

City and Community Profile: Solo, Central Java, Indonesia

15 JANUARY 2012

CITY PROFILE

CASE STUDY OF SOLO, CENTRAL JAVA



Households living along the riverbanks of the River Bengawan in Solo

1. OVERVIEW OF THE CITY OF SOLO

Solo is a medium-sized city located in the middle of the province of Central Java, it sits along the riverbanks of the Bengawan River. Solo, also known as Surakarta, has been settled for

over five centuries and was previously the seat of the Mataram Kingdom. Since then it has been an important political and economic center for the region. Manufacturing and trade are the largest sectors of the local economy.

SOLO FACTS

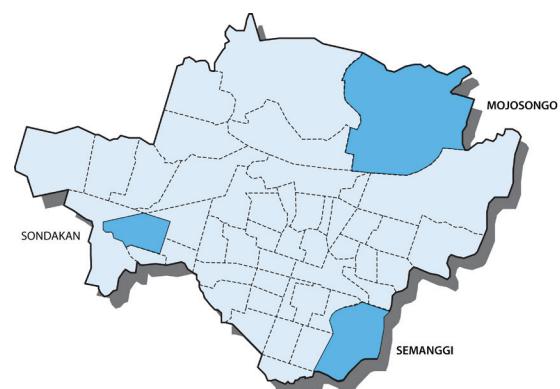
CITY FACTS

Total land area:	4,600 ha
Population:	534,498
Pop. density:	116 people/ ha
Poverty:	21%
# of Districts	5
# of Neighborhoods:	51

WATER

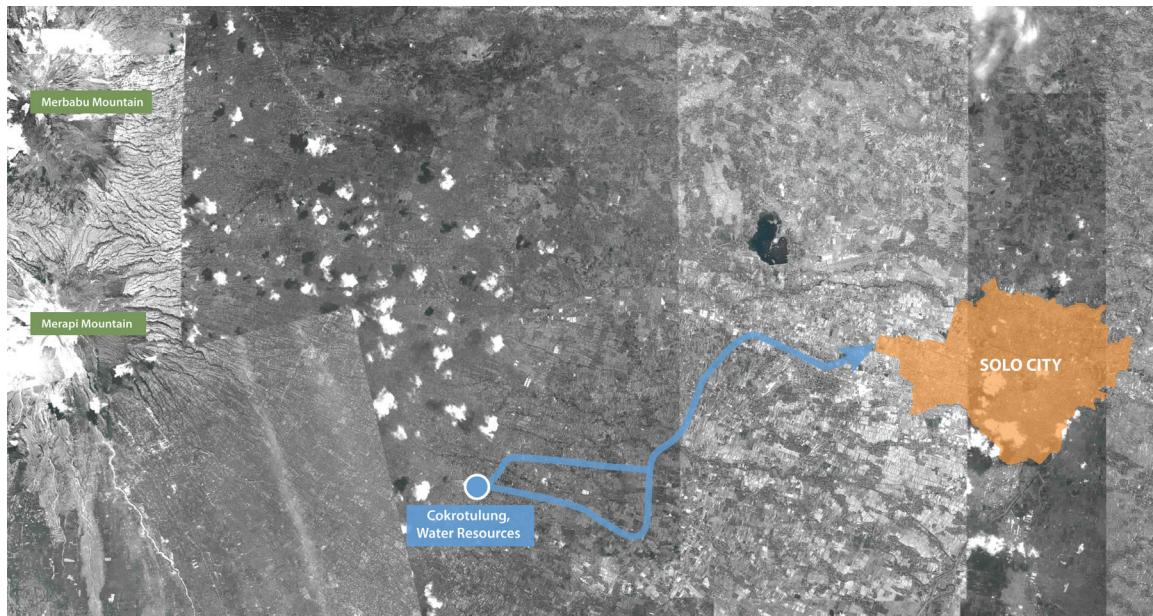
PDAM water:	38%
Public wells:	13%
Private wells	43%

Sources: Solo in Figures 2010; solokotakita.org



The city of Solo and the three communities profiled

SOLO KOTA KITA



Historically Solo's water has been supplied by the Cokro Tulung mountain spring in neighboring Klaten Regency, west of Solo.

2. SOLO'S WATER SOURCES

The sources of Solo's water supply system have evolved over time due to a number of different factors. The original water source for the city comes from the Cokro Tulung mountain spring, in the neighboring municipality of Klaten. In 1928, during the Dutch colonial occupation, an aqueduct was built to supply the city with water, and this is still in use today. But, as the population of the city grew, this water source would not be enough so other sources had to be developed to keep up with the increased demand. Today there are a variety of different sources that supply the city; but the type of source may vary according to when an area was settled and also depending on what part of the city one is located.

The distribution of water in Solo relates closely to the geography of the city. Firstly the city of Solo is not flat so its topography affects water distribution. The south of the city is lowest and closest to the Cokro Tulung mountain spring, so this area of the city (the Kecamatans of Serengan, Laweyan and Pasar Kliwon) is serviced by the Cokro Tulung spring. The far east of the city, which historically also had Cokro Tulung mountain spring water now does not derive its water from the spring, since the water is consumed before it reaches the east. In the east they use a variety of sources (treated river

water, mountain spring and deepwater wells). In the north of the city most of the water comes from deepwater wells and treated river water, this area is higher than the rest of the city and is the most recent to be settled.

Another factor that determines the type of water sources that supply different areas of the city relates to the typology of settlements in that location, and when they were settled. Solo developed slowly over the course of many centuries, with a relatively stable population. Around in the middle of the 20th century the whole city below the Kalianyar River was almost completely settled. In 1982 a piped water network was built to service this whole area of the city (with water from the Cokro mountain spring). But industrialization of the municipalities that surround Solo, such as Sukoharjo, Karanganyar and Boyolali, led to rapid urbanization in the last quarter of the 20th century, increasing both the population and density of the city. As a result newly urbanized areas have created new demand for water, and since the Cokro Tulung mountain supply is limited, new sources have had to be created. The north of the city, above the Kalianyar River, is one of these new areas. The water supply there comes from newly created deep water wells, as opposed to the city's original piped water network. As

the population of Solo and its surrounding municipalities continue to grow water demand will continue.

