Drawers of Water II: assessing change in domestic water use in East Africa

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Despite abundant research on the relationship between water supply projects and health, relatively little is known about long-term trends in household water use. This article compares information from the original *Drawers of Water* study, which took place in East Africa in the late 1960s, and the *Drawers of Water II* study in the same region in 1997, and points to improvements as well as deterioration.

This article reports the findings of a large-scale, long-term, repeat, cross-sectional study of domestic water use and environmental health in East Africa, based on the landmark book *Drawers of Water*[1]. It concentrates on changes in domestic water use over the three decades since that book was published in 34 rural and urban sites in Kenya, Tanzania and Uganda that reflect the diversity of environments, living conditions and water service levels found in the region. Changes in domestic water use are examined in terms of mean per capita water-use levels at site and country level. The findings reveal both positive and negative changes in water use in East Africa, in terms of levels and types of use, reliability, access and cost.

While measurable improvements have been achieved in some quarters, there have been significant declines in others. As populations continue to grow rapidly, placing added pressure on already over-stretched systems and services, the long-term prospects for increasing per capita water use in the region appear limited. Only with concerted action by international external support agencies, in partnership with municipal and national governments, local communities and water service providers, will these trends be reversed or at least slowed.

Drawers of Water revisited

Drawers of Water was the first large-scale assessment of domestic water use and environmental health in Africa, and is still regarded as relevant and influential.[2] The study looked at the use of water for consumption, hygiene and amenities in domestic life. It also examined the direct cost of water use in monetary terms as well as the social cost of water measured in energy and time expenditure. Information on per capita and total household water use was recorded and factors affecting variations in use were assessed.

In 1997, a comprehensive reassessment of domestic water use and environmental health in East Africa was launched with support from the Department for International Development, building on the original *Drawers of Water* (DOW I) data from the late 1960s. By using the *Drawers of Water* data as its baseline, and employing a range of formal and participatory research methods to carry out detailed historical analyses of a spectrum of rural and urban communities, this study attempted to 'fill in the blanks' over the past three decades and chart the major trends and changes that have occurred in the domestic water and environmental health sectors in East Africa. Given the wide range of policies formulated and implemented, the multiplicity of programmes and projects initiated, and the diversity of institutional actors involved in water development in the region over the past 30 years, this research may be likened to a kind of 'archaeology' of water and health strategies and impacts, requiring the meticulous excavation and reassembling of the available evidence.

Changes in per capita water use

At a regional level, mean daily per capita water use has declined by 30 per cent over the last three decades, from 61.4 to 39.6 litres. This is a reflection of the almost universal drop in water use by piped households in both rural and urban areas. While water use by unpiped households has almost doubled (rising from 11.0 to 19.7 litres), use by piped households has decreased by approximately 50 per cent from 128.0 to 66.0 litres. Despite this decline, piped households continue to use over three times the amount of water consumed by unpiped households (during DOW I the ratio was 11:1) (Figure 1).

Although in absolute terms the increase for unpiped households is relatively small, it should bring significant environmental health benefits to these households since, after satisfying basic consumption needs, the additional water is likely to be used for hygiene

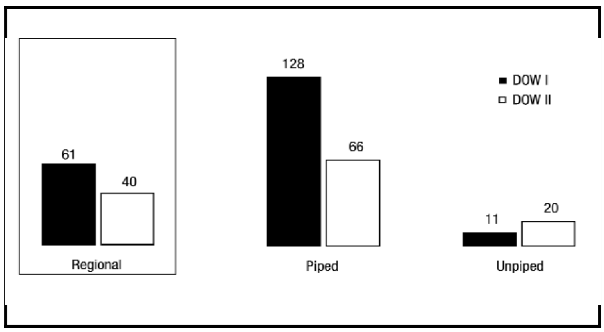


Figure 1 The change in mean per capita water use for piped and unpiped sample households in East Africa (litres per day).

