality.

## **Sustainable Development Goal (SDG)**

### **Number 6:**

Ensure availability and sustainable management of water and sanitation for all.



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## Development Challenges in Water

# Water access gaps and global consequences

**844 million**

people do not have access to a clean source of water.<sup>1</sup>

**842,000**

deaths, annually, could be prevented by improved water sources.<sup>2</sup>

One-third of the deaths are children.

**2.1 billion**  
lack access to safely managed water.<sup>1</sup>

CGAP has focused on water access because it is strongly linked to digital finance—but many of the innovations described here will apply to sanitation as well.

## Development Challenges in Water

There are long-term benefits to clean water and sanitation.

Meeting SDG 6 requires \$114 billion per year—three times more than what has been spent on water.<sup>3</sup>



And, achieving universal access to in-home water and improved sanitation would eliminate

**70%** of diarrhoeal disease.<sup>5</sup>

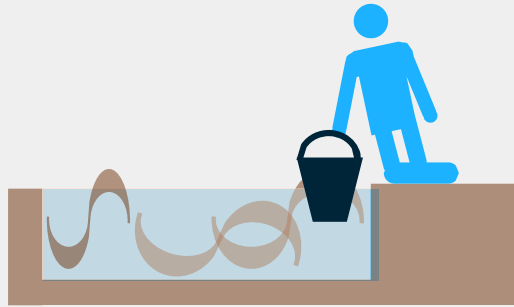


Yet, every \$1 spent on achieving universal access to safe water generates at least \$3.30 in benefits.<sup>4</sup>

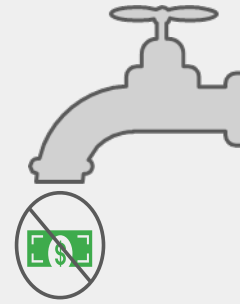


## Development Challenges in Water

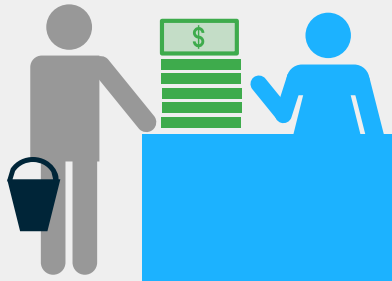
# Why is universal access to water difficult to achieve?



Water has unique attributes, including free alternatives, high cost of delivery, and lower willingness to pay.



Utilities are often subsidized to cover losses, and/or are not allowed to charge cost-reflective tariffs.



Informal providers fulfill a need, but charge far more per liter.



Rural water systems can lack long-term governance and service capacity.

**But we have made progress: 2.6 billion people have accessed improved water since 1990.<sup>6</sup>**



## Development Challenges in Water

Water has unique attributes that make it challenging to sustainably provide.

### Water requirements

The average person requires a minimum of 20L per day but basic use is closer to 50–100L.



Affordable water should make up only

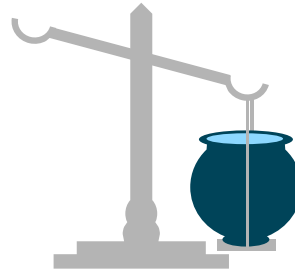
**3–5%**

of household expenditure.<sup>7</sup>

Water needs to be available all day, every day.

**365  
24/7**

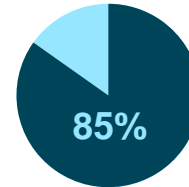
A 20L bucket weighs 45 pounds.



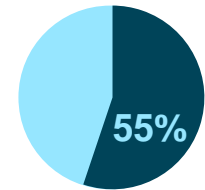
“Intermittent supply will leave customers unsatisfied, resulting in low willingness to pay for improved service.”—Asian Development Bank<sup>9</sup>

### Water logistics

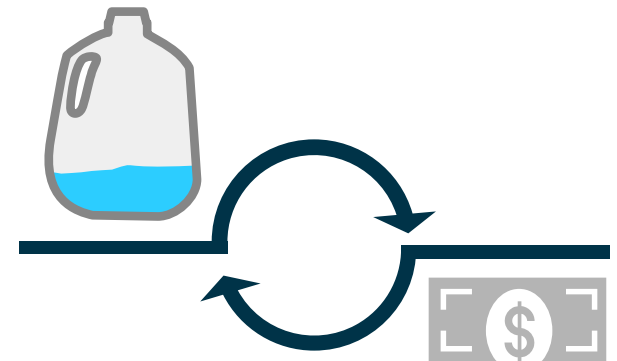
Household usage of clean water varies depending on how far away the source is.<sup>8</sup>



