

When are communal or public toilets an appropriate option?

In general, individual household toilets are preferable to communal/public toilets. However, this Topic Brief argues that communal or public toilets may be the most appropriate medium-term solution in some specific situations: notably in high-density slums with a high proportion of tenants and/or frequent flooding and water-logging. Nonetheless, the financing and sustainable management of communal/public toilets is very challenging, and requires extensive consultation and careful analysis at all stages. This brief presents an overview of issues to be considered.

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What are communal and public toilets?

When talking about different types of communal and public toilet, people use different terms in different ways. This Topic Brief will use the following definitions:

Household toilets are toilets used only by a single household, typically a single family or extended family. However, facilities classified as “household toilets” often serve very large households, or they may be regularly used by neighbours. So the boundary between household toilets and shared toilets is not clear-cut.

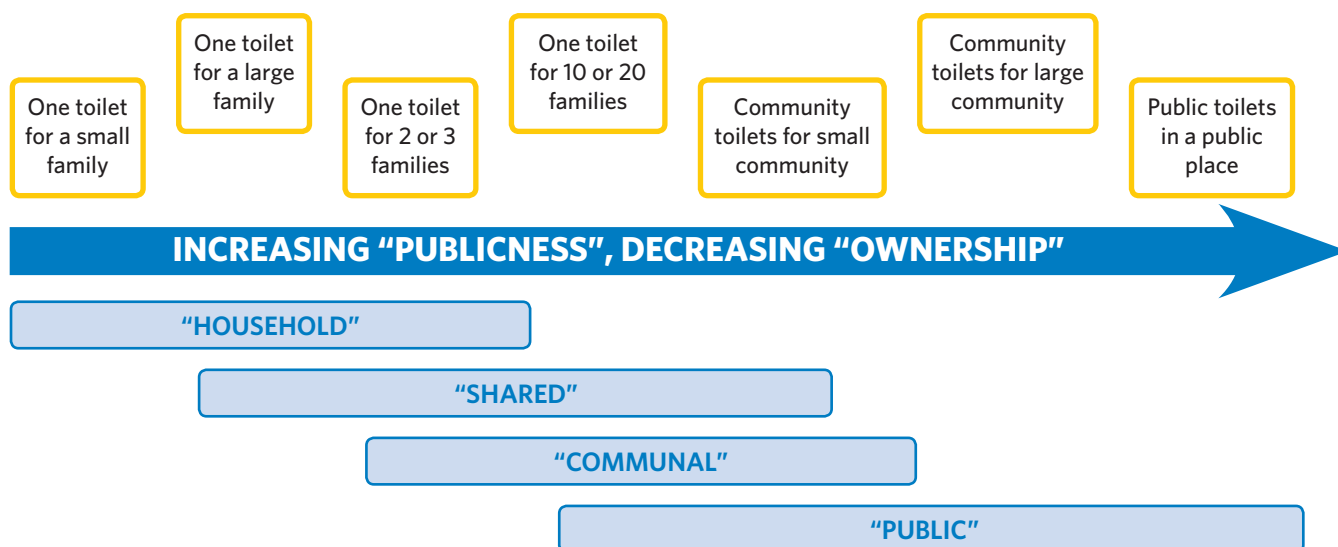
Shared toilets are toilets shared between a group of households in a single building or plot. This can cover very different situations: for example, a toilet shared by 20 tenant families each occupying one room in a large building; or a toilet shared by 3 related families living within a single plot or compound.

Community toilets are toilets shared by a group of households in a community. In some cases each household will have a key to one of the toilets within a block: this may be one toilet per household, or one toilet for a group of households. Communal toilets may be owned by the group of households.

Public toilets are toilets open to anybody, in public places or in residential areas: typically there will be a charge for each use. Sometimes charging will be monthly: each user pays for a monthly ticket. Users of public toilets will generally feel less “ownership” than users of communal toilets.

But of course the boundaries between these different categories are not clear-cut, and it is probably helpful to consider the different categories as positions along a continuum, as shown in the diagram overleaf.

Also relevant here is the distinction between on-site and on-plot facilities: so for example a group of households within a compound may have individual on-site toilets that discharge to a shared *on-plot* septic tank.



As of October 2010, the WHO-UNICEF Joint Monitoring Programme (JMP) considers non-household toilets of any sort (shared, communal or public toilets) to be “unimproved”, though it is possible that this will change in future, with increasing recognition that this may be an over-simplification.

In this Topic Brief we will focus on communal toilets and public toilets. Institutional toilets (for example in schools and hospitals) will *not* be considered. We argue that communal or public toilets can in some cases be the most appropriate solution, but we stress that numerous challenges need to be overcome.

Where are communal or public toilets widely used?

Public toilets are of course found worldwide, in locations like bus stations and markets. These toilets are often used more for urination than for defecation. Here our primary interest is in toilets for low-income residential areas, and in defecation use (since urine does not constitute a major public health risk). Pay-per-use public toilets are most commonly seen in public locations, but may also be constructed in low-income residential areas, or in “hybrid locations” serving both residential and transient users (for example, in a low-income community adjacent to a market).

Probably the best-known example of the pay-per-use public model is that of India’s Sulabh toilets:^{1,2,3} these are pay-per-use sanitation blocks also offering other services (for example showers), and typically made financially viable by advertising revenues. The Sulabh International organisation runs 6,500 pay-per-use toilets in locations throughout India, some in low-income residential areas. However, reports suggest that, in general, these facilities are only profitable in high-traffic public locations like markets and bus stations, where advertisers are willing to pay good rates; the Sulabh organisation claims that the loss-making facilities in residential areas (i.e. within slums) are cross-subsidised by revenues from profitable toilets in public places, but reports suggest that the loss-making facilities are often not adequately maintained and are unaffordable for poor households.¹ We are not aware of any detailed independent evaluation of the performance of the Sulabh model in residential areas: such an evaluation would certainly be of interest.

In some African countries (e.g. Senegal), public toilets are not widely used except in public places. In other countries (e.g. Kenya), public toilets for residential use –often very poorly maintained– are seen in some very poor settlements. In one country, Ghana, pay-per-use public toilets for residential use are very widespread: in Kumasi,

for example, at least 40% of the population is estimated to use public toilets, of which there are about 365 serving about 400,000 people.³ Some public toilets in Ghanaian cities offer a good level of service, though many are very poorly maintained.

Communal toilets are seen in low-income communities of many African and Asian cities. Again, probably the best known example is from India: the SPARC model, implemented in Pune and Mumbai as a collaboration between three Indian NGOs (SPARC, the National Slum Dwellers Federation NSDF, and the women's organisation Mahila Milan).^{3,5} Under the SPARC model, communal toilets (each seat serving about 50 people) are constructed and managed by NGOs under contract from the municipality, with close community involvement; a moderate per-household monthly fee is then collected, allowing payment of an attendant with responsibility for cleaning. Again, we are not aware of any detailed independent evaluation of the performance of the SPARC model. Certainly it would be of interest to assess whether revenues are sufficient to ensure sustainability. There have been cases in which municipal politicians have demanded that these toilets be free, reducing revenues.⁵

WSUP has supported or is supporting installation and rehabilitation of public or communal toilet facilities in cities including Antananarivo (Madagascar), Bangalore (India), Maputo (Mozambique) and Nairobi (Kenya). This support is coordinated with other aspects of WSUP's sanitation work, including the development and marketing of innovative on-site products and services, city sanitation planning, and integrated faecal sludge management.

