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THE FUTURE OF WATER, SANITATION AND HYGIENE:
INNOVATION, ADAPTION AND ENGAGEMENT IN A CHANGING WORLD

Briefing paper on the status and prospects for Borama water supply Somaliland

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An important centre of learning for Somaliland, over the last century Borama has grown to around 10,000 settled households today. Faced with an uncertain operating environment, keeping pace with demand for improved water services has presented considerable challenges to Borama community and international partners over recent years. Drawing evidence from secondary sources and a rapid purposive research exercise, the development trend to the current status of Borama's water supply is described, in terms of water resources, water sources, supply engineering and management of service delivery. Insight into recent efforts to sustainably manage ground-water resources are presented, as are encouraging results in service development and delivery by SHABA water utility, operating through a pilot PPP contract. Based on results and an assessment of constraints and opportunities identified by the authors, discussion and recommendations are offered.

Context

In Awdal region of Western Somaliland located 9°56'N 43°11'E rests Borama town, close to the Ethiopian border and within the upper slopes of the Dur-Dur watershed. Close to the confluence with Amoud *tugga*, Damok spring was traditionally a home water source of the Gadabursi clan, and Borama community. Recognised also as a traditionally important centre of learning, over the last century Borama has grown to become a market town of around 10,000 settled households, in a semi-arid, predominantly agro-pastoral area. Faced with an uncertain operating environment, keeping pace with demand for improved water services has presented considerable challenges to Borama community and international partners over recent years. To meet these challenges current research addresses gaps in knowledge and capacity to sustainably:

1. Identify and develop groundwater resources to meet future demand, and
2. Ensure growth of household connections through an optimal management contract.

Water Resources and Supply Development

At an altitude between 1,350 and 1,450 masl annual precipitation is around 550mm. Groundwater dynamics are complex. Four geological formations outcrop in the area; the basement complex of pre-cambrian origin, the Triassic-Jurassic sandstone/conglomerate of the Adigrat formation, remains of karstified Jurrasic limestone and widespread alluvial deposits. Soils are predominantly calsisols and regisols and vegetation is dominated by the succession to acacia tortilis (qudhac) tree cover. Dependent mainly on wood fuel for household energy, natural resources degradation is a growing concern.

Flowing from karstified limestone close to the fault with the metamorphic pelitic rock, Damok spring was tapped to a pump house by the British in 1938, following 3 failed attempts to drill. In 1959 the system was extended 3.5km to town via a 4" rising main to Sheikh Ali storage tank, but besides a ring main little water development subsequently occurred until after the Somali-Ethiopian war of 1977 when Borama received an influx of refugees. From 1984-86 USAID funded studies of regional groundwater potential and test wells were drilled in the Damok and Amoud valleys. A parallel Chinese hydro-geological investigation in 1986 resulted in nine test wells. Caritas MHD and German drilled wells struck water in the same period, but for which there are no data. Following civil-war which reached a peak of intensity around 1991, only two Chinese wells were in operation. During the 1990s despite interventions by international aid, failure in delivery of water to the town led to Borama experiencing a severe water shortage between 2000 and 2002, by which time the town water system in public hands had collapsed, and Damok spring had dried up.

Service Delivery and Management Performance

Failure of the public sector to make required improvements triggered questions concerning water services and management options, opening dialogue between Borama community, the Ministry of Mineral and Water Resources (MMWR), UNICEF and USAID. Pioneered by academics of Amoud University, workshops were organized from June 2000, wherein options of private sector involvement interested community and business leaders who showed willingness to invest. Modalities were agreed and shares were floated, with $105,000 capital raised to establish Awdal Utility Company (SHABA) in 2003. A ten year PPP lease agreement, which became the pilot model for Somaliland, was subsequently ratified between MMWR, Borama Municipality and SHABA, transferring responsibility for service delivery to the private operator in October 2003.

