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WATER AND SANITATION FOR ALL: PARTNERSHIPS AND INNOVATIONS

Spring protection in Southern KwaZulu Natal

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SOUTHERN KWAZULU NATAL (SKZN) is a region on the south-east coast of South Africa. It is an rugged area of approximately 5500km^2 dominated by valleys and gorges of several major rivers. The region has a high concentration of natural springs which have been traditionally used for water supply.

The demography of the region is complex. While formal settlements are concentrated along the coastal strip, the hinterland is settled by underdeveloped rural communities in the former KwaZulu 'homeland'. These communities consist of family household units or 'imizi' scattered along ridge lines. Infrastructure is limited and the economy is based on subsistence agriculture.

In November 1994 a Crisis Intervention Programme (CIP) was initiated by the Department of Water Affairs and Forestry (DWAF) after a prolonged drought. It was estimated that at that time, 95 per cent of the approximately 510 000 people in the rural communities of SKZN had less than 5 litres/person/day of water available to them. More than 300 requests were received for assistance which were assessed in the field and followed by technical recommendations.

The technologies utilised in the CIP were conventional machine drilled boreholes installed with handpumps, maintenance of existing handpumps and spring protection construction. A total of 147 boreholes were drilled with only 63 having yield sufficient for a handpump. This was due to complex geology with minimal hydrogeological mapping and rugged terrain with few roads limiting access to the drill rigs.

Maintenance was undertaken on more than 300 handpumps. None were designed for VLOM (village level operation and maintenance), so all work had to be undertaken by a private contractor. Only 10 handpumps installed during the CIP needed maintenance during the programme. However, experience showed that each handpump required some attention once or twice a year.

Spring protection

This technology involves the construction of a concrete box around a spring outlet to collect the water flowing out of the spring and piping this water to a storage tank. Water can then be collected from a tap connected by pipe to the tank. The basics of a spring protection construction are shown in Figure 1.

There are three fundamental objectives for protecting springs:

- to prevent pollution of the spring water by humans, animals, insects and surface water runoff.
- to increase the infiltration rate at the spring outlet.
- to store overnight flow from the spring for utilisation during the day.

A total of 176 spring protections were undertaken by seven contractors in the CIP. Although construction methodology differed slightly with each contractor, common standards for all contractors were ensured by DWAF management.

Spring protection was found to be significantly cheaper than handpump installations on boreholes in this project.

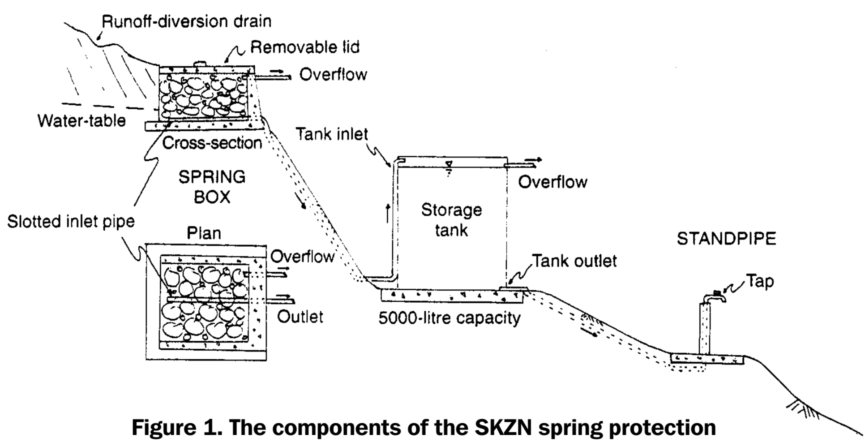

Figure 1. The components of the SKZN spring protection

The average initial total cost of a spring protection was R8000 (œ1200), compared with R34000 (œ5230) cost for a handpump on a borehole (including drilling of dry holes). Assuming a supply of 10 litres/person/day, spring protection had an average unit cost of R20/person compared to R110/person for handpumps on boreholes.

Construction of spring protections was labour intensive employing people from the beneficiary communities. Contractors were responsible for the supply of materials, supervision of construction and on site training of community employees. Not only did this instil within the community a sense of ownership of the final installation, but it also ensured that future maintenance could be undertaken on the community level.

Although maintenance required for spring protections is low, good management ensures its sustainability as a water source. Latrines, cattle kraals and other contamination sources must be excluded from the vicinity of the spring source. Grazing cattle and washing clothes in the immediate vicinity must be discouraged. Native vegetation around the spring source must be maintained but exotics such as Eucalypts must be removed to ensure the spring source does not dry up. The contractors informed the communities of these practices and some have now built fences around the spring source and appointed a caretaker.

Construction case study

Lima Rural Development Foundation constructed a total of 35 springs, servicing a total of approximately 7000 people in the Kwahlongwa and Qwabe Tribal Districts, 20 km inland from Hibberdene on the lower South Coast of KwaZulu Natal.

Recognising the existing social structures, Lima made contact with the Chief or 'nKosi' of the area who is responsible for all levels of community interaction and development. The nKosi facilitated Lima on many levels of project management, including community employment, liaison and the verification of spring sites. Five community members were identified by the nKosi to be employed by Lima as foremen. Before commencement they undertook a week's training in spring development and construction. The first four springs were constructed by this team of foremen to ensure they were familiar with all aspects of construction. Subsequent springs were constructed by five teams each with a foreman and five local community members. At the more remote sites, people from the target community were employed on a daily basis to transport materials.

Lima were responsible for project management. This involved project co-ordination, construction supervision and transportation of materials and labour. Two Lima staff members with vehicles were committed full time to the project over a period of three months. Each construction team worked on a contractual basis for Lima and were paid on a task basis for each spring completed.

Spring protection construction began with excavating around the spring source. A concrete box was formed and cast depending on the nature of the spring source. Trenches for the pipes were then dug and the slab cast on site for the base of the ferro-cement tank. The pipes were then laid and the tank constructed once the slab had dried. Standpipes were erected with two taps and encased in a PVC pipe filled with concrete for durability. Each team undertook the construction of a number of springs simultaneously to reduce standing time. Each spring took approximately one week to construct.

Due to the crisis relief nature of the CIP, there was a limited time frame for construction of the 35 springs. This led to problems such as errors in the identification of sustainable springs for protection. This was exasperated by factors such as:

- social pressure on the nKosi to choose springs closest to the communities for protection.
- recent rains which gave the communities false confidence in some springs.

Responsibility for the correct identification of springs to protect was never clarified between the client and contractor. Construction experience during the project highlighted areas which require emphasis to ensure spring protections are constructed well. These include:

- excavation of the spring source and construction of the concrete box require special attention to ensure that the flow from the spring source is not affected.
- water must continuously flow in the pipes to avoid blockages. This can be attained by maintaining pressure head throughout the system, ensuring that inlets and outlets are levelled correctly and providing overflows at the concrete spring box and storage tank.
- the standpipe must be of highly durable construction as this is the component of the system which is used the most.

The primary benefit of the project was the supply of potable water. However, a total of 40 jobs were created within the community during the project, including drivers assistants and night watchmen. Skills were developed within the community and some people have since found further employment. A positive communal spirit evolved which re-enforced existing social structures. At the end of the project, the nKosi held a celebratory 'msindo' for all those involved in the project.

Conclusion

The protection of springs during the CIP was found to be a beneficial technology for primary water supply in Southern KwaZulu Natal. This was due to low cost (less than a quarter of a handpump on a borehole), low maintenance and high community involvement in construction, operation and maintenance.

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