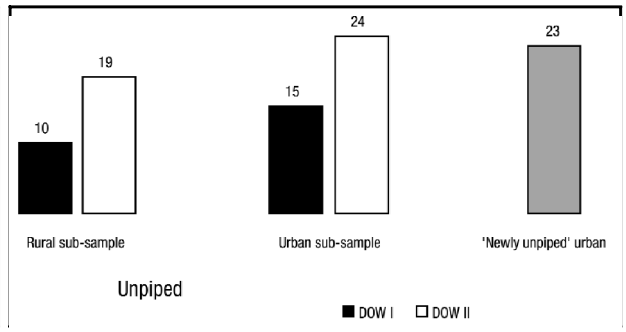


Figure 2 Changes in mean per capita water use in 'mixed' sites (litres per day).

purposes such as bathing, clothes washing and house cleaning. (According to DOW I, the minimum per capita water consumption required for survival in a tropical area is in the range of 1.8–3 litres daily; during DOW II, the average daily per capita consumption was found to be approximately 4 litres.) In piped households, on the other hand, the decrease is likely to be reflected in a reduction in water use for amenities such as watering gardens and flushing toilets, but may also be reflected in a reduction in the use of water for hygiene purposes.

The emergence of 'mixed' sites

The original *Drawers of Water* study examined a total of 34 field sites, which were defined as being either 'piped' (having direct connections in the home or compound) or 'unpiped'. Rural households tended to obtain their water from outside the dwelling, while most urban households used piped supplies. The repeat study found that this distinction no longer holds true for all households in all study sites. Several of the sites once categorized as 'unpiped' now have a number of households with reliable piped connections. In some sites originally classified as 'piped', such as Iganga in Uganda and Temeke-Dar es Salaam in Tanzania, significant numbers of unpiped households now exist. In these latter cases, the physical infrastructure is still in place but water supply systems and services no longer function properly, thus forcing families to either collect water from unprotected external sources or purchase water from private vendors or kiosks, frequently at relatively high prices.

In accordance with the general trends in water consumption, households that have remained unpiped in previously 'unpiped' sites have increased their per capita consumption while piped households in 'piped' sites have experienced a decline. However, piped households resident in sites which were previously 'unpiped' have benefited from an almost threefold increase in water consumption and consume almost twice as much water per capita as their unpiped neighbours. In previously 'piped' sites, those households that do not have access to piped resources have experienced an even greater decline in per capita water use than their piped neighbours. There is little difference in piped and unpiped consumption levels between sites that were previously defined as either 'piped' or 'unpiped' (Figure 2).

The reliability of piped water supplies has declined significantly over the last three decades in most of the study sites. Different factors contribute to this situation, including a lack of system maintenance and the stress placed on existing network capacity by an ever-increasing urban population. While in 1967 practically all sample piped households received 24-hour service delivery, today only 56 per cent of them benefit from the same level of service, almost 40 per cent receive less than 12 hours of service, and roughly 20 per cent get one to five hours of service per day (Figure 3). Not surprisingly, more affluent areas such as Parklands in Nairobi, Oyster Bay in Dar es Salaam, and Tororo in Uganda all enjoy virtually continuous 24-hour water supply, while high-density, low-income settlements such as Karuri, Kenya and Dodoma, Tanzania, can count on a maximum of only five hours of service per day.

The current study found that piped water supply was available in some urban areas that were totally unpiped in 1967. Urban centres located in some less affluent places, such as Mathare Valley in Kenya, Dodoma in Tanzania and Mulago in Uganda, are included in this group. Although water is now being piped to these communities, only 20 per cent of households regularly receive 24-hour service, while 30 per cent obtain five hours or less of water per day.

The burden of water collection

Obtaining water often involves significant inconvenience in terms of the time spent in collection, the physical effort required and negative health effects which may result. In many ways, the burden of water collection for unpiped households seems to have increased since *Drawers of Water* I.

As was the case three decades ago, women bear primary responsibility for water collection. However, some changes have occurred. For example, by *Drawers of Water* II there has been an increase in child drawers as well as in the number of males, notably teenagers, collecting water for commercial purposes. The principal mode of transport has also remained unchanged, as women and children continue to walk to and from the source, carrying water on their heads using plastic jerrycans and saucepans. As a consequence they are prone to health problems such as headaches, general fatigue and pains in the chest, neck and waist.

