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## QUENCHING THEIR THIRST: MOROCCO BRINGS WATER TO RURAL CITIZENS, 2004–2014

### SYNOPSIS

In 2004, nine years into an ambitious program to increase access to potable water in rural areas, Morocco struggled to achieve its goals. Not only was building water networks in remote areas costly and difficult, many water sources developed during the preceding decade had failed after years of drought. Millions of Moroccans faced health risks from poor-quality water. Women and children, especially girls, had to devote much of their time to hauling water from far-flung wells and streams. With support from international donors, the national water utility, then called ONEP (Office National de l'Eau Potable, or National Office of Drinking Water), created a new water-supply infrastructure connected to reservoirs and turned to the private sector for a cost-effective way to manage the system. Under an expanded mandate, ONEP began outsourcing maintenance and monitoring responsibilities as well as some construction work to private firms, and in 2009, piloted a new type of public-private partnership. In 2014, the utility reported that the percentage of rural Moroccans with access to potable water had soared to 94% from 61% in 2004. More girls were attending school, and many women no longer faced the time-consuming task of fetching water. By 2016, although questions remained about the financial sustainability of the overall system and the reliability of some connections, the program had brought water to more than 12 million Moroccans.

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### INTRODUCTION

“People were suffering, including me, because of the water situation,” said Khayyatiya Karad, a woman in a small village near the town of Ben Slimane in northwestern Morocco. “The

source was far away, and we didn’t even have animals to carry the water. We used to go ourselves.”

Karad and her family were among millions of rural Moroccans who still lacked access to

clean drinking water in the late twentieth century and the early years of the new millennium. When the North African constitutional monarchy began to tackle the water problem in 1995, only 14% of rural Moroccans had access to potable water from the national water utility's network.<sup>1</sup> At the time, nearly half of the country's citizens lived outside cities—and usually, they were poorer than their urban counterparts.<sup>2</sup>

For many, the frequent need to draw water from distant sources affected family health, education, and finances. Families without household connections or access to communal outdoor faucets called standpipes had to dispatch family members to fetch water from traditional sources, primarily wells or rivers. Water had to be collected almost every day.

“In a typical rural community, people walked for hours and hours to get to the water source, and then hours and hours to bring that water back home,” said Mouhssine Tadmouy-Cherki of the High Atlas Foundation, a nonprofit development organization. Many used donkeys to carry the large plastic containers of water, but others had to carry the water on foot.

The lack of accessible water had broad societal impacts. Because the burden of providing water fell disproportionately on female family members who managed households, women and girls had little time to attend school or engage in more-remunerative economic activity. In 1995, 26% fewer girls than boys attended school countrywide.<sup>3</sup>

Untreated water from wells and streams put community health at risk. Approximately 40% of all diseases in Morocco during the 1990s were water and hygiene related. A cholera outbreak shook the country in the late 1980s and early 1990s, and diarrhea frequently afflicted young children.<sup>4</sup> Without water from household faucets or nearby standpipes, families stored water in their homes, where supplies often became contaminated. Other sources of water were prohibitively expensive for most rural Moroccans.

A 1-liter bottle of water cost less than US\$1, but average per capita income in 1995 was only US\$1,230.<sup>5</sup> A 1995 government survey reported that 0.1% of rural Moroccans depended on bottled drinking water, while 0.7% relied on tanker trucks that brought water directly to rural communities.<sup>6</sup>

To improve livelihoods, health, and equity, in 1995 the government launched the Collective Program to Supply Drinking Water to Rural Populations (Programme d'approvisionnement groupé en eau potable des populations rurales), known by the French acronym PAGER. The aim was to bring clean drinking water to villages that were spread across thousands of square kilometers, including in the Atlas Mountains and on the edge of the Sahara. The program sought to connect 80% of rural households to piped networks within 10 years. The government initially budgeted the program at US\$120 million, and the World Bank and other foreign donors contributed funds to cover all but US\$26 million of the cost.<sup>7</sup> Donors would contribute further funding to the program in subsequent years.

Two arms of the government shared responsibility for implementing PAGER. The General Directorate of Water, part of the Ministry of Public Works,<sup>8</sup> built and managed most new connections. The financially autonomous public water utility—called the National Office of Drinking Water and known by the acronym ONEP, for Office National de l'Eau Potable—focused on reaching rural areas near urban centers.<sup>9</sup> PAGER mainly built standpipes but also installed direct household connections, which were significantly more expensive.

