

# Who is Going to Drill the African Boreholes?

## Entrepreneurs in the Rural Water Supply Sub-sector

Private drillers form an essential segment of the borehole drilling sector in Africa. More needs to be known about their abilities and the contribution they can make. Case studies of entrepreneurial drilling companies in four African countries are used to illustrate business strategies and common constraints, and possible ways forward.



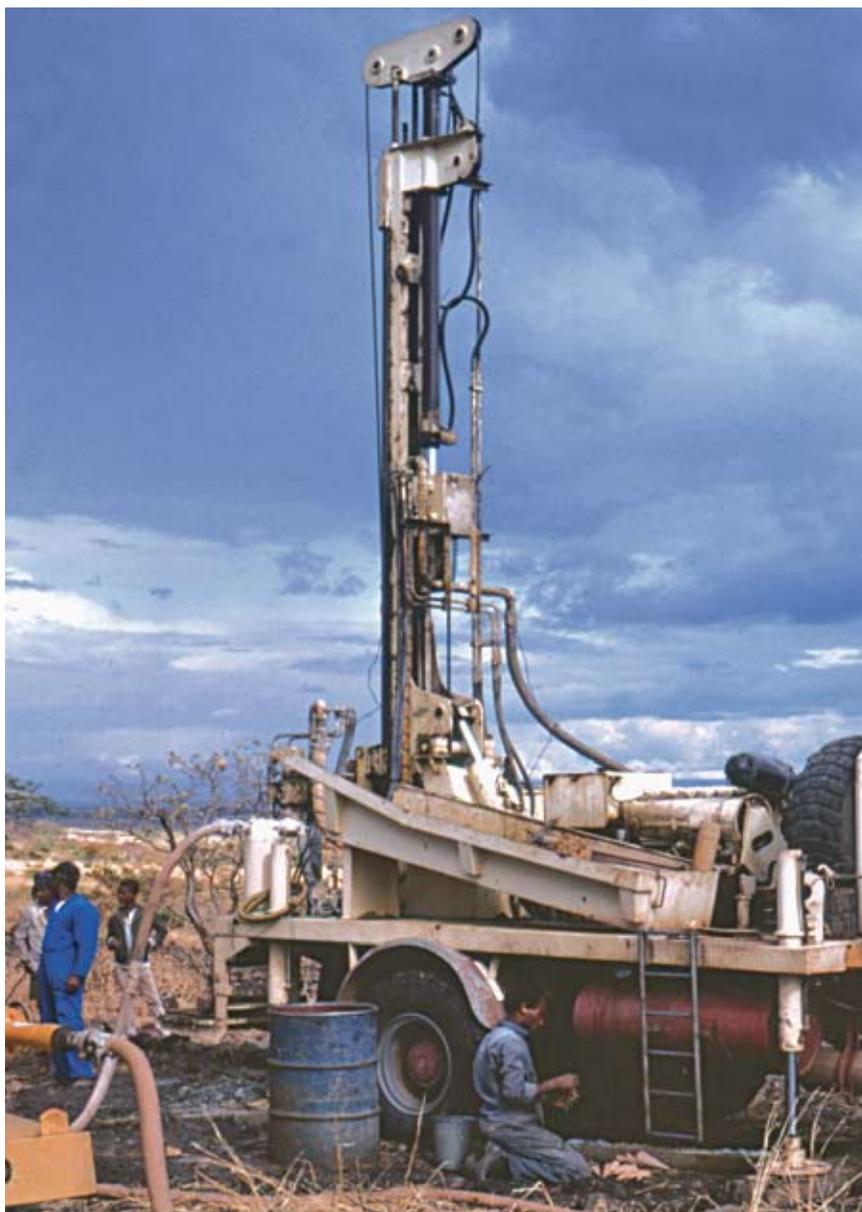
## Executive Summary

Thousands of water supply boreholes need to be drilled in Africa. These new boreholes will be central to increased water supply coverage in many African countries so an effective drilling sector is intimately linked to the achievement of their Millennium Development Goals (MDGs) by 2015 for water supply. This Field Note tackles the important question raised in its title which is who is going to drill all those African boreholes.

External support agencies have tried to build drilling capacity in government agencies and NGOs, but most now admit that this approach has not worked, and are turning to the private sector for solutions. However, the life of the private borehole driller is not well known or understood, as it is mostly played out in remote and inhospitable corners of the world, far from the eyes of donors and government regulators.

It is hoped that information from four case studies of four successful pioneering companies in this Field Note will encourage sector stakeholders to develop stronger relationships with, and provide appropriate support to, these drillers.

In this way, government, NGO, and private drilling agencies will develop greater knowledge of, and confidence in, each others' ability and capacity. This will lead to more



Drilling in Ethiopia

healthy public-private partnerships and increases in borehole production and cost-effectiveness. It should be a win-win scenario. Increased workloads lead to higher profits for the drillers, and greater

re-investment in equipment and capacity. Efficient implementation will attract more finance and support to the sector easing the burdens of service delivery through limited public resources.

## Introduction

Recent estimates suggest that up to one million new boreholes will be needed in Africa to achieve the 2015 MDG for water supply. If one considers that typical African drilling rates are only 10-100 boreholes per rig per year then at least a thousand drilling teams working flat out for the next ten years will be needed. The scale and magnitude of the challenge is being given increasing recognition and more aid is now being directed towards water supply. This, in turn, means that there is a rising demand for reliable and cost-effective drilling services which are critical to providing access to sustainable water supplies.