More than 100 meters away



Less than 100 meters away





## Development Challenges in Water

# Utilities do not profit on water.

In 2014, the median utility took in only 14% more revenue than operating costs.<sup>10</sup>

“No capacity to replace its assets once they wear out, let alone expand services to larger groups of consumers.”<sup>10</sup>

### Non-revenue water = enormous losses

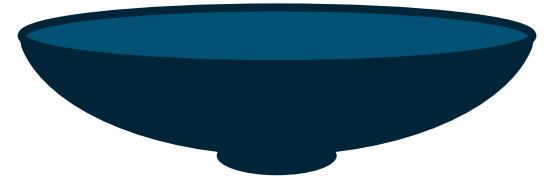
In developing countries, an estimated 16 billion cubic meters of water is pumped but never billed annually. This represents \$3 billion in value, and includes both leaks (technical losses) and theft (water that is consumed but not paid for).<sup>11</sup>

### Postpaid metering facilitates high arrears.

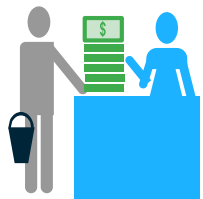
A 2008 survey of African utilities showed that over half of utilities were collecting revenue from less than half their customers.<sup>12</sup>

### Lack of capital recovery limits access to capital (as it should).

“At present, most water-sector actors in developing countries rely on government lending and concessional financing...to mobilize financing for capital investment.”<sup>13</sup>







Development Challenges in Water  
Informal providers fill  
gaps in service  
coverage, but charge  
far more to do so.

- Systems vary from household connections, communal standpipes, water sachets, and tanker trucks.
- Water from informal providers is of “extremely dubious quality” or is stolen from utility pipes.<sup>14</sup>
- In Chennai, households purchasing water from private vendors spent 5.6% of monthly income on water, compared to 2.8% for households who used public water points.<sup>15</sup>





## Development Challenges in Water

Rural water systems are often installed by external actors, but are expected to be maintained locally.

Local water boards often lack the technical and financial capacity to oversee complex systems.

20–40% of rural water points are non-functioning at any given time.<sup>16</sup>

Historically, local water boards have been unable to charge tariffs that cover operational expenses plus necessary maintenance.<sup>17</sup>

One evaluation found water projects “inaugurated with great fanfare,” but only 12% of villages in Peru and 30% in Ghana collected enough revenue to cover repairs.<sup>18</sup>





“The word ‘value’, it is to be observed, has two different meanings, and sometimes expresses the utility of some particular object, and sometimes the power of purchasing other goods which the possession of that object conveys... **Nothing is more useful than water: but it will purchase scarce anything;** scarce anything can be had in exchange for it. A diamond, on the contrary, has scarce any value in use but a very great quantity of other goods may frequently be had in exchange for it.”

—Adam Smith



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Photo: Caroline Suzman / World Bank

## The Role of Digital Finance in Universal Access

DFS holds tremendous potential in the water sector, but implementation is in a nascent stage compared to that of energy.

### DFS use cases in the water sector



Digitization  
of bill payments



Prepaid  
water



Digital credit  
for financing  
connections

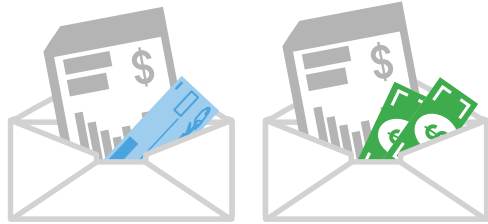


Subsidization  
of consumption

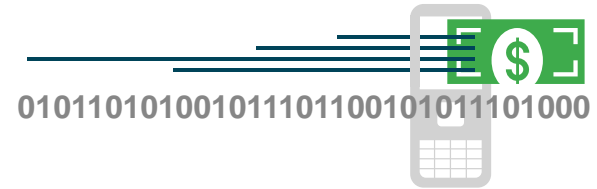


## The Role of Digital Finance in Universal Access

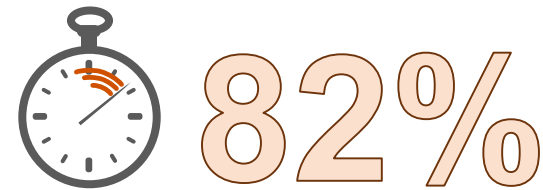
# Digitizing water bill payments can save time and money.