WSUP experience: Antananarivo

WSUP has supported installation of pay-per-use public toilets, mostly in high-traffic public locations, though also in low-income residential areas; these toilets are managed by local Water User Associations. The WUA employs an attendant to take payments and to clean the toilets. A very useful side-benefit of employing an attendant is that accurate records can be kept of the daily number of visits of different types (urination,

defecation or shower; man, woman or child): this provides very strong data for evaluation of performance and ongoing planning. As discussed below, several of these toilets have not achieved high defecation usage, and ongoing sanitation planning needs to consider more carefully where to locate public/communal toilets, and what charging model to use.

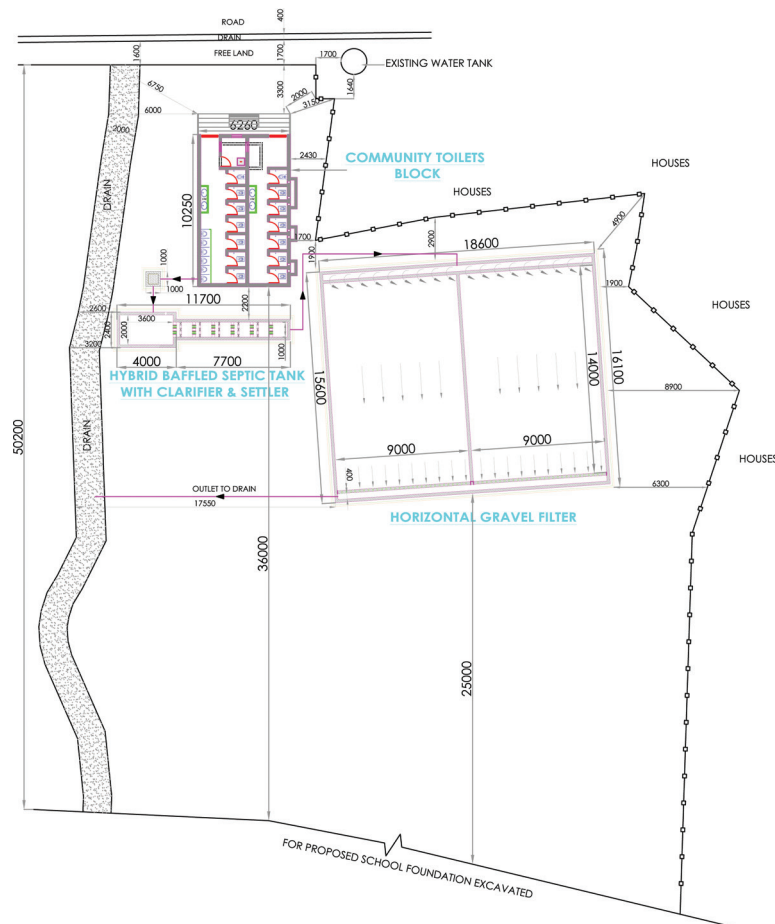
WSUP experience: Bangalore

WSUP has supported rehabilitation of two existing pay-per-use public toilets serving small communities (each block comprising 2 women's + 2 men's toilets, serving about 50-60 households, though with septic tank capacity for up to 100 households) and new construction of a larger pay-per-use public toilet (7 women's + 7 men's toilets, serving about 200 households) connected to a local wastewater unit (see diagram overleaf). In all three cases ownership has been handed over to the municipality, but management is by a users' association which has committed to collection of a per-use fee of 1 rupee (about 0.02 US\$), and which employs an attendant on a monthly wage of about 1000-1500 rupees (about 22-33 US\$). Since these toilets are receiving about 100 uses per day (mostly defecation uses), gross revenue is currently about 3000 rupees, sufficient to cover the attendant wage and routine operation and maintenance costs.

In the case of the toilets with septic tanks, the municipality has committed to desludging, though it remains to be seen whether this commitment will be met: certainly, it is questionable whether current net revenues are sufficient to cover this cost. It is worth noting that the per-use fee of 1 rupee was set by the users' association; WSUP recommended a per-use fee of 2 rupees. [Also of interest is that these toilets are apparently being used more by women than by men: although we do not have detailed data on this yet, reports from the project location suggest that many men prefer open defecation, whereas women are unhappy with open defecation and thus more likely to switch to use the public toilet facility. For further information on this project, including discussion of implementation delays that arose as a result of local political, land availability and water supply issues, see reference 6.]

Bangalore

New construction of a larger pay-per-use public toilet (7 women's + 7 men's toilets, serving about 200 households) connected to a local wastewater unit.

**WSUP experience: Maputo**

The WSUP-supported Tchemulane project has to date supported installation of 5 communal ablution facilities in the district of Chamanculo C, and further construction is underway in this and other districts. These are multiservice units comprising toilets, showers and laundry stands, each serving between 15 and 55 households within a defined compound. They discharge to septic tanks. As in Bangalore, the units are managed by user groups, but tariffs are paid as a monthly per-household rate ranging from about 0.30 US\$ to about 1.50 US\$, giving total monthly gross revenues ranging from about 4 to 50 US\$. The water kiosk that forms part of the facility is staffed part-time by a self-employed attendant who retains the net revenue from water sales; however, there is no toilet attendant, and toilet cleaning is done by users on a rota system. The monthly per-

household payments are collected by the user group and banked for use in ongoing facility maintenance and desludging. As in Bangalore, user groups were allowed to set their own monthly household payments; and again as in Bangalore, there is concern that some user groups have set payments too low for financial sustainability. A clear lesson arises here: user groups need to be given autonomy, and user tariffs must be affordable (or waived) for the poorest members of the community; but to achieve financial sustainability, it is essential to ensure that user groups set and collect tariffs that are affordable but also sufficient to cover O&M costs. [Further information on the Maputo sanitation blocks is given below, and in the WSUP Practice Note "*Financing communal toilets: the Tchemulane project*"⁷, available for download from the WSUP website.]

Lessons Learned: In the WSUP-supported Tchemulane project in Maputo, the first communal sanitation facility built had a much higher construction cost than the blocks built subsequently, largely as a result of over-design (i.e. higher construction standards than necessary). Learning from this experience meant that subsequent blocks were built with smaller septic tanks; with septic tanks directly underneath the superstructure, not to one side; and with a cheaper (but still high-quality) superstructure. This greatly reduced construction cost, from about US \$27,000 for the first block to about US \$6,400 for subsequent blocks of similar size and capacity.