Progress was slow. By 2001, only 50% of rural households had access to drinking water connections, and the goal of 80% access by 2005 was clearly unachievable. In 2001, an advisory council convened by the king determined that PAGER was suffering from having two masters, and it agreed to give ONEP sole responsibility. The public utility had until 2004 to transition to

full control of PAGER and until 2017 to achieve the ambitious goal of providing a reliable supply of drinking water for more than 90% of rural Moroccans.

Water itself was also in short supply. Morocco was a water-scarce country. About 80% of the country's water consumption went to agricultural use, with households and industry using the rest.<sup>10</sup> But natural water sources were unreliable and the frequency and severity of drought years had increased beginning in the early 1980s.<sup>11</sup> One of Morocco's worst droughts of the twentieth century occurred in 1994 and 1995, when rainfall was less than half the annual average. Crop losses in those years devastated the livelihoods of rural families who primarily relied on farming.<sup>12</sup> PAGER could not address the broader water scarcity issue but it could connect users to more-reliable sources of drinking water.

## THE CHALLENGE

"The objective was set by the state," said M'barek El Khdar, an engineer with a decade of experience at the utility and a core member of ONEP's rural water access team. "But the question of how to achieve [the objective] was for us to decide."

In 2001, ONEP leaders created a Directorate for the Expansion of Access to Drinking Water that would take charge of expanding access to clean water to reach 90% of Morocco's population. "There were new staff members, but we capitalized on our previous experiences and brought in staff from other sections who had worked on the project since 1995," said El Khdar, who became head of the directorate's planning division. The World Bank assisted in developing new distribution management models.

The team faced the dual challenges of extending infrastructure and finding a way to operate the system over the long run. Of the two, the latter was the more difficult. Although donor contributions would pay for new pipelines, pumps, chlorination facilities, standpipes, and

other equipment, managing the system after installation was problematic. Management was a complex task that included repairing and maintaining the system, guarding facilities, connecting new homes to existing networks, monitoring water usage, checking water quality, and collecting payments. ONEP had 7,200 employees working primarily on urban water supply but did not have the capacity to perform those tasks across a rapidly expanding water network.<sup>13</sup> "Investment is the easiest part" of extending rural water supply, said Xavier Chauvot de Beauchêne, a senior water and sanitation specialist at the World Bank who worked in Morocco. "It's always possible to find money one way or another—from donors, the state budget, or elsewhere. . . . Management is what's going to be the main challenge."

ONEP staff could carry out basic tasks such as reading water meters, distributing bills, and performing basic maintenance of standpipes and household connections. But in rural Morocco, where small communities were dispersed widely across uneven terrain, logistics were complicated and required more personnel. In a city one technician might be able to read hundreds of individual water meters per day but only as few as, say, 10 a day if required to drive long distances between small desert towns.

Financial sustainability was the paramount consideration. Providing service in rural areas was inherently less profitable than in cities because each kilometer of new pipe served a smaller number of consumers. In sparsely populated areas, the cost of extending the network was higher than the additional revenue ONEP would receive from the extension. "Investment costs per customer are going to be much higher than in cities," Chauvot de Beauchêne said. "You're going to put your financial sustainability at risk if you're not careful." Although donors might provide money for building new pipelines and connections, they would not fund day-to-day operations and management costs.

ONEP planners knew they would be unable to finance the cost of investment in large-scale rural operations through higher tariffs for users. The utility set domestic water prices according to a schedule it devised. The tariffs it charged varied between regions and with monthly usage but had not increased in years. Domestic prices ranged from less than US\$0.15 per cubic meter (about 264 gallons) to just under US\$1.50.<sup>14</sup> Water tariffs were a politically charged issue because a massive increase in water charges for poor rural Moroccans would be politically untenable.

In addition, experience had revealed no single way to handle fee collection, monitoring, and maintenance throughout the country. Since PAGER's beginning in 1995, the program had tried several different models—including associations of community members, individual caretakers, and small private contractors—but it had not found a single solution.

The association model had attracted favor within the development policy community during the 1990s. In Morocco, it had worked in “communities where it was well implemented and managed,” Tadlaoui-Cherki said. “There were also instances when it was not, and it was a waste of resources and of time.”