The following are the different sources of water that supply water to Solo:

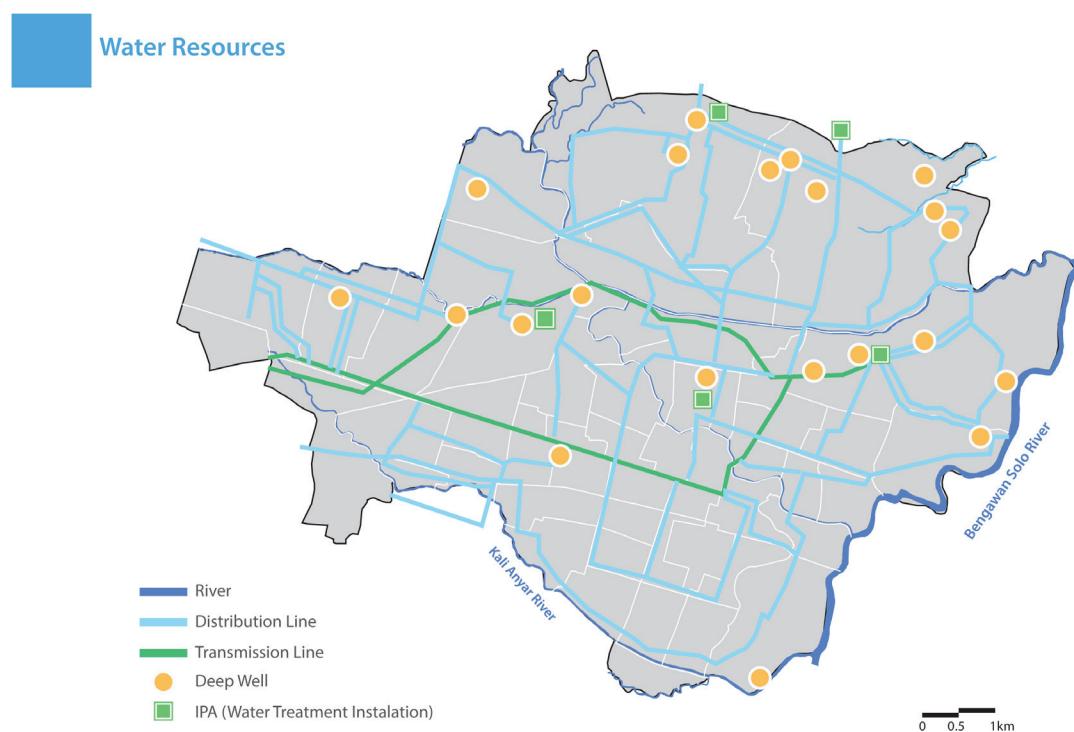
- a. **Channeled mountain spring water:** Historically most of Solo's water came from a mountain spring in the neighbouring municipality of Klaten called Cokro Tulung.
- b. **Treated river water:** An alternative source is the treatment of surface river water which comes from the Begawan River, which runs through Solo. The city created a number of water treatment plants called IPAs, there are now three IPAs in Solo (location, date of construction and capacity to be confirmed)
- c. **Subterranean water:** Subterranean water resources are at a depth of between 100 – 200 meters. Subterranean water can be either privately or publically built and managed. There are 26 different public deepwater wells, 16 are in the north of the city (mostly in Mojosongo and Kadipiro) and 10 are in the south of the city (mostly in the middle of the

city). Private deepwater wells are often used by large hotels or industries. Deepwater wells use a reservoir system so that water that is collected can be accessed at all times.

- d. **Surface water:** Surface water can be extracted by the use of wells that are built and managed either publically or privately. In Solo surface water lies is at a depth of approximately 20-30 metres.



A deepwater well in the Mojosongo Kelurahan (neighborhood), such wells pump water from depths of 100-200 meters underground



The city's deep wells are distributed in various locations around the city while water mains and distribution lines extend across Solo.

SOLO KOTA KITA

THE EVOLUTION OF SOLO'S WATER SOURCES

Several factors contribute to the need to develop different water sources for the city's water needs. Of course urbanization is one of the important drivers of change since swelling population has meant that the supply of water from the Cokro Tolum spring alone was outstripped by increased demand. But there have also been important institutional and political changes, as well as environmental and maintenance issues, which have contributed to the urgency of developing alternative sources.

One of the obvious factors that has contributed to the insufficiency of water supply from the Cokro Tulung spring has been the decayed state of the pipes that connect it to the city. Built in 1928 and poorly maintained the 38-kilometer length of pipes is in poor condition. Although it is difficult to estimate the extent of water loss through leaks it is presumed to be very high. In addition in 1998 the Reformation period ushered in new regulations governing the management of local resources with the Local Autonomy laws (Otonomi Daerah) that has limited the amount of water that could be supplied by Cokro Tulung. Under the new laws each municipality, or district, in Indonesia was made responsible for managing their own natural resources. The district of Klaten decided to ration the supply of water to Solo from

Cokro Tulung, so that it would ensure that local farmers and settlements would be given priority. It gave Solo only a fixed quantity per year, that was to be paid for by PDAM Solo. This essentially curtailed supply at a fixed annual amount and meant that new sources had to be sought to supply the city.

As a result PDAM Solo began developing a variety of new sources of water, these include river treatment plants, boring deep water wells, and also more surface wells. Below is a description of the different sources:

Deepwater wells

Deepwater wells draw water from subterranean groundwater over 150 meters below the ground surface. This became PDAM's main strategy to provide additional water starting around 1998-2000; there are 26 such deepwater wells today. The start of this policy coincides with the onset of Otonomi Daerah meaning that as each municipality became more protective of their water resources, they had to find sources of water within the border of their municipality.

Surface water wells

Surface water wells draw water from a depth of approximately 30 meters and use motors to pump the water to residents. There are numerous water wells in Solo, managed both

CHALLENGES FACING WATER SOURCES

Current challenges

- The state of the pipes connecting Cokro Tulung to the city is very poor. Repairing them will be very costly.
- The amount of water from Cokro Tulung mountain spring cannot be increased, PDAM has had to look for new sources.
- During the dry season the level of water in deepwater wells and rivers decreases significantly.
- River water and surface water is polluted by effluents from the batik industry. It is very difficult to completely eliminate pollutants.

