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Volume 1

The Transformation of Irrigation Boards into Water User Associations in South Africa

Case Studies of the Lower Olifants, Great Letaba and Vaalharts Water User Associations

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Nicolas Faysse

International Water Management Institute

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Acronyms

ARDC	Agricultural Rural Development Cooperative
BP	Business Plan
CF	Commercial Farmer
CLP	Compulsory Licensing Process
CMA	Catchment Management Agency
DoA	Department of Agriculture
DEAT	Department of Environment Affairs and Tourism
DoLA	Department of Land Affairs
DWAF	Department of Water Affairs and Forestry
HO	Head Office
RO	Regional Office
EF	Emerging Farmer
EKB	Ebenhaezer Small-scale Farmers
HDI	Historically Disadvantaged Individual
IB	Irrigation Board
IWRM	Integrated Water Resource Management
LNW	Lepelle Northern Water
LORWUA	Lower Olifants Water User Association
LRC	Legal Resource Centre
LWUA	Letaba Water User Association
MAR	Mean Annual Runoff
MC	Management Committee
MM	Matsikama Municipality
NWA	National Water Act
NWRS	National Water Resource Strategy
PTO	Permission To Occupy
RDP	Reconstruction and Development Program
RSA	Republic of South Africa (under the previous dispensation)
SAB	South African Breweries
SPP	Surplus People Project
TRANCRAA	Transformation of Certain Rural Areas Act
VHWUA	Vaalharts Water User Association
VGK	Verenigende Gereformeerde Kerk
VSB	Vredendal Saamwerk Boerdery (Vredendal small-scale farmers)
WUA	Water User Association
WDM	West Coast District Municipality
ZAR	South African Rand

Summary

In South Africa, the 1998 National Water Act launched an in-depth reform of water resource management. At the local level, all the Irrigation Boards (IBs), which used to be managed by large-scale farmers, are to be transformed into Water User Associations (WUA). These WUAs should incorporate all users--whether they have a formal water entitlement or not--in the defined area of jurisdiction. This transformation will enable better participation by the historically disadvantaged individuals (HDIs) in the management of the water resources. It will also provide a basis for improved and integrated local management of water resources.

The International Water Management Institute (IWMI), in cooperation with the Department of Water Affairs and Forestry (DWAF), has undertaken a research program on the transformation of IBs into WUAs. The main objective of the research was to understand the constraints and opportunities of the transformation, with regard to the goal of meeting HDIs' water-related needs. A secondary objective was to assess the role of these new WUAs with regard to integrated local water resource management. This working paper covers three case studies of IBs that have already been transformed into WUAs. The case studies constitute the background information for the research report entitled *An assessment of small-scale users' inclusion in large-scale WUAs in South Africa*.

The first case study is the Lower Olifants WUA in the Western Cape, which was the first WUA in South Africa. Its principal functions are to operate and maintain a canal that enables irrigation throughout the year in an arid region. Around 9,200 hectares are irrigated, mainly for vineyards. The Ebenhaezer Colored community is situated downstream in the system. This community is supposed to receive a given amount of water free, in compensation for its forced displacement in 1913. The community does not receive the water on demand as the upstream commercial farmers do: Instead, it basically receives the unused flow at the end of the system. The community does generally receive its water entitlement, but it cannot schedule this flow nor store the unused water. The involvement of the community within the WUA should have been an opportunity for capacity building, but has failed to solve the abovementioned problem.

The second case study relates to the Great Letaba WUA in the Limpopo Province. This WUA manages the allocation of water downstream of two large dams, near the town of Tzaneen. An area of 12,500 hectares is irrigated in the river valley, mainly for fruit tree farming.

There are four small-scale farmer schemes under the jurisdiction of the WUA. They face many internal problems, especially with regard to land tenure. The emerging farmers are involved in the WUA, which helps them in terms of capacity building and linking with other institutions. The WUA also undertakes some actions to support them. However, in periods of water restrictions, the emerging farmers face the same water restrictions as the commercial farmers, although the Department of Land Affairs (DoLA), which is paying their water fees, is paying for more water than they use.

The third case study assesses the Vaalharts WUA, which is situated in both Northern Cape and North West provinces. This WUA is one of the largest irrigation schemes in South Africa (37,100 hectares overall). It manages mainly a canal that takes water from the Vaal River to irrigate commercial farms and, downstream, the Taung Irrigation Scheme in the former Bophuthatswana homeland. Emerging farmers in Taung use mainly pivot irrigation and have faced many financial and technical problems. More recently, a brewery company has started contracting with them for the production of barley and helps them in their farming activities.

Introduction

In South Africa, the 1998 *National Water Act* (Act 36 of 1998) launched an in-depth reform of water resource management. At the local level, all the Irrigation Boards (IBs) are to be transformed into Water User Associations (WUA). These WUAs are to invite all users--whether they have a formal water entitlement or not--to be incorporated in the defined area of jurisdiction. The transformation from IBs to WUAs was to enable better participation of 'historically disadvantaged individuals' (HDIs) in the management of their water resources. This term refers to all the persons who were deprived of certain rights during the apartheid regime, i.e., black, colored, Asian and disabled people, as well as women.[1] The transformation from IBs to WUAs is also designed to provide a basis for undertaking some initiatives for integrated local management of the water resources.

The International Water Management Institute (IWMI), in cooperation with the Department of Water Affairs and Forestry (DWAF) has undertaken a research program on this transformation. The main objective of the research is to understand the constraints and opportunities inherent in the transformation, with regard to the goal of meeting the water-related needs of HDIs.

A secondary aim of the research is to understand the potential for WUA involvement in the integrated management of water resources. The main output of this research is the IWMI Research Report: *An assessment of small-scale users' inclusion in large-scale water user associations in South Africa(Faysse, forthcoming 2004)*. Seven case studies provide the backbone of the research report. A team of researchers performed these studies between July 2002 and July 2003.

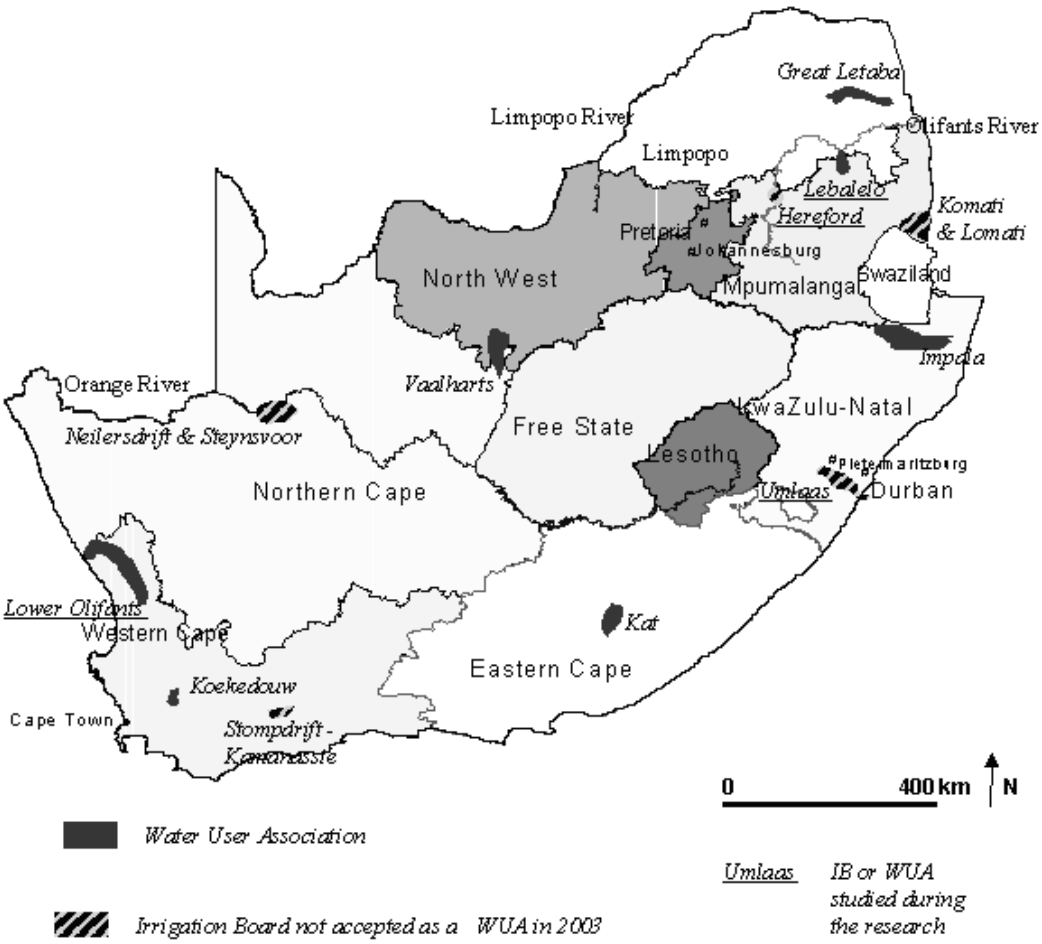
This working paper presents three examples of IBs that have already been transformed into WUAs: the Lower Olifants and Great Letaba Water User Associations come from former Irrigation Boards, while the Vaalharts WUA comes from the integration of two government water schemes and one emerging farmer scheme. (Three other case studies of Irrigation Boards that are still to be transformed into WUAs are presented in another Working Paper.) The description of the research and the introduction to the South African context are given in the research report, hence not repeated here.

Willem de Lange wrote the section on the Lower Olifants WUA in the Western Cape. Jetrick Seshoka was responsible for the case study of the Great Letaba WUA in the Limpopo Province. Nicolas Faysse wrote the last section, on the Vaalharts WUA. Figure 1 shows the location of these case studies, as well as the other IBs or WUAs that have a significant population of HDIs (see Faysse 2004). Each case study report has been reviewed by at least the chairman of the WUA or the IB.

The study has been co-funded by IWMI and the Cemagref

[1]A formal definition is: 'HDI' means a South African citizen, who (i) due to the apartheid policy that had been in place, had no franchise in national elections prior to the introduction of the Constitution of the Republic of South Africa, 1983 (Act 110 of 1983) or the Constitution of the Republic of South Africa, 1993 (Act No. 200 of 1993) (the interim Constitution); and/or (ii) is a female; and/or (iii) has a disability, provided that a person who obtained South African citizenship on or after the coming to effect of the Interim Constitution, is not to be an HDI" (Preferential procurement regulations, as approved in April 2001 pertaining to the Preferential Policy Framework Act No. 5 of 2000).

Figure 1. IBs or WUAs with a large presence of HDIs.



The Lower Olifants Water User Association

The first two sections of this case study describe the methodology and the study area. The next section focuses on the current situation with regard to water management in general in the Lower Olifants River Water User Association (LORWUA) area. The following section describes and analyses the most important problems faced by HDIs in the LORWUA and some suggestions are given for addressing these problems. The last section discusses some issues directly related to the accommodation of HDIs in the LORWUA.

Methodology

The analysis is based on a grid of initial questions. The following questions were used as an initial guide for the study.

Research Questions

What has changed for the HDIs with the transformation from the Vredendal Irrigation Board into the LORWUA?
This is the main research question of the case study because it has been 5 years since the 1998 *National Water Act* (NWA) was enacted, arousing high expectations with regard to the accommodation and promotion of HDIs in water management, since that was one of the corner stones of the Act (NWA, section 2).

This research question is broken down into several other questions:

- *What is the overlap between LORWUA functions and HDI needs?*
  This question tries to determine the extent to which the needs of HDIs in the LORWUA are satisfied and, thereby also tests the impact of the WUAs created under the 1998 NWA with regard to the accommodation and promotion of these groups. In order to do this, the most important needs of the HDIs were identified and ranked.
- *How much do HDIs participate in LORWUA?*
  This question looks at the degree of decentralization of the water management achieved, since this was also one of the important aims of the Act. Decentralization implies the involvement of all water users in one WUA, including HDIs.
- *What has changed in the transformation from the Vredendal Irrigation Board into the LORWUA?*
  This question investigates the transformation process of LORWUA. Since LORWUA is currently still in the process of transformation, this question also addresses the changes occurred after the constitution was enacted (e.g., changes in responsibilities and in staff).
- *To what extent does LORWUA practice integrated water resource management?*
  Integrated water resource management (IWRM) may be described as an "evolving, iterative process for the coordinated planning and management of water, land and the environment resources for their equitable and sustainable use" (DWAF 2002--First definition of a National Water Resource Strategy {NWRS]). It involves coordination of the quantity, quality, environmental, and health aspects of water, achieved at the level of the water resource unit, i.e., a catchment or an aquifer. Although this definition of IWRM is not always clear-cut, this question addresses the extent to which LORWUA takes responsibility for the IWRM of the basin.

Persons Interviewed

The study was mainly based on semi-structured interviews with the different stakeholders: commercial and emerging farmers,[2] environment representatives, municipalities, Non-Governmental Organizations (NGOs), Department of Agriculture (DoA) and Department of Water Affairs and Forestry (DWAF), etc. A total of 23 people have been interviewed (table 1). The reference codes given in this table will hereafter be placed in brackets and used at the end of a relevant sentence to signify that a specific stakeholder is the source of information.

Table 1. Stakeholders interviewed in the Lower Olifants WUA.

Stakeholder		Reference	Number
Matsikama Municipality		MM1; MM2; MM3	3
Western Cape Department of Agriculture		WCDoA1; WCDoA2	2
Department of Water Affairs and Forestry		DWAF1; DWAF2	2
HDIs	Ebenhaezer small-scale farmers	EKB1; EKB2; EKB3	3
	Vredendal Saamwerk Boerdery (Vredendal Small-scale farmers)	VSB1	1
	Farm workers	FW1	1
West Coast District Municipality		WDM1	1
Cape Nature Conservation		CNC1	1
Surplus People Project		SPP1	1
LORWUA		L1; L2; L3	3
Commercial Farmers		CF1; CF2	2
HDI Advice Committee		HAC1	1
Legal Resource Centre		LRC1	1
Namakwaland Agricultural Co-operation		NLK11	1
Total			23

Context

Description of the Basin

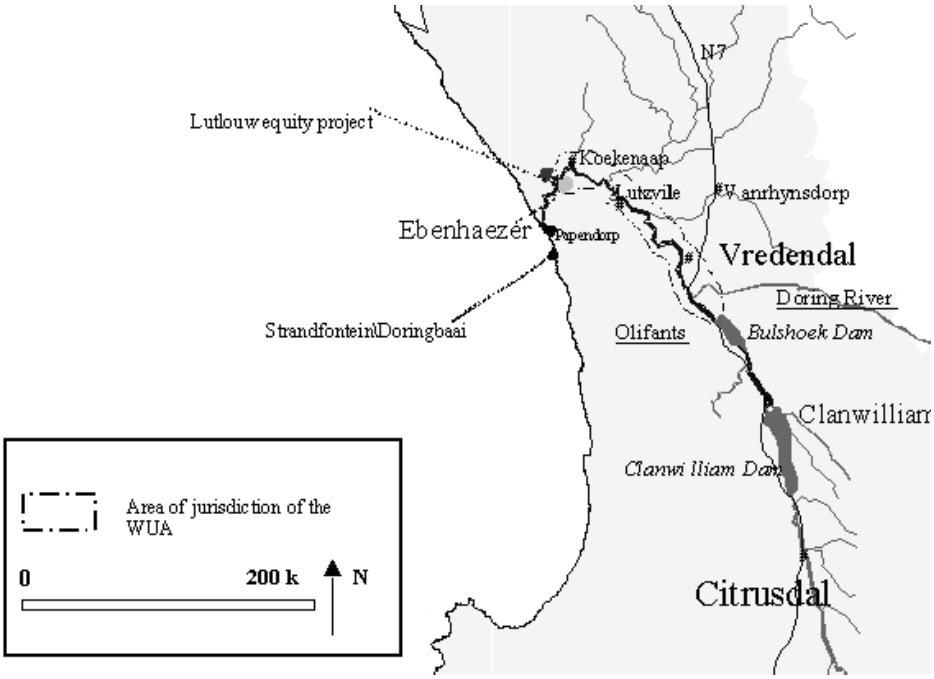
The Olifants/Doring Rivers water management area is situated along the west coast of South Africa, beside the cold Benguela sea current of the Atlantic Ocean. The catchment is characterized by a Mediterranean climate with a strong deterministic water supply (winter rainfall) from mid-May to the end of August. The summer months, November to February, are very warm and dry, and are characterized by extremely high evaporation losses. Climate variation is extreme, with summer temperatures reaching 45 °C in the Vredendal/Koekenaap area, and snowfall until mid-September in the Cederberg wilderness area. Precipitation varies from over 1,000 millimeters per year in the Cederberg mountains to less than 100 millimeters per year in the northern coastal areas (DWAF 2002).