“Some associations were not qualified or could not financially maintain the system, and they abandoned it,” said Abdellah Jahid, a water engineer who worked on rural water access for ONEP. Associations in some villages successfully raised money for the immediate construction of connections but were unable to raise the money needed to pay for long-term maintenance.

“A great share of [the associations] collapsed because they underinvested in comparison to what proper design required,” Chauvot de Beauchêne said. “When the systems started to break down, they did not have and could not collect the money to repair them.” As the local water networks became dysfunctional, many were abandoned.

By 2004, ONEP and donors like the World Bank had begun to question the performance of nonprofessional associations in managing water provision. “It’s a job to provide service for people,” Chauvot de Beauchêne said. “It’s not something you do on the side on a Sunday afternoon. It’s something you have to be professional in to be able to manage long-term.”

Two other management models had been successful on a small scale but did not constitute a long-term solution. ONEP had hired community members to act as standpipe caretakers in more than 3,000 villages. Those caretakers agreed to monitor the amount of water taken from the standpipe by each household, to collect revenue, and to perform basic maintenance tasks. The model was simple and often effective, but it did not work in communities with household connections. The third model of small private enterprises worked in hundreds of communities, but its small scale would not let ONEP rapidly scale up service to large areas of rural Morocco.

An ONEP study completed in 2004, just before the utility took full control of the program, revealed that a quarter of the local operations were not providing consistent water service because of either water scarcity or poor management by users’ associations or caretakers, El Khdar said. ONEP planners also had to determine how best to balance two different models for expanding water access in rural areas. The General Directorate of Water had developed about 80% of the PAGER connections from 1995 to 2004, building stand-alone distribution systems fed by groundwater sources. The directorate “thought the simplest and quickest thing was to dig wells” to increase water access, El Khdar said. But droughts and increasing demand for water in agriculture meant that some wells ran dry. By 2001, a quarter of the groundwater fed connections were either dry or in disrepair.

The remaining 20% of PAGER's connections, built by ONEP during the same period, relied on surface water from Morocco's 116 dam-created reservoirs.<sup>15</sup> ONEP had expanded a network designed to supply water to urban centers but that passed through rural areas, by adding branches to serve communities within 10 kilometers of existing trunk lines.

## FRAMING A RESPONSE

In response to the findings of the 2004 assessment, El Khdar and other members of the ONEP planning team developed a new strategy that prioritized connections from Morocco's large dammed reservoirs, which were less vulnerable to drought than wells or streams were. Overall, the country had a fairly large renewable freshwater resource, of which it used less than half each year.<sup>16</sup> "The majority of the [new] projects were oriented toward dams, which meant establishing more pipelines, treatment stations, and pumping stations," El Khdar said.

Tapping reservoirs required coordination with regional authorities. Morocco was divided into nine river basin regions, and each basin agency managed water use in its territory.<sup>17</sup> "They [the basin agencies] define the sources that are exploitable," Jahid said. "They specify the quota for potable water. In each region, we consulted them."

ONEP also had to improve water system maintenance and management in rural areas, where the utility lacked the capacity to deploy staff across far-flung villages. "ONEP understood that it basically had three options," Chauvot de Beauchêne said: It could continue to work with collective associations, although they were often unreliable; it could try to manage service delivery through household connections directly with its own resources; or it could turn to the private sector.

The team decided on a mixed management model that emphasized private contractors but retained important aspects of public participation

and consultation. The team also decided to retain existing management structures in communities where associations were functioning effectively. "Where associations are in good shape socially, politically, and financially, they can [continue to] do it themselves," El Khdar said. "It would not make sense to have the private sector there." Where local structures had failed, the contractor would take over the household-level management and revenue collection.

Management that was delegated to the private sector was a logical solution to the knotty problems that existed in many rural areas. Although ONEP's Directorate for the Generalization of Drinking Water had well-trained engineers, it lacked the human resources to manage the growing network. "The reason ONEP went to private operators was not necessarily for specific technology or for specific know-how," Chauvot de Beauchêne said. "They knew exactly how to get this done, but they didn't have the staff capacity to do it properly."