WSUP experience: Nairobi

In the Kibera district of Nairobi, WSUP has been involved in various communal sanitation interventions: large BioCentre public toilets, community pit latrines, and more recently sewered multiservice communal blocks. BioCentres are large facilities designed to serve approximately 600 households. They have large digestion tanks that function like septic tanks (with leaching of liquid effluents into the soil); in addition, the digester tank favours generation and collection of biogas, which in theory reduces desludging requirements and at the same time provides useful fuel. A total of three BioCentres were constructed with WSUP support in the early stages of WSUP's involvement in Nairobi. This intervention can be considered part of a wider programme: the BioCentre concept was introduced by the Halcrow Foundation in collaboration with local NGO Umande Trust in 2006, and was expanded by other donors, notably the Agence Française de Développement (AFD), to various low-income districts of Nairobi. AFD and the Athi Water Services Board have produced a useful evaluation of this intervention.⁸

Notable concerns have been poor contract and construction management (which can be considered problems specific to the location rather than general to the BioCentre concept), lack of vehicle access for desludging (i.e. poor site selection), and low utility of the biogas generated. Conversely, the facilities are reported to be popular: the inclusion of community meeting rooms has been particularly successful, and has helped generate significant revenue. The facilities are well used for defecation, and thus probably contribute significantly to environmental hygiene: however, they are closed at night, have no facilities for sanitary towel disposal, and are used less by women, and especially children, than by men. These evaluation findings are broadly in line with WSUP's experience: biogas generation does not justify the extra capital cost; community meeting rooms are popular and a useful source of revenue; large public facilities of this type cannot resolve sanitation needs on their own (particularly for women and children), but can make a significant contribution. As discussed below, key lessons learned from this experience are being applied in ongoing WSUP work (see below).

In 2009, in Gatwekera village in Kibera, WSUP supported a demonstration of the pay-per-use communal toilet model, part-subsidising the construction of 10 communal toilets (two-cubicle lined pit latrines, each serving 15-30 households = approximately 55-110 people). It was intended that households would pay a monthly fee of 80 Kenyan shillings (approximately 1.25 US\$).

An independent evaluation in 2010 indicated that all 10 facilities were being used regularly by men and women and over-5 children, representing a substantial improvement over the previous situation (largely open defecation or dependence on distant BioCentres). Nevertheless, problems were observed: notably, not all facilities were collecting the monthly fee, and some facilities were not being kept clean. The evaluators attribute this and other difficulties to local management issues,⁹ as further discussed below. Once again, this stresses the critical importance of setting up effective and sustainable community-level structures for facility management.

Currently, WSUP is supporting installation of communal toilets each serving about 20 households, and larger multi-service centres (incorporating toilets, showers, laundry facilities and a business/community room) set up as commercial operations and each serving an area of about 5000 people (i.e. households within a radius of about 200 m). These multi-service centres incorporate sludge holding tanks, for disposal of sludge from latrines and septic tanks throughout the area served. The communal toilets will be user-maintained on a rota system, while the multi-service centres will be pay-per-use, but will also offer a monthly household payment option (probably of interest to families living close to the facility). All of these units (including the communal toilets) are designed to drain to sewers, in line with the current policy of Nairobi City Water and Sewerage Company (NCWSC) to extend sewer lines into low-income settlements like Kibera. This takes advantage of the fact that Nairobi has a functional sewerage system with existing sewer mains running close to various low-income settlements including Kibera; though of course proximity of functional sewers to low-income settlements is not a common situation in African towns and cities.

In addition to these WSUP-supported interventions, of particular interest is a model currently being developed by Practical Action, also in low-income districts of Nairobi. These are 2- to 4-seat communal toilets (called "stand-alone toilets") constructed for small compounds of between 5 and 29 tenant households; in each compound the landlord is required to give up one of the house plots in order to construct the toilet.¹⁰ To date, these toilets have been constructed with donor funding, but a very encouraging outcome is that several landlords have now constructed toilets of this type with their own funds. Readers are referred to the very useful Practical Action evaluation of this initiative.¹⁰

Potential problems with communal and public toilets

Based on WSUP experience and the experience of other actors worldwide, this Topic Brief argues that communal toilets or public toilets can be the most appropriate sanitation solution in some *specific* urban contexts. However, there are *numerous* potential problems that need to be taken into account and avoided:



Well-maintained communal toilet in Bangalore

- Communal and public toilets are often dirty and unhygienic because of poor design, poor construction and/or poor maintenance (e.g. infrequent emptying, no repairs). In addition, they are often not kept clean by users and operators, with insufficient funds available for cleaners and cleaning materials. Communal and public toilets are often clean and hygienic when they are first built, but in very poor condition after a couple of years.
- Communal/public toilets may be unsafe, particularly at night and particularly for women/children, because they are often in dark places with poor or no lighting. This problem is more likely with public toilets than with communal toilets serving a small group of households.
- Independently of safety issues, the distance to a communal/public toilet will often be dissuasive: again, communal toilets serving small groups of households will typically be preferred by users over public toilets located further away.
- User charges may be dissuasive, because people can't pay or are unwilling to pay. In particular, daily use of pay-per-use public toilets is often clearly unaffordable for very poor families. In some cases, men will have money to use toilets, but not women or children; though sometimes women and/or children may be allowed free use.
- Communal/public toilets lack privacy and may be embarrassing for some users: in some cases doors may be broken or missing, so that even basic privacy is lost.
- Communal/public toilets should have facilities for hand-washing with soap: but often these facilities are lacking. In some cultures defecation should be followed by body washing, and communal/public toilets may not provide for this.
- Communal/public toilets should have facilities for sanitary towel disposal by menstruating women and girls: but often these facilities are lacking. Likewise, facilities suitable for use by children or disabled people may be lacking.
- Public toilets may be taken over by local street gangs (as in Nairobi¹¹) or by political factions (as in Kumasi⁴); this may often mean that they are run for excessive profit with little regard to affordability, quality of service or reinvestment.

“Communal or public toilets should have facilities for sanitary towel disposal”

So when can communal/public toilets be appropriate?

Despite these potential problems, communal or public toilets –if well-designed and well-managed– can be clean and safe and appropriate: for example, some public toilets in Kumasi (Ghana) offer high standards of service,⁴ and WSUP’s experience in locations including Antananarivo and Maputo has been broadly positive. In some contexts communal or public toilets are probably the most appropriate medium-term solution.^{3, 12, 13, 14, 15} Specifically, we suggest that communal/public toilets may be an appropriate choice in communities with the following characteristics.

Small plot sizes (and small dwelling sizes): This may mean that there is simply not enough space to build a household toilet. This situation may be seen in “extreme slums” like Kibera in Nairobi and Old Fadama in Accra, and in very poor multi-family compounds as seen for example in poor districts of Maputo. There is also a related problem, occurring in less extreme situations: digging a pit and then moving it when full (a cheap and effective solution in lower-density areas) is typically not an option in high-density areas. However, even in very small plots household solutions may be possible and should not be ruled out.

Low incomes: This may mean that householders are unable or unwilling to invest in household sanitation. However, this will probably only be a critical problem in situations in which low-cost household-level solutions (e.g. pit latrines) are inappropriate.

High proportion of tenants: Tenants will typically be unwilling to invest significant amounts of money in sanitation facilities, and landlords will often be similarly unwilling to invest. In addition, tenants will often resist paying any increased rent resulting from a landlord attempting to recoup their investment in sanitation improvements.

Water-logging and regular flooding: These are common problems in low-income urban communities, and they create extreme challenges for effective household sanitation: latrines and septic tanks are difficult to build, do not leach properly, and may frequently collapse or overflow. Acceptable technologies (e.g. raised non-leaching tanks, raised dry-composting toilets) will often be too expensive for individual householders. In these situations, communal/public toilets can use acceptable technologies of this type, but at a lower per-capita cost.