[2]'Commercial farmer' means a large-scale, almost always white farmer, while 'emerging farmer' means a small-scale, historically-disadvantaged farmer.

All the surface flows originate from the Cederberg mountains and are carried to the Atlantic by the Olifants and Doring Rivers (only the Olifants is a perennial river). The DWAF (2002) provides some information regarding the balance between resources and uses in the catchment, in which LORWUA is situated. It shows a current deficit, which should worsen in the future, especially with the definition of an Ecological Reserve (a minimum flow set aside for environmental purposes).

The area studied is in the lower part of the Lower-Olifants/Doring Rivers catchment and is situated near the towns of Klawer, Vredendal, Lutzville, and Koekenaap in the Western Cape (figure 2). The main storage dam in the catchment area is the Clanwilliam Dam situated on the Olifants River (with a capacity of 127,000,000 cubic meters) upstream of the town of Clanwilliam. There is no large storage dam on the Doring River. The Clanwilliam Dam feeds the Bulshoek Dam, which has a capacity of 5,000,000 cubic meters and is mainly used as a balance dam for the LORWUA Irrigation Scheme (L1). The irrigation scheme is serviced by an open concrete canal system. The main canals stretch over 280 kilometers (60 km for secondary canals). The system operates on a just-in-time basis, using a water demand scheduling system managed by LORWUA (MM3).

Figure 2. The Lower Olifants River Water User Association.



History

In the 1800s, irrigation practices in the Olifants/Doring area were based on the winter river floods. Predictably, these were not very reliable and, together with the erosion-related problems, it became necessary to seek alternative methods of irrigation (Wellmann 2001).

> "In 1911 the Olifants River Irrigation District was proclaimed and the irrigation scheme was first authorized under Act 5 of 1912 (Ebenhaezer was included in this proclamation). This district was governed by the Olifants River Irrigation Board. A

loan of £155 000 was provided to assist in the construction of canals and the building of the Bulshoek Dam in 1913….Considerable irrigation possibilities were discovered lower down in the Olifants/Doring River area that was outside the proclaimed irrigation district. Therefore, the scheme was entirely recast and extended. Act 28 of 1917 now governed the scheme and costs were estimated at £505 000 from which £252 500 was a loan to the Olifants River Irrigation Board and was to be repaid by the rate of £112.60/morgen/yr. The project was completed in 1924 at a cost of £600 000 and consisted 170 kilometers of ground canals. However, this system was poorly managed and, due to canal breaks, leaks, cave-ins and insufficient storage capacity of Bulshoek Dam, the water supply became unreliable. It was decided to build the bigger Clanwilliam Dam and this project was completed in 1935" (Wellmann 2001).

This Clanwilliam Dam ensured ample storage capacity but the IB did not consolidate the existing scheme, resulting in a continued irregular water supply and some friction among the water users of the system. The situation continued for another 8 years before the state took over the management of the whole scheme in the mid-1940s. Under state management, most of the canal was lined with concrete by the early 1960s. This smoothing out of the water supply led to prosperity in the valley and proper administration of the scheme. Measuring weirs were erected to regulate the flow and ensure a more constant supply of water (Wellmann 2001). After the late 1960s, the Vredendal Irrigation Board assisted the state in managing the irrigation scheme. The Vredendal IB was never in control of the management of the scheme and was only involved as an advisory body (L1). The IB consisted mainly of commercial farmers (CFs) and formed the basis of the LORWUA.

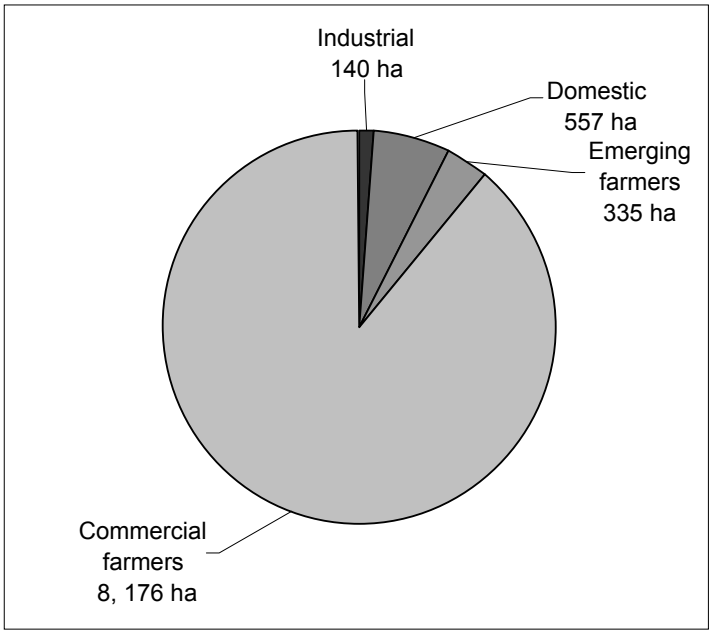
An advisory committee from the DWAF was appointed to facilitate the transformation process towards a WUA and, although this was a slow process, in 2000, the first WUA in South Africa, namely, the Lower Olifants River Water User Association was successfully set up. The LORWUA constitution was approved on 6 January 2000 by the Minister of the Department of Water Affairs and Forestry.

Water Uses in the Basin

It is important to note that the LORWUA area is not the whole of the Olifants River basin. The upper reaches and the area between the Clanwilliam and Bulshoek dams are excluded from the LORWUA, together with all the tributaries (Doring River, etc.,). Figure 3 gives a schematic representation of the water use of all registered water users in the canal managed by LORWUA. Commercial agriculture is still by far the dominant water use practice in LORWUA.

The belowmentioned uses are canal users only. The LORWUA area also includes roughly ten water users with pumping rights for extraction directly from the river (L1). The biggest of these users is the Lutlouw equity-sharing project opposite the Ebenhaezer community (refer to figure 2) with a dam that has a storage capacity of 2,000,000 cubic meters, and is filled in winter with flood water from the river.

Figure 3. Registered water users in the LORWUA.



Commercial Farmers

Economic activity is concentrated on commercial, irrigated agriculture with approximately 90 percent of the total water used for irrigated agriculture. Crops farmed are: wine grapes, table grapes, tomatoes, citrus, deciduous fruit and vegetables.

Drinking Water Use and Industries

The Matsikama Municipality (MM) is also a user of the canal, with formal registered water rights (figure 3). There are also some industries, involved in sand extraction or production of concentrated tomato juice.

HDIs

The three main groups of HDIs in the LORWUA area were identified as the Vredendal small-scale farmers (VSB), the farm workers employed by the commercial farmers, and the Ebenhaezer community (consists the Ebenhaezer small-scale farmers [EKB] and the Ebenhaezer domestic users).

The second group of HDIs water users are small-scale farmers (seven farmers) cultivating in the neighborhood of the Vredendal town. They get their water from the Municipality.

The third group of HDIs is the farm workers on commercial farms. These people mainly work for CFs and do not irrigate their own crops.

It is important to give some history and background information relative to the Ebenhaezer community. The Ebenhaezer community comprises roughly 3,000 inhabitants (i.e., around 500 families). It is situated in the Van Rhynsdorp magisterial district along the Olifants River approximately 20 kilometers west of Lutzville (refer to figure 2). The Rhenish Mission built a school and a church on the site, which was already serving as a trading post for northbound travelers in 1832. In July 1837, the British Crown granted 5,270

morgen[3] of land to the Rhenish Missionary Society Trust but this land was abandoned in 1887 and, in 1890, it was transferred to the Dutch Reformed Church (Surplus People Project 1995: 80-93 and SPP1) The 1925 Exchange of Land Act (Act 14 of 1925) enabled the government to dispossess the Ebenhaezer community of portions of the Ebenhaezer and Doornkraal farms in favor of white settlement, in order to assist poor white families after the First World War. The Act made provision that other land, adjoining the retained part of Ebenhaezer, be granted to the Ebenhaezer community (Union of South Africa. Act 14 of 1925). The land was consolidated into the Farm Ebenhaezer Kolonie, where the Ebenhaezer community still lives today. However, no land ownership was granted to these people.

A further provision of the Act was that, in terms of the Mission Stations and Communal Reserves Act (Union of South Africa. Act 29 of 1909), all registered occupiers of land were entitled to water free of charge from the Olifants River Irrigation Scheme in respect of an area of 300 morgen (257 hectares). However, the EKB was to provide free labor for the maintenance of their canal.[4] These water use rights were originally meant only for irrigation purposes: domestic use was very small and undefined at that stage. These water use rights were divided among 150 small-scale farmers, but administered as a single farmer by the water authority. Today, the water for the registered 257 hectares is used for domestic purposes as well as irrigation. (Note that under the article 56[3] of the Water Act [Union of South Africa. Act 54 of 1956], Ebenhaezer was not authorized to receive domestic water.) As the population of Ebenhaezer grew and domestic water use increased, the competition for water resources became more evident. This increased demand for water set the scene for future conflict situations between water users in the Ebenhaezer area, in a context of a decreasing flow available to the Ebenhaezer community.

Most of the EKB farmers are very poor, live in marginal conditions and are dependent on subsistence irrigation, fishing, and sheep farming.

The Ebenhaezer community is also currently engaged in a land claim, with which they are being assisted by the Legal Resource Centre (LRC) in Cape Town (LRC1). The Surplus People Project NGO has worked closely with this community by facilitating the processes of the restitution claim through capacity building, technical assistance, and negotiation support. Water-related issues are part of the problem and, throughout the study issues related to land and water will be mentioned simultaneously.

Water Management Issues

Water Quantity

Currently, water supply just balances water demand. All irrigators in the LORWUA are completely dependent on the canal system for their irrigation and domestic needs, with the exception of the few water users who have rights to pump directly from the river in winter. All water use rights within the system have already been issued and no additional rights are available (L1). The use of a demand-orientated approach in managing the canal is problematic because of the long time (approximately 3 days) it takes for releases from the Bulshoek Dam to reach the EKB, who are the end users of the canal. During this period, transportation losses can be extremely high, particularly in summer, from November to February. It is, therefore, difficult to supply the demanded volumes of the water users towards the end of the canal.. In the Olifants River itself, no releases are made from Bulshoek for the ecological reserve, because the dam is leaking at 1,000 m^3/hour (MM3).

[3]A South African unit of area, equal to about 2 acres or 0.8 hectare; from the Dutch: morning, a morning's ploughing.

[4]This canal refers to the internal distribution system of EKB, downstream from the LORWUA EKB water meter.

Insufficient quantity (or canal flow) is the main water-related problem HDIs face in the canal and, therefore, will be the main focus of this paper.

Water Quality in the Canal

The water quality at the entrance to the canal is good. Upstream, the Bulshoek Dam acts as a purification system and agricultural effluents cannot percolate into the canal since it is lined with concrete and most of the irrigation is done downstream in the canal. The general perception of all water users in the LORWUA is that the quality of canal water is very good (L1, EKB1, 2 and 3). The water quality of the canal is currently monitored by LORWUA and the only sources of pollution in the canal come from dead animals and occasional raw sewage spilling (two cases were reported in 2002, L1). According to L1, LORWUA resolved the situation quickly with no danger to human health.

Some HDIs from the Ebenhaezer community are still drinking directly from the canal (EKB2). Indeed, given the unstable water supply for irrigation to the Ebenhaezer small-scale farmers, some irrigators sometimes use their quota of free basic domestic water (6 m^3/month/household) for irrigation. When they discovered that they must pay for additional water used, they started using raw canal water for domestic purposes to save on water bills from Matsikama Municipality (MM). This was still happening in April 2003 (EKB2).

Water Quality in the Olifants River

The water quality of the river itself is very good upstream of the Bulshoek Dam. However, from there and particularly downstream of Lutzville, nitrification becomes a problem (CNC1 and L3). The DWAF is currently monitoring the water weekly but, after the Catchment Management Agency (CMA) is constituted, it will become LORWUA's responsibility. During the dry periods of the year, in March and April just after the irrigation season, the river is at its most polluted. (No water extraction directly from the river for domestic use was recorded.)

There are from time to time signs of high levels of *Escherichia coli* in the river. However, this is a very common natural bacteria and it only becomes a problem when a certain level of bacterial activity is reached, which is not the case in the Olifants River. Effluents from commercial farms are also a problem in the winter months because drip irrigation is by far the most widely used irrigation technique. Although it is extremely economical and the water savings per hectare are substantial, one of the drawbacks of drip irrigation is that land under this type of irrigation tends to build up high levels of nitrophosphates and other fertilizers in the irrigation season. Indeed, the maximum volume of water that can be applied to a specific piece of land in a given time period is extremely limited--therefore the land cannot be regularly 'flushed' (as with overhead impact sprinklers) to get rid of these fertilizers. With the first rains, most of these lands are 'flushed' naturally (it is sandy, well-drained land) of the fertilizer that was applied in summer. The result is that this fertilizer-rich, effluent water drains into the river, and saturate it with nutrients so that there is a sharp increase in the aquatic micro fauna and flora. This boom in micro populations starves the water of oxygen and, after one or two weeks, in mid-April, oxygen levels drop too low to sustain the high level of micro-organisms. Soon after, the water turns a deep green color and has a bad odor, as the result of the micro-organisms dying because of oxygen starvation. This condition lasts for a maximum of one month until the balance between aquatic life and oxygen is re-established or when the winter floods come. The danger, however, is that there can be a loss of species and, therefore, a loss in biodiversity for the local area (CNC1).

The soil of this area is sandy and hence naturally well drained, but it also erodes quite fast. The bulk of erosion takes place in winter when the river floods its floodplain. Most of the vineyards in the floodplain are not accessible until the beginning of September (almost a month after the rainfall season). During the flood period, a lot of fertile topsoil is eroded and lost to the sea. This process is natural, but Cape Nature Conservation and the commercial farmers try to limit this type of erosion by building wire baskets filled with rocks to stabilize the riverbank. Some ecologists do not like the idea of riverbank stabilization, but it is currently the best practice available (CNC1).

The Transformation of the Irrigation Board into a Water User Association

The Vredendal Irrigation Board acted as the founding organization for the LORWUA. As required in the guidelines for the transformation from IB to WUA (DWAF 2000), emphasis has been placed on ensuring racial and gender representation in the constitution. Currently, there are five colored representatives on the LORWUA Management Committee (MC), of whom four represent the HDI water users. The total number of members on the MC according to the constitution is 16, constituted as follows:

- Eight persons from the eight CF subdistricts that had water rights under the previous IB;
- One person from the EKB;
- Two persons representing the farm workers;[5]
- One person representing the MM;
- One person representing the West Coast District Municipality (WDM);
- Two persons representing industrial users; and
- One person representing small-scale farmers around Vredendal (hereafter VSB).

Candidates were elected through a process of nomination on 23 March 2000. Since training and capacity building is essential for HDI representatives, this is currently done in Clanwilliam by the DWAF through courses in WUA management and the intricate nature of the laws that govern HDI areas and their water rights (in particular the EKB).

Water Management in the Lower Olifants Water User Association

Current Management

The area of jurisdiction of the LORWUA includes properties using water from sources not affected by the existing canal, as well as the previous Vredendal IB management operational area. Hence, users that extract water directly from the river during winter, as well as groundwater users, who were not part of the former Vredendal IB (like the Lutlouw equity share scheme), are now included in the LORWUA (Constitution 2000: 6). Even though the Lutlouw Scheme has no direct contact with the canal system, the LORWUA acts as guardian over the scheme (LORWUA Constitution 2000: 3-4).

[5]The LORWUA constitution refers to these representatives as household users (LORWUA constitution, 2000:6 and L1). Although somewhat confusing, it was confirmed by L1 that household users actually refer to farm workers.

The LORWUA no longer receives financial assistance from the DWAF. The only assistance it might receive would be in the form of loans for possible major infrastructure developments (L1).