Public agencies still dominate the drilling sector in many African countries despite policies that encourage the phasing out of direct implementation by government. Although both governments and donors recognize that the drilling sector is impeded by limited resources in terms of skills, equipment, and working capital, capacity building efforts still tend to focus on NGO and government drillers.

The shortage of drilling capacity is beginning to highlight how vital the private sector will be in the ability to meet the rising demand for drilling services. At present, commercial drilling companies receive little or no support, and not much is known about their business strategies or motives. What is known, however, is that improved capacity and cost or efficiency savings in borehole production, whether in the

public, NGO, or private sectors will have a significant impact on reaching water supply coverage goals.

This Field Note results out of the Rural Water Supply Network's "Cost-Effective Boreholes" flagship (CEB) and the Water and Sanitation Program's "Drilling Entrepreneur Support Initiative" (DESI). It provides a snapshot of the activities and strategies of four entrepreneurial drilling companies in Ethiopia, Madagascar, Nigeria, and Sudan. It attempts to present their views, perceptions, and comments on the drilling industry and the water supply sector within which they work. The drilling companies described cover a broad spectrum from social enterprise to high-tech, million-dollar organization. The different strategies and business models adopted by the companies reflect both the varied backgrounds of the entrepreneurs, their diverse local drilling markets and how it is possible to overcome the many challenges.

## Case Studies

Each of the four private drilling companies undertakes similar activities although the local context of their operations is different in each case. They all:

- Compete for work
- Procure equipment and materials
- Recruit and train personnel
- Implement projects (usually drilling boreholes and installing pumps)

- Operate and maintain equipment
- Manage the financial and planning aspects of the business.

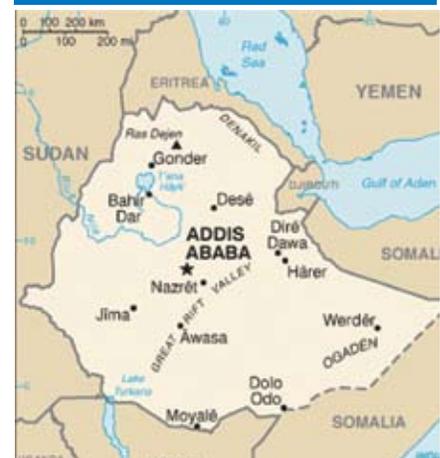
## Ethiopia

### Tana Water Well Drilling PLC

Etsegenet Berhe, born and raised in Ethiopia, founded the Tana Water Well Drilling (TWWD) PLC in March 2004. Etsegenet is a water resources engineer with extensive professional experience, including working for UNICEF and the UN in Ethiopia and abroad.

At the outset, Etsegenet used his personal assets and professional connections to purchase a brand new state-of-the-art Ingersoll Rand drilling rig costing close to US\$1 million including accessories and support facilities. A local bank provided a three-year loan of US\$400,000, against which Etsegenet had to use both the rig and his house as collateral.

### Map of Ethiopia



Source: CIA Factbook 2006



TWWD Ingersoll drilling rig

TWWD made a strategic choice to invest in a new, high-tech drilling rig for two main reasons:

- (a) lower operation and maintenance costs (compared to secondhand machines), especially in the Ethiopian context where skilled technicians are in short supply and spare parts are rarely available locally
- (b) the ability to drill very deep (up to 500 meter) and large diameter (up to 17 inch) boreholes, suitable for both urban water supply and large irrigation wells.

There is a higher demand in Ethiopia for big, deep boreholes because of the geological conditions. Rigs capable of drilling large diameter boreholes using a variety of technologies (mud/rotary/down-the-hole hammer) are increasingly valuable.

Etsegenet's large initial investment made a strong statement of his intent in the sector, and helped him to attract experienced drillers and managers to the company. TWWD has since used its new technology and capacity to drill 50 deep wells (average depth 162 meters) around Ethiopia.

This approach appears to have been successful. Only two years after start-up, they have bought a second new Ingersoll Rand drilling rig. The company now employs 21 personnel, including a management and support team in Addis Ababa, and 2 drilling teams in the field.

### Institutional environment

No private drilling companies existed in Ethiopia before 1991. Most drilling and water supply works were carried out by State Enterprises or international NGOs. However, economic reforms introduced in the early nineties opened the market, and there are now estimated to be 25-30 private drilling companies. This includes five Chinese and Indian firms.

The ongoing decentralization process devolves provision of water supply services to the district (Woreda) level. In practice, most districts lack the resources or capacity to deliver local services. Regional Water Bureaus (RWBs) and State Enterprises continue to dominate the drilling sector.

### External support

Ethiopia has some of the worst social indicators in the world, including very low access to water supply. In recent years, severe drought in many areas of the country has exacerbated the situation, further underlining the importance of effective and sustainable financing of water supply services. Recent estimates suggest that as many as 80,000 new boreholes will be needed to meet Ethiopia's MDG for water supply, requiring an investment totalling US\$1 billion over the next ten years.