El Khdar and his colleagues thought larger-scale delegation of management to the private sector could make the program more flexible, increase management capacity, and achieve economies of scale. Contracting to professionals could alleviate management problems in communities where participatory models had failed and could lower the management costs of connections. "If one entity showed it could not continue the service, then we would find someone else," said El Khdar. Donors including the World Bank supported use of the private sector.

Such delegation to the private sector was not new to PAGER. Since 1996, the program had been working with so-called microenterprises—small firms, typically consisting of two or three people, that ONEP contracted to check water meters, carry out caretaking work, and perform basic maintenance. One person in each enterprise usually had a degree from a technical school, Jahid said. ONEP recruited the more qualified

community members, helped them create their own companies, trained them to do the work, and then directly contracted with the small firms.

Although ONEP had signed more than 800 contracts with such small enterprises, rapidly increasing the utility's capacity to manage large networks required bigger thinking.<sup>18</sup> The microenterprises "allowed for sustainability and maintenance, but with the expansion of the project it was not enough," Jahid said.

El Khdar and his colleagues at the directorate proposed working with larger companies to manage the expanded rural network. There was a precedent for this outside of PAGER. In 1997, Casablanca, the country's largest city, signed a water management contract with a subsidiary of a French company. By 2002, three additional urban municipalities had signed 25- and 30-year contracts for management of water services. ONEP's role was to provide water to the cities.<sup>19</sup>

Contracts under the proposed rural management model covered wider areas, including multiple villages and as many as 100,000 inhabitants. "One or two municipalities would probably not interest companies," El Khdar said. "It is better to provide a big cake, so there will be more potential gain."

Using a fee-for-service arrangement, the utility paid contractors predetermined fees for building pipelines, maintaining pumping stations and other infrastructure, and distributing ONEP water bills. The contractors collected payments from customers at rates determined by ONEP, and gave the payments to ONEP. If a household did not pay, the utility could ask the contractor to disconnect the household from the water supply.

Contractors also could take on partial responsibility for maintaining and monitoring infrastructure in areas where community associations and caretakers already existed. ONEP paid the contractor fees for the specific tasks it undertook. If a local management system was working well under an association or

caretaker, the company could manage infrastructure from the main pipelines fed by reservoirs to the village. The association or caretaker would then be responsible for service from the village water meter to local households.

## GETTING DOWN TO WORK

After ONEP assumed full control over the rural water access project in 2004, the utility built pipelines that extended well beyond Morocco's urban-centered system and developed contracting models that gave private companies management roles.

### *Extending the system*

El Khdar's directorate assumed responsibility for building the main water pipelines between urban centers and surrounding communities. Initially, the directorate continued to focus work on settlements within 10 kilometers of existing infrastructure, but later it began to extend service farther into rural areas. Instead of drilling for groundwater, the team connected most communities to networks fed by large reservoirs. ONEP also replaced existing infrastructure that had failed, often digging deeper wells or replacing pipelines.

To make sure new projects had support from the communities they served, El Khdar and his colleagues emphasized frequent communication with citizens. The directorate sent delegations to speak with community leaders about the type of project they wanted: either communal standpipes or individual household water connections. The parties discussed cost estimates and how the community would manage the connection: by way of an association, a caretaker, or a private contractor. "We needed to hear what they wanted, and they had to express it," El Khdar said. "We consulted with the population in several phases for a long time before the implementation of the project."

For any new village-level connection, ONEP, the municipal council, and the chosen local

manager in the form of a caretaker, an association, or a private company signed a three-way agreement that defined responsibilities and split the cost so the community could join the water network. The cost of connecting the community to the network generally ranged from 2,000 to 3,000 dirhams, or about US\$200 to US\$300, per person. That did not include additional costs if the community wanted household connections. Initially, ONEP paid 65% of the cost of connecting the community to the network, and the municipal council paid 30%. The future users of the system paid the remaining 5% up front, giving citizens a sense of ownership over the project. ONEP's share came from its own revenues, subsidies from the government, or donor support—largely in the form of concessional loans with favorable terms, Jahid said.

The pipeline construction projects were time-consuming, generally taking two to three years in areas that had no existing water infrastructure. Preparation alone could last six to eight months.<sup>20</sup> ONEP then had to build pipelines and purification stations and install pumps. To maintain community support over the long timeline for such projects, ONEP sent delegations to each community three times a year to discuss the project and update citizens on its progress.