The DWAF is still responsible for the maintenance of the dam, but LORWUA takes charge of the daily operation of the sluice gates. Currently all of the sluice gates are in need of repair and any infrastructure-related costs, like upgrading and major repairs to sluice gates, are the DWAF responsibility until the dam is in a proper state for the transfer (L1). There are 16 sluice gates at the Bulshoek Dam, all of which were in a very poor state until the DWAF replaced 15 of them with new gates. The newly installed gates do not have the correct overhead gear and are currently not operational. The last old gate also needs to be replaced (L1). In the near future, however, Bulshoek Dam should become LORWUA's full responsibility.

The LORWUA is responsible for the operation and management of the existing waterworks infrastructure at the Bulshoek Dam, and for the water distribution system from Bulshoek to the Ebenhaezer community and Koekenaap (L1). It is not responsible for managing the internal distribution system of the EKB.

The canal is operated on a demand-based system whereby the total demand of the LORWUA users is requested daily from the Clanwilliam Dam (outside the LORWUA management area). The Bulshoek Dam is used mainly as a balance dam for the canal. Special authorization is needed for LORWUA users to pump directly from the river (L1).

Irrigation water cost roughly R1,537/ha/yr in 2003.[6] Two quotas are used in the LORWUA, namely a yearly quota of 12,200 m^3/ha and a weekly quota. The weekly quota, also called maximum extraction rate, is equal to 325 m^3/ha for all irrigators. No irrigator is allowed to demand more than the maximum extraction rate and no cross-substitution between weeks is allowed (i.e., an irrigator is not allowed to receive 200 m^3/ha one week and 450 $m^{3/}$ha the next week), because of the limited carrying capacity of the canal.

All registered irrigation users in the LORWUA are theoretically entitled to 12,200 m^3/ha/yr (this amount was determined on 15 April 1983). The theoretical figure of 12,200 m^3/ha/yr must be understood in terms of a total available volume because, since 1998, water has not been linked to land any more and each farmer can farm on whatever land area he wants, as long as he/she does not use more than his/her total volumetric quota. However, the actual yearly quota is often reduced after an annual estimation of the amount of water present in the Clanwilliam Dam in October/November each year. It seldom happens that the yearly quota is really 12,200 m^3/ha.

The canal operates for 40 weeks in the year (it varies actually between 38 and 42 weeks). Therefore, during normal years, when farmers get their full annual quota, the two quotas amount to the same volume of water: 40 * 325 = 13,000 cubic meters. However, when the annual quota is lower (e.g., 8,133 m^3/ha in 2002), the farmer has to take the annual quota into account when making his/her weekly water demands.

IWRM in the WUA

The transformation process is still not complete with regard to the transfer of the DWAF staff to the LORWUA. This hampers the ability of the LORWUA to practice IWRM properly on its own. The result is that, at this stage, no clear-cut distinction could be made between IWRM from the DWAF, and IWRM from the LORWUA, because the personnel of

[6]In 2003, ZAR1.00 = approximately US$0.12.

these two organizations are currently shared. The transfer of personnel from the DWAF to the LORWUA is currently the LORWUA's most important issue (L2 and L3).

The LORWUA would like to incorporate the irrigators from the mid-section of the Olifants River, i.e., those upstream of the LORWUA, where there is a small canal between the Clanwilliam and Bulshoek dams with users who have canal rights and river pumping rights. However, these farmers are not keen to join the LORWUA, probably because of the price difference between the fees paid to LORWUA (R1,537/ha/yr) and their fees. Currently these users pay R236/ha/yr for their water and they maintain their own canal. According to L1, these water users do not have to pay high water prices because their infrastructure differs significantly from the LORWUA canal that carries water from the Bulshoek Dam.

Water Management and the Promotion of HDIs in the LORWUA

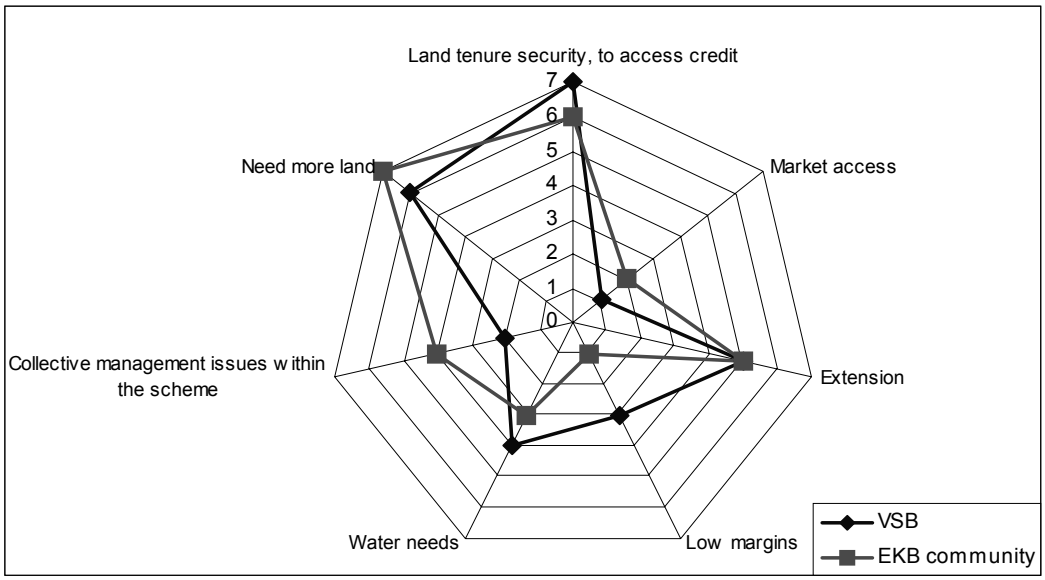
Among the fundamental purposes of the 1998 NWA are the aims of meeting basic human water-related needs and promoting equitable access to water resources (1998 NWA, section 2).

The extent to which these HDIs are accommodated in the LORWUA will be discussed in the following subsections. The first two subsections describe HDIs' needs in general and their needs with regard to water. Then the EKB's main problems are assessed, and the last subsection analyses the LORWUA's ability to tackle these problems.

HDIs' Needs in General

In both the EKB and the VSB, a water user was asked to rank the problems faced by the community. Although interviewing only one user limits a priori the capacity of extending the results to the whole community, the interviewees were asked about general water-related problems, which all users usually face. The following figure 4 is a graphical representation of the needs of the two groups.

Figure 4. General needs of the EKB and the VSB.



Respondents to the interviews were asked to rank seven types of farming-related needs from most important (7) to least important (1).

The graph shows a similar pattern for the problems of the EKB and the VSB. It appears that acquiring additional land is a high priority for the EKB. This was also mentioned in the interviews: The 1.6 hectares per small-scale farmer is considered too small an area for a sustainable livelihood.

The most important need for the VSB is with regard to access to credit because all the funds received for their project are already invested in the demarcated land.

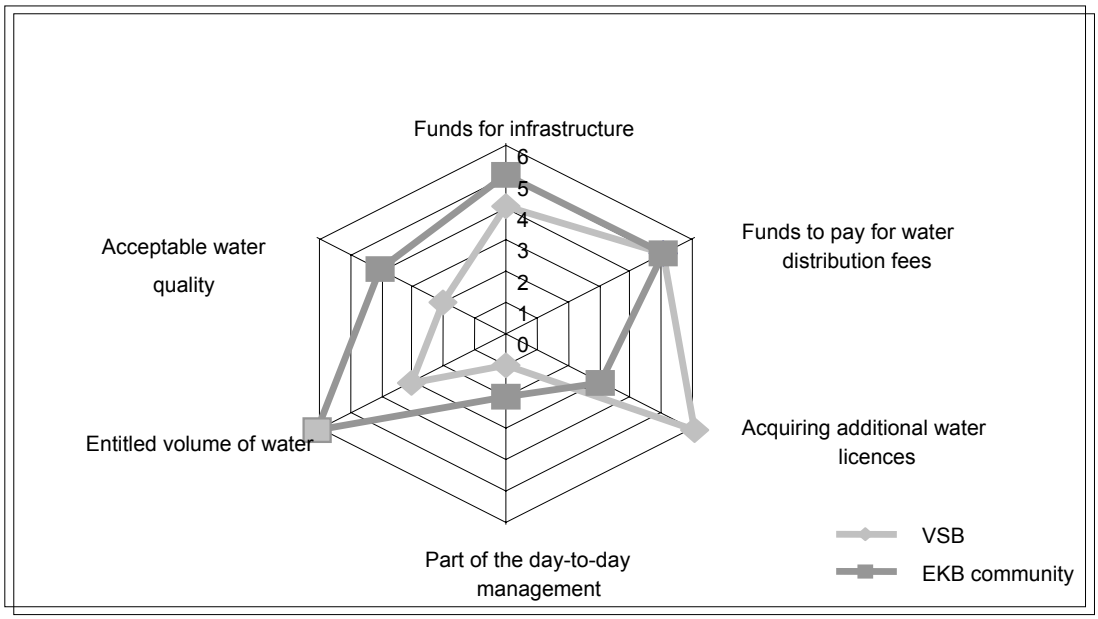
The fact that low margins, market access and water needs are not ranked high does not mean that they are not important. The EKB argue that land-related problems enjoy priority.

HDIs' Needs with Regard to Water

Farm workers on commercial farms are supposed to participate in the decision-making process in LORWUA via two representatives at all MC meetings, so that this participation could be a launching pad for discussing the needs of farm workers. However, each CF is supposed to provide his/her farm workers with all their water needs, which include safe drinking water and proper sanitation and, since the farm workers do not farm themselves in the LORWUA area of jurisdiction, no needs were identified with regard to their access to irrigation water.

The following figure 5 is a graphical display of a assessment of the needs of the HDIs in the EKB and the VSB.

Figure 5. Water-related needs of the EKB and the VSB.



Both persons interviewed marked funds for infrastructure and funds for water distribution fees as important.

The VSB farmer marked the acquisition of additional water licenses as his most important need. This could be because the VSB buy their water from the Matsikama Municipality and pay marginally higher tariffs for irrigation water than CFs (VSB1). The EKB farmer did not rate additional water licenses as important because he thought that the

problem was not that they needed more water rights, but rather that they were not receiving the amount of water they were entitled to. The two persons interviewed rated participation in the daily management of the LORWUA as not important. The VSB farmers are represented in the LORWUA and they have few problems with the management of the association.

Water quality is not a problem for the VSB because they are quite high up in the canal compared to EKB. Water quality problems are stated to be of relative importance to the EKB, but they were dominated by water supply problems within the EKB.

The EKB ranked entitled volume of water as very important because, although they do have an entitlement to water, there are some fundamental problems regarding the definition and supply of the water. Therefore, the single most important need identified by the member of the EKB was related to an inadequate supply of water.

Inadequate water supply could refer to the total volume of water received over a given period or to the regularity of the water supply over a given period. Within the EKB, variable water supply is a greater problem than the total volume of water received over the year. The problem is that the area where the LORWUA operates is subjected to extremely high evaporation losses during the transport of the water along the 280 kilometers of open concrete canal. All the variations of flow, due not only to evaporation, but also to canal leakages, canal breaks, water theft and difficulties in management, have an impact at the tail-end of the canal.

The ability of the LORWUA management to release the exact volume of water from the Bulshoek Dam to satisfy water demands in districts 7 and 8 (farthest from the Bulshoek Dam), is a to a great extent a function of their ability to predict the weather accurately. Evaporation alone is sometimes responsible for losing up to 35 percent of the total volume of the canal (L1). It is, therefore, difficult to supply water users at the end of the canal (districts 7 and 8 as well as the EKB) with a steady supply of water. In order to smooth the water supply to these users, a small balance dam is in the final planning phases, construction of which started in April 2003.

Major Problems Faced by the Ebenhaezer Community

The abovementioned water-related needs of the EKB can be grouped into three main areas:

- Canal flow
- Canal management
- Leadership and participation in the LORWUA MC

Do the EKB Farmers Receive the Canal Flow They Are Entitled To?

According to the 1925 Act, the EKB farmers are entitled to enough water to irrigate 257 hectares (confirmed by the LORWUA entitlement document, 2000:8). However, several elements make EKB water use different from CFs. First, though EKB farmers are entitled to a given annual volume, they do not get water on a demand basis as other commercial farmers do; and second, the entitlement of EKB is, according to Act 14 of 1925, only for irrigation purposes, but this water is currently also used for domestic purposes.

Since they are situated on the downstream part of the canal, they receive all unused flow from the CFs upstream and the LORWUA tries to make sure that they receive a steady flow. Within the EKB entitlement for 257 hectares in the LORWUA, a change was made because EKB is an ‘end canal’ user and they receive surplus water (in this document, the surplus

water is defined as the difference between the actual flow and the scheduled one at the entry --distribution point--of Ebenhaezer). Therefore, the IB has limited the initial quota of EKB from 12,200 m^3/ha/yr to 10,460 m^3/ha/yr (i.e., a 14 percent reduction). The translation of the initial annual quota in a reading of the meter at the entrance of Ebenhaezer is summarized in table 2 below.

Table 2. EKB theoretical entitlement to irrigation water.

Entitlement	(m^3/ha/year)	10,460.00
Total enlisted hectares		257.00
Total water entitled	(m^3/257ha/year)	268,220.00
Water entitled per week	(m^3)	67,205.50
Entitled flow	(m^3/ha)	400.03
400 m^3/hour traslated to 2-foot Parshall meter reading		195.2 points

It must be noted that the abovementioned 192.5 points is a theoretical reading, given that there is no decrease in the general annual water quota.[7]

Since 1998, the West Coast District Municipality (WDM) received a right to use surplus water but, though WDM theoretically has a right to surplus water only, they are, in fact, a user of highest priority, which can become of importance during periods of low water flow. This priority is put into practice through the design of canal management within Ebenhaezer, which ensures that domestic use will be served first. Therefore, even if the domestic consumption is on average only 8 percent of the total water demand, it can have a significant effect on irrigation in periods of scarcity.

There is indeed ample surplus water flowing past the LORWUA EKB meter (MM3). However, LORWUA calculations are based on the assumption that users will withdraw water from the canal night and day but the EKB cannot do this because they can only practice flood irrigation during the day, and they do not have a dam to store the unused water for use during the day. Although it may seem that some additional surplus water is created by the fact that EKB farmers do not irrigate at night, therefore creating unused water at night, this is not surplus water, but quota water that is wasted. The reduction of the theoretical EKB entitlement in the LORWUA is, therefore, questionable and, by deciding on a theoretical flow of 10,460 m^3/ha/yr (192.5 points on the LORWUA EKB meter), the LORWUA makes the following dubious choices:

1. Not giving the EKB farmers the opportunity to irrigate on a demand basis (confirmed by EKB3);
2. Reducing the theoretical annual quota of 12,200 m^3/ha/yr to 10,460 m^3/ha/yr because EKB is an end canal water user without legal grounds for doing so;

[7]The 192.5 points could be much less because, at the beginning of each irrigation season, a projection is made of what the quota per hectare for that particular year will be. The reading on the 2-foot Parshall meter for the EKB, with a restriction of 8,133 m^3/ha/yr in the LORWUA, would be as follows: 257 hectares * 8,133/42 weeks/168 hours = 296 m^3/hour or, according to the 2-foot Parshall meter table, 158.5 points (This procedure is exactly the same for all water users in the LORWUA). It is, however, not clear whether an additional 14 percent is deducted from the 158.5 points for EKB.

3. Discounting the fact that EKB farmers do not have storage facilities to make use of the night flow (except for the small Olifantsdrift balance dam). However, it must be noted that many CFs practice flood irrigation on a 24-hour basis; and
4. Not taking into account requirements for WDM and Ebenhaezer community domestic water, which should receive higher priority than all irrigation rights in LORWUA, and hence lead to a greater flow at the LORWUA EKB meter.

Moreover, in the rationale for the decrease of the EKB quota, the surplus water argument has been used twice: *first* to decrease the amount of water given to the EKB, and *second* to supply the WDM with domestic water.

The Actual Flow Received by EKB

The previous subsection explained the EKB entitlement: This section analyses the volume of water the EKB actually receives. The only data available for determining the flow towards EKB is the measuring point at the LORWUA EKB meter just upstream of the main distribution point (figure 9).