On average, the daily number of trips for water made per household

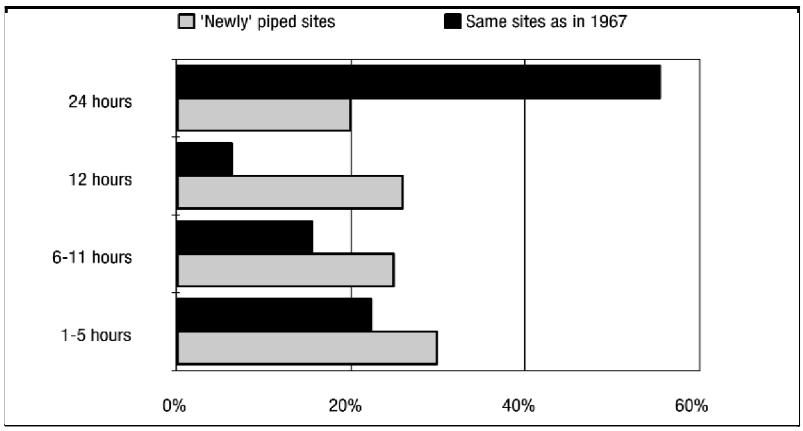


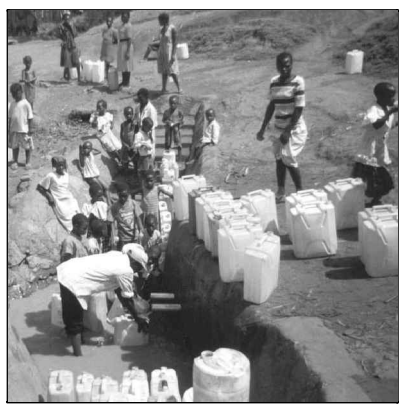
Figure 3 Mean hours of water supply service – DOW I vs. DOW II

increased from 2.6 in DOW I to 3.9 in DOW II. An average of three trips to the primary source was reported by almost 80 per cent of unpiped households in rural areas in the late 1960s, while by the late 1990s the number of trips had increased and 45 per cent of households reported more than three trips to the source. Again, 70 per cent of urban dwellers reported three trips or less to the source in DOW I, while only 50 per cent of them made at most three trips. One cause of the increase in number of trips is the increase in water use by unpiped households.

Drawers can travel considerable distances to obtain water. On average the distance covered to collect the daily water for one household decreased slightly from 428 to 406 metres between the two studies, with households in rural areas walking substantially more than those in urban sites.

This decrease is due in part to the improved accessibility of protected sources such as hydrants, standpipes and wells, both in rural and urban areas. It also reflects the increase in vendors supplying water direct to the home. Despite this small improvement, rural households remain worse off than their urban counterparts. For example, the average distance to hydrants and standpipes was 424 metres for rural households and only 99 metres for urban households. In addition, some rural households reported that sources that were previously available had dried up in recent years and, as a consequence, they had to walk longer distances to the next available source.

The time spent collecting water should be closely related to the distance to the source, but in many cases the drawer has to queue for a long time to obtain water. The time spent queuing for water has increased significantly since DOW I, reflecting the increase in population relative to the number of sources available. Indeed, despite the decrease in distance, the average time involved in water collection per household has increased significantly from 17 to 25 minutes for a return journey in rural areas, and from 10 to 18 minutes in urban areas. This increase in time required to collect water has reduced the time remaining for other activities such as cleaning, cooking and farming. Moreover, time spent queuing sometimes makes children late for school. Fighting over water at the source is also reportedly common.



Time spent queuing for water has increased significantly

The cost of water

Households with piped water connections face relatively high costs for water. During DOW I the average cost of water in urban centres was US$0.77/m^3, ranging from a minimum of $0.32 to $1.25/m^3. Thirty years later, the average cost of water in urban areas was slightly lower at $0.63/m^3, and households living in rural areas pay considerably less than their urban counterparts ($0.26/m^3).

Despite the decrease in cost of water, the reported values for urban areas are still high in comparison to more developed countries. During DOW I, the cost of water was an average of $0.32/m^3 for cities in the United States.

