NGOGOLO SUGAR COOPERATIVE

Assessment of Irrigation Scheme and Farm Economy

December 2008

PUM *Netherlands senior experts*
P.O. Box 93078, 2509 AB The Hague
The Netherlands
Tel. +31 70 3490555
www.pum.nl

Date:	December 2008
Name expert:	Eelke Boonstra Project No. 47778-sj
	Casper Veeningen Project No. 47779-sj
Name applicant:	Inkomati Catchment Management Agency
Address applicant:	32 Bellstreet, 1200 Nelspruit, South Africa
Postal address:	Private bag X11214, Nelspruit, 1200, South Africa
Contact person:	Joseph H. Mabunda
Project dates:	09-11-2008 to 24-11-2008 (47778-sj)
	08-11-2008 to 28-11-2008 (47779-sj)
Status of the report:	Final

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Summary

The farmers of the Ngogolo Sugar Cooperative, all growing sugarcane, are concerned about their irrigation infrastructure which is over 40 years old. They are above all concerned about the high and ever rising electricity costs for operating the pumps and about the maintenance costs and consider this the main cause of the low profitability of their farms. The members of the cooperative want to adapt and modernize their irrigation system. They have asked to formulate recommendations for repair and overhaul, if not a complete renewal of the system. Furthermore, an assessment is made of the profitability at farm level and the fees to be paid to maintain the infrastructure, in the present situation and with possible changes in the future. The economic consequences for the profitability of the farms of the different options to improve the irrigation system have been calculated. Discussion points were formulated to facilitate the decision making.

1 Introduction

In November 2008 PUM Netherlands Senior Experts, at the request of the Inkomati Catchment Management Agency (Inkomati CMA), sent two experts for short missions to South Africa to advise on the Ngogolo Sugar Cooperative project in the northeastern province Mpumalanga. The missions were effected by Mr. Eelke Boonstra, farm economist (9 – 24 November 2008) and Mr. Casper Veeningen, hydraulic engineer/water management specialist (8 – 28 November 2008).

The objective of the assistance was (1) to make an assessment of the existing irrigation infrastructure and to formulate recommendations for repair and overhaul, if not renewal of the whole system, and (2) to assess the present farm economy of the cooperative and to make a business plan for a sustainable future. Because the two objectives are strongly interrelated, the present document has been prepared as one report including the findings of both experts.

The assessment and recommendations are based on information obtained from various sources, in particular from the Ngogolo Sugar Cooperative, Inkomati CMA, TSB sugar mill, Akwandze Agricultural Finance, Mpumalanga Cane Growers Association, Mpumalanga Agricultural Development Corporation and various other farmers associations in the Malelane area. Their helpful assistance is gratefully acknowledged.

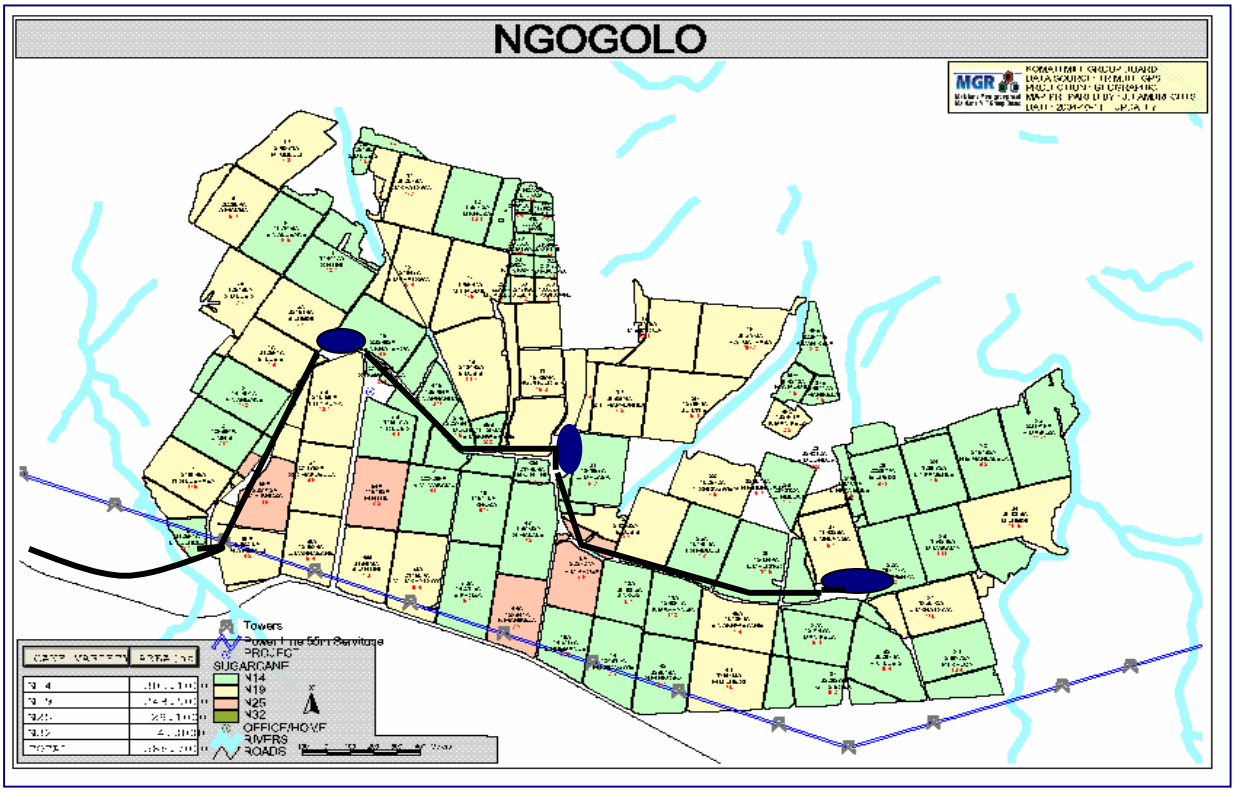

Figure 1 Ngogolo Sugar Cooperative - schematic layout of irrigation canal and dams

2 Present situation of the Ngogolo project

Ngogolo Farmers Association
The Ngogolo Farmers Association (also called Ngogolo Cooperative Society or Ngogolo Sugar Cooperative) is situated in the province of Mpumalanga, between the provincial capital Nelspruit and the Mozambique border, just downstream of the Driekoppies Dam. The cooperative consists of 64 farmers who grow sugarcane at farms with an average size of 8.75 ha. The total area covers 586 ha.

The main aim of the cooperative is to organise the water supply to the individual farms. The cooperative is responsible for the infrastructure of the irrigation system. For operation and maintenance of this system a fee is charged to the farmers. The cooperative closely cooperates with TSB (*Transvaalse Suikerkorporasie Beperk*), the sugar mill that processes the sugarcane produced, and with Inkomati Catchment Management Agency (Inkomati CMA).

The overall problem is the low profitability of the farms. The farm profit is strongly related to the efficiency of the irrigation system and its costs. The Executive Committee of the Cooperative has asked to look into the possibility of a cheaper and more efficient irrigation system and the way this would affect the profitability.