The EKB is one of three water users who receive water that flows past the LORWUA EKB meter. The others are the WDM (for the domestic use of Strandfontein, Doornbaai, Viswater and Papendorp), and the MM for the domestic use of Ebenhaezer community, which includes the town of Ebenhaezer and a Reconstruction and Development Program settlement downstream of the Olifantsdrift Dam. This meter is the last meter where canal flow is accurately measured and the main distribution point is downstream from this meter. Therefore, the only way to estimate the volume of water EKB is receiving for irrigation purposes is to deduct the domestic use of the WDM and the MM (measured at the water purification works of the WDM) from the volume that flows past the LORWUA EKB meter (MM3).

Figure 6 below is a graphical display of the total weekly flow measured at the LORWUA EKB meter from October 1993 until October 2002. The following remarks are important before trying to draw any conclusions from this graph:

- The graph is based on the total weekly flow (approximated, since it is based on only one weekly measure) from October 1993 to December 2002.
- The measuring system of the LORWUA was only computerized in 2001 so no surplus flow data was available between March 1999 and July 2000.

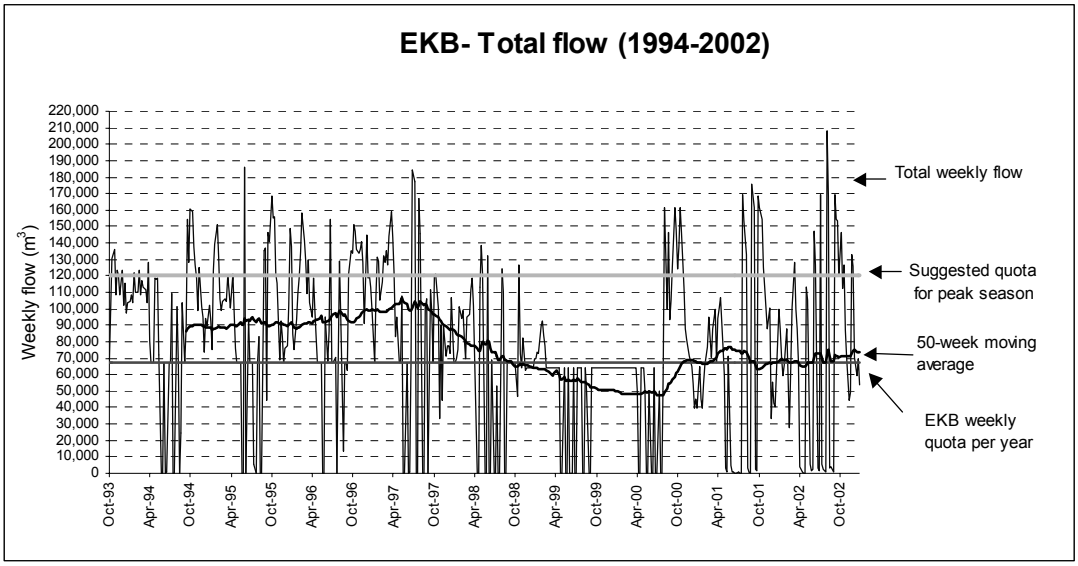
The graph indicates the total flow past the LORWUA EKB meter, as well as a 50-week (yearly) moving average of the flow (the periods when the canal was and when data are missing are taken into account). The weekly quota (67,200 m^3) for which the meter is registered is also indicated (refer to the horizontal line at 67,200 m^3).

Note the sudden yearly drops in the total flow due to canal maintenance, during which no water is available for the water users. According to L1, the canal is active for roughly 40 weeks of the year.

The yearly moving average starts to decrease after October 1997 and intersects the registered quota at roughly October 1998. From there, the moving average is less than the quota (but note that no surplus data were available after March 1999) until it starts to increase again after September 2000 and intersects again with the quota on December 2000. It does not, however, increase to its previous level from before October 1997. This indicates a fall in surplus as from October 1997, and therefore a fall in flow past that point. There are large variations in surplus flows, i.e., in flow above 67,200 cubic meters per week.

The decline in the difference between total flow and the quota past the EKB point after October 1997 suggests a reduction of the surplus, which in turn suggests an increase in commercial agricultural irrigation upstream. The main possible explanation is that, after 1998, commercial farmers were no longer constrained to irrigate a specific area and they made the maximum use of their water entitlement. (Note that no additional water use rights were issued after 1998.)

Figure 6. Total flow arriving at the entry of the EKB.

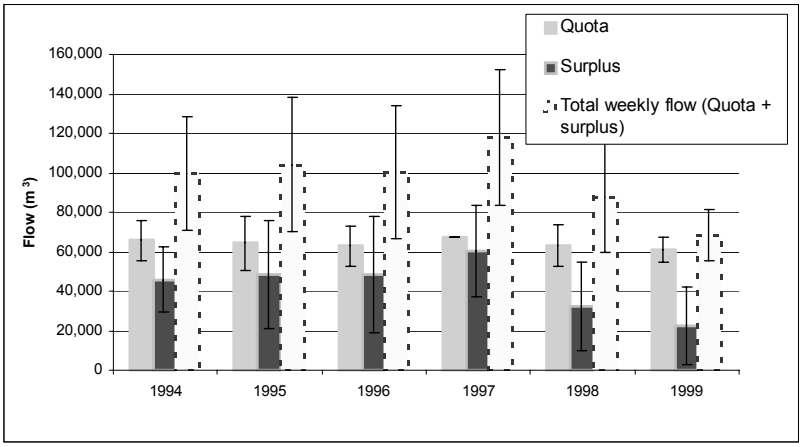


The following table 3 and figure 7 analyze in more detail figure 6. Table 3 includes the standard deviation and average flow for 1994–2000, but only for periods when the canal was in operation. During this time, the average quota received past the point was 64,232 m^3/week. Average total flow is 92,550 cubic meters for the period, but recall that EKB is not the only user of the water that flows past the LORWUA EKB meter. The question should, therefore, be whether the difference in total flow and the full quota is enough for all other uses that take priority over irrigation.

Table 3. Weekly flow for the LORWUA EKB meter.

Weekly flow 1994–2000 (m^3)			
	Quota	Surplus	Total
Average	64,232	46,076	9,255
Standard deviation	9,178	26,011	32,742

Figure 7. Average weekly flow with Standard Deviation at the EKB meter.



The standard deviation of 26,011 indicates a very unstable supply of surplus water. The probability of a non-existent (or even negative) surplus is therefore considerable, which explains the current conflict between irrigation and domestic uses.

Figure 7 indicates the average weekly flow per year. The standard deviation of each year is also indicated (as said earlier, no surplus data were available after 1999 and some surplus data were missing for 1999).

The annual standard deviation of the surplus almost equals the range of the surplus during the same year. This indicates an unstable surplus and that any water use right based on surplus water should be questioned. Note the small standard deviation for the quota: This suggests a stable quota for the EKB, but recall that this graph is of total weekly flow and that variation in supply within the week is not shown.

Comparison With the Needs of EKB.

The next step of the analysis is to compare the flow arriving in EKB with the water needs of EKB, especially during the peak period. The water needs at the EKB meter are based on domestic needs as well as irrigation needs.

Beans and lucerne were identified as the two main crops under irrigation in Ebenhaezer. The planting season for beans starts at the beginning of April and the harvest time is roughly in August. A second season for beans starts in October of the same year, with harvest at the end of February. Lucerne usually follows. The April to August season is in the winter and evapotranspiration losses are much less than in the summer season. The following figure 8 is a short summary of a typical irrigation season for this area.

Figure 8. Cropping pattern in the EKB.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			winter beans						summer beans		
summer beans		lucerne									

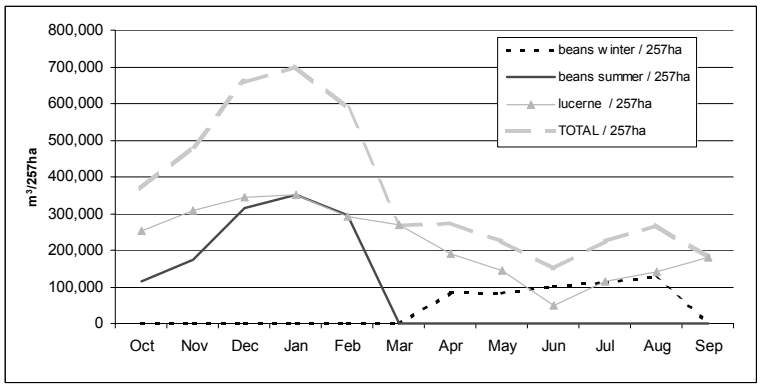
Roughly 6,370 cubic meters are needed to flood irrigate 1.6 hectares of beans for the whole winter season (150 days) (WCDoA1). This figure is substantially higher for the summer season, when 15,380 cubic meters of water are needed to flood irrigate 1.6 hectares in the October to February planting season.

For lucerne, more water is needed. A volume of 21,020 cubic meters of water are needed to flood irrigate 1.6 hectares of lucerne for one year in order to harvest the crop to its full potential. If the EFs irrigate less, the lucerne still yields a harvest but not to its full potential. What normally happens in Ebenhaezer is that the farmers irrigate what they can and hope for the best. Harvest time for lucerne is December/January when it is cut and baled (WCDoA1).

The following graph (figure 9) displays the irrigation needs during a typical year in the EKB area (WCDoA1). The graph has been drawn for 257 hectares of irrigated land with an assumed 50 percent beans and 50 percent lucerne. An irrigation efficiency of 0.65 was used to take into account flood irrigation.

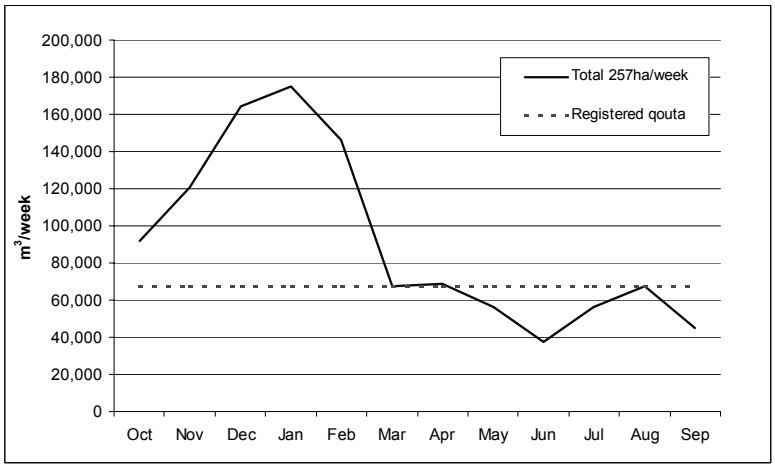
Figure 9 indicates a clear peak season from October to February because beans need relatively little water in the winter planting season, which is from April to August.

Figure 9. EKB monthly crop water requirements.



The following graph (figure 10) is based on the previous one, but displays the total weekly irrigation need for the EKB (257 ha). The dotted line indicates the quota from LORWUA (for all water uses served by the meter). All surplus water should be added to the quota before comparisons between the need and the quota can be made.

Figure 10. EKB weekly irrigation requirement.



The following table 4 represents all water uses at the LORWUA EKB meter and could be seen as a summary of all water needs for the EKB measuring point during times of peak demand. While the irrigation needs are based on detailed crop water requirements obtained from Elsenburg Agricultural College, Western Cape, the domestic need is based on actual water usage obtained from the MM.

With the current system, the EKB small-scale farmers are entitled to 400 m^3/hr (the deduction of 46 m^3/hr for domestic use is considered to be buffered on average by the surplus). Flood irrigation is only practiced in daylight, therefore, an effective irrigation period of 12 hours a day is assumed. Hence, a maximum of 48,00 m^3/day = 33,600 m^3/week is available for irrigation. It is currently practically impossible to supply EKB with 67,200m^3/week only in daytime because the canal operates on a 24-hour basis. Therefore, roughly half of the EKB small farmer entitlement is wasted as 'surplus' water during the night due to insufficient storage capacity.

From table 4, it is possible to calculate that, given the current water supply, a maximum of 90 EKB small-scale farmers could be accommodated in the peak time (given the first assumption of the table). Mainly because of this water deficiency, only 56 EKB small-scale farmers are still active on 126 hectares of the original enlisted 257 hectares (WCDoA1).

Table 4. Water need at EKB measuring point in the peak season.

Flood irrigation in EKB					
Crop	Season	Total water need for 1.6 ha (m^3)	Farmers #	Need (m^3)	Need (points)
Beans	Oct-Feb	15,382	75	1,153,650	
Lucerne	Nov-Feb	10,090	75	756,713	
Subtotal				1,910,363	
Total domestic use in EKB (in peak season)[2]				74,691	
Total domestic use for WDM (in peak season)[2]				53,990	
Total use (m^3 in peak season)				2,039,044	
Total need in peak season[3]			(m^3/week)	119,944	
Irrigation need in peak season			(m^3 /hour)	669	261.00
Domestic need in peak season			(m^3 /hour)	45	4.70
Total need in peak season[3]			(m^3 /hour)	714	280.00
Water received past EKB meter in peak season[4]			(m^3 /hour)	458	210.00
Shortage in peak season			(m^3 /hour)	256	

[1]Note that the assumption was made that half the farmers plant lucerne and the other half plant beans. In reality farmers plant both crops, but on half their land. Another important point to note is that, according to the DoA, only 56 of the original 150 farmers (or 126 hectares) are still active today, so the stated water needs will be smaller in reality.

[2]Based on Matsikama Municipality data for 2001 (peak season is 17 weeks: Nov-Feb).

[3]That is, 2,039,044/17 weeks/7days/24 hours.

[4]Based on LORWUA flow meter readings at EKB.

To conclude, there is evidence that the current water supply is insufficient for the following reasons:

1. The water right of EKB was reduced by almost 15 percent;
2. It is difficult to schedule the use of surplus water;
3. EKB farmers cannot make use of their full quota;
4. The practice of flood irrigation is not suitable for a water scarce area; and
5. Domestic use is steadily growing.

Note that the total volume of water is not mentioned here, because EKB does indeed receive more than their quota on a yearly basis.

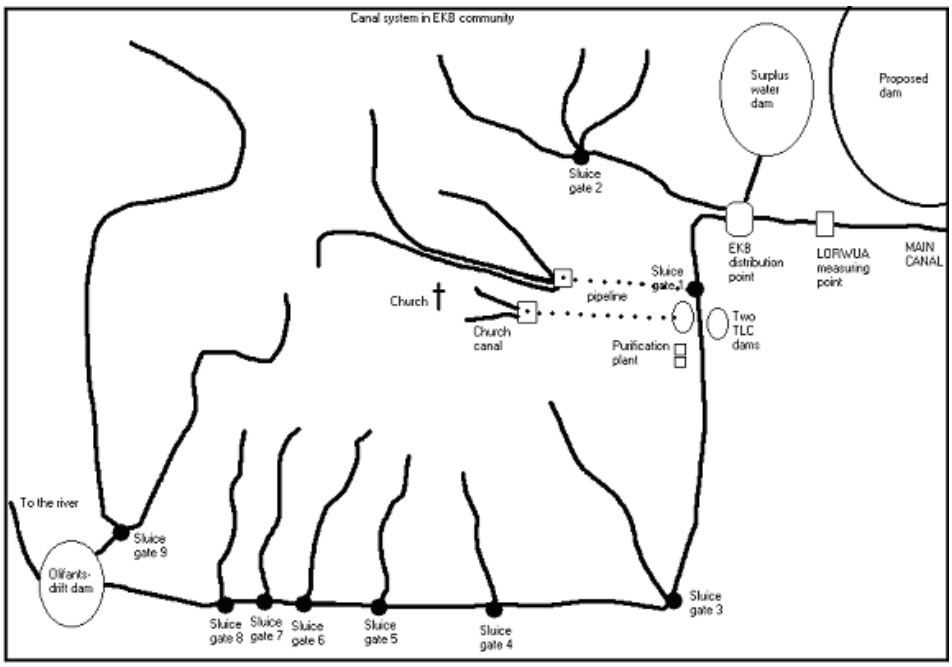
Internal Management of Water Allocation Within Ebenhaezer

It is also necessary to assess the internal management of the water allocation within the EKB. If it appears that mismanagement of the internal canal system is to blame for extreme water losses in the community, it may be necessary to tackle these internal problems first.

This analysis will be reported by first explaining the physical infrastructure of the EKB canal system and then the management of the system. Afterwards, the main problems that could lead to water losses will be discussed. Lastly, some suggestions will be made for addressing these problems.