Future challenges

- The water level of deepwater wells is decreasing every year.
- Competition between local governments and private companies (such as Danone) over the Cokro Tulung mountain spring will likely increase in the future.
- Increasing seasonal variety of water levels for the Bengawan River mean that it may not be a reliable source of water in the future.
- Increased use of deepwater wells depletes public surface water wells that supply many community water needs.

privately and publically, and these often are built in areas where density is high and pipes are difficult to install, and where immediate water needs urge rapid installation. Thus in many urban poor areas surface water wells are the source of water for residents

River water treatment plants

River treatment plants, also known as IPAs, draw water from the river and treat it so its fit for human consumption. PDAM started to build such plants in 1998, and there are now three in the city, drawing water from the River Bengawan. One problem that PDAM faces has been dealing with polluted water from the Batik dye industry. While attempts have been made to clean this water using mud from other municipalities and filtering it out, dye residues still remain. Also supplying sufficient water during the dry season when the water level of the river is very low is a seasonal challenge.

MANAGING SOLO'S WATER SOURCES IN THE FUTURE

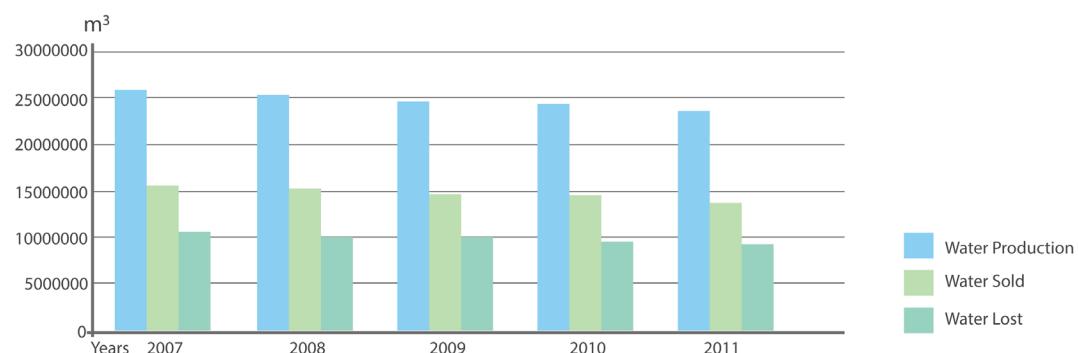
Given the increasing difficulty of providing water for Solo's population from sources within the municipality there are new arrangements being developed to propose alternatives. At the moment there are plans to create a regional water resource management scheme in conjunction with Solo's

neighboring municipalities. The idea is to create a municipal compact or partnership with the adjacent municipalities of Wonogiri, Sukoharjo, Karanganyar, Surakarta, Sragen (the metropolitan area known by the acronym Wosusukan). Together with these local governments would co-manage the water resources of the Waduk Gajamungur Dam in Wonogiri. This would help supply water for irrigation, electricity, and domestic consumption purposes for all these municipalities

WATER LOSS TO THE SYSTEM

As has been mentioned above, there is significant water loss in the system, estimated at 40% loss in 2011, largely attributed to leakage form the pipes that run from Cokro Tolum, but also due to water theft. The Cokro Tolum pipes have not been fully repaired since their installation by the Dutch in 1928, although 30% of the 38 Km pipeline has been repaired. PDAM mentioned that they would need national resources of 1 billion Rp in order to repair 800 meters of the pipeline, meaning that they would require around 100 billion to complete the task. Another source of water loss is through illegal connections, however there is no quantifiable data to account for the extent of water loss through theft.

**PDAM Surakarta
Water Production and Distribution**



	2007	2008	2009	2010	2011
Water Production	25902099 m ³	25391983 m ³	24817080 m ³	24581453 m ³	23799386 m ³
Water Sold	15670331 m ³	15425614 m ³	14892569 m ³	14802307 m ³	13868020 m ³
Water Lost	10231768 m ³	9966369 m ³	9924511 m ³	9779146 m ³	9584197 m ³
% WaterLost	38,65%	39,26%	40,00%	39,80%	40,66%

Source: PDAM Kota Surakarta

SOLO KOTA KITA

3. SOLO'S WATER DELIVERY SYSTEM

SUPPLYING WATER TO THE PUBLIC

There are differing estimates for the coverage of water supplied to Solo's population. The public entity responsible for the city's water supply calculated in 2010 that it was providing water to 57% of the population, and that its target for 2011 was 74%. PDAM calculates this estimate by counting the number of piped house connections (55,338), and the number of water hydrants, and then estimates the number of users for each connection/ hydrant. Through PDAM's calculations one hydrant serves twenty families (of six people), and one piped connection serves one household of six people. Thus the estimate uses a rough estimation of household size and approximate number of users for public hydrants.

The NGO Solo Kota Kita used a different technique to gather data across the city working with local neighborhood leaders in each of the city's roughly 2,700 RT units. An RT unit is a territorial and administrative unit that approximately contains twenty households. In each RT a Ketua RT, or block captain, informally oversees activity and communicates information from the neighborhood leader, or Lurah. Using this administrative system Solo Kota Kita interviewed each Ketua RT to report how many households had access to PDAM piped water, how many used public wells, and how many

used private wells. The information collected through this crowd-gathered technique indicates that PDAM supplies water to 38% of the city's households; but this does not account for PDAM's supply of water to public hydrants. The differences in the two values can be attributed to: a) PDAM generates their data based upon counting the number of connections (and public hydrants) and estimates of users, whereas Solo Kota Kita counts the number of household connections; and b) Solo Kota Kita's data did not include the provision of water from public hydrants as supply through PDAM (it counted piped water alone).

There are a number of different ways that water is accessed and delivered in Solo. Access to water will differ in relation to one's location in the city (which relates to considerations of housing density, topography and age of settlement), as well as how much of an investment one is willing to pay to install pipes.

1. PDAM household service: PDAM water comes to households through pipes, offering a direct connection to the water mains. The consumption of PDAM water is monitored by household meters and a fee is paid according the quantity of water used per month. Customers using piped water pay an installation fee of around 1.6 million Rp, and submit their request to the nearest PDAM office; the installation fee can sometimes be waived for poor neighborhoods.

CHALLENGES FACING WATER DELIVERY

Current challenges

- Many continue to relocate to new settlements in the north of the city (Mojosongo and Kadipiro) increasing demand for services.
- Solo is increasingly popular as a tourism destination and new hotels are being built that use private deepwater wells. These draw water from groundwater resources and negatively effect neighborhood water supply.
- The periphery of the city continues to grow and residents are looking to Solo to supply their water since Solo has infrastructure, while the surrounding municipalities are not urbanized (eg. Boyolali and Karanganyar).