## Who is Going to Drill the African Boreholes?

Despite recent growth, private drilling companies own just over 40 percent of approximately 150 drilling rigs. There is a large and active NGO sector in Ethiopia, and several NGOs operate their own drilling rigs. However, the majority of non-private rigs are owned by the six State Enterprises or are UNICEF rigs operated by the RWBs. Many of these drilling rigs are old and inefficient. Significantly increased financial commitments to the rural water supply sub-sector in Ethiopia have been promised by The World Bank, African Development Bank, European Union and others. These commitments should result in a doubling of annual sector finance (to more than US\$130 million), with much of the capital investment planned for groundwater development. This rapid expansion of service delivery should increase the demand for a modern and responsive drilling sector.

### Madagascar BushProof

BushProof is a relatively young enterprise, having been started in 2004 by Adriaan Mol and Eric Fewster (both European). Both of the founders have NGO backgrounds, having previously spent more than a decade working for international development and relief agencies such as Medair, World Vision, and Médecins Sans Frontières. However, after witnessing the failure of a number of NGO projects once the external funding was withdrawn, they reached the conclusion that a new and more sustainable approach was needed.

Adriaan and Eric founded BushProof as a social enterprise with a commitment to humanitarian goals, and want to see both financial and social returns on their efforts and investments. Their premise is that a locally based entrepreneurial organization, built around pro-poor technologies and approaches, is more likely to result in appropriate innovations and sustainable impacts than a non-profit organization reliant on external support.

BushProof is a private limited company registered in both Madagascar and the United Kingdom, whose main activities are:

- Low-cost drilling and well construction (using water jetting and manual drilling techniques)
- Manufacture of handpumps and point-of-use water treatment technologies
- Consultancies within the water and sanitation sector.

BushProof has both promoted and developed a number of innovative and cost-effective products that are well adapted to the Madagascan context. However, after the initial success of the Development Marketplace Award, BushProof is finding it hard to convince large clients to adopt its new and unfamiliar technologies.

#### Demand for drilling services

There is little private demand for well drilling in Madagascar. A relative abundance of untreated surface water, and a limited understanding of the links between contaminated water and



Source: CIA Factbook 2006

disease, provide few incentives to invest in private boreholes. Most borehole drilling contracts involve deep wells financed by the government, multi- and bi-lateral donors, or international NGOs. These contracts are generally won by the handful of private drilling companies, and the lone state enterprise, that own down-the-hole (DTH) hammer rigs capable of drilling to a depth of 200 metres. As BushProof specializes in shallow boreholes, most of its current clients are medium-sized NGOs attracted by its ability to construct

### Box 1: Innovation rewarded: World Bank Development Marketplace Award

In 2005, BushProof received a prestigious World Bank Development Marketplace Award of US\$150,000. The Development Marketplace (DM) is a global competition that rewards development innovations suitable for replication and scaling up. BushProof's winning proposal involved the use of a low-cost water-jetting technique to construct shallow boreholes equipped with Canzee handpumps, thus increasing access to safe drinking water in a rapid, cost-effective, and sustainable manner. The award financed a workshop to manufacture Canzee handpumps in Madagascar to reduce production costs and make the pumps readily available locally. It also enabled a study into the potential for well jetting on a national level, which found that well jetting is feasible in 20 percent of Madagascar's territory and approximately 2 million people could be served by this low-cost technology.

The Canzee handpump manufacturing facility was established in November 2005, and this workshop now enables BushProof to produce other appropriate technologies like treadle pumps and well screens. In January and February 2006, BushProof used the DM Award to construct 150 wells in a remote and cyclone-vulnerable area on Madagascar's east coast, working with a large local NGO to complete the community development work. Normally, hand dug wells constructed in this part of the country take up to 4 weeks per well to build. The 150 jetted boreholes were completed in just 3 weeks. Hand dug wells equipped with handpumps normally cost US\$1,500-2,000 in Madagascar. Suggestions from NGO competitors that the BushProof approach remains expensive are misplaced as the jetted boreholes and Canzee pumps constructed under this program proved to be 50 percent cheaper than conventional installations. An evaluation completed a few months after construction showed that only six wells had problems (broken pumps or low water quality), which is a failure rate well below previous jetting interventions. BushProof has re-jetted and repaired the problem wells as part of their guarantee, and has run refresher training courses to boost village maintenance capacity.

wells rapidly and cost-efficiently even in remote locations. However, demand for and interest in low-cost and manual drilling techniques is rising. Several NGOs and donors are now training and contracting other local enterprises to undertake appropriate drilling techniques such as rota-sludging.

The adoption and acceptance of BushProof's innovations in Madagascar are more likely since the June 2005 revision of the government standards for water supply. Following strong advocacy by Adriaan in sector discussions, the official 'manuel de procedures' (for the provision of low-cost, small diameter boreholes at depths of up to 20 meters) now includes jetting as an approved drilling technique. The Canzee pump is one of only five approved handpumps.

<sup>1</sup> The Canzee pump derives from a direct action handpump originally developed in New Zealand, and later improved and refined by Richard Cansdale of SWS Filtration (UK).

### Institutional environment

Since 2001, the government has worked hard to create an enabling business environment in Madagascar. BushProof was assisted by an official Business Support Center to obtain its company registration in only a few months, which would be a remarkable feat in many African countries.

Since the mid-1980s, NGOs have implemented most of the water supply projects in rural Madagascar. As a result, the division between NGOs and private enterprises is blurred, with many NGOs competing against local enterprises for work. Private firms working in NGO sectors are often at a distinct disadvantage. For instance, BushProof is legally obliged to charge 18 percent Value Added Tax (VAT) on its products, with an additional 20 percent import duty payable on any imported materials or equipment. NGOs have a competitive advantage as some of their overhead costs are often covered by funding from external donors. This means that cost items such as salaries and overheads do not need to be recovered in the quoted rates.