The following sketch (figure 11) illustrates the internal distribution system of EKB. It is important to note that there is no official drawing of the canal infrastructure and this sketch is a copy obtained from the SPP.

Figure 11. Schematic description of the canal network within the EKB.



Description of the Waterworks

The LORWUA canal splits downstream of Klawer to the left- and right-hand sides of the river. The canal towards EKB is part of the left branch of the canal. There are nine sluice gates in the main canal to EKB (5,000 m long). All the sluice gates are connected to primitive internal earthen canals with secondary sluice gates. These secondary canals are not lined with concrete and transportation losses are extremely high due to infiltration in the canal itself (note that the secondary canals are made of sand and drainage losses are extreme), canal breaks, and lack of maintenance within the EKB group. LORWUA canal water enters the system directly from the main canal through the LORWUA measuring point. This is the last time irrigation water is measured (refer to figure 11). The water is distributed at the main distribution point to the surplus water dam used for the communal farm of the Department of Agriculture (DoA) (WCDoA1), to the second main sluice gate, and to the rest of the canal. The canal between the distribution point and the second sluice gate is also an earthen canal. Water for domestic uses is extracted from the canal between the EKB distribution point and sluice gate 1. The purification works service all the EKB domestic needs, as well as the domestic needs of Doornbaai, Papendorp, and Strandfontein.

The WDM installed two reservoirs, from which the purification network starts. An employee of the WDM is permanently stationed there and manages the sluice gates at the distribution point to ensure that there is always enough water for the purification network. The use of drinking water for both Ebenhaezer (who received their first purified water in 1996, MM3) and Strandfontein is not formalized with LORWUA. WDM uses surplus water but they have a use of higher priority relative to EKB farmers and, as mentioned before, this surplus water has also been dedicated to EKB to be able to decrease the scheduled flow. There is currently no measure of how much water really goes to the purification network. This extraction by WDM (with a right to surplus water only) is a source of conflict between WDM and EKB.

Sluice gate 1 is linked to an underground pipe that services its users. The church also receives its water via a pipeline, with the water coming from one of the Transitional Local Council dams (SPP1). The church is the only irrigator that receives water directly from a dam and, hence, has a very stable water supply. Sluice gate 3 is situated on a natural bend with a steep gradient to the fields below so that, when this gate is opened, the rate of delivering to the other gates (it depends on the routine but it is normally gate 4 or 5) falls dramatically. Therefore, the management of gate 3 is a source of internal conflict between irrigators. Gates 4, to 9 follow on from gate 3. The canal ends in the Olifantsdrift Dam, which is used as a balance dam for gate 9. It was suggested by the SPP that this dam should be filled in the night, when the EKB irrigators do not irrigate, for use as irrigation dam by the gate 9 users (SPP1). This worked, but some problems are currently experienced because not all irrigators abide by this rule.

Management of the Canal

A water management committee is responsible for the management of the internal distribution system of EKB. Within the EKB, only the water right holders are allowed to manage canal sluice gates.

In the past, there was enough water even in times of peak demand and, hence, no specific system of allocation was set up. More recently, because of the increase in water scarcity, on the recommendation of the SPP, a water-bailiff was appointed to assist with and check on the water allocation cycle. Each irrigator is responsible for opening and closing his

own sluice gate. No locks or clips[8] are used and the success of the system is entirely dependent on the cooperation of the irrigators. This has proven to be a very fragile management system and is certainly one of the main reasons for conflicts in the EKB. SPP tried to set up management of the sluice gates based on a time schedule with a watering cycle of one-and-a-half weeks. Each irrigator would be granted a fixed period for watering his crops, disregarding the actual flow. However, the unstable water supply has meant that a system based on timing did not deliver equal volumes of water to each irrigator and this was problematic (EKB1, EKB2 and EKB3). A second strategy was proposed by the SPP (SPP1), where each irrigator irrigates his/her land until saturated and then passes the turn to the next irrigator. The consequence was that the watering cycle on average became 3 weeks. This was much too long for cash crops and bad harvests with a low morale among farmers became the norm.

Roughly 90 percent of the EKB at present are members of the Verenigende Gereformeerde Kerk (VGK) church. Since the EKB originated from a mission, the church was always respected as the moral and ethical caregiver. Members of the church who had water rights shared their water with the church, so that the church would remain functional within the EKB. Nevertheless, over the years, the link between the church and the community has been eroded.

The 'Exchange of Land Act' (Act 14 of 1925) stated that water right holders could receive free irrigation water in exchange for free labor to maintain the canal. Initially, the agreement was respected from both sides. However, in more recent times, social links within the community weakened, and problems were experienced in obtaining sufficient labor for maintenance and upgrading of their canal system.

Role of the New Dam

In 1997, a project was initiated by some CFs to try to help the EKB develop some additional agricultural land (WCDoA2). The idea was an equity-sharing project similar to that of the Lutlouw equity-sharing project. This project identified the need for a dam and R1,450,000 was made available from the DoA to upgrade the current canal system and to build a dam. However, the community of Ebenhaezer did not want to go further with the scheme because it mistrusted the intentions of the CFs and, so the project was terminated. The money is still available at the DoA. This same funding was made available for the construction of a new dam at EKB. This newly proposed balance dam is a joint project of the DWAF, DoA, WDM, and LORWUA. It was initiated by the LORWUA but mainly developed by the DoA.

The motivation and stakeholders of the new dam are as follows:

- Stabilizing the flow for EKB (257 ha);
- Stabilizing the flow for CFs in district 7 (71 ha); and
- Domestic use for EKB, Doornbaai, Papendorp, and Strandfontein.

The DWAF will be responsible for the construction of the new dam upstream of Ebenhaezer. It will have a volume of 140,000 cubic meters and not the original 203,000 cubic meters proposed (WCDoA2). The dam will be 198 x 198 x 6 meters and will be waterproofed with high-density polyethylene hexane. It will serve as a balance dam to smooth out the supply of water to the LORWUA EKB water meter. After the completion of

[8] 'Clips' refer to the calibration system of built-in canal meter boxes.

the dam, it would make sense to reintroduce the time scheduling in the EKB to try to give each irrigator an equal volume of water per hectare.

According to WCDoA2, the most important determinant of the volume of the dam was the variation in water supply relative to the total volume flowing past the LORWUA EKB meter. Crop water requirements did play a part in the determination of the volume, but past and projected surplus water played the dominant role.

The financing of the project will be done as per table 5 below:

Table 5. Financing of the EKB balance dam.

Source	Contributes
DWAF	Construction
DoA	Lump sum of R1,450,000
WDM	Will be billed directly
LORWUA	Management and maintenance
EKB	Dam site

Source: WCDoA2

Total cost of the dam is estimated at R4,450,000 (WCDoA2), the remaining R3,000,000 being paid by the DWAF and the WDM.

Conclusion

This analysis showed that water demand exceeds water supply at the LORWUA EKB meter during the peak demand period of November to February. There is an extreme variation in the supply of surplus water, which leaves rights to surplus water during peak times of little value.

There should be a revision of water rights to ensure proper entitlement to domestic water use because water use rights based on surplus water are not clearly defined.

The new dam will enable EKB to benefit from the night flow and will be used as a stabilizing dam for the irrigation needs of the EKB. However, the dam is not large and it is not certain whether the dam will have storage capacity for enough water to cater for long low-flow periods.

An alternative could be to increase the water use efficiency, given the same water supply. This argument suggests the importation of more efficient irrigation technology (like a pressurized water supply and drip or sprinkle irrigation), but requires considerable capital outlay.[9] The fact that EKB makes use of flood irrigation (with an efficiency coefficient of 0.65) is important since drip irrigation (with an efficiency coefficient of roughly 0.85) could have enormous savings in total water usage. However, the cropping pattern must be kept in mind, i.e., beans are not irrigable under drip irrigation (but sprinklers could be used).

Another solution could be to put aside a given minimum flow for the WDM (based on projected domestic supply) and then to help EKB set up a demand management system.

Some infrastructure-related operations have already started, according to an action plan proposed by the MM (MM3). This plan consists water distribution,[10] canal maintenance (R14,000,000), and the new balance dam. A decision was taken to repair the canal system,

[9] The replacement of the entire open canal system of EKB with a closed pressurized system is also in the planning phases (this project is also initiated by the LORWUA) (L1).

[10] Water distribution includes the completion of distribution boxes in EKB, the installation of measuring points, calibration of the system, maintenance, and permanent personnel for managing the canal in EKB.

through a 3-year program (2001–2003) with a total budget of R800,000 financed by Land Care, a program financed by the Department of Agriculture. During this initiative, several actions have been taken:

- removal of trees along the canal;
- lining the main canal with concrete; and
- hiring of a water bailiff from October to March to organize the distribution of water.

Repair of the broken sluice gates has not been completed due to insufficient funding.

Do HDI Representatives Actively Participate in the LORWUA Management Committee?

Language is certainly no obstacle since all the people speak Afrikaans. Currently, all members of the MC are men, with the exception of one of the two farm-worker representatives. None of the HDI representatives had a detailed knowledge of the 1998 NWA, and the responsibilities of the LORWUA or the future CMA.

Overall, HDI representation in the LORWUA MC is currently not very active. At a MC meeting on 20 March 2003, the only HDIs present were one person from Ebenhaezer--but not the formal representative--and one of the two farm-worker representatives.

VSB

The representative of Vredendal small-scale farmers speaks for seven small-scale farmers. He is generally present at all LORWUA MC meetings (L1 and L3). However, the link between the representative and the rest of the small-scale farmers is not clear. His ability to actively participate is still hampered by a lack of experience and knowledge of commercial farming practice (L1 and L3), although small-scale farmers do feel part of the management of LORWUA and would like to play an important role in the general promotion of HDIs (VSB1). However, it was clear that some capacity building with regard to the current responsibilities of the LORWUA and the CMA is still needed.

EKB

The active participation of the EKB is problematic, because the representative of the EKB no longer attends MC meetings due to an imbalance of voting power (EKB1).

The status of the EKB with regard to membership of LORWUA is also uncertain. According to the constitution (LORWUA 2000: 6), the EKB do have a representative on the LORWUA MC but the EKB is not officially part of the WUA. Therefore, there is uncertainty regarding the leadership and representation of the EKB in the LORWUA MC. Mutual mistrust, history and politics play an important role in the inability of the EKB to identify a representative for the LORWUA MC. There have been several initiatives from LORWUA to try to mobilize the EKB to elect a representative, and the SPP also played a leading role in this regard (SPP1) but, so far, the success of such initiatives has been limited.

Farm Workers

The presence of the farm-worker representatives did not lead to any explicit changes for this group of users, for two reasons. First, there is no organization within the farm-workers' community: The farm-workers representatives do not know much more than what is happening on the farm where they are working. Second, the farm workers in the LORWUA do not face major problems with respect to water (FW1).

The Ability of the LORWUA to Address These Problems

The EKB is a water user with a minority of water use rights. Their main problem is to make sure that they obtain their entitled water rights. The answer to this problem lies in monitoring of their entitlement, either through a monitoring organization like the DWAF or by installing proper monitoring equipment in the EKB. The LORWUA could do the latter.

At a meeting between the LORWUA and the EKB on 9 April 2003, both parties agreed to propose an action plan to upgrade the EKB canal system. These proposed plans were to be discussed at a subsequent meeting.

LORWUA currently has many staff problems, which hamper its ability to accommodate HDIs with regard to capacity building. The manager of the WUA actively tried to reach out to the EKB to help them organize themselves and to identify a legitimate leader to represent them in the LORWUA.

Communication between HDIs and their representatives at the MC was identified as a problem, and that the LORWUA could help these representatives to communicate clearly with their right holders, and assist in organizing the HDI groups.

There are currently no training programs in good irrigation practices and water management administered by the LORWUA. However, according to L1, the local CFs play a very important role in the transfer of knowledge and practical expertise to the small-farmers in particular (confirmed by SVB1 and EKB3). Apart from the initiatives from the CF, the DWAF and the DoA are currently the main role players in capacity building. L1 foresaw that LORWUA would only start playing a leading role when all its personnel have been transferred from the DWAF. Such capacity building initiatives should be enacted on EKB premises (and those of other HDIs) and not in far off places like Clanwilliam, because transport is a major constraint for HDIs.

The new balance dam upstream of EKB will address the water supply problem of the EKB meter. The LORWUA will maintain and manage the dam free of charge for EKB (as the main beneficiary of the project).

Other Relevant Issues for HDIs

Internal Problems Within the EKB

The community is organized around a committee established by the Transitional Local Council on 26 October 2000 in accordance with the Transformation of Certain Rural Areas Act (TRANCRAA), (Republic of South Africa. Act 94 of 1998), (SPP1). The TRANCRAA committee has the following subcommittees (Surplus People Project 2001:4-10):

- Tourism
- Mining and Fishing
- Plots and Buildings
- Agriculture
- Land Claims
- Communication

In April 2003, the Ebenhaezer representative on the LORWUA MC was also the chairman of TRANCRAA, as well as chairperson of the following subcommittees: Land Claims Committee, Communications Committee, and Executive Committee. Moreover, at the December 2000 Municipal elections, the chairman of TRANSCRAA was elected as Councilor of Ward 1 of the MM (Ebenhaezer is only one area of Ward 1). Such

concentration of responsibility in one person proves to be problematic in addressing the internal conflicts faced by the EKB.

Vagueness of LORWUA's Responsibilities

The responsibilities of LORWUA after the transformation process are clearly stated in the constitution (LORWUA 2000: 3-4), but the transformation process (which now is in its third year) is a one of slow development that will take some time to be completed. Throughout the study, some vagueness with regard to the delimitation of the current LORWUA responsibilities was identified. Two examples of such vagueness relate to monitoring of water quality and capacity building of HDIs .

Monitoring of Water Quality
According to the LORWUA business plan (2000:7), one of the principal functions of the LORWUA is to prevent any unlawful act likely to reduce the quality of water in any water resource within the area of jurisdiction. This certainly includes the river and the monitoring of water quality in the river, but no water quality management strategies could be found under the general maintenance and management strategies (LORWUA BP 2000:9-11). However, the DWAF will continue monitoring the water quality of the river until the CMA takes over.

Capacity Building of HDIs
According to the LORWUA business plan (2000:7), other functions of the association include providing management services, training and other support services to rural communities (HDIs). A separate point for HDIs was created in the LORWUA business plan (2000:14), where it is stated that assistance should be given to HDIs in the form of advice, planning, supply of small items, training in water distribution and costing. However, no activity had started yet in March 2003.

The Land Claim Issue

Land ownership among HDIs is an important issue. None of the small-scale farmers in the EKB is a landowner. Currently the EKB is busy negotiating a land claim with the LRC and, therefore, some details of this claim must be given.

The whole area west of the Lutzville floodwater bridge was given to Ebenhaezer as a crown grant on 6 July 1837 by the British Crown (SPP1). Today, however, most of this land is occupied by commercial farmers. Moreover, some land was lost before 1913 and no claims can be accommodated for this loss.

Ebenhaezer claimed their land or a R90 million monetary compensation but they were offered only R20 million. Ebenhaezer rejected the offer and wanted to take the matter to court. However, the service providers SPP and LRC agreed with the Land Claims Committee that EKB should think clearly on this matter. Instead of rejecting the R20 million, a solution could be to find additional land in compensation, to be added to the R20 million. The community worked out their strategy and instructed the committee to open lines of communication and to go for the best deal. It was stated that the TRANCRAA process must also be considered as part of the claim settlement package.

The Membership of EKB

A last important issue is the official status of EKB membership of the LORWUA. It is clearly mentioned in the constitution (LORWUA 2000:6) that one MC member represents the EKB. However, according to the same constitution (LORWUA 2000:2), subdistrict 7 excludes the EKB and, EKB is not mentioned further in the delimitation of the LORWUA area of jurisdiction. In contrast, according to the LORWUA entitlement document (2003: 8), EKB is registered as user L150 for 257 hectares of irrigation water at the LORWUA. In the LORWUA Business Plan, the whole of section 19 (2000:14) is devoted to the EKB, but it is still not clear whether EKB is officially part of the LORWUA.