- Communal or public toilets may be an appropriate solution in low-income high-density districts, particularly:
 - a) if there is a high proportion of tenants,
 - b) in situations of water-logging and regular flooding, and
 - c) when there is currently severe faecal contamination of the local environment (widespread open defecation and/or foul water on the streets).
- Communal or public toilets are less likely to be appropriate in lower-density semi-urban districts with larger plot sizes and often higher proportions of owner-occupiers.
- Communal or public toilets should only be introduced after detailed exploration of the social and economic context, and extensive consultation with the community in question: it is certainly not a solution that can be imposed by government or donors.
- Communal toilets serving small groups of households and charging a monthly per-household fee will generally be preferred by users, especially women, because they are closer to home and cheaper than pay-per-use public toilets. However, per-capita capital cost will generally be higher than for public toilets, recovery of investment costs may be difficult, and it can be challenging to achieve sufficient revenue and community commitment to ensure cleanliness and long-term maintenance.

Public or communal toilets?

When are pay-per-use public toilets appropriate, and when are communal toilets appropriate? There is no straightforward answer to this question: WSUP-supported programmes have used both types, depending on the local situation. In general, users will prefer communal toilets serving say 15–30 families, located within 30 m of the house, as in the ongoing WSUP-supported intervention in Maputo.⁷

However, such toilets are likely to have higher capital cost per capita, are unlikely to be sufficiently profitable to attract private investment or profit-driven management, and require strong community commitment in order to maintain cleanliness. Pay-per-use public toilets may be sufficiently profitable to attract private investment, particularly in locations in which residential use is supplemented by transient use (e.g. close to a market or bus station); however, there are strong risks that the tariff will not be affordable, and/or that the block will be too far from households to ensure constant use, especially by women. A common situation is that men will use public toilets on their way to and from work, while women stay closer to home and thus do not have this option.

These issues have been illustrated by the “Sulabh versus SPARC” debate,¹ and in the WSUP context by the contrasting models used in Antananarivo (pay-per-use public toilets) and Maputo (monthly-payment communal toilets). In Antananarivo, a key difficulty has been to achieve high usage levels and reach residential users; in Maputo, the chief concern is ensuring adequate revenues and adequate community maintenance.

In Antananarivo, WSUP initially supported pilot-phase installation of two public multiservice facilities in relatively low-density peri-urban districts, as part of a wider water and sanitation programme. These were located in public locations (a market, a main street), but received lower usage than expected.

A subsequent phase involved installation or rehabilitation of 11 public toilets throughout central Antananarivo, in locations identified as appropriate by the municipal and local (*arrondissement*) authorities. Some of these toilets are currently experiencing high demand, others are receiving mainly urination visits, which are of limited public health relevance. Only one of the facilities is in a primarily residential area (*Faami*): this is receiving very high demand (about 215 defecation visits per day, versus only about 50 urination visits; the opposite pattern to that typically seen for public toilets in locations like markets). This suggests a significant demand for public sanitation in this district; and indeed this district (like similar districts in central Antananarivo) has several existing pay-per-use public toilets which are of very poor hygienic quality but which receive high usage. Nonetheless, future initiatives to extend communal or public sanitation services in Tana need to consider where facilities need to be located, and what service model should be adopted, in order to genuinely meet the defecation needs of men, women and children in low-income communities. Certainly, we consider that in high-density high-water-table low-income districts like Faami, public and/or communal facilities may be an appropriate medium-term solution.

In Maputo, WSUP’s experience with communal ablution facilities has been more clearly positive, in that all of these facilities are clearly meeting the needs of low-income communities; however, there is some concern about financial sustainability. As further discussed below, user groups have been allowed to set monthly per-household tariffs, and in some cases they have set a tariff that is probably too low to ensure routine maintenance over coming years. Nonetheless, the user-group management model has been carefully structured in Maputo, on the basis of extensive community consultation and with the full support of the municipality, so that we can be optimistic about ongoing expansion and incremental improvements.



Communal toilet facility in Maputo

“It is critically important to consider what will happen to the liquid component of the waste”

Making communal/public toilets work: design

Communal/public toilets may be of various types, including the following:

- pit latrines (several compartments over one large pit)
- pour-flush toilets discharging to a septic tank with infiltration drainage
- pour-flush toilets discharging to some sort of sealed holding tank
- pour-flush toilets with septic tank discharging liquids only to a sewer network
- pour-flush toilets with discharge of solids and liquids to a sewer network
- urine-diverting toilets with separate collection of faeces in raised vaults

It is of course essential to carefully consider desludging at the design stage (including possible use of the facility for disposal of nightsoil or sludge from local household toilets).

In addition, it is critically important to consider what will happen to the *liquid component* of the waste. A septic tank discharging to a nearby open drain or water body is a questionable solution, since this may constitute a significant health risk. If there is no good drainage option (i.e. soils are impermeable or waterlogged, and there is no sewer), one possibility is to consider urine-diverting toilets with raised vaults, or even pour-flush toilets discharging to a sealed holding tank. However, sealed tanks require frequent and costly emptying, and are not widely used (though they have been reported to function reasonably well in Afghanistan¹⁶).

Independently of whether the receiving tank is a drained septic tank or a sealed holding tank, it probably makes sense to send all toilet discharge to the tank (faeces and “toilet urine”, anal washwater, and flushwater), but to send “urinal urine” and washbasin/shower greywater to a leach-pit or nearby open drain. Note that use of urine-diverting toilets does not necessarily imply use of faecal compost as fertiliser: urine-diversion and collection of faeces to raised vaults may be an effective solution even if the faeces are not reused for agriculture.

An alternative possibility is to construct a local treatment facility: however, this will of course require significant capital expenditure, an appropriate area of land, and sustainable arrangements for operation and maintenance. WSUP has used an approach of this type in Bangalore, supporting installation of a small-bore local sewer network and DEWATS (decentralised wastewater treatment) system serving household toilets and a public toilet in the district of Swatantra Nagar. For detailed technical information, see reference 17. As with many programmes of this type, construction of the treatment facility faced significant opposition from local vested interests, leading to delays in implementation; but these problems have eventually been overcome, and the plant has recently come on line. For a detailed evaluation of these and other aspects of this project, see reference 6.

Lessons Learned: One of the WSUP-supported pay-per-use public toilets recently constructed in central Antananarivo (Madagascar) is particularly promising: demand for defecation use is high and revenues are sufficient to cover desludging costs. However, there are design problems with the existing facility that need to be corrected: a) the septic tank is drained directly to an existing open drainage channel, because the water table is too high to allow an infiltration field; b) shower water and urinal urine are drained to the septic tank, contributing to rapid filling. Future projects in situations of this type should consider separate drainage of shower water and urinal urine .

Making communal/public toilets work: financing capital costs

Ideally, the capital costs of communal/public toilets should be funded by the user community or by local private investors: local financing can be expected to lead to stronger ownership and improved sustainability.