Future challenges

- As city continues to develop densities are likely to rise. The north of the city (Mojosongo) continues to grow rapidly as do the surrounding areas in the periphery.
- The poor areas of the city that are increasing in population are usually of very high densities where it is difficult to install wells and pipes. Alternative supply mechanisms have to be sought in such locations.



Public water hydrant at RW7, RT 3, Semanggi. Households fill containers and jerry cans for domestic consumption.

2. PDAM Public hydrants (*hydrant umum*):

Public hydrants are stand-alone reservoirs or tanks that fill up containers and buckets for residents to fill up and use domestically. Public hydrants are serviced by PDAM and connected to the public mains. Since some areas of the city are very built up and it is too difficult to install pipes to individual houses the hydrant offers one connection point where households will have to manually access water. Public hydrants are located in strategic locations in these dense settlements so that access is as convenient as possible.

There are two kinds of public hydrants, those that require a fee for consumption and those that are free for public

use. Public hydrants that are located in residential areas and for domestic consumption require payment to PDAM, this is monitored by PDAM and managed by the community (usually by the RT leader). The fee for consumption is around 500 Rp per 1,000 liters. Public hydrants that are located in public spaces, usually in the city center, offer free water to the public and are generally used by pedicab drivers and street vendors.

3. Public Wells: Public wells are located in residential areas where households can draw water for cleaning and household purposes. The water drawn from public wells is free, but since there are maintenance costs associated with the operation of wells, those that use motorized pumping systems for example, a small fee is collected from users. Public wells do not usually have a reservoir system to store water. This can be problematic if there is no electricity, so the system can be unreliable at times. Public wells can be built by the community itself, or through small neighborhood grants, or by the Department of Public Works.

4. Private Wells: Private wells operate in the same way as public wells but they are usually for use by one to four families.

5. Drinking water distributor: It is more and more common nowadays to see private drinking water distributors servicing private residences with drinking water that is stored in large plastic bottles.

4. INSTITUTIONAL POLICIES AND APPROACHES

LOCAL INSTITUTIONS INVOLVED IN WATER SUPPLY

There are two main local government departments that are involved in supplying water in Solo, PDAM and the Department of Public Works (PU). PDAM is the principle institution responsible for channeling water to the city and providing it through piped infrastructure to households and communities. However the Department of Public Works is also an important provider of water through the construction of public surface water wells. These two institutions work separately given that their funding come from different sources. PDAM draws on the city's budget, whereas Public Works receives funding



A public well in the Semanggi neighborhood.

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from the national-level Ministry of Public Works. There is no exact criteria that is used to determine which institution has predominance over the other, but in general Public Works will build wells where water needs are most urgent and it is difficult to install pipes, for example in relocation areas. These are not connected to the city's water mains, and are considered ad hoc installations that the local community is responsible for managing. PDAM thus manages the water delivery system, installing pipes, collecting revenue, maintaining infrastructure at a citywide level, while Public Works builds and installs wells that are later handed over for community use.

There are other local government departments who play a role in the provision and consumption of water, albeit in a more minor role. The Department of Environment works to help increase water catchment, for example, they have programs that seek to increase the absorption of surface water through creating little holes in the ground. They have also been promoting the cultivation of trees to improve water catchment and reduce erosion. In recent years the Department of Environment has created an urban

reforestation campaign that has increased the amount of green space in the city (although it is arguable whether this initiative is connected to efforts to improve water supply). The Department of Health promotes a health campaigns to raise awareness about the healthy management and consumption of water through health centers.

OPPORTUNITIES FOR IMPLEMENTING NEW POLICIES

Given the changes to water provision and supply over the last fifteen years it is possible to see that further changes in water policy are both feasible and likely. At the inter-municipality level, efforts are being made to increase water supply through the creation of a municipal compact establishing a regional water body. This partnership would govern and distribute water to the districts of Wonogiri, Sukoharjo, Karanganyar, Surakarta, and Sragen is likely to be created in the coming years.

At the community-scale there are initiatives to increase water catchment that could support the creation of new city policies. In various communities residents have promoted the artificial recharge of groundwater resources, for example

WATER POLICY AND THE NEEDS OF THE POOR

Water policy has a positive effect

- Public hydrants do help provide for the poor as they bring water to areas that are too dense to extend the city's piped network, or to build deepwater wells.
- Water from public hydrants is very cheap and thus makes it affordable (approximately 100 Rp. For one gallon)
- The Department of Public Works (PU) also is effective in building public wells and public toilets in the city's poor areas.
- For many poor people the use of public wells benefits them because they wouldn't be able to afford regular payments.
- Some poor people, who are street vendors and pedicab drivers, use the free water hydrant on the main street (Slamet Riyadi) for daily uses.

Water policy is insufficient

- In areas such as Semanggi the increasing density of the settlement means that traditional supplies of water (PDAM) are inadequate to supply residents. First PDAM had to build deepwater wells, but with more density these also became insufficient. At the moment the solution has been to install public hydrants, but it is unclear how long these will keep up with demand.
- Many poor people still access water from public wells (not necessarily built as a result of public investment).

in the neighborhoods (kelurahans) of Sondakan and Danukusuman. They are drilling permanent holes into the ground, at least a meter deep, and installing a filter and a concrete tube so that surface water will be absorbed. There are also some other smaller initiatives to promoting the use of bio-pores. These are widespread in dense areas (currently there is a project idea to create 5,000 bio-pores). These are quite shallow, only 50 cm of depth, holes driven into the ground.

5. COMMUNITY PARTICIPATION IN MANAGING WATER SUPPLY

Community members are often very involved in managing water resources. They can be involved in the planning or maintenance of water systems, the collection of payments, and the resolution of any conflicts that may arise from them. Community participation may differ depending upon what kind of water system the community has. For households that receive piped PDAM water there is little need for participation, since households pay individually for the city to maintain service quality. But in many communities payments are made collectively requiring a collection system to be put in place; or, where maintenance of infrastructure such as public wells is necessary social mechanisms are used to co-manage the resource together. The kind of participation that a community engages in may differ in relation to the kinds of payment systems, planning approach, and the kind of maintenance arrangements that are required in different communities.

DIFFERENT FORMS OF PAYMENT COLLECTION

Ngangsu: The ngangsu system is a community payment collection system used where different families share the same source of water, be it a well, a public hydrant or a standpipe. Ngangsu literally refers to a ceramic bottle that historically women used to transport water from springs; it now refers to the manual collection of water. In areas where there is a public hydrant or public well that requires a payment for its use or maintenance, someone

in the community will be responsible for charging for the water that is drawn from it. This person can either be a designated community leader, like the RT leader (Ketua RT), or the position can rotate amongst users.