The irrigation scheme
The Ngogolo area is irrigated directly from the Lomati River. For the intake of river water a pumphouse with two pumps has been constructed on the river bank, capacity 1,750 m^3/hr. The water is lifted from the river and discharged through pipes of almost 300m length into an open canal, of which the water level is some 20 - 22m above the river surface. The canal (width about 3m, depth 1.5m) has a length of about 7 km and is crossing the Cooperative's area from west to east, following the height contours from approximately +307m at the head of the canal to +305m at the tail end. The first two kilometres of the canal are situated outside the Ngogolo project area.

The irrigation system was built in 1964, designed for furrow irrigation. It has been converted into a sprinkler irrigation system. Three dams with storage basins have been built alongside the canal at distances of 3.5km, 5km and 7km from the head of the canal. Each basin is related to a specific area so that the total project area is divided into 3 separate sub-areas. Booster pumps have been installed to supply water to the sprinklers in the fields in each of the 3 sub-areas, through sub-surface pipes. The diameters of these pipes are 250mm near the pumps, gradually decreasing to 90 mm at the tail ends of the system. The field levels of the farms are increasing in the southern direction up to a level of +320m or about 14m above the water level in the storage basins.

Figure 2 The first storage basin (A)

The basins are 3m deep and have the following horizontal dimensions and pump capacities:

Basin A: 30 x 15 = 450m^2, pump capacity 720 m^3/hr at 50m pressure
Basin B: 40 x 20 = 800m^2, pump capacity 840 m^3/hr at 80m pressure
Basin C: 50 x 30 = 1,500m^2, pump capacity 760 m^3/hr at 77m pressure

This means that the total booster supply potential is 2,320 m^3/hr. The system has been designed for 18 sprinklers per 7 ha (= 2.57 spr/ha x 1.39 m^3/hr = 3.6 m^3/hr/ha = 1.0 l/s/ha).
At this water demand of 1.0 l/s/ha, or 3.6 m^3/hr/ha, this potential is sufficient for 644 ha, which is more than the total area to be irrigated. The water allocation is the limiting factor. The storage in the basins is sufficient for 2 days irrigation without replenishment by the intake pumps at the river bank.

During the last three years 5 farmers have converted their irrigation method from overhead sprinklers to a drip irrigation system and a 6th farmer is in the process of installing such a system.

Water allocation and water use

In view of the total water demand from all water users abstracting from the Lomati River, the water allocation is subject to restrictions. For the Ngogolo project the water allocation is based on the water demand for a sugar cane area of 420 ha, whereas the actual project area is 586 ha. Every year a certain amount of water per hectare is allocated, distributed during the year on a weekly basis. If at any time the weekly allocation is not used, the balance will theoretically remain available for use during a limited period of time. In practice, this facility is not used.
Presently, the maximum allocation is 8,500 m^3/ha/year. During the last two years 25% reduction had to be applied. With the Driekoppies Dam in the Lomati River and the Maguga Dam in the Komati River in operation the water security is much improved and in principle the amount of 8,500 m^3/ha is considered to be available. The peak water demands are favourably affected due to the fact that the sugar mill (TSB) requires a spread of the harvesting during the year.

The pumps of the river water intake are operated in line with the weekly water allocation, e.g. 7 days during 8 hours each day if the water allocation would be 56 hours. Operating time of

all pumps is concentrated between 10.00 am and 18.00 pm, thus avoiding the peak electricity rates. During the operating hours the farmers are free to take water according to their needs. There are no preset schedules. If the pump operator is timely informed by those farmers who do not need water on a specific day or during part of that day, the operating pressures of the relevant pumps are reduced.

3 Problem assessment irrigation scheme

The farmers of the Ngogolo project are facing various types of constraints that have a negative impact on the profitability of their farming activities. This chapter is limited to discussing constraints that are related to the water supply by irrigation. The general complaint is that the irrigation scheme is old, so that it needs at least rehabilitation, if not complete restructuring. The system is suffering from unnecessary water losses and the cooperative is faced with high costs of operation and maintenance, in particular with respect to maintenance of pumps and the ever increasing costs of electricity for the operation of the pumps.

The following specific issues are reported by the Executive Committee of the Cooperative:

- Use of canal water by others
- Water losses by leakage and evaporation
- Cost of operation and maintenance of the pumps
- Restrictions in water availability

Use of canal water by others
The irrigation canal starts near the main road where it is easily accessible and the first two kilometres of the canal are outside the area of the Ngogolo Sugar Cooperative. It partly runs along fields of the neighbouring Nhlangu West project. It appears that the local community is using water from the canal for various purposes, some of which also cause pollution in the canal. The amounts of water involved are limited, however. Better fencing will reduce this problem. An alternative is to use a pipe over the first kilometre of the canal.

Two other groups of users are taking their water from the Ngogolo irrigation scheme:
- a group of 10 farmers with about 1 ha each
- the Ngogolo Leather Fern project (decorative plants)

They respectively pay amounts of R 1,300 and R 2,000 per month to the Ngogolo Cooperative, and bear the costs of pumping the water from one of the storage basins to their farms. These users are not included in the official assessment of the water allocation for Ngogolo.

Water losses by leakage and evaporation
The canal has a concrete lining over the whole cross-section and length. Over the years the concrete lining started leaking. It is difficult to make an estimate of the amounts of water involved. Based on very rough information about the rate of decrease of the canal water level during longer periods in which the river intake is not in operation, the water loss by leakage is estimated to be in the order of 760 m^3 per day or some 280,000 m^3 per year. This is about 5.5% of the maximum water allocation.

For the evaporation rate from open water no reliable figures for the local climate conditions could be obtained during this short mission. For an estimated average evaporation of 7 mm per day, the water loss by direct evaporation from the canal and the storage basins will be about 117 m^3 per day or almost 43,000 m^3 per year, which is 0.8% of the maximum water allocation.

Operation and maintenance of the pumps

The design of the irrigation scheme with an intake from the river and three storage basins is such that a large number of pumps have to be operated and maintained:
Pumphouse at intake: 2 pumps + 2 older pumps in a separate pumphouse, used as spares.
Basin A: 3 booster pumps
Basin B: 2 booster pumps
Basin C: 2 booster pumps
In addition 4 transformers have to be maintained.

Most of the pumps are old and the maintenance is said to be costly. Moreover, electricity costs are high and a yearly increase of more than 20% has to be faced. For the Ngogolo Cooperative the large number of pumps and transformers and the associated costs are a major concern.

Of course, it is important to explore possibilities of reducing the costs of pumping. Nevertheless, the following should be kept in mind:
- In comparison with other sugar cane projects in the area, which are generally much smaller, the number of pumps per hectare is not excessive. The adjacent Nhlangu West project, for example, is using 2 pumps for the intake of river water, serving an area of 104 ha only. For Ngogolo this figure amounts to slightly more than 1.5 pump per 100 ha.
- As shown in Table 1 the electricity costs per hectare for Ngogolo are in the higher category but not significantly larger than the figures for some of the other farmers associations.
- The electricity costs are in the order of 11-12% of the total operational costs incurred by the farmers.