Often, however, capital financing will come at least partially from municipal or national government, or from international donors. Mixed financing systems are also increasingly common: for example, the national government or donor commits to pay 25% or 50% of the total cost if the user community and/or municipal government and/or local investors are able to pay the remainder; other possible solutions include soft loans made directly to user associations or to local private investors; see reference 18.

In the well-documented SPARC Alliance community sanitation programme in Pune (India),⁵ community-based organisations were closely involved in programme planning: however, we are not currently aware of instances in which communal toilets have been fully financed by user associations. Note the contrast with public toilets, which may often be profitable and privately financeable in high-demand locations.

Capital cost per capita varies greatly depending on location and design, and on the usage levels achieved. Below are recent figures for specific sanitation facilities in specific WSUP-supported programmes:

Table 1
Summary of design features of public and communal toilets constructed with WSUP support.

Location Year of completion Data source	Defecations per day Design capacity (Actual)	Design	Cost (US\$)	Cost per capita
Antananarivo 2010 post-construction project data	80 (220)	Pay-per-use public facilities; 6 toilets, 2 showers, 1 trough urinal; septic tank with liquids drained to open drain	\$27,000	\$340 (\$79)
Nairobi 2011 planning documents	2000? (no use data)	Pay-per-use with monthly fee option; septic tank with liquids drained to sewer	\$34,000 (excluding sewerage)	\$17?!
Maputo A 2010 post-construction project data	173 (no use data)	Monthly-fee communal facilities; 4 toilets, 4 showers, 1 laundry basin, 1 standpipe and raised tank; septic tank with infiltration field	\$6,427	\$37
Maputo B 2010 post-construction project data	60 (no use data)	Monthly-fee communal facilities; 2 toilets, 2 showers, 1 laundry basin, 1 standpipe and raised tank; septic tank with infiltration field	\$4,463	\$74
Bangalore A, Kaveri Nagar 2010 planning documents	460 (no use data)	Pay-per-use communal facilities; 14 toilets, urinals; local treatment plant (DEWATS): i.e. large settling/septic tank, gravel filtration bed	\$35,000 (\$58,000 including filtration bed)	\$76

* Estimated as capital cost divided by defecations-per-day; lifespan per-use capital cost (assuming a facility lifespan of 10 years) varies from less than 0.01US\$ in Nairobi to about 0.10 US\$ in Tana.

“It will often make more sense *not* to build new toilets, but rather to reconstruct existing toilets”

To date most WSUP-supported communal/public toilets have been with full subsidy of construction costs, and subsequent hand-over of ownership to municipal or community-level government: in Antananarivo, for example, they have been handed over to Water User Associations governed by the fokontany (the lowest level of local government, typically representing a population of about 6000 people). However, in almost all cases, land has been provided by municipal government, representing a significant municipal contribution to the cost. In some cities in which WSUP has worked, including Maputo and Nairobi, members of the beneficiary community have contributed labour. In ongoing and future projects, WSUP is looking increasingly to encourage mixed financing of capital expenditure (CAPEX) costs for communal toilets: i.e. donor/government subsidy finance combined with householder, municipal and/or private-sector contributions.

It will often make more sense *not* to build new toilets, but rather to reconstruct existing toilets. A filthy public toilet that is heavily used is a clear opportunity: here demand and land availability are already confirmed, and all that is required is reconstruction and improved management. WSP¹¹ reports privately financed reconstruction of public toilets in central Nairobi; WSUP has reconstructed public toilet facilities in Bangalore.

The profitability of pay-per-use public toilets can give rise to complications. In Kumasi (Ghana), it has been recent practice that local government representatives have a right to franchise out publicly owned public toilets for their personal profit: this appears originally to have been an arrangement in lieu of salary. Indeed, Caplan (2010)⁴ notes that the biggest challenge around public toilets in Kumasi “is to find a way for the professional and technical staff to overcome the patronage relations between politicians and contractors”. Likewise in Nairobi, WSP¹¹ reports illegal take-over of public toilets by “street boys”, who run the facilities with little regard for hygiene, and at least in some cases in an intimidating and extortionate manner.

The most widely promoted contract types for market-driven construction of public toilets are build-operate-transfer (BOT) or rehabilitate-operate-transfer (ROT) contracts or similar, as reported from Nairobi¹¹ and from Kumasi.⁴ In a typical contract of this type, a private investor finances and constructs the facility according to a government-specified design on government-owned land; the investor then runs the facility for profit (subject to pre-specified regulatory constraints) for a lease period of perhaps 20 years; in theory, the facility is then transferred back to the government. BOT contracts for pay-per-use public toilets in Kumasi are reported to be generally profitable for operators;⁴ however, we currently have insufficient data to assess whether contracts of this type are generally profitable in other African contexts.

Communal toilets serving relatively small numbers of households are unlikely to generate sufficient revenue for full capital recovery. In the ongoing WSUP-supported programme in Nairobi, for example, initial assessments suggest that capital recovery within commercial timeframes would be difficult. However, we consider that capital recovery may be possible for facilities financed by a sanitation tax collected through water bills.

For more information on financing issues, see especially references 11 and 19.



BioCentre facility in Kibera

“ Different service levels favour access by the poor, but nonetheless there is a need to ensure minimal levels of hygiene ”

Making communal/public toilets work: operational costs, affordability and regulation

The operation and maintenance (O&M) costs of communal/public toilets should be more than fully covered by revenues, whether under a BOT contract or following subsidised construction. Major O&M costs include desludging, facility maintenance (plumbing repairs, painting, etc.), and the wage of the attendant (if there is an attendant). The attendant will generally be responsible for cleaning, day-to-day maintenance, taking payments, and customer service; ideally this person should also keep detailed records of use patterns.

In multi-service facilities that combine toilets with other services (e.g. water supply, shower facilities, other small business such as newspaper vending or shoe-shining), the attendant may additionally have other roles. In an evaluation of a WSUP-supported public toilet in Bangalore, the women operating the toilet expressed worries about the cost of desludging, which had initially been done by a local partner NGO. In fact the evaluators judged that the operators were making enough money to cover the cost of desludging: so a concern is that desludging may be delayed to save money in the short term.

Tariffs (user charges) should of course be set at a sufficient level to cover costs including desludging. This should certainly be feasible in the case of high-demand pay-per-use public toilets. The Sulabh organisation have reported data for a public toilet facility in a very busy location in Delhi: the facility has 20 toilets (i.e. 20 seats), 6 showers and urinals. Users are charged 2 rupees (about 0.05 US\$) per visit for toilet or shower use, while the urinals are free. An average of 700 people per day use the facility, generating an annual revenue of 504,000 rupees (about 13,000 US\$), versus O&M costs of 400,000 rupees (about 10,200 US\$).¹³

In Kumasi (Ghana), managed-for-profit public toilets are estimated to have revenues of between about 13,000 and 38,000 US\$ per annum,⁴ which is certainly sufficient to cover desludging and other costs. In the case of monthly-payment communal toilets, O&M cost recovery may be more difficult. In the WSUP-supported Tchemulane communal sanitation project in Maputo, user groups were asked what amount they wanted to contribute: different groups opted for between 10 and 40 meticaïs (about 0.30 – 1.20 US\$) per household per month, and in at least some cases this may be insufficient to generate sufficient revenue for routine O&M (see Figure 1 below).