The ngangsu system is used to collect payments that are made to either PDAM (in the case of public hydrants) or for a communal maintenance fund (in the case of public wells).

In some cases a community will set a monthly target that has to be collected, split evenly amongst users. If more money is collected the additional amount goes towards community savings (that will later be used for maintenance), or if there's less then the community has to collectively pay the difference.

The ngangsu system gives the community a high degree of control over the management of the system. It has been promoted by both PDAM and Public Works because it is an effective way of having community members collaborate with one another and assuming responsibility for the collection and maintenance of their hydrant or well. This system is often used in high-density poor areas.

Social Master Meter: In other communities the payment system is also collective, but PDAM's own water meters regulate it, this system is called the Social Master Meter. In some communities PDAM is able to install a piped water supply system to around 20-30 households, using a deepwater well (around 200 m deep). Each house will have a meter to gauge how much they have consumed individually, and there will also be a Social Master Meter to indicate how much they owe PDAM collectively.

PDAM will ask the community to manage the water resource collectively, interacting with them through a community representative. This person will collect the payments and serve as a direct point of contact (for example signing the MOU). In this way the community is able to manage themselves, by self-organizing around their water management needs, and PDAM only need deal with specific issues and through the community representative. This system has been used in new settlements where water resources are recently installed, such as the resettlement communities in Mipitan, Mojosongo in Solo, where PDAM is building deepwater wells.

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PARTICIPATION THROUGH PLANNING AND BUDGETTING

In addition to managing the collection of fees there are other ways in which community members participate in the management of water resources. For example in Solo there are two very different planning processes which occur in most cities in Indonesia that invite the participation of community residents, the musrenbang, a locally managed budgeting cycle, and PNPM, a national government neighborhood block grant program.

Musrenbang: Solo's annual musrenbang process allows community members to prioritize water supply as a part of the local budget spent on small-scale infrastructure improvements in their neighborhoods. Residents can propose the construction of a public well.

PNPM: Another means of participation in planning at the neighborhood scale is through the national level block grant called PNPM. Communities can put forward a project proposal, for example, to build a well, hydrant, or the pre-installment of water pipes, as was the case in Semanggi.

PARTICIPATION IN THE MAINTENANCE OF WATER

Community members can be called on not only to pay for, but also maintain, water systems. PDAM provides water to many households as a public service, charging for both the provision of water and servicing the system; this means community members are rarely involved in the maintenance of water infrastructure. In some cases however, where piped connections are not feasible, surface water wells are used, these require community maintenance. These may be areas with more urgent and immediate needs, such as relocation communities. In such cases the Department of Public Works helps to fill the gap in service, it builds the public well infrastructure, but maintenance becomes the responsibility of community members. Prior to handover the Department of Public Works provides guidance to the community about how to manage the well, for example indicating that they should form an organization and appoint specific roles.

ORGANIZED COMMUNITY PARTICIPATION

There are two major organized committees that undertake participatory activities at the community level, mostly focused on planning and project implementation issues. The Kelompok Swadaya Masyarakat (KSM), is a community organization set up through a national neighborhood grant institution called PNPM. This committee usually takes on the task of discussing and designing community block grant proposals, and overseeing their eventual implementation. The other group is the Lembaga Pemberdayaan Masyarakat Kelurahan (LPMK). The LPMK is a neighborhood-level development committee that exists in every kelurahan of the city. This committee often works on the prioritization of proposals through the musrenbang process.

Within each community there will be a working group that specifically works on ensuring responsible management of water, this is a working group, or Kelompok Pengelolaan, a community-based water management committee. This is particularly the case in communities where the Department of Public Works has installed a deepwater well. In such cases, where there is little or no government service or support, communities have to organize a Kelompok Pengelolaan so that they can self-manage the wells to install pipe connections to individual houses, regulate and collect fees and ensure adequate maintenance.

In Solo there are no NGOs that work specifically on water issues, but there are a few NGOs whose work does relate to participatory water management. One such organization is Pattiro, an NGO that is dedicated to improving governance and transparency; they promote citizen complaints related to public services, and the monitoring of public services. Another NGO in Solo is Solo Kota Kita, they promote access to information about community issues and resources that could be helpful for community groups to understand the situation of water in their communities.

COMMUNITY PROFILES

3 CASE STUDIES OF MOJOSONGO, SEMANGGI AND SONDAKAN NEIGHBORHOODS

MOJOSONGO

Mojosongo is a very large neighborhood in the north of Solo. Most of the residents are newcomers and many have resettled there from flood prone areas of the city. The population of Solo's northern area is still growing since the rest of the city has already been entirely settled, and this is the last remaining area where new development can extend to. Mojosongo is dominated by a large national government housing project, 'Perumnas', which has provided new infrastructure for expansion, this includes housing and piped water connections. Mojosongo is known as the driest area of Solo and it is hilly and less fertile. This makes it a difficult place to access water.

The west of Mojosongo is largely the 'Perumnas' area, here PDAM water supplies water to households. Mojosongo overall has a relatively high level of PDAM service, 76%, and this is thanks to the installation of pipes and service that occurred in the western part of the kelurahan as

part of the national housing project. This water comes from deepwater wells that PDAM manages.

In the eastern and southern parts of Mojosongo PDAM offers a much more limited service. Given the dry soil it isn't possible to create surface water wells, so deepwater wells have been built here by the Department of Public Works and these are self-managed by the community. There are five self-managed deepwater wells in Mojosongo that service an estimated 5% of the population (approximately 700 households), largely in resettlement areas.

