E49b – Technical solutions for supplying water

19 March 2012

1) What is involved ?

Given, and after first becoming aware of, or reviewing, ***thanks to the previous Factsheet E49a***, the main issues that arise in precarious and informal habitat or shanty town areas, setting out which technical means can be applied to bring water to precarious habitat and shanty town areas.

NB. For the various distribution modes for this water, please refer to the next Factsheet E49c. For the means relating to governance and management modes, please refer to Factsheet E49c. For issues that are specific to sanitation, please refer to Factsheets A15 and A16.

2) The issue

Precarious suburban habitat areas and shanty towns are most often built in very poor neighbourhoods, devoid of any public means of access and situated in run-down locations, in unwelcoming areas or hollows or on unstable hillsides where makeshift dwellings have been hastily built, often illegally. It is therefore often **very hard to bring suitable equipment and vehicles to these areas and to perform work there** as the lanes or alleyways are narrow and winding and consequently digging ditches and installing networks to normal standards is not an obvious option.

Besides, once the water has been piped to the entrance to the shanty town, it still needs to be brought to various points within it, for distribution to the population, and this most often is not what city or town authorities wish to do, often stressing the fact that these are informal and therefore illegal neighbourhoods so long as they have not received any recognised right to at least temporary water supplies or housing, as recognised by the UN's new 2011 "right to water".

This Factsheet will therefore successively set out what means are available for carrying and distributing water to a shanty town.

3) The main technical means for carrying water

a) Prolonging the city's public water network into the shanty town

This doubtless ideal solution, is seldom applied for the administrative, financial and often political reasons already set out as well as for technical reasons linked to disorganised configuration and high population density in these precarious habitat areas.

b) Prolonging the city's public water network only to the gates of the shanty town or its borders

This is a **frequent solution with three variants :**
It comprises running pipes up to the informal habitat areas and :
- **Installing "water kiosks" where the pipes arrive, i.e. bulk water supply points** managed and maintained by small scale private operators or neighbourhood communities who then, must often with the help of the local population, install mini-network buried at a shallow depth, and sometimes even in the open air, using pipes to supply standpipes made available for free or at a cost, depending on cities or regions, or collective hook-ups used by multiple families or even some private hook-ups on a fee paying basis, or
- **Installing a connection to supply a few small pipes** laid **to a few standpipes** within the shanty town, or
- **Installing lifting pumps on the ends of the supply pipes**, pumps that are able to increase the mains pressure and send water uphill to public standpipes when the shanty town is built on a hillside or above a city or town, as is often the case.

Installing a public network in Brazil - Photo Melo

c) Building mini networks within the shanty town

This relatively frequent solution is generally carried out by small investors or local private network operators. Most often, it comprises laying only **a few pipes between a mains pipe, or even more often a motorised private drilling and a few standpipes** in a neighbourhood, with the advantage of multiplying water points of sale and thereby ensuring a return on the drilling investment.
To attract investors and improve service in the shanty town, it would however be useful for these operators to obtain guaranties from the town or city that they will receive proper compensation when the authorities decide to invest more in this location and to connect existing infrastructures to the public municipal network.

d) Building complete networks

This kind of construction is **costly and difficult** given the technical and topological characteristics of shanty towns so it was seldom seen until relatively recently when a Brazilian engineer came up with the idea of building far more simple networks that are easy to lay and less costly, by eliminating the requirement to comply with the very onerous standards that usually apply when working in the public

domain and by running smaller pipes, at a shallower depth, through the “properties” inhabited by shanty town dwellers. **This is what is known as “condominium” networks**.

“Condominium” water distribution

So-called “condominium” networks are a different approach to designing and expanding water supply networks by **extending them with real small scale networks, simplified** yes, but suited to the needs at hand. They are properly structured, but built to less onerous standards and managed by small scale local operators or local neighbourhood committees or even by agreements between a number of landlords or users who make available their land to allow the pipes to pass and connections to be made.

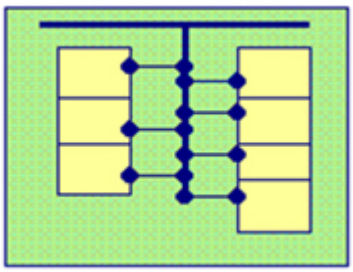
As stated previously, condominiums are a way of envisaging an organised extension to regular water mains so that they can reach suburban neighbourhoods. The cost of installing and maintenance these extensions is shared by a group of inhabitants just like any joint form of ownership, hence the name. The main advantage of any such extension is that the pipes run through the private property held by families who are members of the condominium. Hence network sizing does not have to meet official constraints or standards set out for pipes that pass under public roads.

This especially reduces the depth required when burying pipes, the diameter and the length of pipes and makes it easier to maintain the installations. Consequently, this leads to installation and maintenance costs that are often more than 30% lower.

User involvement in financing and also in fitting these installations also leads to a feeling of responsibility and therefore better infrastructure usage.

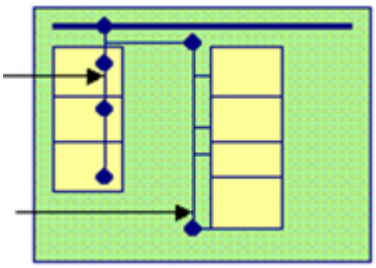
The condominium system is intended to reduce the cost of individual hook-ups to the public water supply network thanks to two approaches :

- Involving the population in hook-up work,
- Building a “sub-network” with simplified technical characteristics (reduced pipe diameters and shallower ditches).



Conventional system

The condominium network runs :
- Through individual plots (“frente de lote” or “fondo de lote”),
- Under the pavement (“acera”) :
A more costly solution (requiring more work), but one that is often preferred by residents who refuse to see sewers pass through their plots.