Tariffs may often vary within a city: in Kumasi (Ghana), high-quality hygienic facilities may charge 3 times as much as low-quality dirty facilities, and there is certainly significant demand for the cheaper option.⁴ Different service levels favour access by the poor, but nonetheless there is a need to ensure minimal levels of hygiene. In some cases, children and very poor users may be given free access;¹¹ often, however, these users are charged.

When deciding tariffs, it is of course important to consider not just revenue requirements for financial sustainability, but also *affordability*. In some situations tariffs that are adequate to cover O&M may exceed the ability-to-pay or willingness-to-pay of the poorer members of the community. This may be the case in settlements like Kibera in Nairobi, for example: options here include municipal subsidy of O&M; a free-use policy for very poor users; or payment by monthly subscription so that there is no need for a full-time attendant; however, all of these options raise sustainability concerns.

In Pune, pay-for-use public toilets charge about 1 rupee per use, which even at only one use per person per day comes to 150 rupees (3.30 US\$) per month for a 5-person family; by contrast, communal toilets constructed by the SPARC Alliance (SPARC, the National Slum Dwellers Federation, and Mahila Milan) charged each family 20 rupees per month.⁵ There is a clear need for better data on ability- and willingness-to-pay for communal/public toilets in different locations, and related data on revenue requirements for commercial profitability, or at any rate to cover O&M costs.

“Some sort of regulatory control will typically be critical for ensuring an adequate balance between tariffs and service quality”

Desludging and faecal sludge management is not the focus of this Topic Brief: however, it should be stressed that inadequate desludging (often related to inadequate revenues or inadequate revenue management) is a very common cause of failure of communal/public toilet projects. Even if revenues are sufficient for desludging and tanker access is good, desludging may be problematic because tanker desludging services are inadequate, and/or because the city has no acceptable arrangements for sludge disposal: in both Bamako and Antananarivo, for example, even the officially approved sludge disposal solution is clearly unacceptable (direct tipping to a local river or on fields). In such circumstances it will be necessary to find the best interim solution possible.

Finally, some sort of *regulatory control* will typically be critical for ensuring an adequate balance between tariffs and service quality. For example, WSUP research in Kumasi is suggesting that lack of regulatory control is one of the key issues to be resolved, since many privately run public toilets are affordable and profitable but grossly unhygienic. Figure 1, below, shows estimated per-household tariffs required to cover O&M and full cost recovery in Maputo, for different service levels, based on WSUP programme data.

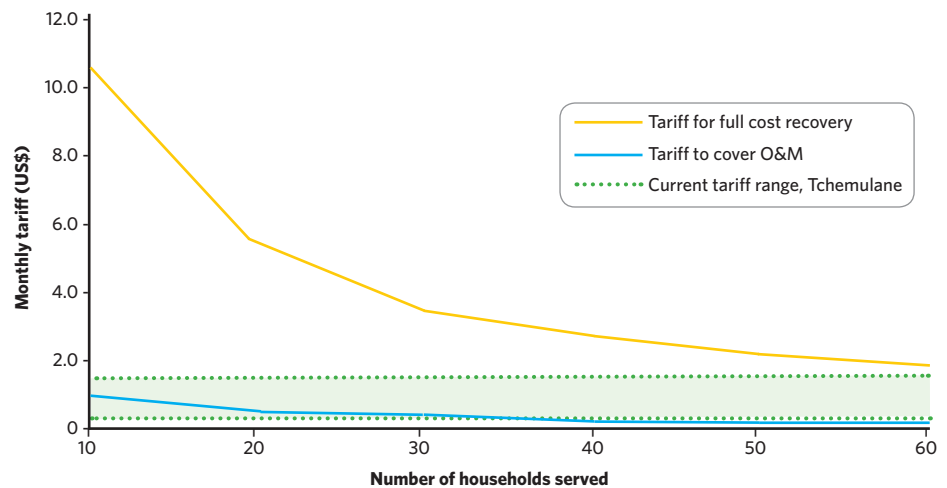


Figure 1. Plot of estimated per-household tariff requirements (vertical axis) to cover O&M, or to achieve full cost recovery (i.e. O&M plus debt service plus capital replacement = CapManEx, see reference 20), based on recent (2010) data for WSUP-supported communal sanitation facilities under the Tchemulane project in Maputo (Mozambique). These facilities serve between 15 and 55 households each. Current monthly per-household tariffs vary from about 0.30 US\$ to about 1.50 US\$, since user groups were allowed to decide what monthly amount they wanted to pay. As can be seen from the plot, current tariffs are sufficient or nearly sufficient to cover O&M (including bi-annual desludging), but are certainly not sufficient for full or partial cost recovery. Assuming about 30 households served by each facility, required monthly household tariff for full cost recovery would be in the order of 3.50 US\$: for more details, see reference 7. Note that tariff requirements for cost recovery rise steeply for facilities serving fewer than about 25 households.

“ Specific consultation with women is critically important in intervention planning ”

Making communal/public toilets work: meeting the needs of women and children

It is well known that public toilets often fail to meet the needs of women and children, because the facility is a long distance from the home, leading to security issues after dark; and/or because children, and in some communities women, may have less spending money than men. For these reasons monthly-fee communal toilets may often be a more appropriate solution than pay-per-use public toilets. If public toilets are used, they should be well-lit and in safe high-visibility locations. The Indian organisation Sulabh reports that its pay-per-use public toilets offer free services to women, children and disabled users;² however, we are not aware of any independent verification that this policy is applied in practice.

Facility design also needs to take into account the specific needs of women and children. It is essential to provide for sanitary towel disposal, not only to meet women's needs but also to prevent blockage of toilets, septic tanks or sewers. In Bangalore, WSUP-supported communal toilets have sanitary towel disposal chutes: lengths of tubing fitted through the toilet wall, leading to a bin in which towels are collected for disposal (which can be by burning or by a contracted collection service). In Kenya, it has also been noted that that women require a greater horizontal distance than men between the squat hole and the back wall of the toilet. Children may likewise require specific toilet designs, as may disabled and elderly users. In some communities, privacy may be a more important concern for women than for men. Specific consultation with women is thus critically important in intervention planning: women-only focus groups, with women moderators, are likely to be a useful approach.

Making communal/public toilets work: finding land

Sanitation mapping is an essential step in sanitation planning generally, and as part of this it will be very useful to map the location of *existing* communal and public toilets, their type and condition, their ownership/management status, and usage figures.³

Land availability for communal/public toilet construction of course varies from one location to another. In some districts of Antananarivo, for example, WSUP has been able to install public toilet services on land owned by the municipal authority; another district is entirely owned by an industrialist, who is prepared to consider donation of plots of land for public toilet construction. In Kumasi (Ghana), land has been made available by traditional leaders.

Problems may arise because people living adjacent to an available plot may not want a sanitation facility constructed next to their property. Nonetheless, WSUP experience in Maputo has been that even for householders living right beside a communal sanitation block, the advantages of a better toilet and washing facilities far outweigh any perceived nuisance. In view of issues of this type, it is clearly important to resolve land availability issues early in project planning: WSUP community workers in Maputo stress that this is critical.