The Government of Madagascar is seeking to address this inequality by stopping NGOs from bidding on tenders for infrastructure construction, instead asking them to focus on social mandates. This may force local NGOs to restructure either as social enterprises like BushProof, or as specialists in people-centered activities such as social intermediation and hygiene promotion.

## Who is Going to Drill the African Boreholes?

### External support

Recent estimates suggest that reaching Madagascar's MDG targets for water and sanitation will require spending of US\$117 million per year over the next ten years. The current government budget is US\$32 million, but actual annual spending is only US\$20 million. Massive rises in output are required from the water sector if the 2015 MDG targets are to be met.

## Nigeria

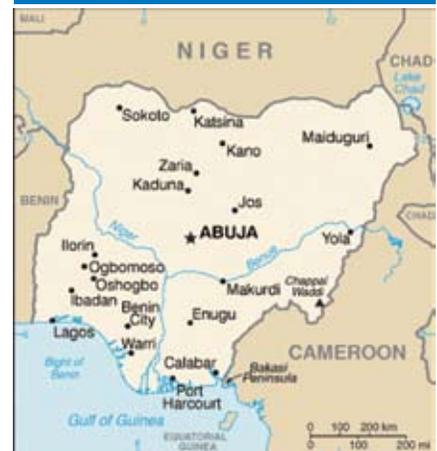
### Fatigen Drilling (Nig) Ltd.

Sunday Arafan, a Nigerian national, founded Fatigen Drilling (Nig) Ltd in

2001. Initially, Fatigen was reliant on hired drilling equipment but its well run operations and skilled drilling crews soon developed a solid reputation in Nigeria. In particular, Fatigen is one of the few private drilling companies that has a full-time hydrogeologist supervising each of its drilling crews. This led to Fatigen being selected as the most suitable local drilling firm in late 2004 when the UK Department for International Development (DFID) and WaterAid decided to loan a Dando Geotec rig to a private drilling company.

Under the terms of the loan agreement with DFID, Fatigen commits to use the rig to drill boreholes for vulnerable communities in Benue State as directed

### Map of Nigeria



Source: CIA Factbook 2006

by BERWASSA (Benue State Water Authority) and WaterAid. In return, Fatigen can use the rig for commercial work whenever it is not required for BERWASSA/WaterAid boreholes. Strict conditions were agreed to ensure that the drilling rig was well utilized and well maintained, including the provision of a US\$8,000 title deed deposit and regular payments into a maintenance fund. Fatigen is responsible for the operation and routine maintenance of the drilling rig, and has to pay fixed fees (US\$400 per BERWASSA/WaterAid borehole and US\$800 per commercial borehole) into a WaterAid administered special account whenever it drills a borehole using the loaned rig. The funds accumulating in this account are used for community development and water-user training relating to the borehole. This includes hygiene and sanitation promotion, and non-routine maintenance of the drilling rig.

In the 14 months since obtaining the DFID drilling rig, Fatigen has drilled 68 boreholes and deposited US\$33,000



Deep drilling in Nigeria

into the special account. Significantly, the regular work and income provided by this arrangement has allowed Sunday Arafan to invest in new equipment and expand his operations. Fatigen now employs 12 permanent personnel, operates 2 drilling rigs (including the DFID rig) and is in the process of purchasing a third rig.

### **Institutional environment**

Nigeria's federal structure makes enforcement of national policies and regulations difficult. Despite cost sharing formulae for rural water

supply that require investments from all tiers of government, coordination and cooperation between federal, state and local governments is weak. Consequently, badly planned and conflicting water supply programs have been implemented, leading to duplication, poor sustainability, and wasted investments.

### **External support**

Most of the large external support agencies (ESAs) are active in Nigeria. However, Nigeria gets the least donor assistance of any sub-Saharan country,

averaging only US\$2 per capita per year. A recent study by the African Development Bank estimates that donors will provide about US\$140 million in sector finance in the next ten years. Some US\$2 billion to US\$3 billion is needed to meet Nigeria's 2015 MDGs for water and sanitation.

In the past, several donors have attempted to strengthen local drilling capacity by donating drilling rigs to state governments or LGAs. Unfortunately, there appear to have been insufficient incentives for the public agencies to operate the rigs efficiently or maintain them properly. Most of these rigs rapidly fell into disrepair. This is why DFID decided to try an alternative approach and loan an imported rig to a private drilling company.

## **Sudan**

### **JB Drilling/MEDIC**

JB Drilling (Sudan) is by far the oldest and largest of the drilling enterprises examined. Tom Belknapp, an ex-UNICEF engineer from the USA, started the original company in 1981. In the following ten years, JB Drilling completed about 800 boreholes in Southern Sudan, mostly for large development and relief programmes. Today, JB Drilling (Sudan) employs 30 permanent staff and operates 8 drilling rigs (with another two being rebuilt). It owns 20 trucks and 8 support vehicles. Its long involvement in Sudan through the periods of civil war and insecurity required a good working relationship with the Sudan Peoples' Liberation Movement (SPLM) and it is now in the



Fatigen drilling in Nigeria

## Who is Going to Drill the African Boreholes?

Map of Sudan



Source: CIA Factbook 2006

process of re-registering with the new Government of South Sudan.