In fact, all water use right holders in Ebenhaezer should be members of the LORWUA to enable the WUA to play its role as service provider, but a clear distinction should be made between the domestic users in Ebenhaezer (who have no specific water use rights since they are serviced by the Matsikama Municipality under LORWUA) and the Ebenhaezer small-scale farming community (who have water use rights). LORWUA does not recognize the community as a water user and at this stage, only the farming community is recognized.

Conclusion

This study analyzed the difficulties and opportunities with regard to the involvement of HDIs in the LORWUA.

It focused on the accommodation of HDIs in the process of transformation from an IB to a WUA. Numerous problems and obstacles were identified and described. Problems with regard to HDIs water entitlement, like canal flow (water supply), as well as active participation in the decision-making process in the LORWUA MC were identified as the most important issues. A range of secondary problems could be derived from these two main problem areas.

Variation in canal flow is the most important *quantity-related problem* faced by HDIs (EKB) in the LORWUA. It was shown that the LORWUA EKB meter does receive on average more than enough water during the year, but that water supply in the peak period was inadequate because of canal transportation losses, high demands, insufficient storage facilities, and large losses within the internal distribution system of the EKB. This factor led to a significant water deficit in the peak demand season from November to February. Moreover, the internal canals of EKB are in urgent need of repair. There are also internal problems of water management within the Ebenhaezer community. However, these problems are not easily solved because of the complete lack of control that Ebenhaezer has over the incoming flow. Even though the WDM theoretically uses surplus water, it actually has priority over the Ebenhaezer community in periods of drought so its water entitlement, as a primary user, should be clearly defined and catered for.

There should soon be a balance dam upstream of the EKB meter to help smooth the supply for that point. It is, however, not completely certain to what extent the balance dam will solve the problems of water flow entering the Ebenhaezer community. The dam will anyway provide a good opportunity to set up an efficient collective management of water distribution within Ebenhaezer.

The current and future position of the Ebenhaezer small-scale farmers vis-à-vis the LORWUA is not clear. The LORWUA is keen to ask them to pay water fees if they are to get the same service as other farmers, but the small-scale farmers may not be able to pay such large fees. A solution may be to define lower fees specifically for these small-scale farmers.

The Letaba Water User Association

The studied area covers parts of two local municipalities, Greater Tzaneen and Ba-Phaborwa, under the Mopani District Municipality in the Limpopo Province. The area is within the former Republic of South Africa and the former Lebowa and Gazankulu homelands (figure 12). The Great Letaba River is an international river with headwaters in the high rainfall Drakensberg Mountains, and it flows through arid areas and the Kruger National Park into the Olifants River in Mozambique (DEAT 2001). Forestry and irrigation occur in the well-watered western zone. Most of the human settlements are in the central zone, and the eastern zone is characterized by nature conservation and game ranging areas. Irrigated agriculture is the mainstay of the local and regional economy, with citrus, mangoes, bananas, litchis, and selected vegetables as the main crops.

In November 2001, the Letaba Water User Association (LWUA) replaced the previous Letaba Irrigation Board, which was founded in 1960. The Letaba IB was established under the previous Water Act (Act 54 of 1956) and its main function was to manage irrigation development only.

The main reason for transforming IBs into WUAs is to open the management of their water systems (canal, part of a river) to all the stakeholders, especially the historically disadvantaged individuals (HDIs) who were not associated with management in the past. First, the study documents what has changed for the local HDIs with the transformation from the IB into a WUA, as well as what could be expected. Second, the study investigates what is and could be the role of the new WUA with regard to the integrated water resource management (IWRM) of the catchment.

The first section of this case study presents the general methodology, especially the stakeholders interviewed. The following section provides some background information on the waterworks, the water users, the current water management issues in the basin, and the management practices of the LWUA. Then, an assessment of the needs of HDIs is presented to enable an analysis of the current and possible actions of the WUA with regard to the HDIs. The last section describes the current involvement of the LWUA in the IWRM of the basin.

Methodology

The study was based mainly on semi-directed interviews with the various stakeholders: commercial and emerging farmers, environment representatives, municipalities, nongovernmental organizations, the Department of Agriculture (DoA), the Department of Water Affairs and Forestry (DWAF), etc. A total of thirty-three persons were interviewed (table 6). The reference codes given in this table will hereafter be placed in brackets and used at the end of a relevant sentence to signify that a specific stakeholder is the source of information.

Table 6. Stakeholders interviewed in the Great Letaba WUA.

Stakeholder	Reference	Number
Letaba Water User Association	WUA1, WUA2	2
Emerging farmers	EF1, EF2, EF3, EF4, EF5	5
Commercial farmers	CF1, CF2	1
Canal Committee Members	GV1, N&N1, PU1	3
DWAF	DWAF1	1
DoA	DoA1, DoA2	2
Department of Environmental Affairs and Tourism	DEAT1	1
(DEAT)	DoLA1, DoLA2	2
Department of Land Affairs (DoLA)	LNW1	1
Lepelle Northern Water	TM1	1
Tzaneen Municipality	TA1, TA2,TA3,TA4	4
Tribal Authority	NRI	1
Kruger National Park	GM1, CJ2, AVR3, DU R4	4
Consultant Company	WB1	1
Water Bailiffs	FW1	1
Farm Worker	FWU1, FWU2	2
Farm workers' Union	MM1	1
Murchison Mine		
Total		33

Context

Waterworks

Storage Units

There are two large water storage dams in the Great Letaba catchment, the Ebenezer and Tzaneen Dams, both of which fall under the jurisdiction of the LWUA. The association provides funds for the operation and maintenance of these dams by the DWAF.

The Ebenezer Dam lies within the high rainfall region of the Letaba River basin in the upstream part of the Letaba River, downstream of the confluence between the Broederstroom and Helpmekaar Rivers. It was completed in 1959 and has a capacity of 70 million cubic meters. The Ebenezer Dam supplies water to Polokwane, the Tzaneen Municipality, and farmers. There is no industry between the Ebenezer and Tzaneen Dams.

The Tzaneen Dam, completed in 1977, is situated on the Great Letaba River immediately upstream of the town of Tzaneen. It was constructed mainly to meet the irrigation water demand along the Great Letaba River valley. Water is also supplied to a mine and several urban and rural villages. The Tzaneen Dam's storage capacity is 157 million cubic meters and allowance has been made to increase this to approximately 250 million cubic meters.

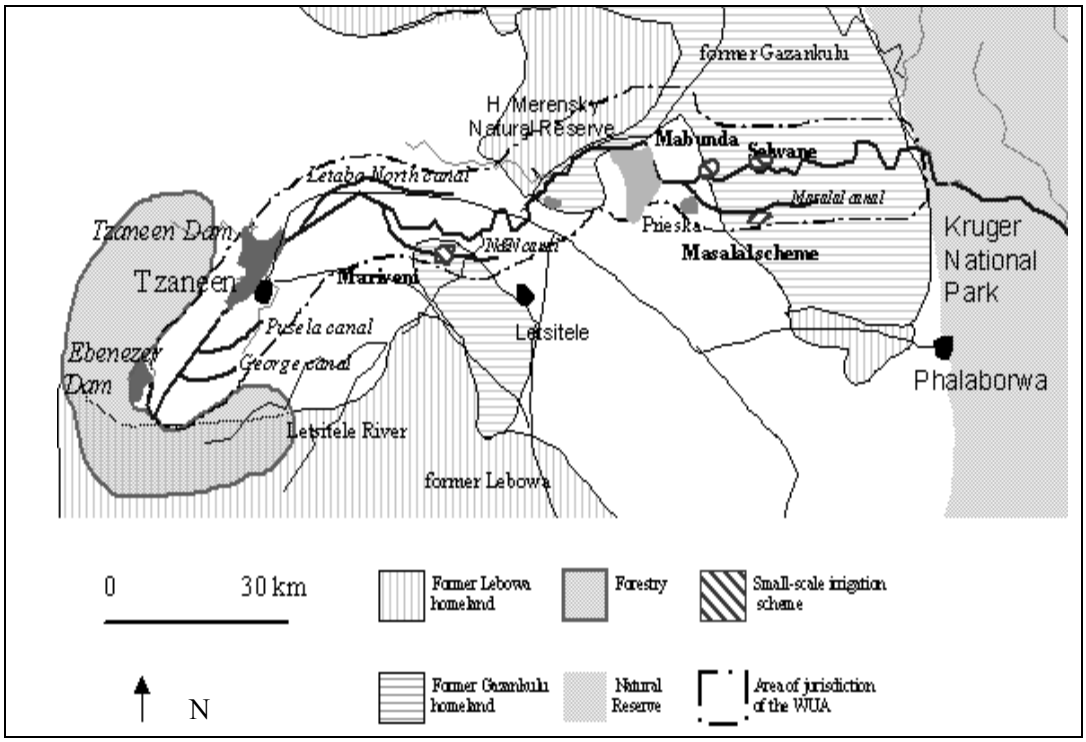
Storage Weirs

Several weirs are built along the Great Letaba River. In accordance with an agreement with the DWAF, these weirs are operated and maintained by the LWUA, though they are owned by the DWAF. They are located downstream of the Tzaneen Dam in the following sequence: Yamorna, Junction, Jasi, Prieska and Nondweni (the Nondweni Weir is situated close to the Mabunda Scheme in figure 12). The Nondweni Weir is of importance because, on hot days, the upstream commercial farmers pump large amounts of water and there is a risk of not getting the scheduled minimal flow for the Kruger Park downstream.

The Canals

Irrigation farmers can be grouped into pump and canal irrigators. Pump irrigators abstract water directly from the river whereas canal irrigators obtain water from the canals. The canals are privately owned and are under the jurisdiction of the LWUA. There are five canals in the catchment, namely George's Valley, Pusela, Letaba North, the N and N, and the Masalal Canals. Two of the canals are between the Ebenezer Dam and Tzaneen Dam (George's Valley Canal and Pusela Canal) and the other three canals are between the Tzaneen Dam and Nondweni Weir (Letaba North, N and N, and Masalal Canals—cf. figure 12).

Figure 12. The Great Letaba River Basin.



George's Valley Canal is 11 kilometers long and serves 17 farmers, none of whom are emerging farmers. The canal is located on the right bank of the Great Letaba River. It is lined with concrete and has a maximum discharge capacity of 0.196 m^3/s. Water is supplied by gravity from the canal to the farmers. In normal conditions, the canal is operated 12 hours per day for 5 days a week, i.e., 250 days a year. The volume of water diverted into the canal is metered at the head of the canal. The total scheduled area supplied from this canal is 376 hectares. The annual irrigation quota for the whole area is 2.5 million cubic meters per year (DWAF 1990).

The Pusela Canal was built in 1965 and now serves 130 farmers. Irrigation water is diverted into a concrete-lined canal by a weir in the river, located 7 kilometers upstream of Tzaneen. The water is conveyed in the main canal 29 kilometers long, and distributed via several secondary canals. The maximum discharge capacity of the main canal is $1.06m^3/s$. The gates are open 24 hours a day, and as such, some farmers have built balancing dams to store the water that flows during the night. The total scheduled area supplied from this canal

is 997 hectares, with an annual irrigation allocation of 7 million cubic meters. There are no emerging farmers on this stretch of the river.

The Letaba North Canal is on the left bank of the Great Letaba River, just downstream of Tzaneen. Water is diverted from the Great Letaba River into the canal by means of the Letaba North Canal Weir (also called Yamorna), approximately 5 kilometers downstream of Tzaneen Dam on the Broederstroomdrift farm. The canal is 43.2 kilometers long and is lined with concrete. The maximum discharge capacity is 2.60m^3/s. The total scheduled area is 2, 951 hectares, and the total irrigation quota is 27.8 million m^3/yr (DWAF 1990).

The N&N Canal system is on the right bank of the Great Letaba, downstream of the town of Tzaneen. Water is diverted from the Great Letaba River into the canal from the N&N Weir (also called Junction), approximately 15 kilometers downstream of the Tzaneen Dam. The N & N Canal consists a main canal, 35.4 kilometers in length, and several secondary canals. These canals are lined with concrete and the maximum discharge capacity of the main canal is 1.59 m^3/s. They serve both commercial and emerging farmers. The total scheduled area supplied is 1,278 hectares, with an annual irrigation allocation of 13.3 million m^3/yr (DWAF 1990).

Each of the above four canals is managed by a Canal Board, which allocates water within the canal, employs a water bailiff, and organizes and finances maintenance. Farmers pay for maintenance of the canals with a contribution ranging from ZAR180 /ha/yr to a maximum of ZAR242/ha/yr, apart from the LWUA fees. All the canals have a problem with leaks, due to their old age and the 2000 floods, which damaged parts of them. Most of the canals obtained flood relief funds from the DWAF.

The Masalal Canal is on the right bank of the Great Letaba River and serves a rural community, an emerging farmer irrigation scheme, and commercial farmers downstream. Water is diverted from the Great Letaba River into the canal by means of the Prieska Weir, which is situated downstream of the Merensky Nature Reserve. The canal has a length of 20 kilometers and is not lined with concrete. During heavy rains, it is blocked with soil, which has to be removed each time by the users. The maximum discharge capacity is unknown. The total scheduled area is 726 hectares and the annual irrigation allocation for this area is 6.7 million m^3/yr (DWAF 1990). There used to be a Canal Board for the Masalal Canal, but it was disbanded when the Gazankulu Development Cooperation bought the land[11] and there is currently no permanent organization to manage the canal. This creates problems of lack of maintenance.

Water Users

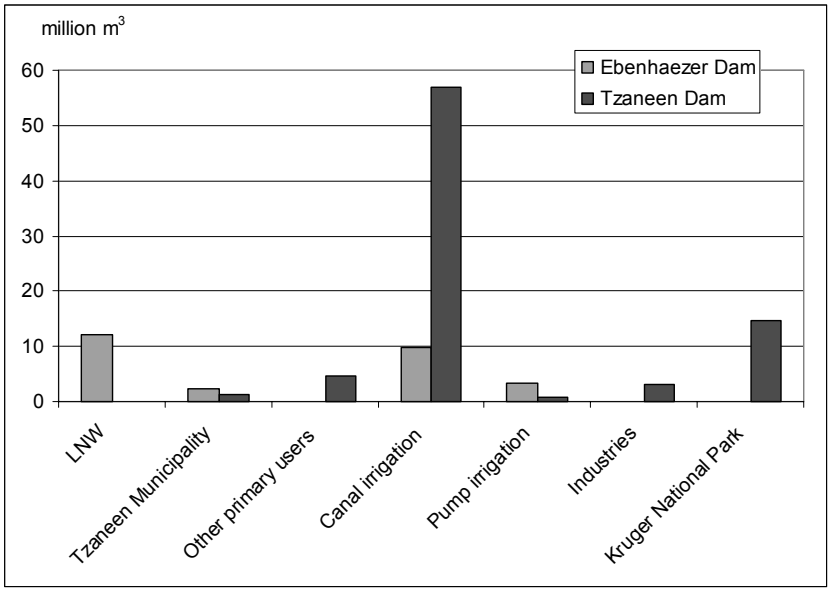
There are various water users in the Letaba River but the LWUA only comprises farmers. The municipalities are explicitly not part of the WUA (cf. the LWUA Constitution: annexure 4). The water users are described in figure 13 below.

The Kruger National Park has an allocation of 14.7 million cubic meters of water from the Tzaneen Dam but, due to other affluents, the actual annual volume of water arriving at the Kruger National Park is much larger.

Irrigated agriculture is the largest consumer of water in the area, using some 75 percent of the whole water volume (DWAF 1990). Under the pre-1998 water law the water rights for irrigation amount to 12,255 hectares, of which the emerging farmers formally hold the title rights for 2,925 hectares.

[11] During apartheid time, every homeland had its own development parastatal agency, in charge of the operation and maintenance of the small-scale farmers' irrigation schemes.

Figure 13. Annual water allocation from the Ebenezer and Tzaneen Dams.



Primary Users

The area has a diversity of settlements that vary from well-developed towns like Tzaneen, through less-developed ones like Nkowankowa and Letsitele, to semi-urbanized communities and rural villages.

Primary users get water from both the municipality and the DWAF. Some purification plants are maintained by the DWAF. For instance, one plant next to the Nondweni Weir supplies water to three villages, Selwane, Nondweni and Mahale, via a pipeline that fills reservoirs in each of the villages. Communal taps are installed in the villages, and the DWAF is responsible for maintenance of the plant and the pipeline, while the villagers are responsible for maintaining the taps. The operation of purification plants is sometimes outsourced to private water providers by the Water Service Authorities (which are often the municipalities), as in the case of Tzaneen. In the long term, the responsibility for all drinking water networks will be handed over to the municipalities.