Management of deepwater wells, Ngemplak Sutan, RW 29

RW 29 is a resettlement community that has recently been created to house families that were moved from different parts of the city to facilitate urban projects, such as removing riverbank dwellers from areas of risk. This community uses deepwater wells that Public Works built. The management of this system is different to those used with PDAM's public hydrants because when the community receives them they become entirely responsible for their management and

MOJOSONGO FACTS

LAND AND DEMOGRAPHY

Total land area:	570 ha
Population:	40,252
Pop. density:	70.6 people/ ha
% Poverty:	9%
% Land Tenure	92%

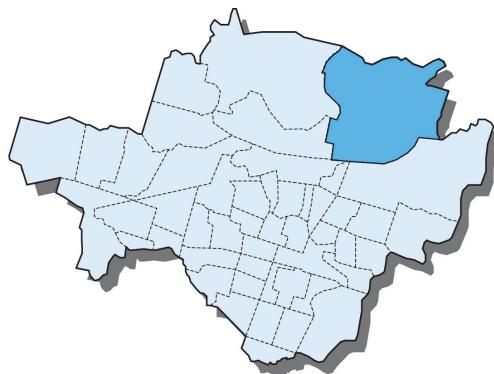
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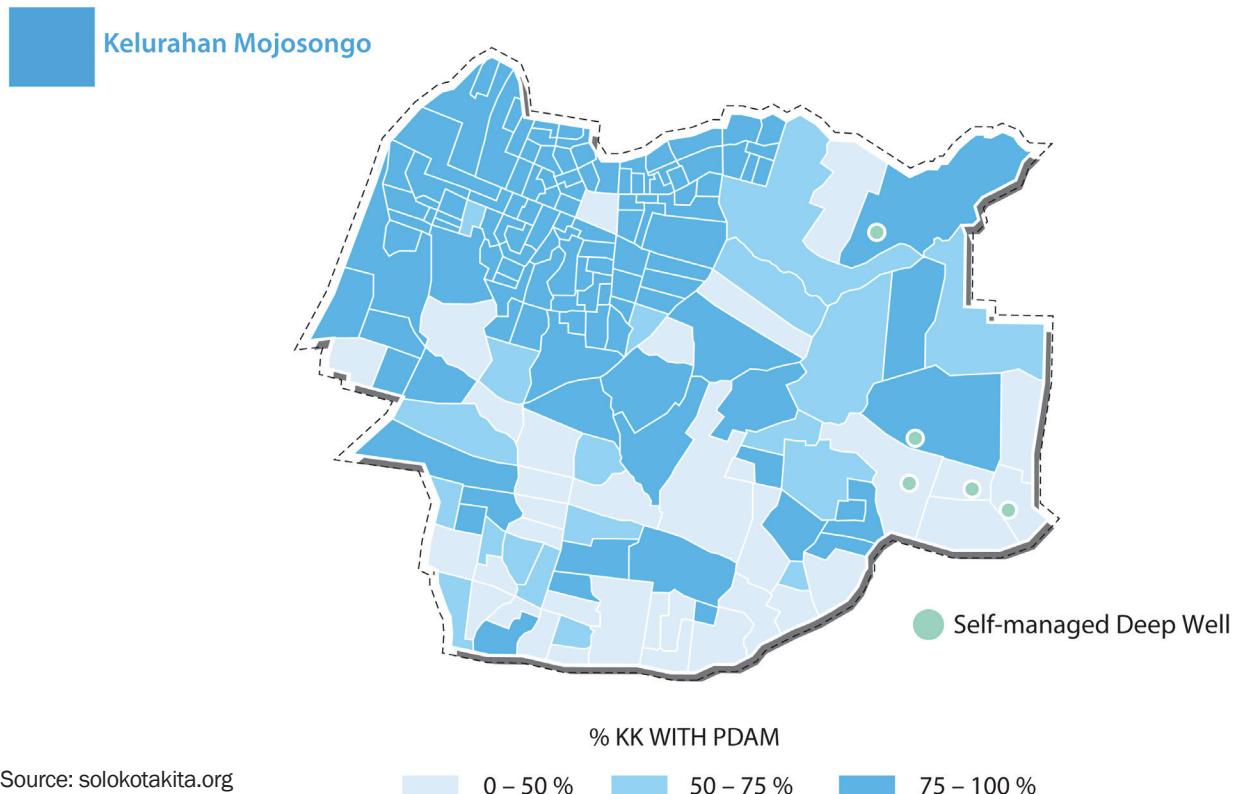
PDAM water:	76%
Public wells:	5%
Private wells	11%

Source: solokotakita.org

MOJOSONGO'S LOCATION IN THE CITY

Mojosongo is one of the largest kelurahans in Solo.





operation. They must establish an organizational structure to manage the well, to install pipe connections, to determine and regulate costs and to ensure proper maintenance. In the case of RW 29 the community has regulated the price for installation, 400,000 Rp for houses nearest the well, 600,000 Rp for households far from it, and 800,000 Rp for those who have moved there from outside the city. The organization also charges 1,000 Rp per meter cubed of water use, with a minimum payment of 10,000 Rp per month. This money is used to service electricity bills for the pump and maintenance fees.

Community management in Mipitan, RW 29, RT 06

Within the resettlement area of RW 29 there is a different kind of water supply system too, the Social Master Meter, this initiative arose from the community's own initiative. For this RT access to the supply from the deepwater well was not possible and they approached PDAM requesting a connection. PDAM decided that they could take water from the IPA (located in Jurug) and install piped service

to individual households. What was different about this scheme from the 'Perumnas' sites that receive PDAM service is that payments are made collectively and management for the service is by the residents. A 'Social Master Meter' was installed entering the community, and individual meters gauge consumption in each house. The community leader then knows how much money need be collected, and is the one responsible for serving as an intermediary with the community (he also is the signatory of the MOU). Therefore PDAM interfaces with the community as a collective entity, instead of as individuals purchasing the service independently. This system ensures a high-level of self-organization and supports a sense of community in this newly established resettlement area. This arrangement is probably made possible by the fact that it is a new settlement and so pipes can be installed easier and negotiations undertaken at the beginning of their tenure there.

SEMANGGI

Semanggi is a neighborhood located in the south east of Solo, along the banks of the Bengawan River. Semanggi is split into two distinct areas, along an embankment, or berm, that was built by the Dutch to help protect the city from flooding. To the west of this is an older planned area, to the east is an unplanned settlement that is vulnerable to flooding and has only been settled in recent years due to migration to the city. Semanggi is a high density area because housing is affordable, and there is high poverty.

There are three main types of water supply that people use in Semanggi: private wells, PDAM piped water, and public hydrants. Private wells are currently being used by around 21% of households, mostly in the east of Semanggi. In dense areas these are shared between different families, and wealthier households may share with neighbors who don't have access. Users of private wells complain that the water is salty.

In the west of the neighborhood PDAM is more prevalent. PDAM began installing pipes in the early '80s and it was easier to do so since the area is residential. In the east of Semanggi PDAM did not install the piped network since this area was prohibited to settle and is still prone to flooding.