Twenty-five years after its inception, JB Drilling (Sudan) is now part of a portfolio of companies and NGOs managed by Tom Armstrong, including:

- Another private drilling firm, JB Drilling (Kenya)
- A Kenyan registered non-profit company, MEDIC Ltd (the executive arm of MEDIC, an international NGO registered in Paris).

This complicated arrangement of commercial and non-profit organizations has been specifically structured to react to the market and enable work to be completed as either a private sector or NGO partner depending on the requirements of the client and the job.

### Institutional environment

South Sudan recently emerged from nearly 30 years of civil war, but the peace and reconciliation process

remains fragile. The new Government of South Sudan is establishing itself but is not yet fully functioning, and lacks capacity and resources in many areas. Road infrastructure is poor with movement severely limited for 3-6 months during the rainy season. Until recently, the roads were littered with landmines, and security remains uncertain in several regions.

### External support

The signing of the January 2005 South Sudan peace agreement allowed humanitarian aid to reach a wider area, and has increased donors' willingness to contribute. Hundreds of thousands of previously displaced people and refugees have begun returning to their homes in Southern Sudan. Economic activity is increasing, but infrastructure battered by decades of war is inadequate for the influx, and most areas are struggling to absorb the rising population.

As part of a coordinated response with the Government of South Sudan, donors are supplying shelter, medical and nutritional assistance, sanitation, and safe water. UNICEF is funding drilling campaigns, both contracted out to private drillers and using UNICEF rigs.

In the long term, there is a huge market for drilling services. Tens of thousands of boreholes will be needed to serve the rising population of South Sudan. However, in-country drilling resources and capacity are limited.

About 400 boreholes were drilled in South Sudan during 2003-04, with

an average productivity of only 10-15 boreholes per rig per year. These low figures illustrate the challenges associated with drilling in remote areas with high mobilization and implementation costs, as well as severe time restrictions imposed by the impassable roads during the long rains.

Over the next two years, the Multi Donor Trust Fund (MDTF) forecasts spending of US\$76 million in the rural water sector, which is likely to raise the required annual production of boreholes in South Sudan to between 1,200 and 1,600.

### Key Constraints Identified

Five common constraints identified by all the drillers were:

- Lack of working capital
- Inadequate supply chains
- Stifling bureaucracy
- Corruption
- Resistance to private sector participation.

Another common problem is overinvestment in drilling capacity. The drillers tend to invest in over-capacity drilling rigs, and several of them retain more staff than they can use on a regular basis. High capacity rigs are expensive, but allow the drillers to bid on more jobs, and reduce the risk of having to call in a more powerful machine when difficult conditions are encountered. Similarly, a certain minimum staffing is required to undertake larger drilling projects, but much of this capacity then sits idle during periods of weak demand.

Also none of them have been able to produce professional promotional materials or invest in corporate marketing campaigns. This is a particular problem for BushProof as the technology is new and relatively unknown.

### Lack of working capital

A lack of investment and working capital was the most serious complaint. Drilling rigs, especially DTH hammer rigs, are extremely expensive to buy, and have significant operation and maintenance costs. In addition, drilling contracts are often based on payment for work completed so contractors require substantial cash reserves (or credit) to buy materials, mobilise equipment, operate rigs, and pay salaries.

These capital constraints make it difficult and expensive for private operators to enter the drilling market. Even those who have the money are often reluctant to invest in an industry that works in isolated rural areas where both risks and costs are high. The few willing to take the risk find it hard to obtain credit without putting up their houses as collateral. Drilling equipment often has to be imported, thus incurring additional import duties, bank charges, and delays.

### Inadequate supply chains

Inadequate local supplies of drilling equipment and parts present other challenges. In Ethiopia, strong state regulation requires the use of national carriers and official letters of credit for the import of all equipment, parts, and



Sudan road conditions

accessories. Letters of credit incur bank charges set at 3.5 percent of the 'cost and freight' value of the imported goods. Similar situations in many African countries mean drilling companies are often forced to employ considerable skills and ingenuity in keeping old rigs, compressors, and trucks functional.

This then requires well-trained and experienced personnel which are in short supply. Licensing and registration in Ethiopia is a drawn-out process for drilling contractors and technicians. This is exacerbated by there being just one formal training center in the country, which is open only to government employees. As a result, private drillers

such as TWWD are tempted to poach experienced government staff by offering salaries higher than those paid in the public sector.

Several of the drillers survive by using their foreign connections to bypass local supply chain restrictions. Sunday Arafan has excellent contacts in Great Britain, which enable Fatigen to have orders shipped to Nigeria for payment on delivery. This avoids the delays caused by slow local banking facilities and heavy bureaucracy. Better still, Tom Belknapp's father runs a long-established drilling company in the United States, which provides JB Drilling (Sudan) with exceptional contacts and

unusual access to bargains on the secondhand equipment market

### Stifling bureaucracy

Drillers tend to be practical, hands-on people and have even less patience with bureaucracy and administrative processes than most small businessmen. This is further complicated by most countries considering the water drilling industry both a high-value private enterprise and an important player in water resource development. The result is careful auditing and taxation, and strict licensing and regulation.

It remains challenging to do business in Madagascar, especially when international operations are required. Banking restrictions make it difficult to process international payments, causing delays of several weeks. Customs regulations are complex and importation of equipment can take more than six months.