#### *Beginning to work with private companies*

When ONEP took over PAGER in 2004, the utility worked with the World Bank to determine how best to prepare bidding documents and contracts for monitoring and maintaining rural supply networks and collecting water payments. El Khdar's directorate then piloted its new system in Mhaya, a municipality in the northern province of Meknès, by recruiting a private company—through a fee-for-service contract—to maintain and operate pipelines and equipment the directorate had constructed. ONEP initiated the project in 2004 through an

open bidding process that targeted Moroccan companies.

A small Moroccan enterprise won the Mhaya contract, which served 2,250 connections in an area inhabited by 16,000 people.<sup>21</sup> Although the firm had previously worked on water supply infrastructure, it had no practical experience in public service management. El Khdar described the arrangement as beneficial to both sides. “They had the adaptability and resourcefulness of the private sector. It was a real partnership,” he said. “The bills are [ONEP] bills, and the tariffs are the same. It is not disengagement [by ONEP]. It is an optimization of our involvement.”

The company was responsible for bill distribution, for monitoring and maintaining the infrastructure, and for checking water quality at the village level; ONEP was responsible for maintaining a reliable supply of water via its pipeline system and setting the price, said El Khdar. ONEP gave the company a fixed payment for each task it performed.

El Khdar's team evaluated the pilot in 2007 and was satisfied with the results. The company could repair leaks within one day and the performance of the water network in Mhaya improved.<sup>22</sup> “We realized that the private sector could work out as a solution,” El Khdar said. If ONEP had to play the same role, the utility would have spent more than the private contractor charged for the work, he added. The private company had efficiency advantages over ONEP, including the flexibility to hire staff as needed on short-term contracts. “They would use the services of skilled local workers,” El Khdar said. “It could be on contract, . . . which provides a lot of flexibility. They could provide training.”

#### *Expanding the use of private companies*

In 2007, after the office deemed the partnership with a private firm in Mhaya to be workable, El Khdar's team concluded that private companies could expand and manage service in remote areas much more cheaply than ONEP

could. From 2007 to 2014, ONEP issued calls for eight 5-year fee-for-service contracts.<sup>23</sup> By 2012, six contracts were operational, each covering a population of 50,000 to 100,000. The areas ranged in size from 450 to 1,600 square kilometers, and the total value of the contracts ranged from DH2.5 million to DH4.7 million, or about US\$250,000 to US\$470,000.<sup>24</sup>

For the expansion, ONEP allowed bids from international companies. “We were opening up a market and setting the groundwork for competition between national and international enterprises,” El Khdar said. The contracts required the companies to: monitor the network and ensure the security of infrastructure, monitor water quality, track water consumption, distribute ONEP water bills, collect water payments, perform preventive maintenance, and repair facilities when needed. Major investments, like building new pipelines, remained the responsibility of ONEP. As with the Mhaya pilot project, a company reported regularly to ONEP on the work performed and the utility paid a prearranged fee for services rendered.

Despite ONEP’s attempts to create interest in the bidding process by identifying and meeting with qualified companies, few bidders emerged. In 2008, just two companies bid for rural water supply contracts: Morocco-based Sotradema and Aquatech, a Canadian firm that received three contracts. In 2010, the number had grown to five bidders,<sup>25</sup> but Sotradema and Aquatech were the only companies to win contracts. As of 2016, Sotradema held five fee-for-service contracts and Aquatech held three.

The companies’ regular responsibilities included monitoring and maintaining the system down to the village meter, which measured total water usage by each community. In areas not served by an association or caretaker, the companies delivered water bills to customers and collected the water payments, which went to ONEP. The companies handled repairs of

standpipes or household connections when requested by ONEP.

Although ONEP was responsible for customer contact, Philippe Gravier, director of Aquatech’s Morocco operations, said customers often contacted his company’s staff about needed repairs or service disruptions, because company personnel were in their communities and closest to the situation. The company forwarded customer requests to ONEP, which in turn could authorize Aquatech to take appropriate action.

Private sector contracts created local jobs. For each region, contractors hired an average of 12 people to permanent contracts and 10 to 15 to short-term contracts.<sup>26</sup> Aquatech employed a total of 73 staff in Morocco as of 2015, all but one of whom were Moroccan citizens. Sotradema employed around 500.