Condominium system

Source : Nomadeis “Aqua tu penses” www.nomadeis.com

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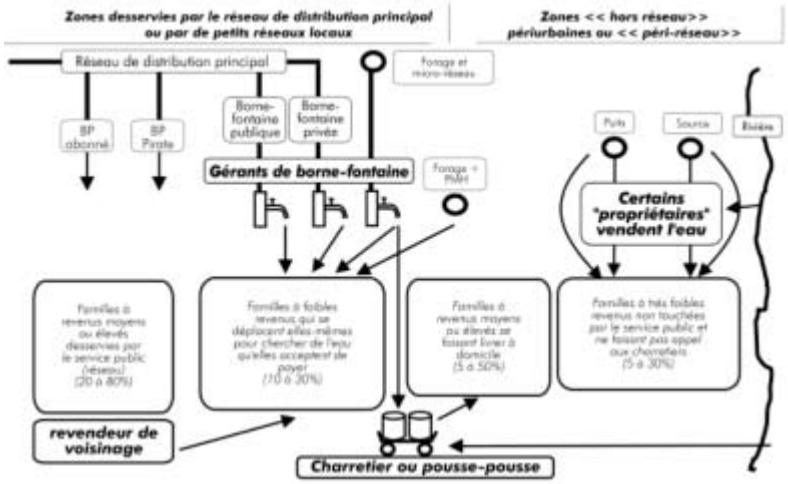
To sum up, the means for serving an informal habitat or shanty town area with a water supply can for the most part be illustrated as follows :



Source : Collignon and Vezina 2000

e) Various other measures

These generally relate to ways of limiting consumption.
These are, for example, low pressure water tank systems like those in Durban, South Africa, where the water company offers, from a low pressure network of small diameter plastic pipes buried at shallow depths and running through the alleyways, via connection boxes that are installed at regular intervals, meters serving some twenty families so that every day they can feed individual tanks (holding approx. 200 litres) located on the ground or on the roof, with a preset amount of water. This system is a far less costly one when compared with conventional connections.

5) Implementation example : the condominum water and sanitation service of La Paz El Alto (Bolivia)


El Alto is located above La Paz, Bolivia and is the part of the La Paz urban area (population 1.5 million) with the highest percentage of low income families and the fastest rate of urban growth. In 1997, a 25 year concession contract was signed between the city and Aguas de Illimani, an Ondeo subsidiary, and an initial partnership agreement was signed between Aguas de Illimani, the Ministry of Housing and Basic Services, the municipalities of La Paz and El Alto, the World Bank WSP and the Swedish aid body, with the primary aim of equipping most every household with individual water hook-ups between 1998 and 2001 and, for the innovative part, 90% of the population with a sewage hook-up.
After a number of technical studies undertaken in liaison with the Ministry of Basic Services, it turned out that the only way to achieve this at acceptable cost was, after raising population awareness of the programme as well as their awareness of hygiene and health issues, to make condominium hook-ups with

the help of the population (a workfare formula) a numerous short, small diameter, local networks running at shallow depth under the alleys and courtyards and linked to the main network by collective hook-ups. By April 2001, 7,897 hook-ups had been made in this way. Other water supply and sanitation projects continued afterwards, allowing further hook-ups.
Unfortunately, the concession was to have a tumultuous life, so much so that in 2005, essentially for economic and financial reasons, the contract was ended, but the hook-ups, which were a success, and remained in place… are still as highly appreciated.

6) Where to obtain further information ?

- Water and Sanitation Partnership in Africa. **Améliorer l'accès des populations urbaines démunies aux services d'eau et d'assainissement – Recueil de bonnes pratiques en Afrique Subsaharienne** (Improving access by impoverished urban populations to water and sanitation services - Collection of best practices in Sub-Saharan Africa). Dakar, 2004. Available from : http://www.pseau.org/outils/ouvrage…
- COLLIGNON, B. ; VEZINA, M. **Independent Water and Sanitation Providers in African Cities**. Water and sanitation programme - World Bank, Washington, 2000. Available from : http://www.pseau.org/outils/biblio/…
- **IRD** : A Report (114 pages) by Emile Le Bris "L'accès à l'eau potable dans les quartiers défavorisés des grandes villes et les petits centres urbains" (Access to drinking water in poor parts of major cities & small urban centres). Available online from :
- http://horizon.documentation.ird.fr…
- MELO, J. C. **"The experience of condominial water and sewerage systems in Brazil : case studies from Brasilia, Salvador and Paruapebas"**. Ledel : Lima, 2005. Available from : http://www.wsp.org/sites/wsp.org/files/publications/BrasilFinal2.pdf
- **Improving water supply and sanitation services for the urban poor in India**. Water and Sanitation Program (WSP), 2009. Available from : https://www.wsp.org/wsp/sites/wsp.o…

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Areas served by the main distribution network or by small local networks
Main distribution network Drillings and micro-networks
Private hook-up - Subscriber Private hook-up - Pirate
Public standpipe Private standpipe
Standpipe operators Drilling + Motor pump
Families with middle or high incomes served by the public mains (network) (20 to 80%)
Local reseller
Families with low incomes who have to go and get their own water that they accept to pay for (10 to 30%)
Families with middle or high incomes who have water delivered to them (5 to 50%)
Families with very low incomes not covered by any public service and who do not use water carriers (5 to 30%)
Water carriers or haulers
Ares "not served" by the mains network in suburban areas or "outside of the network"
Wells Springs Rivers
Some "owners" sell water

- Emplacement : Accueil > en > Wikiwater > Technical sheet > Facilitating access to water > Preserving >
- Adresse de cet article : https://wikiwater.fr/e49b-technical-solutions-for