In Ethiopia, rules and regulations remain designed around public sector operations. Truck-mounted drilling rigs need to be registered with the Road Transport Authority (RTA). The RTA charges 2 percent of the value of private vehicles as its standard registration fee. As a modern truck-mounted drilling rig can cost up to a million dollars, this charge is astronomical for a start-up or small sized company.

A significant amount of sector finance for water supply development in Africa is provided in the form of charitable donations, grants, or awards. For

### Box 2: Supply chain problems in Nigeria

Fatigen was using a down-the-hole (DTH) hammer rig at a borehole site near Oju but was not making any progress. When the drill pipes were removed and the brand new DTH drill bit was examined, the shank through which the air passes into the drill bit was found to be leaking.

Sunday Arafan had bought the 'new' drill bit from a dealer in Kano for US\$900. After examining the bit it was found to be reconditioned and spray-painted to look new. Fortunately, Sunday had a replacement bit which allowed drilling to continue. Without the replacement, the drill crew would have lost two days' work while waiting for the new part to arrive from Jos. In addition, it is unlikely that Sunday will be able to get any money refunded from the unscrupulous equipment dealer.

a limited company, this can create complications as the 'income' may be regarded as taxable. JB Drilling addresses this constraint through its partnership with MEDIC, using the blurring of distinctions between NGO and private drilling enterprises to its advantage.

### Corruption

Corruption presents substantial challenges to most businesses in Africa. In the drilling industry, corruption can take the form of collusion in procurement and contract awards, fraudulent transactions, and bribery. There is also construction fraud such as badly constructed boreholes protected by inadequate or non-existent inspections.

In Nigeria, as well as in other countries, the transparency of tender processes and drilling contract awards remain a serious problem. Local governments authorities (LGAs) hold competitive bidding processes, but genuine drilling companies rarely win these contracts. Drilling contracts often are awarded to local businessmen with good political

connections. They sub-contract the work to cheap drilling outfits that lack capacity, equipment, or experience. As a result, many of these boreholes are either badly constructed or incomplete. Breaches of contract are common.

This situation has helped Fatigen strategically to find a profitable market niche. Much of Fatigen's work is sub-contracted from 'contractors' who were awarded tenders but lack the appropriate equipment for the job. Also, Fatigen is regularly contracted to finish work that other less competent drillers have failed to complete. At this point, when the main contractor is under pressure to deliver in a short space of time, realistic prices can be negotiated and ensures a good return for Fatigen's work.

### Resistance to private sector participation

According to the drillers' accounts, resistance to private sector participation in water resource development takes two main forms. They are ideological resistance by NGOs and economic resistance by state drilling agencies.

### Box 3: Program Management Unit for Sudan drillers

One of the unique features of JB Drilling's operations is the Program Management Unit (PMU). Originally established by the NGO MEDIC to provide professional support to its water supply projects in South Sudan, the PMU now provides logistical and management support services to JB Drilling (Sudan), two other small private drilling companies and one local NGO.

The PMU is financially self-sufficient. Each of its member drilling agencies contributes 8 percent of borehole costs in return for the support services provided, and for access to any work that the PMU generates. The PMU uses its extensive contacts, good reputation and multi-agency capacity to acquire large packages of work, then encourages its members to compete for the individual contracts according to productivity, capability and availability. In 2006, the PMU is targeting completion of 300 boreholes in South Sudan, and it is also developing small water distribution schemes (SWDSs) in growing rural centers. Typically, these small schemes comprise a solar pumped borehole and water tower serving about twenty water points through a pipeline up to two kilometres in length. The PMU has found these schemes to be more cost-effective than the multiple boreholes previously used to serve a population of similar size and distribution.

In Madagascar, several NGOs often equate for-profit companies with exploitation. Although BushProof's approach for shallow water points costs up to 50 percent less than conventional installations, NGOs maintain BushProof is too expensive. In other instances, donors suggested they were unable to fund an organization that was not expressly non-profit or 'commercial'.

NGOs have an important role to play in providing low-cost development and relief services to poor and vulnerable communities, which is why they receive charitable donations and tax exemptions. Sustainable local capacity and services can only be achieved through local enterprises being encouraged and supported to acquire 'skills for trade'.

Despite ongoing sector reforms, decentralized implementation and private sector participation remain largely theoretical in many African countries. Government water authorities and drilling agencies are reluctant to relinquish control and implementation of lucrative infrastructure projects. For instance, Tana Water Well Drilling recently won a competitive tendering process in the Tigray region of Ethiopia. While they were waiting for the contract to be issued, the Regional Water Bureau informed them that the contract had already been awarded to the State Enterprise, despite its failure to participate in the tender process.

In the past, donors often provided drilling rigs to government agencies or NGOs, or even ran their own drilling rigs (such as UNICEF). While still new, the

donated rigs allowed these recipients to win commercial work more easily. This played a large role in restricting the ability of small private drillers to enter the sector. Most of the drilling rigs donated in this way quickly fell into disrepair, causing donors such as DFID to look at alternative approaches such as their current support to selected private drillers.

The drillers suggest that rigs donated to non-private agencies are unlikely to be successful because sustainable drilling operations require hard-earned experience and dedicated personnel, as well as incentives to work long hours in difficult conditions. It takes time to build up the required technical capacity, and needs a long-term, committed approach. This is often hard for government agencies or NGOs to provide as they have little control over their budgets or work programs. In the case of government, it is also very difficult to take measures (such as incentives or sanctions) that ensure high levels of staff performance.