Figure 3 Nhlangu West pumphouse (left) and Ngogolo pumphouse

Name of Farmers Association	Costs of electricity per hectare per year
Langloop 1	R 858
Mbongozi	R 930
Nhlangu East	R 1,358
Buffelspruit	R 1,368
Ngogolo	R 1,390
Nhlangu West	R 1,561

Table 1 Costs of electricity (April 07 – March 08) **Source: Eskom**

Restrictions in water availability

The water allocation for the Cooperative as a whole is determined by the Lower Komati Irrigation Board on a weekly basis. Apart from possible restrictions for the whole Lower Komati catchment due to the necessity of reduced release from one or both reservoirs, the Ngogolo Cooperative still faces the problem that the allocation is based on an irrigated area of 420 ha. The actual area is 586 ha (or even more if the additional users are included) so the shortage equals at least the water demand for 166 ha. According to information from TSB the number of sprinklers used per hectare is above the design condition of 18 sprinklers per 7 ha. This may be another reason that farmers feel constraints in water availability. On the other hand, the water demand is slightly reduced because several farmers now use the water-saving drip irrigation method. Moreover, it appeared that some 8 farms (about 70 ha) are left idle at present.

During the discussions with representatives from the Cooperative, water shortage was not mentioned as a major constraint, although the situation is clearly not the optimum one to fulfil the water demand of sugar cane in the Ngogolo area throughout the year. Possible shortages depend on the amount of rainfall which has to supplement the maximum water allocation of 8500 m^3/ha/year (= 850 mm per year). In any case, the fact that the area to be irrigated considerably exceeds the area on which the water allocation is based, is a matter of continuous concern. Efforts have been made to change this situation, unfortunately without the desired result.

Figure 4 Sugar cane field after harvesting

4 Discussion of alternative solutions

4.1 Selection of alternatives

In order to improve the farming conditions a number of mitigating measures can be considered with the objective to either increase the production per hectare or to reduce the costs incurred by the farmers. In the perception of the farmers the measures should focus in particular on improvement of the irrigation system. Based on the assessment of the farm economy other categories of measures will be considered as well.

With respect to the irrigation scheme the measures to be considered can range from a rehabilitation of the existing scheme to more drastic solutions where a partial or complete redesign is involved.

Basic alternatives

Option 1: Upgrade of the existing irrigation scheme
Option 2: Redesign of the irrigation scheme

For each option there is the choice to continue using overhead sprinklers for the water distribution in the fields, or alternatively to convert to a drip irrigation system. Therefore the following options will be considered:

1. Upgrade of the existing irrigation system - with sprinklers
1A. As option 1, with drip irrigation system
2. Redesign of the irrigation system - with sprinklers
2A. As option 2, with drip irrigation system

Although the Ngogolo irrigation infrastructure has not yet been adapted to drip irrigation, several farmers already successfully apply this method.

Advantages of drip irrigation:

- Increase of production per hectare due to a more uniform water distribution. Estimates of yield increase are up to 20%.
- About 30% less water demand due to decrease of evaporation losses and a more effective water supply directly where it is needed.
- 20 m reduction in pump pressure.
- The lower water demand and lower pump pressure also significantly reduce the costs of electricity for operation of the pumps.

Disadvantages

- High investment costs
- More maintenance required, including regular flushing of the dripper hoses to avoid blockage by silt.
- In general more vulnerable than a sprinkler system. Sometimes a sub-surface system is chosen. Then problems may occur because the heavy trucks entering the fields after harvesting will cause a compaction of the toplayers of the soil, thus hampering a proper functioning of the drip system afterwards.

Figure 5 Drip irrigation as applied in Ngogolo

4.2 Option 1: Upgrade of the existing irrigation system - with sprinklers

This first option aims to mitigate some of the problems incurred by the cooperative without the need of major investments. The irrigation infrastructure with canal, storage basins (dams) and boosters, as well as the in-field irrigation design, has been properly designed. In principle it is a good system with the advantage that the dams and boosters provide flexibility in the operation of the system.

In order to achieve a reduction of the problems mentioned in Chapter 3, and an improvement of the operation of the irrigation scheme including some cost savings, the following measures are suggested.

- Repair of the canal lining. The canal lining consists of concrete sections of about 3 m length. The creaks at the junctions between the sections should be filled.
- Place fences along the canal section outside the Ngogolo area, where the gravel road is running alongside the canal, and improve the existing fence at the beginning of the canal. The total length involved is about 500 metres. Alternatively, the pipe conveying the water from the pumphouse to the canal could be extended over the first kilometre of the canal. For further prevention of unauthorized use of canal water it is recommended to take the necessary actions to have the access to the river water at the opposite river bank improved (owner?).
- Improve the efficiency of farming operations with the objective to optimize the yield per unit of water. This may include a large range of managerial measures such as improvement of irrigation scheduling, optimum timing of weed control, optimum amount of fertilizer and timing of the supply, etcetera.
- Charge the actual costs per hectare to other users, or try to terminate the agreements for delivery of water (assuming that they have the alternative of pumping directly from the river, situated at short distance).

Figure 6 Head of irrigation canal

Investments required

The costs of this minimum option is estimated to be less than R 100,000 for canal maintenance and fencing.

Implementation of the pipe option to replace the first kilometre of open canal will approximately cost an additional R 200,000.

No provision for replacement of pumps has been made in this cost estimate. It has been assumed that there is no immediate need for replacement and that it will only be done for individual pumps when a major breakdown occurs.

4.3 Option 1A: Upgrade of the existing irrigation system – with drip irrigation

Considerable advantages will be obtained from the point of view of cane production and savings of water (and electricity) if the cooperative would completely convert to drip irrigation instead of using overhead sprinklers. The positive and negative aspects have been described in Section 4.1.

The existing infrastructure can be used. The implementation of a drip irrigation system, however, is relatively costly. It requires extra pipes in the fields (sub-mains) with clusters and valves from where the dripper lines are laid out in the fields. The maximum length of the dripper lines is 100 metres. The silt concentration in the water may be the cause of blockage inside the tubes. Therefore a filter system should be installed in the pipes at the main river water intake. Additional filters are necessary at the heads of the sub-mains.

Due to the relationship between pump pressure and pump flow, modifications to the pumps are required to enable sufficient flow at the lower pressure that can be applied for drip irrigation. Although this is not the optimum situation it is technically possible and the costs are included in the estimates below. As soon as replacement of one or more of the old pumps is required, another type of pump with optimum characteristics for these conditions can be installed. All measures mentioned in Section 4.2 also apply in this alternative, so that summarizing Option 1A includes the following measures:

- Repair of canal lining
- Fences at places outside the Ngogolo area where the gravel road is running alongside the canal.
- Improve the efficiency of the farming operations.
- Implementation of a drip irrigation system

Figure 7 Primary filters for drip irrigation (Zelpy Cooperative, Buffelspruit)

Investments required for Option 1A

Item	Cost per hectare	Total cost
Investments of Option 1		100,000
Modification of pumps		307,000
Primary filters at pumphouse	5,000	2,930,000
Secondary filters/clusters/valves	2,000	1,172,000
Sub-mains	1,500	879,000
Dripper lines (5263 m/ha)	9,500	5,567,000
Labour	3,060	1,795,000
Design & supervision of works		250,000
Total		**R 13,000,000**

Table 2 Investments for existing infrastructure with drip irrigation

4.4 Option 2: Redesign of the irrigation scheme - with sprinklers

The Ngogolo Cooperative has specifically requested to consider a complete redesign as a possible solution for the majority of the problems. It includes:

- Relocation of the pumphouse for the intake of river water to a site much closer to the fields of the Cooperative (near farm No.11 at the northern boundary; see Figure 8).
- Abandoning the canal.
- Closure of the three storage basins and filling them with earth in order to add them to the agricultural area.
- Water distribution by a completely closed pipe system under pressure.