In an email exchange in early 2016, Jamaledine Ait Riala, an engineer at Sotradema, said that the five fee-for-service contracts generated a net profit for the company

Gravier said in 2015 that Aquatech’s contracts with ONEP were not profitable. “We had hoped to break even after three to four years, but we didn’t,” he said. “The prices [for providing services for ONEP] were too low. If we raised the prices, we would lose the contracts.” Gravier said the contracts were nonetheless worthwhile for the company because they provided a portfolio of projects that could be used to compete for water management contracts in other countries.

#### *Developing subsidies for expansion*

The fee-for-service contracts enabled ONEP to efficiently outsource the management of water supply networks the utility had already built. But to expand rural drinking water supply, ONEP had to rapidly increase the number of new connections. The utility wanted to explore contracts that assigned to private companies network expansion and bringing water to more

households. Through conversations with the World Bank, ONEP drafted a new, output-based, contract with financial incentives whereby companies would deliver water to more rural households.

The World Bank and other donors supported output-based aid models rather than ONEP's fee-for-service management contracts. Instead of providing payments for only the provision of specific services, the output-based model provided companies with four sources of remuneration, according to Ait Riala. First, the company collected all water bill payments, minus energy costs and other fees. Second, it received all payments for new village-level water connections minus a reserve. Third, the company received 3,500 dirhams (\$US 500) for each new subscriber to water service in a village. Fourth, it received a subsidy based on the company's performance during the first five years. ONEP would base the subsidy on the volume of water delivered to the company's customers, number of new working connections, and lengths of new pipelines built.<sup>27</sup>

The subsidies were time restricted so companies would be incentivized to quickly expand the network. Subsidies expired after three years for volume of water delivered, after four years for length of pipelines laid, and after five years for new connections made. The concept was that as the network grew, user fees would increase and the company's need for the subsidies would decrease.<sup>28</sup> ONEP designed the subsidies so operators could break even midway through their contracts and become profitable for the remaining years.<sup>29</sup>

The output-based aid model transferred commercial risk to the private sector. If the companies were unable to build new connections and collect revenue from water users, the *companies*, not *ONEP*, would lose money. Although ONEP retained legal responsibility to provide water, the companies would suffer if the networks did not produce sufficient revenue.<sup>30</sup>

Because the public–private partnership model changed the way in which ONEP delivered an essential service to communities, El Khdar's directorate needed approval by local authorities. “In practical terms, [ONEP] went to the municipalities and said, ‘Look, I do not have enough staff to manage service delivery in-house, and I would therefore like to propose hiring a private operator—which I would manage—to deliver service in your area on my behalf,’” Chauvot de Beauchêne said. “The municipal council deliberated on this to decide whether it agreed with the approach. That's done with each and every municipal council concerned with a proposed submanagement delegation to a private operator.”

El Khdar and his colleagues chose to test the output-based aid model in the area around Jorf el Melha, a town in northern Morocco. The project covered an area of 1,200 square kilometers with a population of 141,000. ONEP had been providing water service for 7,800 households there at a financial loss.<sup>31</sup> The contract set a goal of expanding access to 22 new communities and installing more household connections in communities that were already connected to the water network.

ONEP restricted the bidding to Moroccan companies, which competed on the basis of the size of the subsidies they required in each of the three measured outputs. The utility provided technical assistance and workshops for potential bidders, with World Bank support. Sotradema won the 10-year contract in 2009 and began work in 2011. ONEP designed the subsidy so the company would break even after five years if it built the desired number of new connections.

Beginning in 2011, Sotradema managed infrastructure built by ONEP prior to the contract, including boreholes, wells, pumping stations, metering pumps, chlorinators, more than 500 kilometers of water pipeline, 259 standpipes, and numerous water tanks, according to data

released by the utility. By 2014, three years into the project, Sotradema had increased the number of connections by 40%, laid 21,500 meters of pipe, increased water sales by 15%, and reduced water loss in its network by 10%. The company collected DH22 million (US\$2.7 million) in revenue and received DH12 million (\$1.5 million) in subsidies from the utility.<sup>32</sup>

Ait Riala said that the company had planned to break even in 2016, five years into the program. In February 2016 he emphasized that the Jorf el Melha contract was a pilot operation and the first experience with this kind of contract for both Sotradema and the water utility, and that its financial viability was not yet clear.