## Business strategies

Each of the four drilling companies tackles the sector constraints with a different business strategy. Examples of how well conceived strategies can see real returns are given below. As the contexts are complicated, the typologies are deliberately over-simplistic.

### 1. The no-credit strategy

High interest rates on commercial loans make large credit-based investments

unfavourable. A no-credit strategy, using the proceeds from ongoing drilling operations to buy secondhand equipment and build up a drilling fleet is one way of building a successful business.

This approach involves substantial operation and maintenance costs. Older equipment needs more looking after, and requires considerable mechanical skills to keep everything running. Strategically this suits JB Drilling (Sudan) as it has built up strong technical capacity during 25 years of working in dangerous and inhospitable areas. It also has preferential access to good quality secondhand equipment through its American drilling connections and comprehensive knowledge of the international market.

## 2. The anything-but-government strategy

Often public sector drilling contracts have a lack of transparency in bidding processes and together with payment delays discourage the contractor from bidding for government work. This leads the contractor to focus on winning contracts from international NGOs and donors.

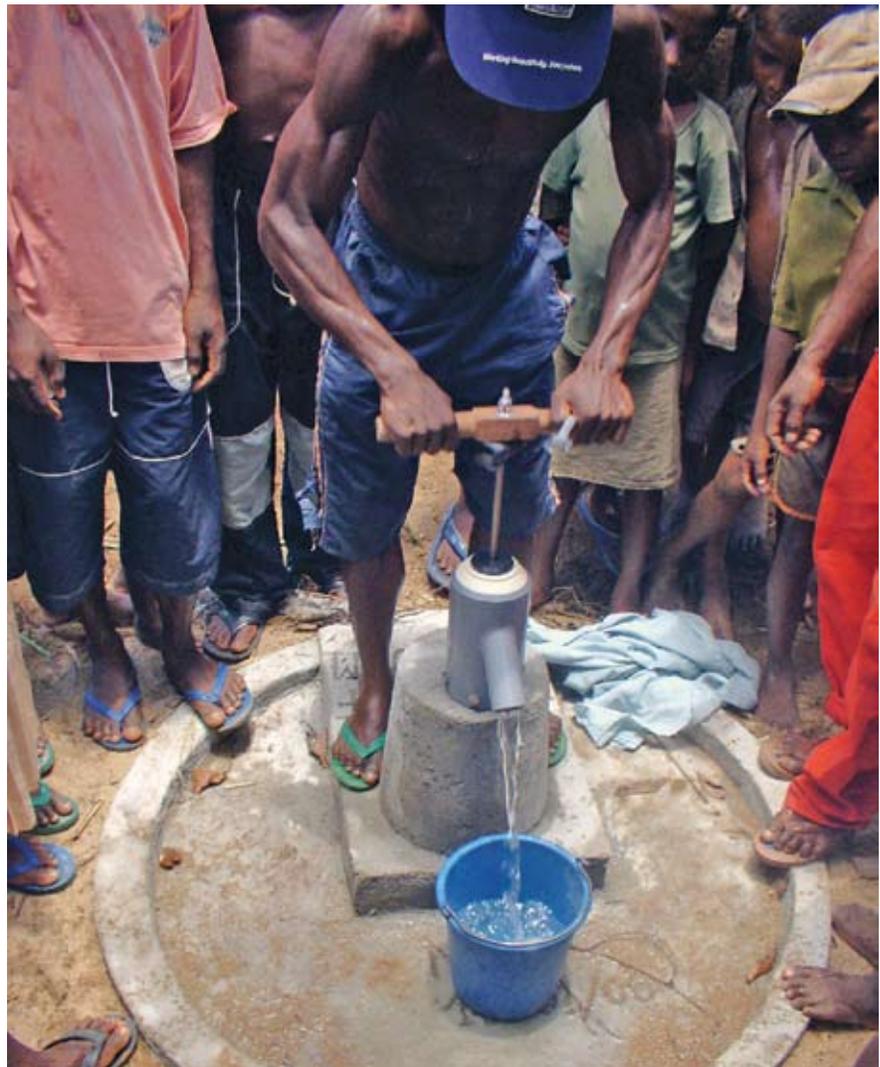
This approach relies on the contractor being known to donors and the level of competition. In the case of Fatigen Drilling (Nig) Ltd, prior work for NGOs like WaterAid ensured that it was in the right place when DFID decided to experiment by loaning its drilling rig to a private company. The management of the rig and the guaranteed stream of work enabled Fatigen to build up its business and further enhance its

reputation. As a result, Fatigen is now in demand by clients wanting a reliable and competent driller that finishes work within a fixed time and budget.

## 3. The high-risk high-investment start-up strategy

A minimum capacity and experience are needed before a private drilling

company can successfully compete for contracts. Start-up investments in old and unreliable equipment delay, or even prevent, the ability to win regular work. It is better to go for broke. Borrow as much as you can. Invest everything you have to buy high-quality modern equipment to give trouble-free (and relatively low-cost) operations for several years. This strategy will allow the



BushProof - Canzee Handpump

company to establish itself in the high end of the market.

To date, this high-risk strategy has worked well for Tana Water Well Drilling (TWWD) in Ethiopia. The ability to raise US\$400,000 for purchase of state-of-the-art equipment attracted well-respected management and technical personnel, and convinced clients that TWWD was a serious contender.