The east of Semanggi started to really grow over the last

twenty years, increasing housing density and increasing demand for water. Given the high numbers of residents, and acceptance of their occupation of the riverbank areas, PDAM decided that the easiest way to provide water would be by installing public hydrants. In 1997 they started to locate hydrants in the poor neighborhoods in the east, there are now 18 of them; given high densities one hydrant can serve up to 100 households.

Efforts are being made to increase access to water for low-income residents of Semanggi. PDAM, supported by AusAID, have installed more piped water connections in the east of the neighborhood, and the government is increasing the supply of water by expanding the facilities of the IPA (river water processing plant). After building a new reservoir PDAM will offer free installment of pipes to households, in exchange for a down payment of three months of water fees.

Two examples help illustrate the different approaches to community-managed water supply. RW 23 is considered a poor area within Semanggi, called Mojo locally; households there access water from a communal hydrant. The community uses the ngangsu method to collect payments to pay the monthly fees to PDAM for the water supply. The local water committee, made up of residents, is charged with appointing one person per RT every month to collect money from the other RTs every day. This responsibility will rotate between the five RTs of RW 23. There is a target amount of 45,000 Rp per day that must be collected. The price is fixed so that one jerry can will cost

SEMANGGI FACTS

LAND AND DEMOGRAPHY

Total land area:	167 ha
Population:	30,441
Pop. density:	182 people/ ha
% Poverty:	26%
% Land Tenure	76%

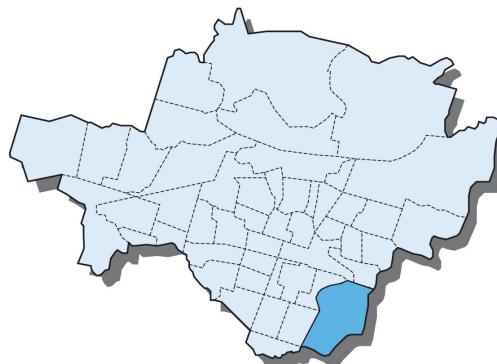
WATER

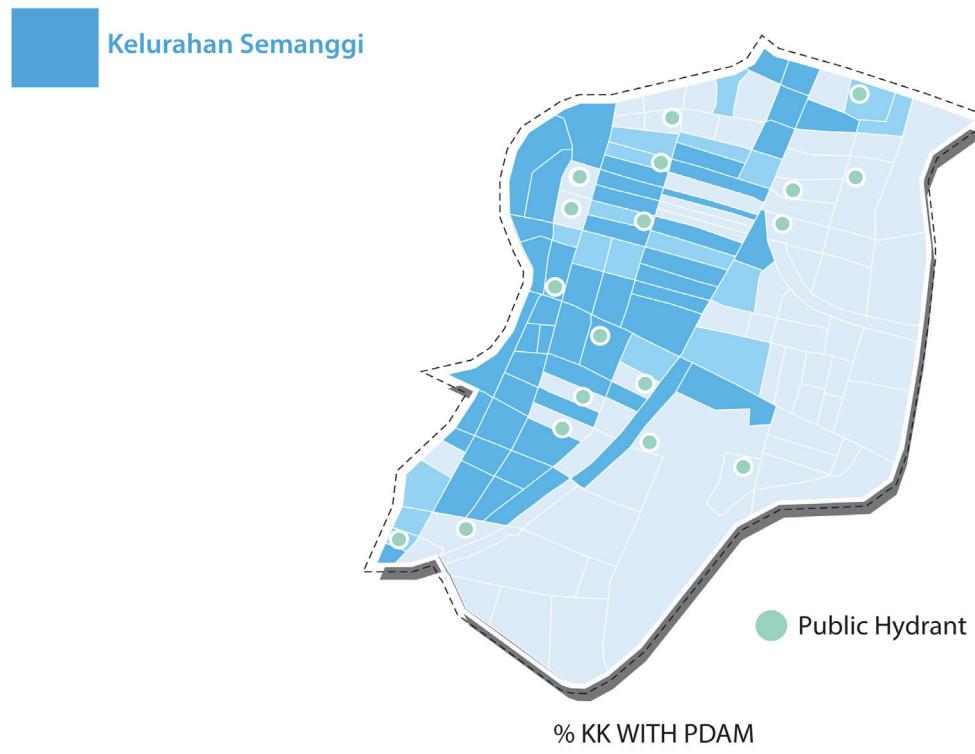
PDAM water:	38%
Public wells:	21%
Private wells	34%

Source: solokotakita.org

SEMANGGI'S LOCATION IN THE CITY

Semanggi lies along the banks of the Bengawan River.





100 Rp., a big container will cost 300 Rp., and bathing will cost 500 Rp. If the money that is collected exceeds the target additional money will go towards maintenance and to support other social activities in the RT such as donations to ‘gotong royong’ fund and for donations to the sick and to the families whose members pass away.

RW 07 is another case, it is an area in the east of Semanggi which has a high population of poor households. Previously they had used public hydrants but since the government has begun offering free installation of water people are switching to PDAM piped water to their homes. They claim that the price is not too onerous and they prefer not having to walk to fetch water. The water hydrant is now used only by street traders and payments are voluntary.



A public hydrant distributes water to families in a dense low-income community in Semanggi.

SONDAKAN

Sondakan is an old neighborhood located in the western part of Solo with many batik factories and small companies. Less famous than neighboring Laweyan, known for its batik production, Sondakan also has many batik workshops where the textile is locally produced. The west side of the neighborhood is very different from the east, it is more industrial and has many riverbank houses. The eastern area is more industrial.

Neighborhoods in the west of Solo have always benefited from a good supply of water from the Cokro Tulung spring source since this is where the pipe mains enter the city. One would expect everyone to use PDAM water, but residents in Sondakan have preferred to use private wells since the groundwater is plentiful. 89% of households use them which is very high in relation to the rest of the city (43%). But this situation is changing given the rise of pollutants seeping into groundwater, mostly from Sondakan's batik industry. Pollutants infiltrate groundwater affecting its colour and smell and causing illness.

Mobilizing community support to install PDAM service

Some areas have decided to act and have approached PDAM about providing them a piped water supply. For

example in RW 5 community members mobilized to approach the city's planning department to propose the installation of piped water to their houses and a tank to service the community. For a few years this proposal was ignored until the current mayor, Hadi Rudyatmo, on meeting with the community agreed to revive the proposal, stating that "ignoring water service was a crime against the people". This is an ongoing process in which political influence has forced PDAM to act, but some community members remain reluctant to pay for the service despite government support. Residents are now proposing that pipes should be installed using the annual participatory planning cycle which awards small grants, the musrenbang.