Ghana Water Company estimates that every dollar in cash costs 3 cents to collect.<sup>19</sup>



WonderKid used mobile payments to help four Kenyan utilities improve their service. Kisumu Water and Sewage Company billed 7% more revenue, and collected 28% more.<sup>20</sup>



Digitizing the water bill can save time. Utility clients in Kiamumbi, Kenya, used 82% less time to pay a bill with mobile money.<sup>21</sup>



## The Role of Digital Finance in Universal Access

# Prepaid water + digital payments = a leaner, automated water utility

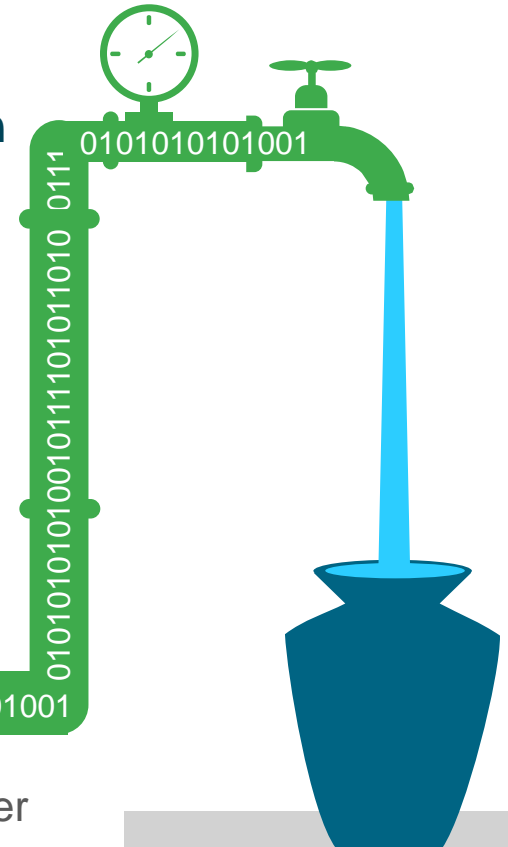
**“I can do what I want with my money, because I don’t need to wait until the end of the month to know how much I need to pay for water.”—Fatimata, CityTaps customer**

Eliminates arrears, allowing providers like Safe Water Network to make a much clearer business case for in-home connections.

Prepayments can be combined with debt service to finance meters, creating a PAYGo solar analog (see next slide).

CityTaps’ smart meters in Niamey, Niger, show a 10-20% reduction in operational expenditure, and the age of debt is negative.<sup>22</sup>

Provides richer consumer insights leading to faster response: Niamey’s water utility knows within 30 minutes of a leak; for other providers this can take days.



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## The Role of Digital Finance in Universal Access

Financing increases affordability.

Credit for grid connections or water assets (such as purifiers or roof tanks) would allow more users to afford in-home access.

Digitizing aspects of the credit process (application, evaluation, disbursement, repayment) can lower costs for the provider and reach a wider market.







## The Role of Digital Finance in Universal Access

Digital finance can help expand access by facilitating subsidies for water consumption.

**The United Nations recognizes a human right to clean drinking water.<sup>23</sup>**

Many utilities already provide “lifeline” tariffs: subsidized water fees that allow low-income customers to access water at lower cost.

Digital finance can help to improve targeting of subsidies: Bogota’s transit system links with national poverty database, using smart cards to offer reduced fares to hundreds of thousands of low-income riders.<sup>24</sup>

Smart subsidies can allow communal water points to serve more people, more effectively.