However, not many entrepreneurs have the resources, contacts, and confidence required to raise the high initial investment implicit in this strategy.

#### 4. The innovation strategy

Innovative, appropriate, and cost-effective products and approaches will result in positive and sustainable development impacts. This, in turn, will

convince governments, donors, and individuals to use and invest in these new technologies.

In Madagascar, BushProof's strategy is to try and market new and largely unfamiliar innovations in a sector that likes tried-and-tested solutions. BushProof is already winning recognition from major donors like the World Bank, but has not yet managed to convert its high profile into a reliable work stream. This will require more emphasis on promotion, marketing, and negotiation to convince mainstream clients that it represents a cost-effective and socially responsible alternative to traditional drilling or NGO approaches.

## Recommendations

### 1. Establish a combined management unit

The most useful model to emerge from the case studies is the Program Management Unit (PMU) operated by MEDIC in Sudan. For a small fee, this unit provides managerial and administrative capacity, and oversight to small drilling outfits. It also improves coordination and efficiency of implementation and lowers costs through central procurement. In addition it promotes and represents its member drilling companies in the marketplace. This helps drilling companies join forces to bid for large contracts and large packages of work.

Some form of central management unit would be helpful in almost every case. The problem is finding someone suitable to take on this role. MEDIC developed the PMU approach after years of



DTH hammer rig in Sudan

experience managing its projects in Sudan, and eventually realized that it could be opened up as a commercial service to like-minded drilling outfits. MEDIC was already well-known and well-respected in South Sudan and trusted to provide a useful and cost-effective service to local drillers. Any new unit would first have to establish its credentials before independent-minded private drillers would be willing to pay for its services.

## 2. Create aggregated drilling contracts

From the drillers' perspective, governments and donors should try to package boreholes into larger clusters of 10–50 wells so that contractors can work more efficiently and tender lower prices. In the context of the complexity of decentralized local governments trying to work together to package drilling contracts, governments and ESAs need to explore options for using larger planning units in drilling programmes. One possibility is the use of catchment-based water resource bodies, which may generate benefits from both hydrogeological similarities (across the catchment) as well as economies of scale.

## 3. Provide financial support to private drillers

Tom Armstrong (JB Drilling/MEDIC) suggests that loans to purchase equipment would be the most practical way in which donors could help under-capitalized local drillers. By linking the loans to borehole contracts, the drilling company could provide appropriate



discounts on each borehole. This would ensure that the loan is paid back by the end of the contract. Another option, if well implemented, is a rolling fund which could be used in this way to provide a sustainable solution to the credit problems identified by the drillers and so help to build the long-term capacity so urgently needed in the drilling sector.

## Conclusions

As in all small businesses, the introduction of measures to ease bureaucratic bottlenecks, improve access to cheap credit, and increase transparency in bidding processes would be hugely beneficial. Efforts need to be directed to help public, NGO, and private drilling organizations to understand each others' different problems and priorities, and to

encourage them to work together for the common good. In this sector, the benefits from these small changes are likely to result in more cost-effective and efficient drilling of boreholes across the continent. The result has to be a significant positive impact on wider processes of public health improvement and poverty alleviation.

It is hoped that this Field Note allows a new appreciation of the private driller's thinking and rationale, and that the reader will come to consider the driller as an ally and partner in achieving the MDGs in rural areas, rather than an exploitative adversary or a simple sector hireling. The themes and issues discussed need to be more fully understood and explored before a robust and reliable African drilling industry can be confidently relied on by African governments.

## References

Baumann, E (2006) *Case Studies of Operating conditions for Local Drilling Entrepreneurs in Rural Water Supply in Africa: Identifying Key Factors for Private Sector Success Rural Water Supply Network Cost-Effective Borehole Case Studies*, Final Draft, Processed.

Mol, A, Fewster, E and Osborn, K (2005) *Ultra-rapid Well Construction : Sustainability of a Semi-household Level, Post-emergency Intervention Loughborough*: 31st WEDC International Conference, Kampala, Uganda 2005.

Naugle, J and Mol, A (2006) *Drilling Entrepreneur Case Study – Madagascar: BushProof – Visionaries, Fools or Profiteers?* RWSN Cost-Effective Borehole Case Study, Processed.

UNICEF (2006) *UNICEF Southern Sudan: Quarterly Report January-March 2006* UNICEF website: <http://www.unicef.org>

WaterAid (2005) *Madagascar: National Water Sector Assessment* WaterAid website: <http://www.wateraid.org>

WaterAid (2006) *Nigeria: National Water Sector Assessment* WaterAid website: <http://www.wateraid.org>

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This field note is derived from fieldwork and case studies completed by the following associate authors: Erich Baumann, Etsegenet Berhe, Adriaan Mol, Sunday Arafan, Jeremy Armstrong and Jonathan Naugle.

The field note also owes much to the detailed and incisive comments made by the peer reviewers, and editing by Melanie Low.



The Water and Sanitation Program is an international partnership for improving water and sanitation sector policies, practices, and capacities to serve poor people



The Rural Water Supply Network RWSN is a global knowledge network for promoting sound practices in rural water supply.

## October 2006

### The Rural Water Supply Network

RWSN is a global knowledge network for promoting sound practices in rural water supply. RWSN grew out of the need to focus greater attention on rural water supply challenges and to encourage the exchange of experience and knowledge of what works between the many public, NGO and private agencies involved in rural water development.

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