The objective of this redesign would be to achieve a solution which would solve all problems together:

- Abuse of the canal, leakage and evaporation; filling time
- Evaporation from the storage basins
- Costs of maintenance and electricity of pump operation by drastically reducing the number of pumps.

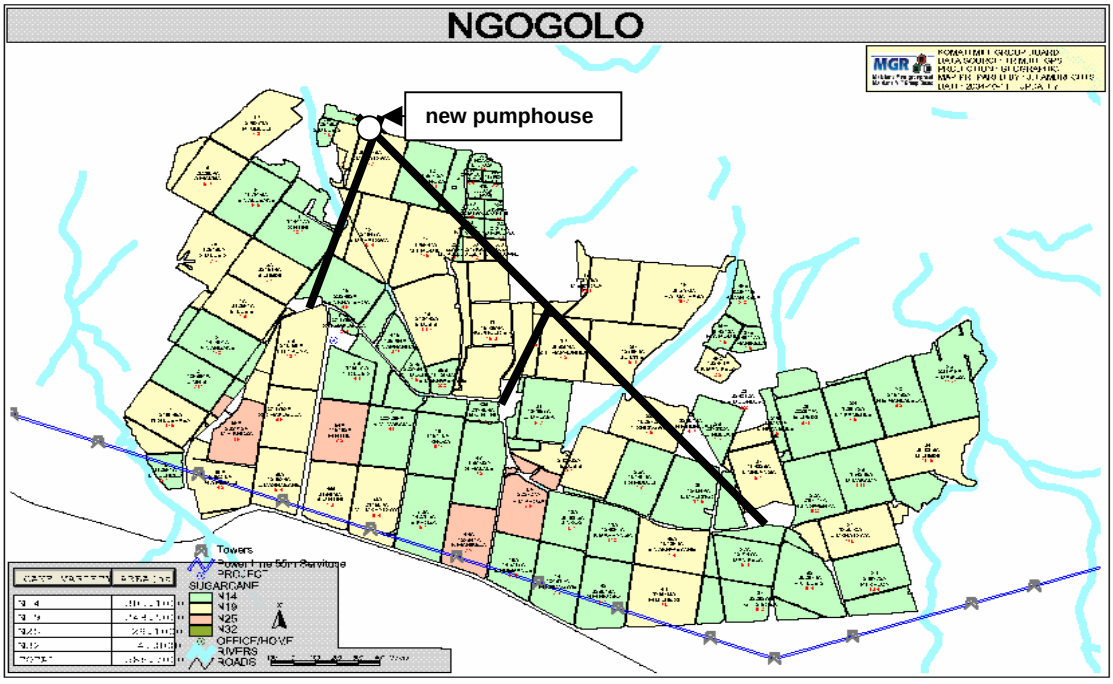

Figure 8 Options 2 and 2A with relocated pumphouse and pipes (without canal and dams)

Design aspects
A detailed design of the optimum layout and infrastructure of Option 2 is beyond the scope of this short mission. A preliminary layout is considered sufficient to obtain an estimate of the implications and approximate costs of this option.

For the new pumps a total capacity of 2,100 m^3/hr has been assumed. This is higher than the capacity of the present pumps of 1,750 m^3/hr, allowing for a possible higher water allocation in the future, and taking into account that at the present location a second pumphouse with two old (spare) pumps is available.
If possible, the layout of the new main pipe system should enable an easy connection to the existing network of field pipes. For this reason the layout has been chosen in such a way that the main pipes, starting at the new pumphouse, are directed to each of the three dams, where in the present situation the boosters are pumping water into the existing field pipe network.

The pressure required for the pumps has been estimated in the following very approximative way:

Difference in level between river surface and highest land area:	37 m
Maximum friction loss in the pipes (1% per metre over 3.8 km):	38 m
Pressure for sprinkler operation:	40 m
Total	115 m

Starting from a design with 2 pumps of 1,050 m^3/hr or 3 pumps of 700 m^3/hr, it appeared that for the required pressure no standard pumps are available. For this reason a solution with four pumps of 520 m^3/hr each, pressure 115 m, has been chosen.

Investments Option 2

Item	Total cost
Pumps (4 nos.) + pumphouse	1,700,000
6 kms of pipeline (av. diam. 300 mm, class 12)	2,250,000
Detailed design and supervision of works	150,000
Total	**R 4,100,000**

Table 3 Investments for new design with sprinkler irrigation

4.4 Option 2A: Redesign of the irrigation scheme - with drip irrigation

If the option of relocating the pumphouse would be implemented, it is in principle attractive to use this as an opportunity to convert to drip irrigation in the same time. In that case the flow capacities and pressures of the new pumps can be lower than in the previous option. The estimated investment costs are shown in Table 4. The pumps are cheaper than those in Option 2. The total costs of the investments for the drip irrigation infrastructure are lower than those in Option 1A, because no adaptation of existing pumps is required.

Item	Total cost
Pumps + pumphouse	1,300,000
6 kms of pipeline (av. diam. 300 mm, class 12)	2,250,000
Infrastructure for drip irrigation	12,700,000
Detailed design and supervision of works	250,000
Total	**16,500,000**

Table 4 Investments for new design with drip irrigation

4.5 Comparison of options

Upgrade of the existing irrigation infrastructure is by far the cheapest solution and easy to implement. The existing infrastructure, although being old, has been well designed and is flexible in use. However, an upgrade, mainly focused on the canal, does not solve the problem of costly maintenance of the pumps and costly use of electricity.

Relocation of the pumphouse and installation of a limited number of new pumps with a closed pipe system will reduce the costs of maintenance of pumps and transformers. A disadvantage, however, is the loss of flexibility. The heavy river pumps have to be operated, also in case only a small percentage of the farmers decide to irrigate.

The Nhlangu West project adjacent to the Ngogolo area has been mentioned as an example of such a completely closed system, which is reported to be much cheaper in operation. The area served by the Nhlangu West pumpstation is 102 ha, however, less than one fifth of the Ngogolo area and consequently smaller than each of the three areas presently served via closed pipe systems by the booster pumps of the Ngogolo storage basins.
Another important difference is the topography of the area. The Nhlangu West pumphouse is situated next to the Ngogolo pumphouses on the same river bank. The distance to be covered by the main pipeline is 2 km and 90% of the area is between +285m and +295m (about 0m to 10m above the level of the pumps) so that no excessive pump pressure is required .

Another example of water distribution directly from the source without boosters is the irrigation system of the Walda farmers association. We were informed that they experienced some problems in irrigating 700 ha using one pumphouse without boosters. It will be very useful to collect more information about this project and learn from their experience.