A major component of primary water use is the 12 million cubic meters per annum transferred to the city of Polokwane (formerly Pietersburg) from the Ebenezer Dam. The Polokwane Municipality has contracted Lepelle Northern Water (LNW) to provide water from the dam. LNW is a service provider, which furnishes water to both large cities and local rural areas. It was started in 1964 as the Phalaborwa Water Board and is now involved in the whole Limpopo Province. In order to improve cost recovery in the rural area, LNW has embarked on a community development initiative aimed at empowering emerging municipalities to fulfill their own responsibilities.

The current system of water use in the rural areas creates some management problems because people tend to leave the public tap unclosed and to irrigate their gardens with potable water. There are also many illegal connections: In the Lenyenye village, there are about 1,700 illegal connections, most of them used for irrigating garden plots. These malpractices have resulted in primary users' abstracting more water than their allocation. For instance, the Nkowankowa Township abstracts 200 percent of its annual allocation of

3.5 million cubic meters, and the LNW used 48 percent more than their allocation from April to December 2002 (DWAF1).

Commercial Farmers

Commercial farming constitutes the core of the economy in the region. Large-scale commercial agricultural activities started in the 1950s and have developed extensively since that time. Citrus, mangoes, avocadoes, bananas, and litchis are the main crops produced and are sold to both local and international markets. Approximately 150 farmers pump water directly from the river and 274 farmers take water from the canals. The pump farmers use as much water as the canal farmers (shown in figure 13). Irrigation techniques include flood, overhead sprinklers, and micro jets. In the upstream part of the valley, the farms are smaller, with land sizes of 30 hectares being the maximum, hence most of the farmers upstream undertake other activities, such as working in Tzaneen (WUA1).

Emerging Farmers

There are four irrigation schemes for emerging farmers in the area of jurisdiction of the LWUA: Mariveni, Masalal, Mabunda and Selwane. Emerging farmers grow citrus, mangoes, bananas, and several vegetables. All the schemes were initiated in the former Lebowa and Gazankulu homelands under the Lebowa Development Cooperative and the Gazankulu Development Cooperative in the 1970s. The schemes are situated on tribal land and the land tenure is still under the Permission to Occupy system. After 1994, the Lebowa, Gazankulu, and Venda Development Cooperatives were merged to form one organization, the Agricultural Rural Development Cooperative (ARDC).

In the homeland cooperatives and under ARDC management, farmers were working almost as laborers: Production loans were advanced to farmers to cover the capital costs of establishing the fruit trees and other costs (labor, maintenance of the scheme, etc.,) until the beginning of the production. The Permission to Occupy lease agreement granted to the farmers was ceded to the ARDC as security for the funds advanced. The marketing rights to all fruits produced were also ceded to the ARDC so that repayments on advanced funds could be deducted directly from the individual farmer's income. Hence, these loans were to be recouped through a levy on the goods marketed through a cooperative marketing structure for the scheme.

In 1998, the ARDC was disbanded, with no transition plan in place, which left the emerging farmers stranded, both technically and financially (Legal Resource Centre 2002). For instance, the Mabunda Scheme was left with a debt of ZAR5.5 million (Legal Resource Centre 2002). Because of poor management and lack of skills and funds for maintenance, the infrastructure has deteriorated.

A process of transition was initiated that lead to the installment of emerging farmers. The chosen farmers were largely the former workers in the schemes. From October 2000 to January 2001, the Department of Agriculture failed to pay the Eskom account, which left most schemes without water and electricity. The Limpopo Province intervened in 2001 and provided funds for electricity to get the irrigation schemes operating. Since the collapse of the ARDC, the farmers have received no inputs or production loans. Many of the farmers and a considerable number of laborers have not received remuneration for a long time.

The Masalal Scheme

In the 1990s, the management of the Masalal Scheme was transferred to a private company, called Measured Farmers. During this period, because of the 1992-1994 droughts and mismanagement, the fruit trees and the equipment were destroyed. The ARDC took back the

management, but passed it to the Department of Agriculture (DoA) in 1999. At that time, the department planned to hand management of the scheme over to farmers soon. Interviews were held to select new farmers to join the former farm workers. At first, 102 farmers were chosen but the number was reduced to 85 farmers to guarantee 12 hectares per person. These farmers were supposed to come from the different neighboring villages but, when the resettlement was about to be finalized, two chiefs from Selwane and Majeje tribes claimed the land. The Selwane Tribal Authority contended that they have been occupying the land since 1922. On the other hand, the Majeje community occupied the land in 1986 because the former Gazankulu government wanted to have Tsonga-speaking people there.

The claim was initiated in 1996 but remains unresolved in 2003. Presently, the Majeje Tribal Authority let their people graze cattle on the land that is under claim and charge them. Livestock from Selwane is also charged for if they enter the area (TA1, TA2, and TA4). The land claim has blocked the transfer of the Masalal Scheme to the farmers and, therefore, also the development of the scheme.

The DoA suggested that meetings should be organized to achieve an agreement between the chiefs, in order to start the project as soon as possible (DoA1). Currently, as long as the management is not transferred to the farmers, the DoA has to pay the remaining farm workers. In the mean time, they have encouraged as many people as possible to choose early retirement so that, out of the initial 87 employees, only 64 remain. Only 34 hectares of the initial 800 hectares of oranges are still 'farmed'. The DoA just pays for the diesel to fuel the water pumps. They do not provide any pesticide or fertilizer. As a result, the oranges can only be sold to fruit juice factories. As soon as the farmers get the land, the Land Bank has agreed to provide the loans to buy better equipment. The WUA is not involved in the land claim process but the Masalal Canal has been cleaned recently with a grant of ZAR30,000 from the WUA.

Selwane, Mabunda, and Mariveni Schemes

The Selwane, Mabunda, and Mariveni schemes are all around 300 hectares in size and have approximately 30 farmers each. They operate, with many production problems, under the management of the Du Roi company. All of them were set up as a result of the same process of transferring ownership to emerging farmers as in Masalal.

Du Roi Precision Farming was established in 2000 to provide advice to farming communities in terms of irrigation techniques, pest control, markets, mechanics, and human resource management. Emerging farmers approached Du Roi for assistance and, in 2001, the emerging farmers from Mabunda, Selwane, and Mariveni Cooperatives signed an agreement with the company's management team. The terms of reference include capacity building, skill transfer, courses on human resource development (including literacy, leadership, conflict resolving and responsibility), a scout course (on looking for pests), the building of a storehouse, mechanical management, and financial management. The agreement is that an amount of ZAR50,000 plus 10 percent of their profit per project will be paid to Du Roi per year for all the services described above (DU1). It was agreed that the schemes would pay as soon as they are operating correctly.

Du Roi thought that somebody should intervene to keep these projects going but no organization has agreed to provide funds, so Du Roi went looking for donations. In 2001, the schemes received a donation of ZAR700,000 from overseas companies, which sustained two projects (Mabunda and Mariveni Cooperatives) and the Du Roi Nursery. This money has mainly been used to pay for the electricity, which constitutes a large proportion of the project costs (cf. Appendix 2) and also to pay all the people who are assisting farmers on a monthly basis. The Mabunda Scheme has received substantial funding from various sources

under the management of Du Roi, but has still made no progress in terms of production. The Mariveni Scheme's main constraint is currently the lack of Permission To Occupy documents (PTOs), which would permit a loan from the Land Bank. The chief wants to grant individual PTOs, while the group of emerging farmers would prefer a collective PTO, since they fear that the chief would choose to grant PTOs to certain persons, or refuse them, for personal reasons.

By contrast, the Selwane Irrigation Scheme is a self-sustained project that has never received financial support from any source but is functioning correctly. The farmers in the scheme received some equipment after the collapse of the Masalal project, and Du Roi assists them with regard to managerial skills and financial management.

As part of the LWUA, emerging farmers are supposed to pay water levies to the association. Currently, the Department of Land Affairs (DoLA) is paying the full water levies of the 2,925 hectares scheduled for irrigation in the former homelands on behalf of the emerging farmers because their land tenure has not been sorted out and the DoLA is still formally the landowner. Land tenure is a serious stumbling block to the development of emerging farmers. While Mabunda and Selwane farmers have their PTOs, the Mariveni farmers still do not have them. The emerging farmers have, together with Du Roi, set up a legal team in order to speed up the land allocation process and minimize the conflicts.

All the schemes are using micro-jet irrigation and have set up a rotation schedule for irrigation because the pump stations do not function correctly. Each farmer irrigates two to three times a week, but all the schemes lack sufficient pumping capacity to cater for the needs of their trees. Mabunda and Selwane pump directly from the river, while Masalal and Mariveni abstract water from the canals.

Prieska

The Prieska community is situated in the upstream part of the Masalal Canal (figure 12). The Prieska community manages a 5-hectare irrigated community garden. It abstracts water directly from the Masalal Canal without any pumping machine and conveys it via pipes to furrows that channel water to the fields for flood irrigation. A technician of the DoA stays in the community to assist them. The DoA has built a small reservoir for water storage, which has not been used because there is no pump. When there are low flows in the canal, pipes are used to bring water from the Letaba River.

Other Uses

There are some industries in the downstream part of the Letaba River: a mine, cotton factories, and a juice factory. The mine extracts antimony and pumps extract water both from the Letaba River and from an aquifer into a reservoir.

"About 45 percent (more than 20,000 hectares) of the total area of ecoregion 2.15 (most upstream zone) in the Letaba Catchment comprise plantations" (DEAT 2001). Most of the natural grasslands have been replaced by commercial forestry. These forestry plantations need large amounts of water, which is why they are typically located in the high rainfall regions of a catchment.

The environment is another user of water and the Department of Environment Affairs and Tourism (DEAT) is the custodian of the environment in South Africa. There is no privately owned nature reserve in the Great Letaba River catchment but there are four state-owned nature reserves: the Tzaneen and Hans Merensky Nature Reserves, Letaba Ranch, and the Kruger National Park (DEAT1). The Kruger National Park is a registered water user with formal rights (NR1—see figure 13).

Water Resource Management Issues

Water Quantity

In the Great Letaba River catchment, water demand from the different users (primary users, irrigators and industries) is on the whole very high. Moreover, the LWUA must ensure a minimum flow of 0.6 m^3/s at the entrance to the Kruger National Park.

The total mean annual runoff at the confluence with the Little Letaba River is 382 million cubic meters, with a first proposed volume of 72 million cubic meters dedicated to the Environmental Reserve (DWAF 2002). The DWAF (2002) provides some information on the current balance between supply and demand in the basin.

The water of the Great Letaba River basin is over-allocated and the extension of water rights was stopped a long time ago. The long drought of 1992-1994 is still in all farmers' minds and two projects have been proposed to address this problem: One is to increase the Tzaneen Dam's capacity and the other is to build the Nwamitwa Dam. Priority should be given to raising Tzaneen Dam because it is less expensive than building a new dam, which would need two national roads to be removed.

Monthly reports from the DWAF show that the municipalities abstract more water than their allocation (between 150 and 200 percent). This is mainly due to increased population and misuse of water by villagers. The LWUA accepts this to a certain extent, since municipalities are primary users, and also use a small amount of water compared to irrigation. The Tzaneen Municipality has water rights from both Ebenezer Dam and Tzaneen Dam but prefers to pump water from the Ebenezer Dam in order to save on energy costs, since the Ebenezer Dam is situated higher than the Tzaneen Dam.

Water scarcity is a serious problem for the farmers. There are often periods when the dams are below the scheduled levels and restrictions are imposed on all farmers.

Water Quality

From Ebenezer Dam to the confluence with the Letsitele River (cf. figure 12), the water quality is relatively good (DEAT 2001). There is no industry upstream and most of the farmers in the area are experienced in the use of chemicals (WUA1, DWAF1). From Letsitele downstream, the water becomes dirty because of soil erosion. The DEAT report (2001) blames poor agricultural practices in the former homelands, even though there is little agricultural activity in the aforesaid areas along the river. Erosion affects the farmers because they incur additional costs for filtering the water before they irrigate. Siltation originating from forestry roads is also a problem. Improved management of timber felling practices, especially during the rainy season, would reduce the amount of soil washed into the river. Despite these impacts, the water quality and in-stream habitat is good on the whole (DEAT 2001).

However, the river is invaded by numerous alien plants. Ten years ago there was a problem of *Salvinia molesta*, which the Irrigation Board successfully eradicated with the help of a specialist. Because of the 2000 floods, hyacinths cover the Yamorna Weir in the middle part of the river. The DWAF has already used a biological approach to treat the dam, by releasing specific insects that kill the plant in the long term, but now has to go downstream and treat any appearance of hyacinth in the river. The Working for Water program was supposed to undertake this task, but the DWAF eventually took it over because of a lack of response from the Working for Water Organization (DWAF1).

Environment
The Great Letaba River has many large dams that do not have a fish-way and as a result, several fish species have disappeared in the upper catchment (DEAT 2001). Shade net fishing is often carried out below migration barriers such as dams and weirs and in pools for seasonal rivers. However, the growing trend of fishing with the use of shade netting raises a number of problems: Deep pools act as important refuge areas for the fish communities and, if netted regularly with fine mesh shade net, few fish remain to repopulate the river.

Hippopotamus and crocodiles have successfully adapted to life in agricultural dams but "the control of hippopotamuses is very poor because hippos from downstream invade emerging farmers' fields and destroy their trees" (EF1).

Towards the eastern part of the Great Letaba River, local communities have over-cut and over-grazed the vegetation in the riparian zone, and alien plants have invaded the remaining riparian vegetation.

The Letaba Water User Association

The administrative offices of the LWUA are in Tzaneen and all functional tasks are carried out from this office.

Water Management

The current management is mainly based on the following three activities:

1. monitoring water abstraction;
2. operating waterworks; and
3. strategically managing the two large dams, with the DWAF.

Monitoring Water Abstraction
The LWUA controls and monitors the abstraction of water by its members from the Great Letaba River, with the help of two full-time bailiffs. One operates from the Ebenezer Dam to the junction with Letsitele River, and the other from this point up to the downstream limit of the LWUA's jurisdiction. The role of the water bailiffs is basically to monitor the use of water by the members of the LWUA (every 2 weeks, and every week during the drought). This entails reading meters, looking for unlawful pumping, opening the main sluices for the weirs, and giving the canals their water allocations. The responsibility of the water bailiffs is restricted to the main sluice of each of the canals.

The water bailiffs write a report for the bimonthly meetings of the LWUA. The report mainly identifies the farmers who over-pump, and who do not co-operate with the water bailiffs, as well as giving an account of the current river flows and dam levels. In case of over-pumping by a farmer, the water bailiffs approach the farmer and tell him that he is over-pumping. If the farmer's non-compliance continues, the matter is reported to the Management Committee (MC).

A farmer is allowed to abstract a given quota of water, either directly from the river or from the canal. Should the actual abstraction in any given month be higher than the allowed quantity, the farmer is penalized the following month and his quota is reduced by the amount abstracted in excess. However, if the abstraction during a particular month is less than the given quota, the farmer cannot claim extra water during the following month.

The LWUA's area of jurisdiction is divided into three climatic zones, from zone 1 upstream to zone 3 downstream (table 7). Each farmer has an annual quota, which varies

according to the climatic zone: 6,620 m^3/ha in zone 1 and increasing the further one goes downstream.

Table 7. Water allocation in the different zones of the Great Letaba River basin.

	Zone 1	Zone 2	Zone 3
Full water quota (m^3/ha)	6,620	8,920	10,900

Many farmers have boreholes. "It is an evil practice," according to WUA1, because it is the same water as the river water. However, the DWAF does not control the use of boreholes, and the WUA has no legal authority to do so. However, the process of registration, which requires farmers to declare their boreholes, is a first step.

Finally, each canal is considered as one user: the LWUA is just in charge of ensuring that these canals do not take more than their scheduled allocation.

Operating Waterworks

The LWUA operates the five weirs from which the canals depart. Nevertheless, since the weirs are significantly silted up, it is difficult to assess their real volume. Basically, the LWUA has to meet a minimum requirement of 0.6 m^3/s at the entrance to the Kruger National Park throughout the year. The Nondweni Weir is still managed by DWAF.

