



## WATER FOR LIFE – FOR CHITUNGULU

### Mthumbe School – Chitungulu, Luangwa Valley, Zambia

#### Sponsors – Schulprojekt Sambia

**The Challenge – to bring clean, safe water to the remote villages of Chitungulu in the Luangwa Valley in a way that enables them to avoid human/wildlife conflict and ensures that the communities benefit from and engage with wildlife conservation as well as improving health, school attendance, productivity, all round well-being and quality of life.**

Around 11,000 people live in the scattered villages of Chitungulu. The communities live largely at subsistence level depending on growing their own food, mainly maize and sorghum and there are limited opportunities for employment or enterprise.

Only a fraction has access to clean, safe water. Schulprojekt Sambia joined with Makolekole to help to tackle this problem by drilling a borehole at Mthumbe Primary School.



318 pupils at Mthumbe School study under the watchful eye of Headmaster Robert Nkhoma and his three staff. There are 176 girls and 142 boys at the school. On the face of it these figures sound like good news for girls' education but, as usual, the statistics don't tell the whole story. Most of the girls are in Grades 1 – 4. After Grade 4 girls tend to drop out and grades 5 – 7 are majority boys. This is due to the usual cultural reasons of a simple lack of confidence in and of girls, early marriage and motherhood and a general preference to choose to educate boys in the absence of funds to educate both genders.

It is a Government Primary School built in 1967 but as so many of these very remote schools – pitifully under-resourced and seemingly forgotten.

#### **Mthumbe Neighbourhood**

Mthumbe School is flanked by several small settlements all of whom have been struggling with water since the school well dried up some years ago.

The only option is to collect water from this extremely deep hand-dug well which collapses each year in the rains and has to be re-dug annually. There isn't much water down there and the water is full of insects and dirt. Bees are attracted so water collectors are often stung.



**Water collection at Mthumbe Village – this was the water supply for 318 pupils, 4 teachers and their families and approximately 15 other local households.**



**Pupils have to bring their own water to school. There are no school lunches because of lack of water. They have 'long drop' latrines and a small tank provided by USAID funded ' Splash' from which to draw hand-washing water**



**Pupil volunteers bringing stones for the building of the cement surround and runoff**

## **Makolekole at work.**

### **Rotary Mud drilling method.**

In the Luangwa Valley, conventional big rigs which use air compression and are really designed to drill in rock usually fail to drill successful boreholes. They drill a hole and the spoil is blasted out with air. This works in a solid substrate but in our alluvial valley where the substrates are all sand, clay, mud, gravel and unconsolidated sedimentary layers, it is not suitable and very often fails.

Instead of drilling downwards, the air compressors blast a cavity underground which inevitably collapses. So - what often happens is that they drill to a reasonable depth of 30 to 40 metres but before they can get the casing in, the borehole walls collapse meaning they can only case to 10 or 12 metres. They will claim that they drilled to the required depth, and technically - they have, but closer inspection reveals that the hole has collapsed and is shallow.

In rocky conditions this collapsing does not happen and the rock would form a natural casing but with unconsolidated substrates, the air compressed method of drilling is unsuitable.

Once the hole is drilled, the big rig teams would then case to the depth that the borehole has collapsed - usually about 12 metres or so, then quickly add the surround, soakaway and pump. In their report they might say that they drilled to 30 metres which may well be true technically - but the key is to look at the number, quality and depth of casings that go down the hole and the number of pipes on the India Mark II hand-pump that go in.



Water at 12 metres is more likely to incorporate the water table level. It is more likely to be contaminated by environmental factors such as nearby pit latrines and run off from fields - possibly with cotton pesticides and likely to run dry in the dry season.

Our Little Beaver Lone Star LS200+ rig from Texas works differently. It is a rotary mud drill which uses water as the medium to remove the spoils instead of blasting spoil out with compressed air. The technology is new for Zambia and is ideal for the Valley - however, our rig cannot drill through rock so we are restricted to drilling in the Valley floor. Not only is the method suited to the Valley substrates but the rig is light and easy to manoeuvre. We can access remote parts of the valley that the big rigs could never reach.

As the drill bit drills in to the ground, the spoil is washed out of the hole with water. We achieve this by circulating water through the drill pipes and out in to sumps that we dig in to the ground at the drill site making a closed water circulation. The walls of the hole are kept in place with a special inert polymer called DD2000 which prevents them from collapsing during the drilling process.



Once the hole is drilled - to at least 35 - 50 metres, we put the high quality PVC casing down. Once in place, we put in a gravel pack around the casing and a sanitary seal to prevent any surface or water table accessing the borehole. The polymer is washed out using chlorine which breaks down the temporary seal thereby allowing aquifer water to flow in to the casing pipes. We perform a pump and yield test in order to calculate the capacity of the borehole, then lastly the concrete surround, run-off, garden pond and pump is installed.

We are accessing water at a depth of at least 24 metres plus. It is at this level and below that the plentiful aquifers of clean fresh, safe water 'flow'. There are two types of casing - solid and slotted. We put the slotted casing low down in the borehole which allows the fresh water to seep in through the gravel pack layer and fill the borehole casing. Casings at the top of the borehole are solid and there is a sanitary seal inserted above the aquifer level so no water from higher up can access the borehole.

This means that contamination from above ground cannot enter so it is not necessary to test water after the rains because, unless the top of the borehole has somehow been breached, surface water cannot enter. However - there is no harm in testing from time to time and in giving the whole system a flush through with chlorine. This is meant to be undertaken by the local authority under the WASH programme (Water and Sanitary Health). The borehole committee will liaise with the council on this to ensure their borehole is included in the local authority stock.

The drilling process usually takes 5 days or so and the construction of the surround, run off and 'pond' about 2 – 3 days.



**Happy customers**

**A productive vegetable garden in Chitungulu**

Not only are the dangers of water borne diseases now things of the past, but now the women and children have more time for education, sports, farming and other pastimes. The communities in which we install our boreholes create productive vegetable gardens which produce more than enough for their own needs and dramatically improve nutrition. The excess is sold locally providing a useful cash income and adding to food security.

The Head Teacher at Mthumbe School plans to turn the school cotton field over to chilli pepper production and join the growing band of Conservation South Luangwa chilli producers – a much more profitable and environmentally friendly crop – thanks to the new school borehole.

**Each borehole means that a community of at least 200 men, women and children, instead of travelling miles to dangerous rivers or scooping dirty water from shallow wells, can access to clean, safe water - for life.**

***UNICEF millennium development goal.***

***' In order for children and families to benefit from clean water and sanitation, water points and sanitation facilities must be accessible. Distance is critical because the shorter the distance to clean water, the more consistently it will be utilised. Furthermore, as fetching water is a task most commonly assigned to girls and women, shortening the distance between households and water supply is essential to reduce the time girls spend in fetching water, which in turn will provide them with more time***

**“One of the most important aspects of wildlife conservation is to get the co-operation of the local community. It has been shown that this is not possible unless they can receive material benefit from their wildlife.”**

**Norman Carr 1958 Luangwa Valley.**



**Headmaster Nkhoma standing with his new borehole and hand-pump. He will head up the borehole committee who will be responsible for the care, security and maintenance of the borehole.**

**(The surrounds and run-off will be installed next week – and we will send pics next season when Chitungulu is once again accessible – the Head would love you to visit!)**

# **THANK YOU!**