A suitable plot of land should be:

- Close to the area of demand: users should not have to walk more than 200 m at very most, and will typically prefer a much shorter distance (probably about 30 m)
- In a location with safe after-dark access: this is critical for women's security
- In a location that is acceptable to people living nearby
- Reachable by small truck, to allow septic tank emptying
- Within reach of a sustainable water supply

Where land is in short supply, then some sanitation blocks have been built high, a 2 or 3 storey building with different facilities and businesses on different floors (e.g. Kibera, Mumbai).

“Any process of city-wide sanitation planning must involve zoning: that is, classification of districts in terms of most appropriate sanitation service solutions”

Scale-up: from concept to whole-city scale

For decision-makers involved in city-wide sanitation planning, what steps need to be taken to move from the concept stage and pilot scale to the whole-city scale? We suggest that there are three key stages: 1) sanitation zoning, involving identification of districts in which communal or public toilets are an appropriate solution; 2) design and costing of communal and/or public toilet models; and 3) identification of and access to finance.

1) Sanitation zoning

Any process of city-wide sanitation planning must involve zoning: that is, classification of districts in terms of most appropriate sanitation service solutions.^{21,22} Within processes of this type (which must necessarily involve extensive community consultation), it may be decided that communal or public sanitation solutions are the most appropriate options for some districts; though of course, in some cities communal/public solutions may not be appropriate in any districts. Note that often multiple solutions may be appropriate: for example, communal services may be the best solution for 75% of a low-income district's population, but not for the remaining 25%. Likewise, time-scale may be relevant: for example, public or communal facilities may be judged appropriate for the 10-year planning horizon, but longer-term planning may aim for household-level facilities.

2) Design and costing

Having identified districts in which communal or public sanitation is judged to be the most appropriate solution, a very careful design process must start. This should not be simply a technical design process: rather, design should consider social, financial and technical aspects together. In other words the final designs need to be not just technically effective, but also based on verifiable demand, fully acceptable to users, and financeable. Once designs have been developed, it will be possible to obtain estimates of total capital cost and annual net revenues. So for example in Maputo (Mozambique), we estimate that communal facilities –each serving on average 130 people (about 31 households)– would be the most appropriate solution for about 219,000 people; this implies a total requirement of 1,685 facilities. Average construction cost per facility (based on demonstration-scale WSUP experience to date) is estimated as 8,168 US\$ including soft costs (design, management, community work). The total required capital cost is thus estimated as $1,685 * 8,168 = 13.8$ million US\$. For further details on the Maputo estimates, see the WSUP Practice Note “*Financing communal toilets: the Tchumulane project*”;⁷ but note that capital costs (in Maputo estimated as 63,000 US\$ per 1000 population) are likely to vary greatly from one city to another. Likewise revenues and costs can be projected, allowing cash-flow modelling and thus detailed analysis of financing options.

3) Identifying and accessing finance

As detailed in preceding sections, there are various options for financing communal and public toilet services. Public toilets serving relatively large numbers of people may be sufficiently profitable to attract private investment; in contrast, communal facilities serving small groups of households (as generally preferred by users) will generally require at least partial government support. One option is for capital costs to be financed by a combination of sunk subsidy and concessionary loan: so for example, 50% of the cost is borne by sunk subsidy from the national and/or municipal government, while the remaining 50% is covered by a concessionary loan to the municipality. Debt service and capital replacement costs (CapManEx) may then be covered by householder tariffs, by some other source of revenue (e.g. a national or municipal-level surcharge on water bills), or by a combination of the two.²⁰

Ideas

The following ideas are worth keeping in mind when considering communal or public sanitation services in a given location:

1) Toilets plus: multiservice centres

It is increasingly accepted that public toilets can often be made more acceptable to users and more financially viable if they are located within units offering other services. The Indian Sulabh facilities typically include bathing and laundry facilities, and may include other services ranging from telephone services to accommodation.¹ The Kenyan company Ecotact (www.ecotact.org) promotes “Ikotoilet” facilities that are designed to be multiservice “mini-malls”: the unit offers not just toilets but also compatible microenterprises like electronic money transfer, mobile phone top-up, newspaper vending, and shoe-shine or barber services. Likewise, Kibera’s BioCentre facilities incorporate an office and meeting space for rent, and this aspect of the BioCentre design is being continued in ablution centres currently being installed with WSUP support in Nairobi. Smaller communal facilities built with WSUP support (in Maputo, for example) typically include a water kiosk, which depending on the specific context may contribute revenue, and/or water supply for toilet cleaning, and/or sanitation-related roles (e.g. cleaning) performed by the kiosk attendant. In general, bundling sanitation services with other sources of revenue – most obviously water supply – can make the facility more attractive to private investors or operators, and can likewise make the business model more attractive for public sector actors.

2) Beautiful toilets!

Ecotact also promotes the concept of “beautiful toilets”: in other words, public sanitation facilities that are designed to be visually attractive, and that are deliberately placed in visible locations on main streets, not hidden from view. The SPARC Alliance promotes a similar approach. The idea is that “beautiful toilets” will offer a more attractive business opportunity to local entrepreneurs; will help break down the cultural barriers associated with public toilets; and will be happier, busier places – and so safer places, especially for women.

3) Part-financing arrangements

An interesting possibility is for the donor and/or government to fund part of a communal or public toilet, and for users to pay the remainder through subscription. Of course there are numerous possible variants of this approach: for example, the donor pays one third, the municipality pays a third, and the community pays a third. Approaches of this type could also be combined with microcredit arrangements. As already discussed, full private-sector finance may be achievable for public toilets in busy locations. Certainly, achieving independence of donor financing is essential for scale and sustainability.

4) Sealed systems

Dense urban settlements may often have severe problems with foul open drains and/or high water tables. In situations of this type, septic tanks with infiltration fields, or with drainage to open channels, may be inappropriate. One possibility is to consider sealed systems, with no drainage of faecal wastewater to the local environment. Such systems include urine-diverting toilets where faeces fall into dry vaults;

or sealed holding tanks that receive only faeces, “toilet urine” and toilet washwater, with “urinal urine” and greywater is drained elsewhere (e.g. to an open drain). An effective and sustainable system for emptying the tanks and safely disposing of the waste will be essential.

5) Connection to sewers

If there is a sewer running close to the settlement where the sanitation facility is to be built, consideration should be given to connecting it to the sewer; though the toilets must still be in a safe location, and at an acceptable distance from users’ homes. In some cases, it may be possible to consider extension of a sewer line into an informal settlement: this approach is currently being tested in a WSUP-supported project in Nairobi in partnership with the Nairobi Water and Sewerage Corporation, and might potentially be feasible in some low-income districts of Maputo.

6) Provision for sludge disposal

Communal and public toilets will generally have a large holding tank that is regularly emptied or a septic tank that is occasionally emptied: so consideration should also be given to allowing for disposal of nightsoil and sludge from other local toilets directly into this tank. In other words, the tank can serve as a sludge holding tank for the local community, with potentially excellent impact on public health. However, this needs to be carefully controlled, in particular to prevent overloading the tank, and to prevent tipping of non-faecal solid waste, such as the various materials that may be used for anal cleansing. An approach of this type is currently being applied in a WSUP-supported project in Nairobi.