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Photo: Nick van Praag / The World Bank

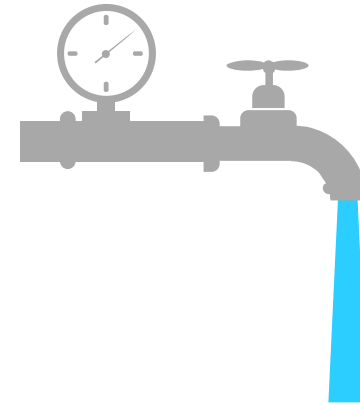
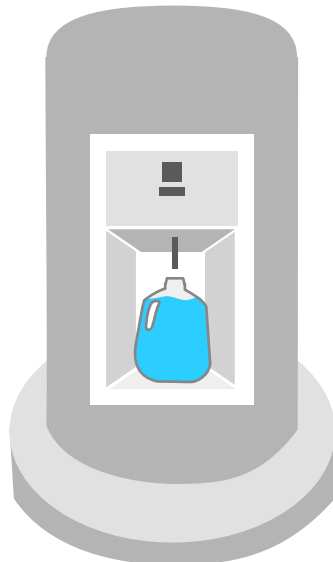
## What We Learned

# Automated, low-cost water service is essential for sustainability.

If there is little space to compete on quality or price, then **providers must reduce costs:**

- Digital payments throughout the value chain
- Prepaid smart meters for households, water ATMs for communal taps

All of these can be paid for digitally, with minimal on-site presence and very low operational expenditure.



## Innovative financing mechanisms are needed to reach the last mile.

Blended finance can help water providers to expand their operations and customer bases, by partnering with experienced banks and MFIs to offer financed connections.

- Digital payments allow debt service to be bundled with water tariffs, reducing the cost of providing consumer finance.
- Digital finance creates transparent, auditable transactions that creditors will require.

## What We Learned

# Case Study: Safe Water Network

Safe Water Network is a nonprofit water organization operating in Ghana and India.

In Ghana, it operates more than 80 micro-utilities:

- Serves 1–3 communities, each with public standpipes and in-home connections.
- Partners with communities, charges tariffs that cover operational expenditure and maintenance.
- Each micro-utility operates as a distinct legal subsidiary, requiring complicated cash management.