Based on the pump capacity installed in each option (kw), the use of electricity for 2000 hours of operation has been calculated (in kwh). Table 5 indicates the savings compared to the basic option No.1. It appears that replacing the larger number of existing pumps by a limited number of heavier pumps as described for Option 2, does not significantly reduce the electricity costs. So electricity costs alone do not justify a relocation of the pumphouse.

Converting to drip irrigation seems to be the appropriate solution to solve a number of the problems mentioned. It will result in a yield increase, in reduction of water demand and there will be considerable savings in electricity costs, in the order of 40%. For an optimum benefit, it is necessary that all farmers switch to drip irrigation so that the design of the infrastructure and pump characteristics can be tailormade for this situation. Drip irrigation can be applied either for the existing infrastructure or for the option with relocated pumphouse. Chapter 5 provides information on the impact of the various options on profitability of the farms, taking into account the benefits on the one hand and the investments required and the way of financing of these investments on the other hand. The technical and financial-economic data together are meant to provide the cooperative with information to facilitate decision making.

Option No.	Description	Investment total	Investment per hectare	Electricity savings compared to Option 1
1	Existing infrastructure	R 100,000	R 171	-
1A	Existing + drip irrigation	R 13,000,000	R 22,180	40%
2	New design	R 4,100,000	R 7,000	4%
2A	New design + drip irrigation	R 16,500,000	R 28,160	43%

Table 5 Savings in costs of electricity

5 Farm economy

5.1 Introduction and problem definition

This chapter will above all refer to the profitability of sugar cane growing at farm level and the fees to be paid to the Cooperative. The economic consequences that the different options to improve the irrigation system in future have for the profitability at farm level are calculated. Discussion points to facilitate the decision making are formulated.

The main and overwhelming problem is the low profitability of the farms belonging to the cooperative. This is not caused by irrigation problems only. The main factors are listed below:

General causes:

1. Low price of sugar worldwide through overproduction, while inputs (fertilizer, electricity) rise in price. Cheap sugar is produced in Brazil.
2. The farmers are “at the end of the chain”. Suppliers of inputs and buyers of the product set a price, including a margin. The farmers cannot do this.
3. Sugarcane is a long lasting crop, with a cycle of 8 years and an adapted and expensive irrigation system. Farmers cannot switch easily to other crops without losses on previous investments.
4. There is only one buyer (the sugar mill TSB). TSB pays one price to all supplying farmers. Although the pricing policy is clear and TSB is interested that suppliers do not switch to other crops, it creates dependency.

Specific causes:

5. Low production per hectare through sub-optimal management. Sugarcane growing needs a lot of detailed attention to maximize the production. Not all farmers can provide this. Few farmers can do this well.
6. The land tenure structure within the Cooperative avoids that good farmers can take over the plots of bad farmers, although they may have bad results, or not use them at all. This increases the costs to active farmers.
7. Sub-optimum water supply. The farmers may get on average less water than is needed for optimum growth of sugarcane, due to restrictions in water allocation.
8. Costs of water are high. Although this is true, it is not higher than other colleagues pay.

Ngogolo famers may have hope for a better future due to the following factors:

- Long term perspective for sugar prices are good because demand and supply are approaching each other and even a shortage may arise in the near future.
- Ngogolo has comparatively favourable conditions for production: high quality soils and an old but well designed irrigation system.
- TSB, although a monopoly, is an efficient company with a clear pricing policy, assuring a stable (although maybe not high) price for the product and its services.
- The sugar cane sector has a well established infrastructure : expertise, input supply, transport, farmers’ organisations, it is all present in the region.

5.2 Farm results at present

First the profitability of the farms was calculated. This was done for the situation as can be expected for next year, under average conditions (see Table 6).

Average Ngogolo farmer			Rand	Rand
Crop/variety	N23/N19		per ha	per farm
Yield of cane in tn/ha	70	RV %	0	0.12
Hectares	8.75	0	0	0
Gross margin	quantity	Price	per ha	total
Gross revenues, RV x price/RV	**73.5**	**2,000**	**16,800**	**147,000**
Transport	613	82	5,740	50,225
Income after transport			**11,060**	**96,775**
Various small deductions per ha	613	4,2	294	2,572.5
Contractor for cutting (Mboniseni)	8.75	720	720	6,300
Electricity and water fee coop	8.75	2,355	2,355	20,606
Fertilizers 160-20-100, 12.5 bags	79	485	4,365	38,194
Chemicals for weed control	8.75	600	600	5,250
Ripping/compactation	8.75	125	125	1,094
Labour costs :	0	0	0	0
Permanent labour for irrigation etc	1.5	7,500	1,286	11,250
Weeding	8.75	750	750	6,563
Fertilizing	8.75	0	0	0
Maintenance sprinklers/hoses	8.75	150	150	1,313
Consumables/ supervision	8.75	250	250	2,188
Direct operation costs			10,895	95,329
Provision for establishment costs			756	6,617
Total operational costs			**11,651**	**101,946**
Operational profit (EBITDA)			**-591**	**-5,171**

Table 6 Existing situation without improvements in average year in near future

The table shows that the average farm is operating at a loss at this moment, even without paying interest and without provisions to compensate for family labour.
Fertilizers is by far the biggest expense, almost twice as high as the second big expense, which is the fee for water supply, including electricity. Labour costs (weeding and fertilizing) is the third major cost factor. In practice farmers economize on fertilizer and labour, the only expenses they can influence directly.

5.3 Costs and income of the cooperative

The Cooperative charges the farmers for irrigation and other services. These costs mainly consist of electricity cost and maintenance of the infrastructure for irrigation. In future the fees will change if a new irrigation structure will be constructed.

The fees are calculated for the following options with respect to the irrigation infrastructure (see Chapter 4)

- Option 1: Present situation, including necessary rehabilitation
- Option 1A: Present situation adapted to drip irrigation
- Option 2: River water intake at new location, closed pipe system and sprinklers
- Option 2A: River water intake at new location, closed pipes and drip irrigation

Option 1: Present situation

A provision of R 100,000 is included for rehabilitation. Maintenance and electricity costs are adapted.

Irrigated area				586 ha	1 ha
Investments done in present irrigation system at present replacement value	Value of Investment	Years to be used	Depr per year	Average maint/yr	Maintenance
Constructions for pump stations	185,000		4,625	1,850	3
Pipes and Canal	5,667,500		141,688	50,338	86
Pumps and electric motors	1,575,700		157,570	63,028	108
Total Investment, Depr. & Maintenance	**7.428.200**		**303,883**	**115,216**	**197**

Table 7 Cost of present irrigation structure based on existing sprinkler system

The value of the investment at present prices is estimated at about R 7.5 million. The annual maintenance costs are estimated at around R115,000, or about 200 per ha.

The cooperative must calculate annually the fees to be charged to the members. The costs consist of maintenance of infrastructure, electricity and water tax, office and tractor costs. From these costs the revenues received from outside users must be subtracted.
The calculation for 2009 was made, and can be implemented by the Executive Committee. This fee was also used in the calculations per farm (see Table 8).