Estimating the cost of water for unpiped households is a difficult matter. This cost usually involves a direct cash price paid at the source, the time and energy expended in travelling to and from the source, and the opportunity cost of what the individuals could do if they did not have to spend that time collecting water. In order to address this situation, the original authors of DOW I came up with an interesting method to derive a caloric cost (based on the energy required to fetch water), determining the staple food (maize) required to supply this energy and calculating the price required to purchase this amount of food. The method was repeated by DOW II to allow a comparison of costs over the past 30 years.

In general, the economic cost of water has significantly increased since DOW I, from $0.82 to $1.22/m^3. Households living in rural areas face lower costs than those living in urban areas, especially when households live in areas that depend on private paid sources (like vendors and kiosks) as their primary water source ($0.74 and $0.84/m^3 for rural areas in DOW I and DOW II respectively, and $1.06, $1.41 and $2.46/m^3 for DOW I, DOW II (same sites as DOW I) and DOW II (sites that were previously only piped).

Determinants of water use and policy implications

The most important factor affecting urban water use in East Africa is whether or not a household has access to

a functioning piped system ('functioning' meaning one from which a household could satisfy its basic water needs throughout the year). In the late 1960s, individuals who had access to piped water were found to be consuming, on average, eight times as much water as those without piped water.

Three decades later, the pattern remains the same, but the ratios have changed dramatically. Today, as we have seen, mean daily per capita water use in a typical piped urban household is about half the 1967 level, while members of unpiped urban households have seen their per capita water use increase to 20.3 litres, a rise of almost 9 litre/day. Kenya has experienced the biggest changes, with mean daily per capita water use increasing by 16 litres in unpiped households and decreasing by 70 litres in piped households.

It is perhaps surprising that these trends and changes are common to all three countries since each has followed a very different political trajectory since the heady days of the first East African Community in the 1960s. But past differences among them in the way water and environmental health services were provided are fast disappearing. Today, the societal arrangements for service provision are converging under the pressure of political and economic forces that originate both from outside (dependence on donors and global markets) and inside (social differentiation and political struggles) the region.

In the short term, the most certain implication of these trends is that the role of the state and external support agencies is crucial for improving water and environmental health services in East Africa. This state of affairs is likely to continue for the foreseeable future, not only because state-provided services are significant in themselves, but also because, without links to the state and donors, many voluntary sector services would cease to function. Experience from Uganda when the state collapsed during the civil unrest of the 1970s and 1980s shows both the considerable resilience of the voluntary sector (expansion in operations) and its limitations (widening inequality in access and drastically reduced quality of services).

The long-term implications of the 'privatization' of service provision are much more difficult to assess. The optimistic view is that we are witnessing a strengthening of civil society, leading to democratization that will make the state more transparent, accountable and efficient. Improved governance and the successful implementation of market liberalization and structural reform programmes will also promote economic growth. The state, in turn, will establish the enabling environment that allows for both the voluntary sector and private enterprise to flourish. Sustainability of services will then be secured. A more pessimistic perspective is that the location of NGOs and CBOs in civil society tells us little about the values and constituencies they represent and therefore little about how they operate *vis-à-vis* the state or their members. In fact, their close links to local élites and their dependence on patronage from the state and donors make their role in fostering 'grassroots democracy' ambiguous. Moreover, the long-term prospects for economic growth, which is a precondition for any domestically supported, demand-responsive provision of services, are also in doubt. Thus, the sustainability of many water and environmental health services is likely to continue to depend on uncertain donor support for the foreseeable future.

Whatever standpoint proves to be correct, it is clear is that the lessons emerging from Drawers of Water II suggest that a new vision of improved access to and use of water and environmental health services in Africa will require a combination of innovative policies and flexible funding arrangements in order to address the water, and with it, the health and hygiene needs of poor people in both rural and urban communities. It will also require strengthened public and private organizations to develop, operate and maintain sustainable water systems and services, and new partnerships between the state, the private sector and civil society that promote market-based water development while creating co-operative management arrangements that work for people and the environment.

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This article draws on a set of detailed reports and articles, including:

Thompson, J., et al. (2001) *Drawers of Water II: 30 years of change in domestic water use and environmental health in East Africa. Summary Report.* London: International Institute for Environment and Development (available from Earthprint.com or from Drawersofwater.org).