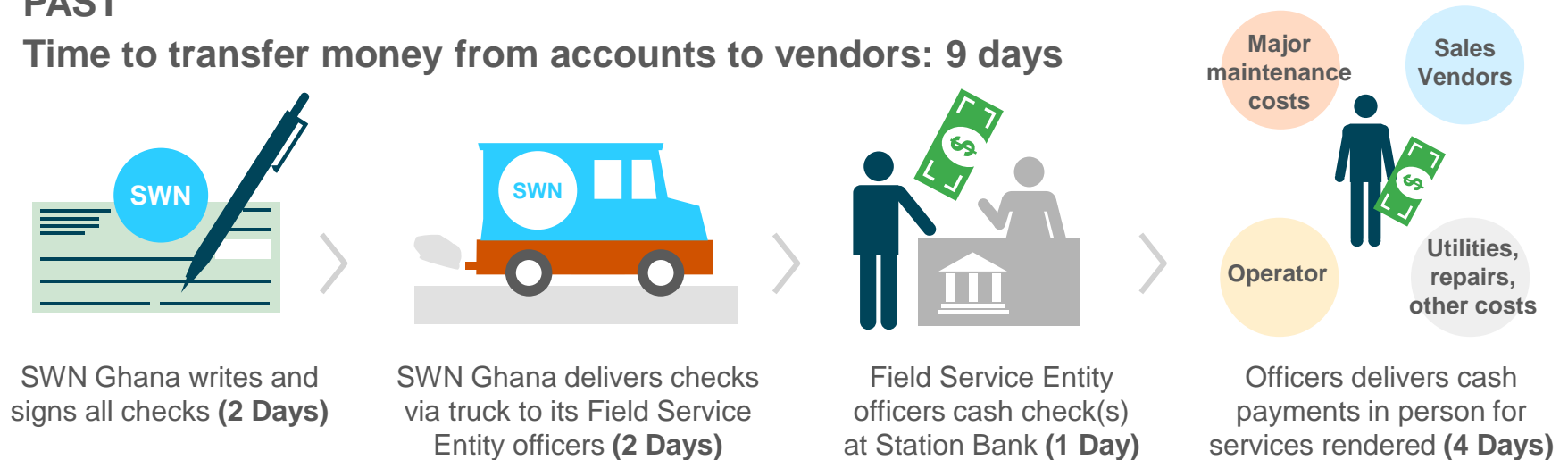


## What We Learned

# Safe Water Network: Improving efficiency by digitizing payments in the water value chain

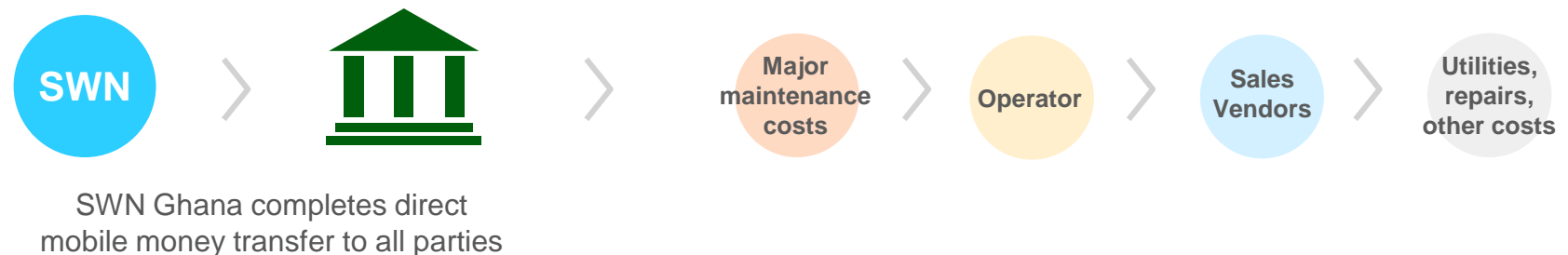
### PAST

Time to transfer money from accounts to vendors: 9 days



### PRESENT

Time to complete value chain payments: 1 day



## What We Learned

# Safe Water Network and CGAP piloted digital payments for prepaid, mobile-enabled meters.

There is a business case for prepaid, “smart” meters:

- They eliminate arrears
- They reduce collection time
- There is a positive impact on revenue, even with reduced consumption

But the learning curve is steep:

- End users are unfamiliar with prepaid; they prefer the old system
- Still largely unfamiliar with mobile payments



“Before, your money was with me.  
Now, my money is with you”

— SWN customer

## What We Learned

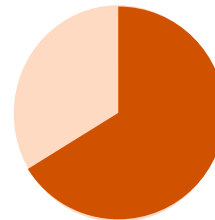
# Water.org: Making microfinance work for water and sanitation

On a more traditional finance front, Water.org has proven that there is a market for loans for water/sanitation improvements.



**\$138**

Average  
loan size



Two-thirds  
of borrowers  
earn less  
than \$2 a day

**+99%**  
of loans repaid  
on time



Digitizing  
WaterCredit  
loans will  
make them  
more profitable  
and accessible.

## What We Learned

Digital payments are gaining traction in the water space, but are limited by social, institutional, and financial barriers.<sup>26</sup>

"[Providers are] not going to increase prices, so **the only way to increase revenue is to sell more or reduce costs.**"—*Lori Gunnu, 1001 Fontaines*

"**If we could move all payments to digital, we would be happy.** Staff could work on other tasks, it would reduce transport and security costs, and customers would have added convenience."—*Eldah Odhiambo, Kisumu Water and Sewage Company*

"For a project to succeed **you need institutional, social, and technology innovation and often [providers] don't have the appetite** for institutional innovation that you would hope for."—*David Schaub-Jones, Seesaw*

"**There are a lot of technologies out there;** many organisations don't have the structure or means to evaluate, operate, or control a new digital system."  
—*Rei Bras Gomes, Cubo*

"**No one was sure what the revenue status was**—how much revenue had been billed and how much had been collected....Once the technology was in place it was found the water was there, but people didn't know how to pay."—*Halima Murunga, Wonderkid*



## What We Learned

Blended finance is an important stepping stone to commercial investment, and digital revenue can act as security.

Blended finance allows a portion of capital investment to come from private sources and earn a commercial return.