Based on Sotradema's success in the expansion of water supply in Jorf el Melha, El Khdar and Jahid decided to replicate the same partnership model in other areas. The utility "studied their 10-year history of private sector involvement in various forms in order to determine the costs and benefits of each model," Chauvot de Beauchêne said. "They established that the output-based aid pilot was the most interesting for them from a cost-benefit perspective. So they decided to replicate it in other areas of the country."

The World Bank helped prepare standard bidding documents and contracts for the delegation-of-service provision using the new model. In 2012, ONEP combined with the national electricity utility to become the National Office of Electricity and Potable Water, known as ONEE. Jahid and El Khdar's directorate became part of the ONEE water branch. The change did not result in any reorganization of the structure or in any change to ONEP staffing. As of 2015, the utility was offering several new rural water supply contracts using the same output-based aid structure.

## OVERCOMING OBSTACLES

When PAGER first provided water for rural communities, the program focused on the

construction of communal standpipes to serve entire villages. By the mid-2000s, however, consumer preferences had changed. Fewer families were content with shared water connections. More people wanted the convenience of being able to simply turn on a tap at home and have clean, fresh water. Citizens increasingly perceived standpipes as a stopgap measure. "You need to have home access to really get the full benefits of water in terms of time savings and health improvement," said Lionel Goujon of the French Development Agency's Morocco office.

El Khdar said he first noticed the shift in consumer desires in 2008, attributing the change to increased communication between rural communities and the outside world. At that time, 86% of rural residents had access to piped drinking water, but only a third of that number had household connections.<sup>33</sup> Household connections, however, cost more than standpipes, and more than municipal governments and many households could afford to pay.

In 2009, after reviewing the cost structure with the World Bank and municipalities, ONEP decided to ease the financial burden on both municipalities and households. First, the utility increased to 80% from 65% its share of the cost of connecting a community to the water supply network and reduced to 15% from 30% a municipal government's contribution. Households, together, continued to shoulder 5% of the total cost of a community connection.

Second, ONEP set a standard fee for households to get individual water connections. The additional cost of connecting individual households to a community water supply had varied and had often been too high for many families to afford. "The connections could cost more than DH7,000 [US\$700]" per household in some communities, Jahid said. "People could not pay more than DH3,500 [US\$350]."

Under the revised cost structure, each household paid a fixed fee of DH3,500 (US\$350)

over seven years. The municipality paid half the overall cost of connecting the household—which could vary between communities—and ONEP paid any remainder. ONEP received assistance from foreign donors to fund household connections. “We could not have done it financially on our own,” El Khdar said.

The new pricing scheme supported the expansion of household connections to more than 40% of the rural population by 2015. But such household connections were not possible in all communities. In some communities that were located in remote areas or in difficult terrain, only standpipe service was possible.

## ASSESSING RESULTS

Beginning in 2004, ONEP succeeded in expanding access to potable water in remote areas that had suffered from shortages and contamination. In 2015, El Khadr said, 94.5% of Morocco’s rural population had access to potable water—defined as living within 500 meters of a standpipe or having a household connection. In 2014, the utility reported that more than 12.7 million rural Moroccans had access to its system, up more than 50% from 8.1 million in 2004. The number of standpipes had nearly tripled to 10,200 in 2014 from 3,478 in 2004. Jahid said in 2015 that at least 40% of rural Moroccans had household connections.

Although ONEE had reached the goal the king’s water advisory council had set, about a quarter of the rural connections had problems that occasionally disrupted service. In 2014, the utility reported that 49% of the dysfunctional connections suffered from problems with the water source; 34% from poor management and lack of maintenance; 9% from aging equipment; and 8% from bad design.

El Khdar said that as of 2015, the program was near its goal of providing water wherever it was feasible to do so. “The remaining 5% are usually very remote, and sometimes there is simply no water there,” he said.

The Joint Monitoring Programme for Water Supply and Sanitation (JMP), a joint operation of UNICEF and the World Health Organization, measured access differently. In 2015, the JMP, which works to measure progress toward United Nations Millennium Development Goals, estimated that 65% of rural Moroccans had access to sources of water protected from outside contamination, including traditional wells that provided safe water. The JMP defined access to water as requiring a connection within 200 meters of a household, a much shorter distance than ONEE’s 500 meters.<sup>34</sup> The UNICEF-World Health Organization estimates also excluded citizens who lacked reliable connections to what the program called “fully improved” water sources. “It is a big debate,” El Khdar conceded in 2015. “Parliamentarians and other departments are criticizing that high number” (the 94% reported by ONEE). He said his office was putting greater focus on addressing dysfunctional connections.