Other community-led means reduce pollutants

Another way in which community members are seeking to improve water supply is by combating the pollutants that are contaminating the groundwater. Through the local participatory planning process, the musrenbang, the residents of RW 5 have prioritized the creation of small boreholes in the ground. It is hoped that this will recharge groundwater water source, reduce standing water, and dilute pollutants. This initiative is being led by the local community development committee LPMK, and has been ongoing for a few years already with full community support.

SONDAKAN FACTS

LAND AND DEMOGRAPHY

Total land area:	80.7 ha
Population:	11,947
Pop. density:	118 people/ ha
% Poverty:	14%
% Land Tenure	84%

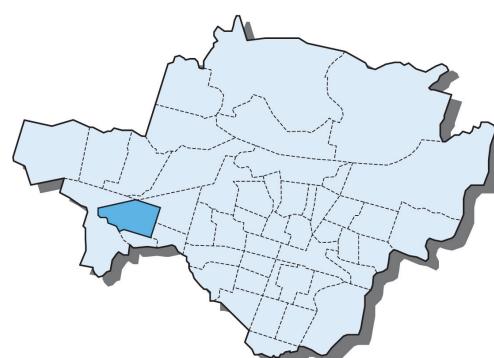
WATER

PDAM water:	13%
Public wells:	4%
Private wells	89%

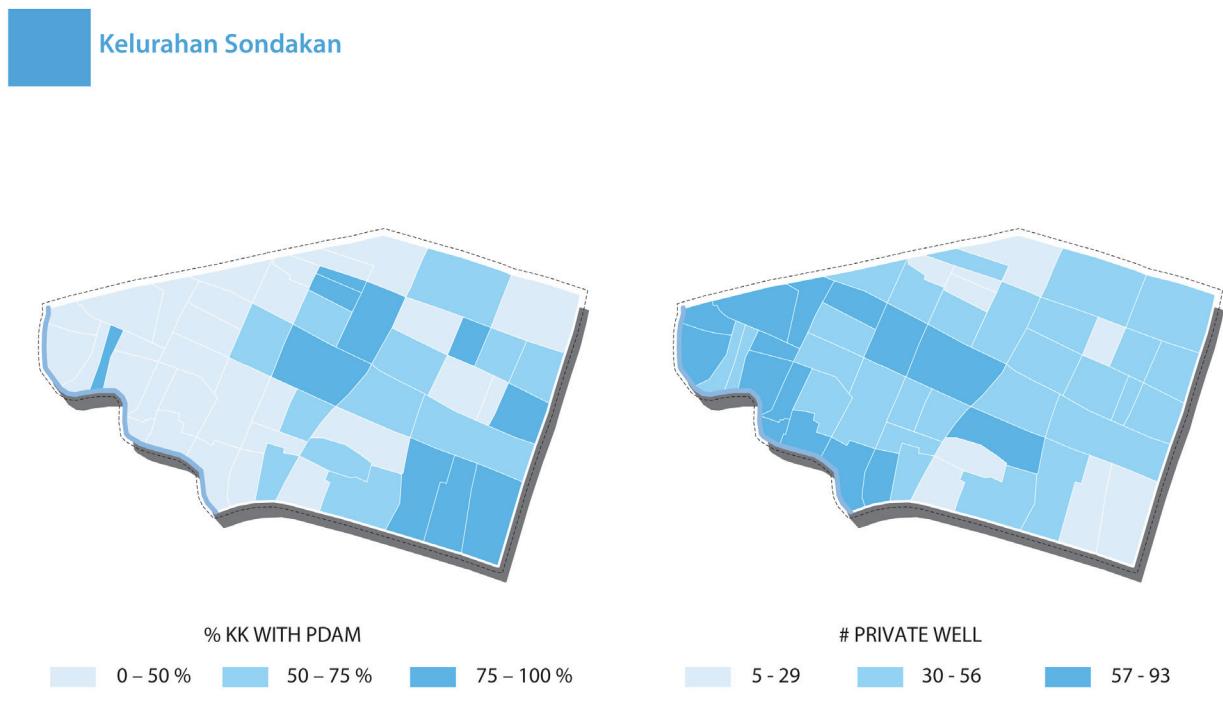
Source: solokotakita.org

SONDAKAN'S LOCATION IN THE CITY

Sondakan is close to the city center, in the west of Solo



SOLO KOTA KITA



CONCLUSIONS

PRELIMINARY FINDINGS FROM THE CITY AND NEIGHBORHOOD PROFILE RESEARCH

During the research the team interacted with local government officials, community members, civil society organizations and water providers, listening and learning from a diverse selection of engaged stakeholders. From this preliminary stage of research the following conclusions were made:

Participation in managing water resources supports community organization, cohesion and empowerment

- The participation of the community members in the management of water helps to minimize conflict, because community leaders are able to mediate any potential conflict that might arise without the intervention of government institutions.
- Communities who manage their own water resources feel empowered because they are given increased responsibility. They are not only beneficiaries of the service, they help to plan for it, negotiate a rate for it with the provider, and manage supply to fellow residents.
- Many community members who use shared water resources, such as public wells, enjoy the social interaction that comes with regular meetings with their neighbors. This daily interaction helps create cohesion and community identity.

Local government institutions, such as PDAM and Public Works, increasingly rely on local communities to self-manage water resources

- PDAM, Solo's local water providers, has allowed local communities to create their own management practices in order to manage local water resources. Communities put forward their own ideas and schemes and they vary from community to

community. This reflects both a willingness on behalf of government to allow flexibility in the creation of different arrangements, and also high levels of participation in designing a solution that will work for them. This is reflected in the fact that almost every community agreement with PDAM is different in some way.

- PDAM is willing to supply water to low-income areas that would hitherto be judged too difficult to operate in, or not conducive due to land tenure issues. One of the reasons they are able to do so is because they have the assurance of community members that they will be responsible for collecting payments, mediating any conflicts that might arise and managing its distribution to residents.
- Community participation in managing water is able to fill gaps where PDAM is unable to serve. The public wells that the Department of Public Works installed for resettlement communities are turned over the community to self-manage because community members are unable to service and maintain them themselves. Thus community participation play an important role in ensuring that underserved areas can access water, and that government-built wells can be maintained and managed appropriately.