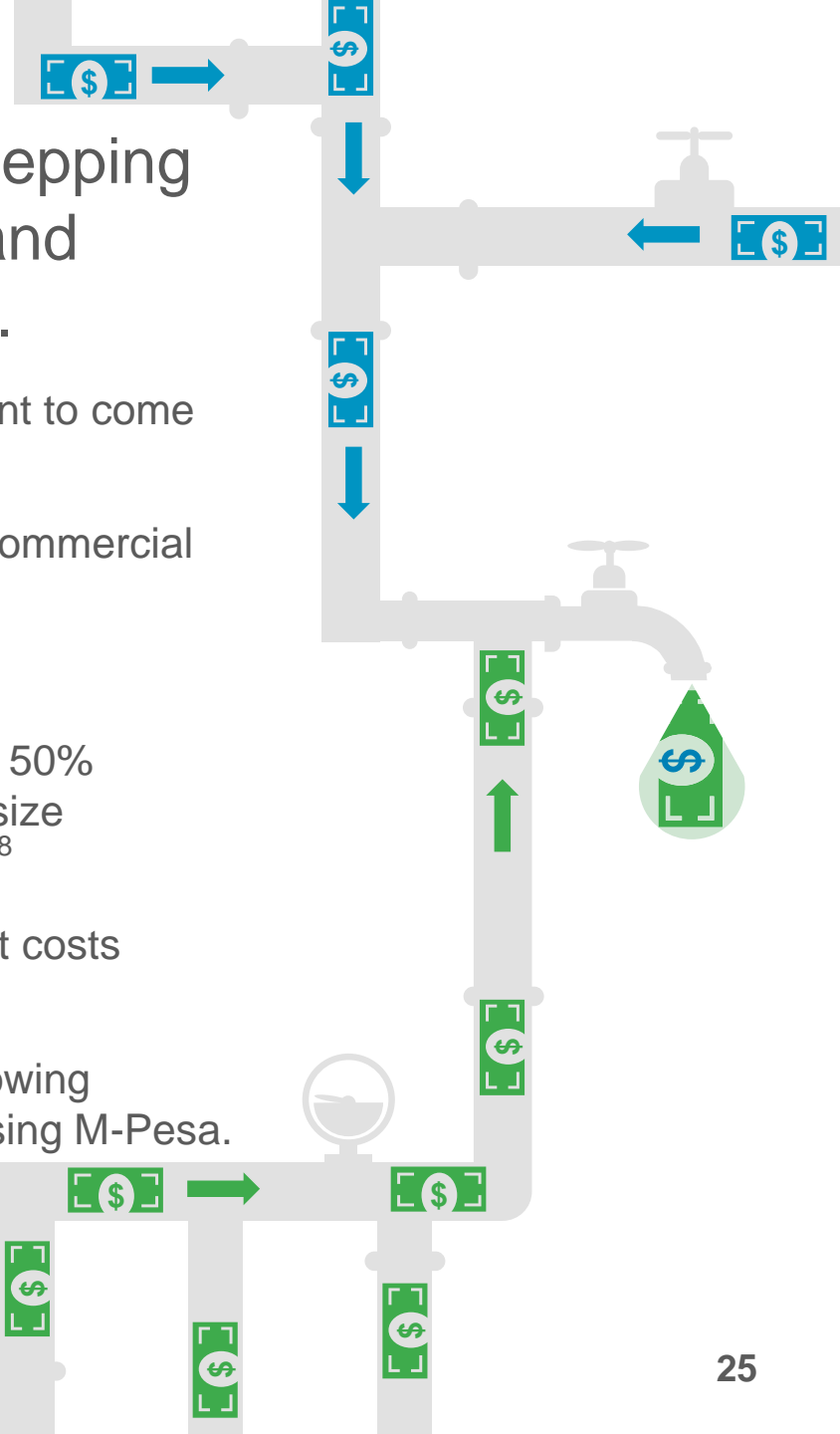
Digital revenue streams have acted as security for commercial debt in energy,<sup>27</sup> and can do the same in water.

### Case Study: K-Rep

K-Rep, a Kenyan MFI (now Sidian Bank), secured a 50% portfolio guarantee from USAID to finance medium-size community water projects, serving 190,000 people.<sup>28</sup>

Communities received grants of up to 40% of project costs from the World Bank, disbursed after installation.

K-Rep also provided 2–3 year connection loans, allowing users to bundle loans with their water bill and pay using M-Pesa.



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## What's Next

CGAP is monitoring three developments that could help digital finance expand access to clean water.

- ➔ **Combinations of technological advances with scalable business models**
- ➔ **Blended finance to unlock private capital**
- ➔ **Digitization of household credit for water connections**

## What's Next

Business models in the water sector require additional experimentation, particularly for nonutility providers.