Separate statistics on education and disease indicated that measurements of levels of health and disease among rural Moroccans had improved markedly, a trend to which better water supplies likely contributed. By the 2000s, cholera was nonexistent,<sup>35</sup> and countrywide deaths of children younger than five years had dropped to 28 per 1,000 live births in 2015 from 63 in 1995.<sup>36</sup>

“People used to get sick from the water, but now it is not the case,” said Khayyatiya Karad, who helped her husband perform his work as a standpipe caretaker in a small village near the town of Ben Slimane in northwestern Morocco.

By 2012, the most recent year for which World Bank data were available, gender parity in education had improved, with the countrywide number of girls attending school having increased to 91% of the number of boys from 76% in 1995.<sup>37</sup> It was not possible to ascertain whether this was in part due to increased access to water, but El Khdar believed there was a connection. “Bringing water to the villages has liberated

women and girls from the burden of getting water,” he said.

ONEP’s use of private sector contracting enabled the utility to double the length of its countrywide distribution pipelines without increasing staff. The total length of pipelines in the network had doubled to 40,000 kilometers by 2014 from 20,000 kilometers in 2000. Still, the availability of free sources of water limited usage of the water that ONEP provided, indicating that some Moroccans were continuing to use unsafe sources to meet many of their needs.<sup>38</sup> Even some households that had direct water connections still did not use more than two liters of water per day from the ONEP system—just a fraction of the 20 liters per person estimated by the World Health Organization as minimum consumption for a healthy lifestyle.<sup>39</sup> The discrepancy indicated that some families were continuing to use traditional free sources of water so as to avoid charges of approximately US\$0.50 per cubic meter.

## REFLECTIONS

Morocco’s efforts to increase water access in rural areas improved significantly when the government empowered a single organization to manage a cohesive strategy. After the national water utility, called ONEP (Office National de l’Eau Potable, or National Office of Drinking Water), took over in 2004 from the former shared system, there were fewer problems with unreliable connections and unsustainable management models.

Regardless of the quality of management and the participation of citizens, the costly task of bringing water to rural, arid areas required donor assistance. From 2001 to 2013, ONEP spent US\$1.3 billion on its program, much of which came from outside donors.<sup>40</sup> The funds were vital for building infrastructure.

Sustainability remained an open question in 2016. Morocco had yet to prove whether ONEP’s program could succeed over the long term. The

contracting system could succeed on a wide scale only if the participating companies earned a profit on their work. Morocco-based Sotradema reported that it had profited from the free-for-service contracts, but Canadian contractor Aquatech had lost money. As of 2016, Sotradema did not yet know whether the pilot output-based contract would be profitable. Low numbers of interested bidders suggested that few companies saw value in the ONEP contracts.

It was important that donors willing to pay onetime costs such as construction did not subsidize continuing costs. “The idea is to mobilize money one time to set up the service,” said Lionel Goujon of the French Development Agency. “The problem is when that investment is not sustainable. If you need to subsidize operations, then at some point you get too much dependency on government money, and you don’t know what’s going to happen in five years’ time. . . . To maintain what has been set up, you have to find some model wherein the price of water can pay at least for keeping it running.”

Reliable water sourcing was another crucial long-term consideration in Morocco. Conducting thorough studies on the sustainability of sources was vital to make sure the network could expand and offer reliable connections. “I cannot drink from an empty glass,” said Abdellah Jahid, who took over as director of the Directorate for the Generalization of Drinking Water in 2006.

Finally, the involvement of citizens and communities helped lead to successful outcomes that were tailored to meet local needs. “People had a sense of ownership over the project,” said M’barek El Khdar, who led ONEP’s rural water supply planning office.

Water users’ associations and caretaker groups remained in place if they were functioning well. In communities where collective commitment was weak, private companies worked with residents to collect fees and maintain water lines.

Overall, Morocco's experience in boosting rural water access appeared to demonstrate the importance of flexibility in strategies to implement the delivery of important public

services, especially in challenging situations and locales.

"There is not one single model that works; otherwise, everyone would have it," Goujon said.

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