		586 ha	1 ha
Electricity costs (35% increase over 07/08)		930,000	1,587
Water tax		17,000	
Maintenance irrigation system		115,216	197
Financing costs upgrading the canal		20,500	35
Sub Total direct operating costs irrigation sytem		**1,082,716**	**1,848**
Sub-Total for costs of coop. office and tractor unit		215,752	368
Total direct costs of co-operative present situation		1,298,468	2,216
Provision for replacement of equipment		162,570	277
Total funds to be recovered		**1,461,038**	**2,493**
Income Cooperative	per ha		
Fees to be charged to outsiders for use of water	**2,997**	**80,906**	**138**
Margin of sugarcane farm belonging to the coop.	0	0	0
To be charged to members		**1,380132**	**2,355**

Table 8 Annual costs and revenues of Ngogolo Cooperative and fee to be charged to the members.

The fee for 2008 was only R 1,300 per ha, the new fee proposed is R 2,355 per ha. This is including the financing costs for a loan to cover the expenses of rehabilitation of the canal. Without these costs the fee could be R 35/ha lower.
The former fee of R 1,300 is not at all covering the present costs. The new fee of R 2,355 per ha includes the depreciation costs of the equipment, but not of pipes and structures, as they can be used over long periods.
It might be possible to reduce the electricity costs (major part of the fee) by renegotiating the rate charged per Kwh as different rates are applied for the different pump stations.

Option 1A: Present system adapted to a drip irrigation system

A drip irrigation system would save water, which is very important, as water is very scarce in the whole region. Also electricity costs would go down. Moreover, the production could easily increase with 20%. Because of these factors Government technicians and TSB are recommending to switch over to this system.

For a durable drip irrigation system filters must be installed, the pumps must be adapted, a design study must be carried out and some other investments must be made. The estimated costs and benefits are summarized in Table 9.

			Depr.	Maint.	Depr./ha	Other costs/ha
Upgrading of the system and pumps	307,000					
Primary filters	2,930,000	10%	293,000	117,200		200
Labour	586,000					
Design and consultancy work	250,000					
Total Investments at cooperative level	4,173,000					
Additional depr/maint drip irrigation			293,000	117,200	500	200
Additional interest costs average 8 years 16%				333,840	0	570
Additional repayment of loan (8 years)				521,625		890
Saving Electricity costs 40%				372,000		(635)
Total additional expenses/ha incl financing costs				**600,665**	**500**	**1,025**
Additional expenses in case of grant (no financing costs, but adding depreciation)						65
New fee with financing costs						**3,380**
Fee to be charged without financing costs						2,420

Table 9 Additional costs and fee if a drip irrigation system is installed

If the present system is converted into a drip irrigation system, the electricity costs will go down with 40% or R 372,000, but the financing costs will go up with about R 855,000 per year. It means that the fee to be charged will rise with R 1,025 per ha per year.

In case Ngogolo can obtain a grant, the fee only has to rise with R 65 per ha per year. A subsidy from Government might be possible, because water and energy savings are a public interest.

Option 2: Redesign of irrigation system

The Executive Committee of the Cooperative considers to move the intake of the irrigation to another place, more centrally located and easier to supervise. The open canal and the three storage basins will be abandoned. This could be combined or not with switching over to a drip irrigation system. The new fees that must be charged to the farmers in this case were calculated.

The additional and existing investments in case of redesign are summarized in Table 10.

	Value of Investment	Maintenance cost/ha
Pump house	100,000	
Sub Total constructions	**100,000**	**2**
Pipe	2,250,000	
Main pipes along fields, 20km at 180,000	3,600,000	
Secundary pipes and minor items	500,000	
Sub Total pipes	**6,350,000**	**92**
Pump st 1 (intake) 2 x 200KW at 1300/kw	1,600,000	
Design and consultancy	150,000	
Sub Total equipment	**1,750,000**	**109**
Total Investment and annual maintenance	**8,200,000**	**203**
Of which new investment	**4,100,000**	

Table 10 Total investments with new intake

The new intake will demand an additional investment of 4,1 million. Still part of the existing structure will be used. The total investment for which annual costs must be calculated is 8.2 million.

Annual costs and fees with new intake	Total	Per ha
Total electricity costs -4%	892,800	1524
Water Tax	17,000	
Maintenance Irrigation system	118,750	203
Sub-Total other coop costs	215,752	368
Income Coop	79,210	135
Total, incl.replacment of equipment and fee per ha in case of grant	**1,363,692**	**2,327**
Financing costs less depreciation of equipment	680500	1161
Fee with financing 4,1 million at 16% and 10 years amortization	**1,772,942**	**3,488**

Table 11 Annual costs and fee to be charged to farmers with new intake system.

When constructing a new intake system, the fee could slightly decrease from R 2,355 to R 2,327. The first years the difference could even be higher because replacement and maintenance of new equipment will be lower than average and the fee could be a bit lower.

But this reduction in fee would be only the case if the new system can be installed without financing costs for the Cooperative. If a loan must be taken for this investment, the fee goes up to R 3,488, substantially higher than what is calculated for the present situation.

Option 2A: Redesign of irrigation system, combined with adapting the whole system to a drip irrigation system.

It seems logical to use the opportunity to combine the change in intake with the conversion to a drip irrigation system, which is preferred in future. The total new investment for the Coop then will be R 7.3 million. The value of the total system and the average annual maintenance costs per hectare are shown in Table 12.

Value of all investments	Value of Investment	Main tenance costs per ha
Pump house	100,000	
Pump station 3 (construction+ dam)		
Pump station 4 (construction + dam)		
Sub total constructions	**100,000**	**2**
Pipe	2,250,000	
Main pipes along fields, 20km at 180,000	3,600,000	
Secundary pipes and minor items	500,000	
Sub total pipes	**6,350.000**	**92**
Primary Filters	2,930,000	
Pump st 1 (intake) 2 x 200KW at 1300/kw	1,200,000	
Design and consultancy	250,000	
Labour	586,000	
Sub Total	**4,966,000**	**28**
Total Investment, Depr. and Maintenance	11,416,000	375
Of which new investments	**7,316,000**	

Table 12 Investment and maintenance per ha

The annual fees to be charged to the farmers are as shown in Table 13 :

Annual costs	Total	Per ha
Total electricity costs (-4%)	892,800	1,524
Water tax	17,000	
Maintenance Irrigation system	219,950	375
Sub-Total other office costs	215,752	368
Provision for replacement equipment	451,600	771
Saving in electricity (40%)	357,120	609
Fees for use of water	79,210	135
Fee without financing costs	1,343,772	**2,293**
Financing costs less depreciation	903,880	1,542
Fee including financing costs		**3,836**

Table 13 Calculation of fees with new intake combined with drip irrigation system

The fee to farmers will be R 2,293 if financing can be obtained for free, and R 3,836 if all investments must be financed with a loan at 16% and 10 years amortization.

Summary of fees for the different options

	No financing costs	With financing costs
Present infrastructure improved	**2,355**	
Present infrastructure converted to a drip irrigation system	**2,420**	**3,380**
New intake with sprinkler system	**2,327**	**3,488**
New intake combined with a drip irrigation system	**2,293**	**3,835**

Table 14 Summary of fees

As can be seen, without financing costs the differences in fees to be charged are small. The drip irrigation system with new intake would even be cheaper than with sprinklers. This is because of the big saving in electricity costs.
However if a loan must be obtained at 16%, with 10 years amortization, the fees would be considerably higher than at present. Conversion to a drip irrigation system then increases the fee with almost R 1,000/ ha with the present intake and with almost R 400 in combination with a new water intake.