There is a need for workable, **cost-effective technologies**, such as prepaid service and mobile payments.

Yet, good technology is not enough; **scalable strategy** is needed to help providers assess potential innovations and incorporate useful ones into their business.

And, as digital tools and transactions become commonplace, **improved data analytics** will help providers to take full advantage of their new capabilities.

## What's Next

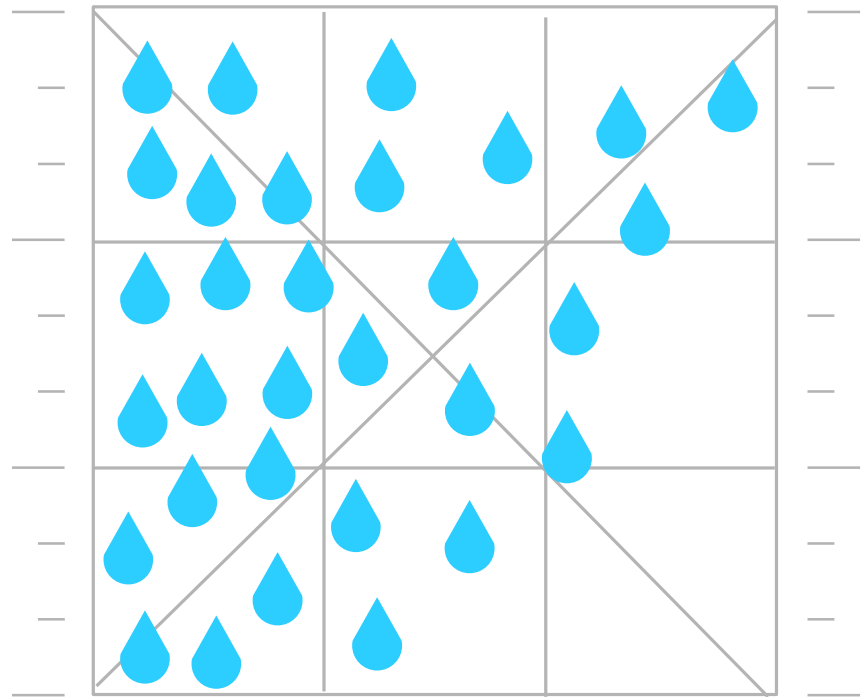
The water sector could benefit from blended financing models because purely commercial businesses are not likely to profit, at least not in the near future.

**Blended finance can unlock investment into the sector by mitigating early-stage risk.**

**Water trust, credit guarantees, and results-based subsidies can help to mobilize capital.**

**Water is hyperlocal; partnerships need to be negotiated everywhere, often with public authorities.**

**Work is underway to adopt more blended finance models.**



## What's Next

# Digital Credit for Water

A number of water-specific digital credit deployments are coming online in South Asia and East Africa. These will provide fascinating insights.

If successful, these can help to lower the high upfront cost of improved access.

Photo: © Curt Carnemark / World Bank



## What's Next

Many new start-ups are addressing water needs.

### **Bangladesh**

Safe Water  
Network

### **Gambia**

eWaterPay

### **Ghana**

Safe Water  
Network  
WaterHealth  
International

### **India**

Drinkwell  
Safe Water  
Network  
Sarvajal  
WaterHealth  
International

### **Kenya**

Maji Milele

### **Niger**

CityTaps

### **Nigeria**

WaterHealth  
International

### **Tanzania**

Bomba  
eWaterPay  
WaterTek

**Many of them are built around the more digital, “Auto-Water” concept, combining:**

- Sophisticated monitoring
- Basic connection financing
- Digital payments
- Prepaid service
- Lower-cost hardware
  - Water ATMS used to cost \$5,000, now this cost is closer to \$500.

## What's Next

More work can be done to link innovation with large-scale providers.

Utilities are still the channel through which most people get clean water.

Organizations (Wonderkid, CityTaps) are working to help utilities adopt improved service models.