From the end user perspective performance has since been good. Data is available from various sources, and although census data are missing and discrepancies exist between sources the general trend can be inferred from Fig. 1. Performance criteria were set at an increase of 1,000 households to be connected on an annual basis and household connections rose from 130 in 2002 to 5435 by end of 2009. In 2002 a baseline study conducted by Hydroconseil identified Borama as the worst performing system assessed, whereas updated analysis now places Borama first among Somaliland towns. From 2002 to 2009 technical efficiency and billing efficiency rose from 40% to 92% and 75% to 100% respectively. Over the same period business efficiency reduced the number of staff per 1000 connections from 338.5 to 8.2, staff levels having been maintained around the 40 mark throughout. SHABA has also demonstrated profitability enough to reinvest in capital infrastructure, such as generators, while maintaining tariffs below the rate rise in energy costs for pumping. Significantly, the number of household connections rose from 1.5 to 77 per 1000 inhabitants. By 2009 end, with an average of 34 l/day available per householder connected, real progress towards the MDG target ('access to an improved water source') can be recorded.

Water Production

By 2000 it was recognized that the water production, supply and distribution infrastructure was badly in need of rehabilitation and development to meet future demands. Work on public assets was completed by 2004 with USAID funding; four Chinese borewells, generators/booster pumps at the pump house, an 8" rising main to the new Farahod storage tank (500m^3), and over 6km of installed distribution mains were commissioned and put into operation. Fig 1 also shows the steady rise in water production over the past six years, noting that accounted for losses have remained more or less constant. Independent reports suggest that of 348,120m^3 water distributed in 2004, 49% was to households, 42% to kiosks and 9% to standpipes. Corresponding percentages for 538,273m^3 distributed in 2009 are 92%, 7% and 1%, and although reports do not identify from where those un-served by SHABA source their water, a decline in kiosk numbers, and decline in ratio of users accessing their water supply in public spaces compared to household connections, which are highly valued by users, has been reported (Nour 2009, Weir 2009).

Not-withstanding these successes, by 2006 constraints to environmental sustainability, specifically on ground water resources were being noted (Mahamud 2006, Petrucci 2008). SHABA monitoring data were recording a steady fall in static water level (SWL) across the production wells under their management. These observations in contrast to service delivery successes, when combined with perceived weaknesses in public oversight and clarity over responsibility for capital investment in infrastructure development, led SHABA representative to more recently state *"we have been left holding the lion's ears"*.

Hydro-geological research was carried out in 2007/8 in order to better understand groundwater dynamics and identify new water sources. The study identified five dominant geological units common to four promising blocks with the main aquifers in the Jurassic limestone unit and the Adigrat sandstones which rest between the limestone and basement. Widespread Tertiary era lacustrine deposits serve as an aquiclude, inhibiting both infiltration and the efficacy of VES geo-physical surveying, of which soundings were made in two promising blocks . Through 65 soundings in several locations covering Damok, Amoud and Shailaha area, groundwater circulation patterns were proposed and modeled alongside parameters like effective recharge, well production and SWL using a mass balance approach to estimate the sustainable limits on groundwater production. An additional two wells were subsequently drilled in Amoud valley 3km east/south-east of the pump house, adding to the existing Damok/Amoud suite (BH1 – 10) of Borama wells. Currently however, one of the new drilled wells provides about 30% of town supply, and this borehole certainly contributes significantly to the well management regime exercised by SHABA to counter aquifer depletion (Fig. 2) in Damok. While imminent connection of the second newly drilled boreholeto the system could contribute an additional 50m^3/hr, besides uncertainties over safe yield any large increase in Amoud valley water production is currently constrained by the production wells hydraulic network. Pump house booster pumps are running close to full duty at near maximum head, in line storage and direct routing provide low buffer capacity for demand fluxes, and the well field riser main is undersized to satisfy design limits on constant hydraulic gradient, or velocity, for a sizeable flow increase.

Discussion and Recommendations

During the 1980s the nature of Damok springs artesian flow was investigated by the Chinese, Aquater and BCI with differing interpretations of the scope and scale of the recharge mechanism (Faillace 1986). Significance of regional flow was identified as part of the BCI investigation, a pilot study for the mega-watersheds paradigm (Bisson 2004). Test well data from the period and in 2001 led to optimistic scenarios for Borama groundwater resources and water supply development, but limits to the wells tests subsequently suggest they were inadequate to validate 'safe yields', which were over-estimated in light of water production practices since 2003.