5.3 Financial consequences at farm level

At farm level the following options can be considered:

a. Present situation (already explained with Table 6)
b. Improve efficiency at farm level to obtain 90 t/ha
c. Applying drip irrigation after adapting the central system and obtain 105 tn/ha.
d. The above mentioned options with new fees if intake from the river is relocated

a. See details in Table 6

b. Farmer with improved efficiency (90 t/ha) with sprinkler irrigation system

Improved Ngogolo farmer with sprinklers				
Yield of cane in t/ha	90	RV %	0.1275	0
Gross margin	Quantity	Price	Total farm	per ha
Gross revenues, RV x price/RV	**100.4**	**2,000**	**200,812**	**22,950**
Transport	788	82	64,575	7,380
Income after transport			**136,237**	**15,570**
Fertilizers 160-20-100, 12.5 bags	105	485	50,925	5,820
Total Operation costs			115,412	13,190
Operational cash flow (EBITDA)			**20,825**	**2,380**

Table 15 Existing situation with improved efficiency in average year in near future

If a farmer can obtain 90 t of sugarcane with the amount of fertilizer as indicated, the EBITDA rises from – R 519 per ha to R 2,380 per ha. This is not yet enough to pay interest on loans and pay for family expenses, but is a big improvement.

c. Drip irrigation.

Drip irrigation is propagated, because it saves water and energy and it improves yields. Some farmers apply drip irrigation already within the present irrigation system. This is not a good situation because:

- no filters are used, so the present drip irrigation system is not durable.
- using drip irrigation without adapting the system will not lead to savings in electricity costs.
- farmers with drip irrigation consume more water per time unit. They assure their share in the water supply easier than farmers with sprinkler irrigation. This may create tensions amongst the members of the cooperative.

When calculating the financial benefits in the calculations of this document it is assumed that when drip irrigation is applied, the central system is adapted too and that the fees to the cooperative are adapted accordingly. It is assumed that drip irrigation will lead to a huge increase in production, from 70 to 105t/ha! The amount of fertilizer must be adapted then.

The results at farm level of applying drip irrigation can be seen in Table 16.

Average Ngogolo farmer with drip irrigation				
Yield of cane in tn/ha	105	RV %	0.13	0
Gross margin	Quantity	Price	Total	per ha
Gross revenues, RV x price/RV	**119,437.5**	**2,000**	**238,875**	**27,300**
Transport	919	82	75,337.5	8,610
Income after transport			**163,537.5**	**18,690**
Electricity and water fee coop	8,75	3,380	29,575	3,380
Fertilizers 160-20-100, 12,5 bags	123	485	59,413	6,790
Drip system costs at farm	8,75	2,175	19,031	2,175
Total Operation costs			151,138	17,273
Operational profit incl. depreciation of drip system			**12,399**	**1,417**

Table 16 Results of farmer with drip irrigation obtaining 105 tn/ha

Compared to the present situation the results improve with R 2,000 per ha, if 105 tn/ha can be obtained instead of 70 tn. In this calculation depreciation on equipment is included, because it is a substantial amount and really must be used every 8 years. With a sprinkler system depreciation is only R140/ha/year.
No interest on the farm investment was included. It this is done profit will decrease with R 1,200/ha to R 217/ha. Also then it is better than the present situation with 70 tn/ha

The yield of 105 tn/ha output requires a high efficiency at farm level. With the same level of efficiency, but with sprinkler irrigation, also better results can be obtained, e.g. 90 tn/ha. Then the results would be as can be seen in Table 15.
Comparing Tables 15 and 16, it can be seen that obtaining a yield of 90 tn/ha with the present irrigation system is more attractive than obtaining 105 tn/ha with a drip irrigation system. This is because of the higher fee to be charged by the cooperative (filters etc.) and the higher costs at farm level, including depreciation on the high investment per hectare (secondary filters and irrigation pipes).

d. Financial consequences of new intake system at farm level and summary of expected profits

If the Cooperative decides to opt for a new intake system, this will imply changes in the fees to be charged. The financing costs of the change greatly influence the results. Table 17 shows the influence on farms with sprinkler irrigation.

Expected Operational profit (EBITDA minus Depreciation) per ha for Ngogolo farms		
Sprinkler irrigation	Improved management (90 tn/ha)	Average farmer (70 tn/ha}
Present situation with minimum improvements for the future	2,240	-731
With new intake system, no financing cost for Cooperative	2,262	-709
With new intake system, financing costs included in the fee	1,101	-1,870

Table 17 Expected operational profit with sprinkler irrigation for farms with 90 and 70 tn/ha and fees adapted to the investments and financing costs

For the average farmer with a yield of 70 tn/ha, there is no hope. For the farmers with 90 tn/ha the new intake system is only attractive if the cooperative can get a free financing and does not pay any interest. If not, the profit decreases with about R 1,100/ha.

Drip irrigation

It seems logical to combine the new intake system with introducing drip irrigation. In this way the system is prepared for the future. Table 18 summarises the influence on farm profit when applying drip irrigation, with or without deciding for a new intake system and with different financing costs.

Drip irrigation and 120 tn sugarcane/ha	Farmer has no interest costs on drip irrigation equiment	Farmer has to pay interest on loan for drip irrigation equipment at the farm
Cooperative adapts present system, no financing costs included in fee to farmers	2,377	1,177
Cooperative adapts present system, financing costs included in fee to farmers	1,417	217
New water intake system combined with drip irrigation system		
No financing costs included in the fee to farmers	2,504	1,304
Financing costs of loan included in the fee to farmers	962	-238

Table 18 Expected operational profit (EBITDA minus depreciation) per ha for Ngogolo farms with drip irrigation.

The drip irrigation system can be very helpful to increase the yield and optimize water consumption. Unfortunately the investment at farm level per ha is high. Moreover, the fee to be paid to the cooperative must rise because of additional investments.

If nor the farmer nor the cooperative have to pay interest costs, drip irrigation becomes slightly more attractive than sprinkler irrigation with 90 tn/ha (Operational profits of R 2,377 and R 2,504 versus R 2,240 and R 2,262).But if interest costs are included, the investment in drip irrigation does not pay at farm level.
The costs of the new intake and pipes will always have a negative influence on farm profit, unless the funds are obtained interest free.

e. The influence of price increase.

At present sugar prices are very low. Some experts expect better prices in the near future, when demand and supply are in better equilibrium. Tables 17 and 18 were recalculated with a 10% price increase and the results are shown in Table 19 and Table 20.

1. Sprinkler irrigation system with price increase

With 10% price increase for sugarcane (from R 2,000 to R 2,200/tn)		
Sprinkler irrigation	90 tn/ha	70 tn/ha
Present irrigation system with minimum improvements for the future	4,535	949
With new intake system, no financing cost for Cooperative	4,557	971
With new intake system, financing costs included in the fee	3,396	-190

Table 19 (as Table 17, but with 10% increase in price of sugar)

As can be seen in the table, even with 10% price increase, farms with a yield of 70 t/ha cannot survive. But farms with 90 tons/ha then can make a good profit. Transferring the water intake will decrease farm profitability, but still a profit remains.