**Digital financial services can play an important role in delivering clean water sustainably, for everyone.**





# End Notes

1. WHO and UNICEF Joint Monitoring Programme. 2017. "Progress on Drinking Water, Sanitation, and Hygiene: 2017 Update and SDG Baselines." Geneva: WHO and UNICEF.
2. WHO. 2018. "Fact Sheet: Drinking Water." Geneva: WHO.
3. Hutton, G., and M. Varughese. 2016. "The Costs of Meeting the 2030 Sustainable Development Goal Targets on Drinking Water, Sanitation, and Hygiene." Washington, D.C.: World Bank Group.
4. Hutton, G. 2015. "Benefits and Costs of the Water Sanitation and Hygiene Targets for the Post-2015 Development Agenda." Copenhagen, Denmark: Copenhagen Consensus Center.
5. WHO. 2014. "Preventing Diarrhea through Better Water, Sanitation and Hygiene." Geneva: WHO.
6. UNICEF and WHO Joint Monitoring Programme. 2015. "Progress on Sanitation and Drinking Water: 2015 Update and MDG Assessment." Geneva: UNICEF and WHO.
7. Hutton, G. 2015. "Monitoring 'Affordability' of Water and Sanitation Services after 2015." New York: UNHCR.
8. Ampadu-Boakye, J., R. Hebert, H. Crooks, and M. Awais. 2013. "Remote Kiosks." Accra: Safe Water Network.
9. Frauendorfer, R., and R. Liemberger. 2010. "The Issues and Challenges of Reducing Non-Revenue water." Mandaluyong City, Philippines: Asian Development Bank.
10. Danilenko, A., C. van den Berg, B. Macheve, and L.J. Moffit. 2014. *The IBNET Water Supply and Sanitation Blue Book, 2014*. Washington, D.C.: World Bank Group.
11. Kingdom, B., G. Soppe, and J. Sy. 2016. "What Is Non-revenue Water? How Can We Reduce It for Better Water Service?" World Bank Blog Post, 31 August. <http://blogs.worldbank.org/water/what-non-revenue-water-how-can-we-reduce-it-better-water-service>
12. Banerjee, S. G. and E. Morella. 2011. "Africa's Water and Sanitation Infrastructure: Access, Affordability, and Alternatives." Washington, D.C.: World Bank Group.
13. Kolker, J., and S. Trémolet. 2016. "Achieving Universal Access to Water and Sanitation by 2030—How Can Blended Finance Help?" World Bank Blog Post, 29 August. <http://blogs.worldbank.org/water/achieving-universal-access-water-and-sanitation-2030-how-can-blended-finance-help>
14. Ikeda, J., Senior Financial Specialist, World Bank. 2018. Written correspondence.
15. Venkatachalam, L. 2014. "Informal Water Markets and Willingness to Pay for Water." London: *International Journal of Water Resources Development*.
16. Improve International. 2012. "Statistics on Water Point Failures." Atlanta: Improve International.
17. Moriarty, P., S. Smits, J. Butterworth, and R. Franceys. 2013. "Trends in Rural Water Supply: Towards a Service Delivery Approach." Montpellier, France: Water Alternatives.
18. World Bank. 2009. "Water P-Notes: Issue 39." Washington, D.C.: World Bank.
19. Appiah Otoo, R., Chief Technology and Innovation Manager, Ghana Water Company Limited. Interview, 3 August 2018.

# End Notes, continued

20. GSMA. 2017. "Wonderkid Multimedia LTD.: Digitising Water Utilities in Kenya." London: GSMA.
21. Hope, R., T. Foster, A. Krolikowski, and I. Cohen. 2011. "Mobile Water Payment Innovations in Urban Africa." Oxford: University of Oxford.
22. CityTaps. 2018. "For Water Utilities." citytaps.org.
23. UN Resolution 64/292, 28 July 2010.
24. Hernandez, C., and T. Peralta-Quiros. 2016. "Balancing Financial Sustainability and Affordability in Public Transport." Washington, D.C.: World Bank.
25. Foster, T. 2016. Water and Sanitation Microfinance Operations in India: An Assessment of Challenges and Determinants of Success. Oxford: Skoll Centre for Social Entrepreneurship.
26. *All quotes from: CGAP and GSMA. 2018. Forthcoming.*
27. Price, D. 2016. "Banking on the Poor." Stanford, Calif.: Stanford *Social Innovation Review*.
28. Advani, R. 2016. "Scaling up Blended Financing of Water and Sanitation Investments in Kenya." Washington, D.C.: World Bank Group.