During the past decade cessation of artesian flow and drop in SWL suggest that proven groundwater resources in Borama vicinity are very much a limiting factor to water supply development. Recent investigations support limits according to the geology and the hydro-geology focussed on geometry of the aquifers, although indications of regional underground flows through geological faults have been noted (Petrucci 2008). A deeper understanding of the hydrological regime with respect to effective aquifer recharge, and further hydro-geological investigation based on seismic refraction, tracer and isotope studies are recommended to better define the nature of groundwater resources available in Borama vicinity, and with respect to regional flows.

As it stands, recommendations to meet future growth of Borama point to potential of the Dur Dur catchment many kilometres downstream. Immediate measures to connect the two new boreholes may suffice for a few years and are recommended by SHABA to keep pace with increasing demand. Current uncertainties however underpin the need for wider scale hydrological and hydro-geological studies as integral to master planning for Borama water supply. This exercise would normally derive from medium to long term demand forecasting, and feasibility studies that follow a more structured and staged approach to planning, design, financing and engineering of works to meet future demand than is evident from recent phases of work. Sustainable water development needs also to address serious constraints in national capacity, there being currently no institutions in Somaliland producing geologists, engineers and technicians of the future.

Nevertheless, the community of Borama, and SHABA on their behalf, have demonstrated considerable initiative and commitment over the past ten years to ensure growth of water supply services focused on delivering through household connections. Fixed on a hydraulic mission but uncertain of resources, meeting challenges ahead suggest adapting a reflexive approach to water resources management, including conservation and supply augmentation at household level. Civic education on water resources and water use may work well alongside protection of the Damok and Amoud catchment environment and their re-afforestation, since the natural environment is held in great esteem by many Somali. However, it is clear that access to an improved water source does not equate easily with environmental sustainability, and we owe SHABA for their transparency; by making relevant data and information available, and by working to stabilize SWLs recently. In this respect, more effective promotion and application of IWRM at all levels needs to be encouraged.

A revised PPP model that serves well the public and private interests is anyway recommended. Leading into 2013 and the renegotiation of the SHABA contract most likely under a concession model, at grass roots level there may be an expectation of dialogue around the value of the improved water supply to date, building on consensus by the community as happened in 2000. From central Somaliland government, current policy places responsibility to the community and regional water authorities, so lessons learned from Somaliland development actions, and from best practices internationally will no doubt prove useful in this respect (Sansom 2003). In conclusion, although recommendations on the way forward are being documented, deficits in data and knowledge addressed, and options for development discussed and considered, it remains to be seen whether the critical gaps between needs, resources and capacity can be bridged, in order to balance the expectations of sustainable development with the hard realities of attaining it.

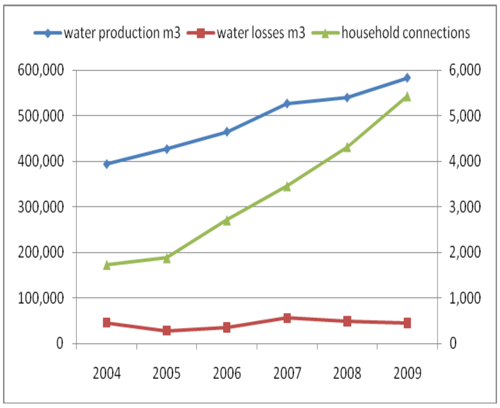

Fig 1. Water production, losses and household connections 2004 - 2010

Source: SHABA

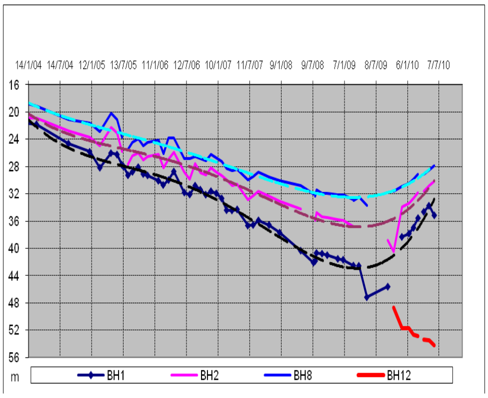

Fig 2. Water levels 2004 – 2010 for main production wells

Source: SHABA/Petrucci

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