2. Drip irrigation system with price increase

With 10% price increase for sugarcane (from R 2,000 to R 2,200/tn)		
Drip irrigation	Farmer has no interest costs for drip irrigation equiment at the farm	Farmer has to pay interest on loan for drip irrigation equipment at the farm
Cooperative adapts system, no financing costs included in fee to farmers	5,497	4,297
Cooperative adapts system, financing costs included in fee to farmers	4,537	3,337
New water intake system combined with drip irrigation system		
No financing costs included in the fee to farmers	5,624	4,424
Financing costs of loan included in the fee to farmers	4,082	2,882

Table 20 (As Table 18, but with 10% increase in price of sugar)

The profitability of drip irrigation farms is very sensitive to changes in price, because of the expected high yields. As can be seen, when the price would rise to R 2,200/tn, the drip irrigation system becomes more profitable and easily can pay now for the extra investments, and also for the interest costs.

6 Conclusions and recommendations

A. Irrigation system

1. Existing infrastructure
The Ngogolo irrigation system is old, but has been well designed and provides flexibility in operation. The problems experienced with the canal (leakage and usage by unauthorized persons) can be solved at moderate costs. If it would be decided to continue using the present infrastructure, individual pumps could be replaced when the need arises (increased maintenance costs or major breakdowns). The number of pumps and the electricity consumption are not exceptional considering the size of the area.

2. New design
A new design with a relocation of the pump house and a completely closed pipe system is technically possible. In this option the canal and the existing dams will no longer be used. Due to the size and the topography of the area a large pump pressure is required, which means that the pumps will be costly.
A new design will solve the maintenance problems but the large investment in new pumps and main pipes will not significantly reduce the electricity costs. Also the loss of flexibility of the present system is a factor to be considered.

3. Conversion to drip irrigation
Converting the irrigation system from overhead sprinklers to drip irrigation will have considerable advantages. The water demand will reduce by about 30%, an increase of production may be expected and the electricity costs will be about 40% less. However, the investment costs are high (about R 12.7 – 13 million depending on the option selected; see Chapter 4) and careful maintenance is required.

B. Economy of sugarcane growing

1. At cooperative level

1.1 Fees to be charged to the members

With the information available at this moment (November 2008), the fees must be increased from R 1,300 to about R 2,300/ha to cover all costs of the cooperative. This fee includes provision for an expected rise in electricity costs.

It is the responsibility of the cooperative to keep the fees for the members at a minimum level. At the moment the following options should be considered:
a. Electricity costs can be reduced by re-negotiating the rate per Kwh.
b. The overhead costs of the cooperative possibly can be reduced, especially at tractor unit.
c. The full fee must be charged to outsiders. The fee should include depreciation and a margin for the cooperative to compensate the risks.

1.2 Decision making on investments.

A decision on improvement of the central irrigation system must be taken, taking into account the influence on farm profitability and financing options.

New intake
- A new intake system decreases the farm profit of the members, unless it is financed with a

grant. Without a grant the profit per farm decreases (or the loss increases) with about R1,200/ha.
- If the price rises with 10%, the above stated is still true, but if combined with switch-over to drip irrigation, the loss in profit decreases to about R500/ha

Adaptation of the central system to drip irrigation
- Adapting the central system to drip irrigation is always favourable for the community because of savings on energy and water. But it decreases the profit for the individual farmers, if cooperative and farmers must pay interest on a loan for financing the investment. Only if the cooperative and farmers get a 100% subsidy (a grant) on this investment it will become attractive. If the cooperative gets a grant, but the farmer not, the farmer would be better off with the present sprinkler system and increasing his efficiency to 90t/ha.

- If the sugar prices rise with 10%, drip irrigation becomes equal or more attractive than sprinkler irrigation also if the farmer has to pay interest on the loan. Then the cooperative should seriously consider to adapt the system to drip irrigation, but still only if a grant can be obtained for financing.

1.3 Improve services to the members

The cooperative should consider to assist more intensively the farmers with improving the economic efficiency at farm level. This can be done by:
- central purchase of inputs,
- negotiate low transport costs for the members,
- make careful decisions on operation of the irrigation system to economize electricity and water if possible.
- study with external expert the possibilities to reduce fertilizer amounts, through recommendations that are based on economy and specific farm conditions. Also the use of organic fertilizers should be looked into.

1.4 Revise policy on unproductive member-farmers

Unproductive farmers cannot pay the fees, so that the costs for the good farmers are increased. At the moment approximately 12% of the fields is not active. The cooperative (or the local administration) should adapt the rules to make it easy to sell or rent contracts of 8 years) farms within the cooperative. Non-productive owners of land should be forced (economically) to rent their farms via the cooperative to productive farmers, who then can increase their area.

If this is not possible ,it might be considered to convert to a central management system (as is done in the cooperative named Zelpy). This system allows to optimize production and profit per ha, if management is good. The negative effect is that famers become shareholders, without involvement in the daily management of the farm, only with a share in the profit in case of positive results). It allows them to engage more in other economic activities.

1.5 Minimize investments with present price level

With present price level of sugar, the investments and the fee to the farmers should be kept as low as possible. But as soon as the price rises with 10% or more, the above mentioned options should be considered.

2. At farm level

2.1 Economic efficiency under present conditions.

For the average farmer with a production of 70 tn/ha there is no future, even with a 10% price increase**.** At the fertile soils of Ngogolo an average yield of 90 tn/ha must be possible in future. The best farmers in Ngogolo have yields of 100 tn/ha. To reach this level, many details have to be optimized (seed quality, planting, weeding in time, replanting, etc). The expertise a better output is available. Farmers not able to reach this level should rent the farm to other members.

The three major cost factors are transport, fertilizers and the fee for irrigation water. For transport costs the farmers must carefully select the cheapest transporter (either TSB of a private transporter).

The amount of fertilizer depends on soil fertility, yields (extraction of minerals) and efficient application, and organic fertilizer available. Regular soil analyses per farm, and determining carefully the amount to be applied according to the expected yield (not too high with present sugar prices!) is what the farmers can do at the moment. Maybe in future organic fertilizers can be obtained to reduce the costs.

2.2 Making investments when definitely prices increase substantially

With the present low prices for sugarcane, investments at farm level (e.g in drip irrigation) are only possible without financing costs, a situation that is not realistic. But when prices increase to R 2,200/tn and higher, investments can be considered.

C. Follow up

First of all, the recommendations formulated should be implemented. Knowledge about implementation is available in the region. Only after this and if the executive committee thinks it recommendable they may consider a further application for assistance.
A possible follow-up would be to assist the farmers in calculating the options to switch over to other crops, for those farmers for whom sugarcane growing is no option (anymore). This could be done most efficiently in cooperation with local experts on marketing of these crops.

In Mpumalanga many farmers organizations are active. Cooperation with Dutch farmers' organizations or agencies with experience in this field could be very useful. Identification of interested organizations and making an inventory of possible fields of cooperation should be undertaken first. It is important that straight from the beginning the organizations are aware that no benefits in the form of direct financial support can be expected. Benefits are more in the line of improvement in planning and organisation, best practices and learning from each other.