Public toilet, Antananarivo

“ People will generally prefer communal toilets located close to their home over public toilets located further away ”

Key conclusions

- Communal or public toilets may be an appropriate solution in low-income high-density districts, particularly where a) there is a high proportion of tenants, b) in situations of water-logging and regular flooding, and c) there is currently severe faecal contamination of the local environment through widespread open defecation and/or foul wastewater in the streets.
- However, communal or public toilets should *only* be used in situations in which household toilets are not a viable solution.
- People will generally prefer communal toilets located close to their home over public toilets located further away. Communal toilets will often be close enough to homes for women to visit after dark without security concerns, and monthly household fees will tend to ensure women's and children's access. However, communal toilets for small groups of households are likely to have higher per-capita capital costs and higher per-capita O&M costs; it is essential to ensure that user groups are able to collect and adequately manage revenues sufficient at least for routine O&M.
- So achieving communal and public toilets that are clean, safe, financially sustainable, and affordable and accessible for all male and female users is challenging: in any given location, a gradual learning-from-experience approach should be used, based on very detailed understanding of the local social, economic and institutional context. In both citywide and national sanitation planning processes, communal and public toilet models should be considered alongside other models, and promoted where appropriate as a valid part of the urban sanitation mix.
- It is critically important to take women's and children's needs fully into account from the early planning stages. Communal or public toilets are only acceptable if they provide effective service for women and children.
- Particularly in the case of privately managed public latrines, appropriate regulation (probably by the municipal authority) is critical to ensure an acceptable balance between the tariff paid and the quality of service.
- In order to achieve real sustainability, it is important to aim for a) genuine local community, municipal and/or private-sector participation in capital costs, and b) education of communities so that they take greater responsibility for keeping their neighbourhoods free of faecal contamination, perhaps drawing on CLTS-like approaches modified for use in the urban contexts.

References

- 1 Kothandaraman P & Vishwanathan V (2007) Sulabh International: a movement to liberate scavengers by implementing a low-cost, safe sanitation system. UNDP "Growing Inclusive Markets" Case Study, September 2007. <http://cases.growinginclusivemarkets.org/documents/76>
- 2 WSSCC (2004) Sulabh Community Latrines: 12 Million Customers Daily. WSSCC Case studies - Asia, India.
- 3 Burra S, Patel S & Kerr T (2003) Community-designed, built and managed toilet blocks in Indian cities. *Environment and Urbanization* 15(2): 11-32.
- 4 Caplan K (2010) Quick stakeholder/context analysis of public toilets in Kumasi, Ghana. Internal report for WSUP.
- 5 Burra S & Patel S (2002) Community toilets in Pune and other Indian cities. PLA Notes 44. www.planotes.org/documents/plan_04411.pdf
- 6 WSUP (2011) Documentation of WSUP-supported communal sanitation programme in Swatantra Nagar and Kaveri Nagar slums in Bangalore, India. Report for WSUP, available for download from the [WSUP website](#).
- 7 WSUP (2011) Financing communal toilets: the Tchemulane project. Water and Sanitation for the Urban Poor, WSUP Practice Note, 2011, available for download from the [WSUP website](#).
- 8 AFD/AWSB (2010) Assessment of impacts of ablution blocks project in informal settlements of Nairobi. Evaluation report, Agence Française de Développement and Athi Water Services Board, 30th March 2010. http://aideeffectivenesskenya.org/index.php?option=com_docman&task=doc_details&gid=6374&Itemid=486
- 9 Dreibelbis R & Onyango L (2010) Rapid assessment of on-plot sanitation implementation in Gatwekera. Report for WSUP, available for download from the [WSUP website](#).
- 10 Peal AP & Evans B (2010) Breaking barriers in water and sanitation service delivery to informal settlements: case study of the Mukuru model. Practical Action. <http://practicalaction.org/docs/Breaking-barriers-in-water-and-sanitation-service-delivery-to-informal-settlements-Mukuru-Model-Full-Report.pdf>
- 11 WSP (2004) From hazard to convenience: towards better management of public toilets in the city of Nairobi. Water and Sanitation Program, Field Note, 2004. www.wsp.org/wsp/sites/wsp.org/files/publications/329200792104_afFromHazardToConveniencePublicToiletsNairobi.pdf
- 12 Wegelin-Schuringa M & Kodo T (1997) Tenancy and sanitation provision in informal settlements in Nairobi: revisiting the public latrine option. *Environment and Urbanization* 9(2): 181-190.
- 13 Colin J & Nijssen S (2007) Public toilets in urban India: doing business differently. Water and Sanitation Program Field Note, 2007. www.wsp.org/wsp/sites/wsp.org/files/publications/519200874857_SAPublicToiletsFN2008.pdf
- 14 Sugden S (2008) Developing a sanitation marketing approach in Antananarivo, Madagascar. Report for WSUP, available for download from the [WSUP website](#).
- 15 Schouten MAC, Mathenge RW (2010) Communal sanitation alternatives for slums: A case study of Kibera, Kenya. *Physics and Chemistry of the Earth Parts A/B/C* 35(13-14): 815-822. DOI: 10.1016/j.pce.2010.07.002.
- 16 Khawaja N (2010) Assessment of options for public toilets for a market centre in Chora, Afghanistan. GTZ report.
- 17 TTI (2010) Detailed project report of sewerage system in Kaverinagar. Pre-implementation planning report produced for WSUP by TTI Consulting Engineers India (P) Ltd, available for download from the [WSUP website](#).
- 18 Evans B, van der Voorden C & Peal A (2009) Public funding for sanitation: the many faces of sanitation subsidies. Water Supply & Sanitation Collaborative Council, Geneva, Switzerland. www.wsscc.org/resources/resource-publications/public-funding-sanitation-many-faces-sanitation-subsidies
- 19 Rieck C et al. (2010) Case study of SuSanA projects: Public toilet with biogas plant and water kiosk (Naivasha, Kenya). Sustainable Sanitation Alliance. www.susana.org/docs_ccbk/susana_download/2-131-en-susana-cs-kenya-naivasha-biogas-public-toilet-final-2009.pdf
- 20 Franceys R & Pezon C (2010) Services are forever: the importance of capital maintenance (CapManEx). In ensuring sustainable WASH services. WASHCost Briefing Note 1b. www.washcost.info/page/866
- 21 Tayler K, Colin J & Parkinson J (2000) Strategic planning for municipal sanitation: a guide. GHK Research and Training, London, UK. www.netssaftutorial.com/fileadmin/DATA_CD/01_Step1/SE48_Strategic_planning_for_municipal_sanitation.pdf
- 22 WSP (2010) Marching together with a citywide sanitation strategy. Water and Sanitation Program. www.wsp.org/wsp/sites/wsp.org/files/publications/citywide_sanitation.pdf

Credits: This Topic Brief was researched and written by Guy Norman with important review inputs from Ken Caplan, Sue Cavill, Francisco Chirruete, Alan Etherington, Richard Franceys, Tim Hayward, Helen Pankhurst, Sam Parker and Kevin Tayler. Thanks also to David Schaub-Jones (BPD) for very useful unpublished information on communal and public toilets in Nairobi. Coordination: Gemma Bastin. Design: AlexMusson.com. [Version 1, February 2011.]