Strategic Management of the Two Large Dams

With the DWAF. Every month, the DWAF office in Tzaneen assesses the consumption of the previous month and draws two scenarios (one with good rain, the other in case of drought) for the 18 following months. Then the DWAF and the LWUA decide on the degree of restriction that will be imposed on the farmers. Each farmer has a given water quota proportional to the area owned and this annual quota is broken down into 12 monthly quotas, with no possibility of carrying any unused water forward from one month to the next.

In case of drought, this monthly quota is decreased by a given percentage, which is the same for all farmers. The other users (municipalities and industries) only start having to decrease their consumption when the farmers' decrease reaches 50 percent. Thereafter, the decrease is the same in percentage terms (e.g., 60 % for the farmers and 10 % for the primary uses). However, during the 1992-1994 droughts, the restriction went as far as a total banning of irrigation water use.

Metering

The Letaba Irrigation Board was among the first to install water meters in South Africa and the WUA is now replacing them because they are too old. The new water meters will use magnetic fields. A first attempt to organize teletransmission failed, because the pumps are deep in the valley and because of theft. The LWUA is waiting to see if it can use the satellites the DWAF is currently setting up to remedy the situation.

The LWUA has 150 meters in use, and four canal intake-measuring devices. The volumes abstracted at each metering point are read weekly, except in times of heavy rains when reading is done in 2-week cycles. The old, but very effective, 'S' type meters are being replaced because spare parts have become unobtainable and these meters are no

longer manufactured. The new meters cost approximately ZAR15,000 each and operate on electricity obtained from the irrigator. The meters also have a battery for use when the electricity supply fails. The new meters function in a very hostile environment because the hot sun affects the accuracy of readings and lightning causes havoc. The users (the irrigators) have no particular liking for the meters ('policemen') attached to their abstraction works. Electric cables are regularly stolen, as well as any brass or copper components and the supporting batteries. (Solar power cannot be used because the solar panels are stolen.)

The result is that sophisticated metering in the field is under constant attack, operates at high cost, and cannot as yet be coupled with a computerized system, which is the ultimate aim. Fruitless experiments with reference to a telemetric system have already cost about ZAR180,000. At present all sorts of plans are devised to counteract the negative effects of the meters. The Irrigation Board could not obtain a loan for the purchase and installation of the meters because it did not have assets to pledge as security and the DWAF refused to underwrite a loan (the previous batch of meters were financed by a loan from the DWAF). This WUA is in the same situation and, therefore, has to finance the metering from its own funds, generated from 'meter levies' imposed on pump irrigators in the same way as if a loan had been obtained from a source outside the LWUA.

Discipline[12]

Based on the meter-readings and continuous monitoring of irrigation water, discipline must be vigorously enforced, in the form of 'giving back' over abstractions, non-supply of irrigation water during dry periods when severe restrictions are imposed, and prosecution for the theft of irrigation water. The discipline of 'giving back' water is imposed during mild restrictions and the water must be 'given back' in the following weekly or fortnightly quota (in other words, not from rainwater). Many cessations of water delivery have been imposed and, in such cases, arrangements are made to deliver sufficient volumes of water for domestic use by the irrigators and the farm-workers on that farm, under the supervision of the water bailiff.

A court instigated by the Irrigation Board dealt with quite a number of prosecutions. The most notable was a verdict by the Appeal Court in favor of the Irrigation Board to the effect that the Irrigation Board can stop the delivery of irrigation water by locking and chaining the irrigator's pumps.

The collection of the government and board levies from irrigators also forms an important part of the disciplinary procedures. The LWUA has attached properties (loose and fixed properties) and ceases the supply of irrigation water when levies remain unpaid.

Voting System

The voter list is divided into five subareas and includes the names of all members and particulars of each member's entitlement to water use and the number of votes to which the member is entitled.

The number of votes is determined on the basis of one vote for 50,000 cubic meters and each farmer has a maximum of 15 votes. The canal boards have no votes or voting power as such. The farmers who pump from a canal are individual members of the LWUA and exercise their votes individually. WUA and canal organizations are linked anyway since the representatives at the MC of the LWUA are also often representatives of the Canal Boards.

[12] Paragraphs 3.4.2 and 3.4.3 written mainly by WUA1.

If the entitlement is in the name of two or more persons, they must designate one of their members to represent them and that person's name must appear on the voter list. The voter list is revised annually by the MC, at the annual members meetings, and whenever there is an amendment to the LWUA's area of operation due to the granting of new water use entitlements (LWUA Constitution 2000).

According to the constitution of the LWUA, each voting district should have three representatives, each of them being for a term of 3 years. One of the three positions is set for re-election every year.

The DoLA is still the formal owner of the land 'farmed' by the emerging farmers from Mariveni, Mabunda, and Masalal Schemes and thus it is formally member of LWUA. However, the DoLA has given each of these emerging farmers a power of attending so that they could take part in the 2001 and 2002 elections. Selwane farmers participated for the first time in 2003, when the elections were held at two different voting zones for district five namely Masalal and Selwane. All votes are by secret ballot. In 2003, in zone 3, some of the white farmers voted for a historically disadvantaged emerging farmer, thus one of the two representatives of this zone is an emerging farmer.

The Management Committee

In the time of the Letaba Irrigation Board, there were nine representatives of the farmers and one representative of the town of Tzaneen. According to the Constitution of LWUA (section 13), the MC consists of 18 members of the association:

- Fourteen persons elected from the five subareas;
- one person representing the users who do not have a formal water license, i.e., "persons involved in stream-flow reduction activity and domestic users of water not supplied with water by any local authority;"
- "one person to be nominated by Tribal Authorities to represent the interests of rural communities;"
- "one person to be nominated by Local Authorities, with an interest in water supply by the Association;" and
- "one person to be nominated by representative recreational bodies."

In fact, only farmers currently (2003) attend the MC. A representative of the DWAF usually comes to report on the state of the dams. According to the constitution, a question can be determined by a majority of votes of the MC members present and voting. However, there is a strong willingness among MC members to reach a consensus so that, when each MC member reports back to his/her constituency, he/she defends the decisions taken at the MC meeting (WUA1).

In 2003, three members represented the emerging farmers and the rest were white commercial farmers. Although there was no female representative it is encouraging to note, while most commercial farmers are male, many emerging farmers are female.

Finances

The LWUA is a self-maintained organization; it raises levies from its members to defray its administration and water management costs. It also collects the DWAF resource management levies from its members and pays those amounts over to the DWAF. The levies vary according to the type of withdrawal (from canal or river) and the climate zone.

Farmers from climate zone 1, which has a high rainfall, pay less than farmers in climate zones 2 and 3, because their quotas are lower (table 8).

The emerging farmers are also supposed to pay but, as mentioned before, the Department of Land Affairs is paying on their behalf. In the financial year 2002-2003, the Department of Land Affairs paid a total of ZAR561, 200 to the LWUA and the DWAF for water levies on behalf of emerging farmers.

In 2003, it was decided to pay between ZAR430 and ZAR600 to each member of the MC per meeting as a transport allowance. There are six meetings a year and the transport allowance varies depending on the kilometers traveled.

The LWUA has not started implementing its Business Plan yet, because it feels it is still in a transition period (WUA1). The Business Plan is seen mainly as a document for the DWAF, but it is also important internally in order to define the goals of the WUA (WUA1).

Table 8. Water fees in the LWUA in 2003.

	Water from Ebenezer Dam		Water from Tzaneen Dam			
	Zone 1		Zone 2		Zone 3	
	Pump	Canal	Pump	Canal	Pump	Canal
LWUA (cent of ZAR/m^3)	3.12	1.85	2.92	1.64	2.92	1.64
DWAF						
Op. and Maintenance (cent of ZAR/m^3)	1.59	1.59	1.37	1.37	1.37	1.37
Catchment Man. fees (cent of ZAR/m^3)	0.64	0.64	0.64	0.64	0.64	0.64
QUOTA (m^3/ha)	6,620.00	6,620.00	8,920.00	8,920.00	10,900.00	10,900.00
FEES						
LWUA (ZAR/ha)	207.00	122.00	260.00	146.00	318.00	179.00
DWAF (ZAR/ha)	148.00	148.00	179.00	179.00	219.00	219.00

Uplifting of HDIs

HDI Needs

A member of each of the HDI groups was asked to rank the needs of the group. Table 9 presents their assessment of emerging farmers' main problems and table 10 focuses on their water-related problems.

Land tenure security is rated as the main problem for most emerging farmers because, without it, they cannot access funds to develop their projects. The schemes are on tribal land and occupation is under the PTO tenure system. Though the PTO theoretically has no legal value in 2003, the Land Bank requires it, in the absence of any other document. The person interviewed from Prieska emphasized water needs as their main problem because they do not have an adequate supply of water.

Table 9. Assessment of the emerging farmer's problems.

	Mabunda farmer	Mabunda manager	Selwane farmer	Meriveni farmer	Prieska farmer
Land tenure security, to access credit	1	1	7	1	2
Market access	5	4	3	3	3
Extension	4	5	4	6	4
Low margins	3	6	2	4	7
Water needs	2	2	5	2	1
Collective management issues in the scheme	6	3	6	7	6
Need more land	7	7	1	5	5

Rate no. = first priority, 7 = least priority

Market access is also a major problem for emerging farmers. Other needs like low margins and collective management issues within the scheme, and demand for more land are not of high priority. The exception is the Selwane project, which emphasized demand for more land as their first priority because they are successful on a small area. Most of the interviewed farmers explained that low margins are caused by lack of inputs and chemicals.

Although they say there is enough water in the river, water-related needs are the second greatest problem for the emerging farmers of Mabunda and Mariveni (table 10). Funds for new infrastructure or maintenance and development of infrastructure are of high priority among the water needs because the infrastructure they are using is too old, and parts of the pumping machine were stolen.

Table 10. Assessment of water needs in order of importance.

	Mabunda farmer	Mabunda manager	Selwane farmer	Meriveni farmer	Prieska farmer
Funds for infrastructure, maintenance and development	1	4	1	1	1
Funds to pay water distribution fees	2	3	2	3	4
Need of water license	3	5	3	6	2
Part of D-D management	4	1	4	2	3
Water HDIs are entitled to	5	2	5	4	5
Water quality HDIs are entitled to	6	6	6	5	6

Rate no. = first priority, 7 = least priority

Current Involvement of the LWUA with HDIs

As defined in the National Water Act (Act 15 of 1998), the functions of a WUA are divided into principal and ancillary functions, the latter being done only insofar as the WUA has the

capacity and the budget to do them. The principal functions of the LWUA are the three activities in water management given above. The ancillary functions of the LWUA are the ones required in DWAF policy documents (cf. Faysse 2004): "providing management services, training and other support services to water services institutions and rural communities," and "providing catchment management services to or on behalf of the responsible authorities" (LWUA constitution 2000.)

Overlap Between the Principal Functions of the LWUA and HDI Needs

The brief need assessment presented in the previous section indicates that, for HDIs, getting the water they are entitled to is not a major problem. However, in 2003 as well as in some previous years, water restrictions were implemented because of shortage of water in the two upstream dams. The LWUA restricts the emerging farmers during periods of water restriction just like any other member of the association but the legitimacy of this is questionable, since the DoLA pays the fees for 2,925 hectares whereas only around 1,000 hectares are actually irrigated. The emerging farmers were not aware of this, which may explain why they did not rank getting the water they are entitled to as an important need.

The pump stations of the Mabunda Irrigation Scheme have been installed too far from the river so that the emerging farmers experience problems with pumping in periods of low water flow. The LWUA backs the Mabunda representative when the latter asks the DWAF to close Nondweni floodgates in normal times, to raise the water in the dam, so that the Mabunda Scheme can pump from it. In the long term, the pumps of Mabunda should be able to pump from the dam even if the latter is not full.

Overlap Between the Ancillary Functions of the LWUA and HDI Needs

As part of their technical management, Du Roi Precision Farming has a responsibility to make sure that the Mabunda Irrigation Scheme functions properly. Du Roi Precision Farming hired a contractor to rebuild the two pump stations, but the farmers were not pleased with the floating pumps designed by the contractor. The DoLA has promised a total of ZAR175,000 to cover the costs of the construction currently under way, and the LWUA is committed to making more money available.

The LWUA recently provided ZAR30,000 to Zone 5 for the cleaning of the Masalal Canal. The rehabilitation of the canal mainly benefits the commercial farmers downstream of the Masalal Scheme, since the latter is plagued by land claim problems and the poor operation of their pump stations.

Representation of HDIs Is Not Completely Satisfactory

In 2003, HDIs had three representatives in the MC: one for Mabunda, one for Mariveni and another for the Masalal farmers. The LWUA paid the transportation costs so that these representatives could attend the MC meetings. At that time, the representative from the Masalal Scheme was described as the one representing the upcoming farmers, i.e., people who were not yet farming.

The MC did not include representatives of farm workers, even though farm workers were present during the public participation process and stated that they would be interested in continued participation in the WUA.

The representatives of two farm-worker unions were interviewed during the study, but the unions were not involved in the public participation process. The unions are eager to represent the farm workers in the WUA, although the issues currently discussed at the meetings of MC might not be of interest to them.

The mechanism put in place to ensure that all MC members report back to their constituencies is not always effective. Some farmers in Selwane do not know their representative and are not aware of the meetings of the LWUA MC.

The languages used in the board meeting are Afrikaans and English. Afrikaans dominates when MC members discuss sensitive issues like water restrictions, because some of the commercial farmers feel more at ease expressing their ideas in this language. However, WUA1 does not think that having an English translator would be meaningful. Farmers shift to Afrikaans when they talk among each other: it is an informal and fast discussion that would be difficult to translate and, if a proposal is made, the chairman repeats it in English. Moreover, in 2003, all the emerging farmers representatives could speak Afrikaans.

The management of the LWUA is relatively sophisticated: A detailed document assessing the past consumptions and some future scenarios is distributed before each MC meeting. In 2003, the emerging farmers had a very limited capacity to understand this document, and as such there is a clear need for capacity building.

Potential of the LWUA to Assist HDIs

By Representing Emerging Farmers To Other Organizations

The LWUA plays an important role in the management of water in the Great Letaba River basin and is recognized as an important actor by other organizations. The association has been able to convince the DoLA to assist the emerging farmers and lobbied the DWAF to close the floodgate at the Nondweni Weir until the Mabunda pumps are fixed. The association could develop these actions further by assisting HDIs in negotiating with marketing, land, or financial organizations. Although the WUA has no responsibility regarding the land tenure issues, the LWUA could assist HDIs by communicating with the DoLA in order to accelerate the process of land claim. Moreover, the management of the LWUA is well organized and makes good use of 40 years of experience. The LWUA is strong enough to undertake or direct initiatives to help the emerging farmers.

By Investing in HDIs Infrastructure

One of the major constraints to HDIs is the infrastructure of the scheme (cf. the water needs assessment of HDIs in table 10 above). Since the DoLA pays water fees for an area much bigger than the area cultivated in 2003 by the emerging farmers, one could suggest that, either some of the water rights are rented out, or part of this sum is used to help the operation and maintenance(O&M) of the infrastructure in the emerging farmers' schemes.

Role of the LWUA in Local Integrated Water Resource Management

The LWUA undertakes some IWRM functions. For instance, it has a responsibility to prevent any unlawful act that is likely to reduce the quality of water, so it ensures that nobody spreads pesticides by using a aeroplane.

However, two things limit the action of the WUA in terms of the IWRM of the catchment. First, the area of jurisdiction of the LWUA is confined to the Great Letaba River and does not incorporate several sub-catchments: the Thabina and Letsitele Rivers on the right bank, the Molototsi on the left bank. The second thing that limited the action of the LWUA was that, in 2003, it was definitely an association of farmers and not of all the water users. The MC was composed only of farmers, in contrast to the definition in the constitution of the WUA.

Not Representative of All Water Users

The municipality and a representative of the game reserves used to sit on the LWUA MC meetings of the association but stopped attending, according to WUA1, because the issues discussed were not of interest to them.

Some Traditional Authorities claim that they were not properly informed about the WUA. One claimed that he is not part of the association because there was no proper consultation, and that he was informed that only emerging farmers who used water from the Letaba River should be part of the association. However, the LWUA claims that all stakeholders were properly informed and invited but never came to the meetings.

The Department of Agriculture was approached during the establishment process, though only the local Tzaneen office attended the meetings and the department never received any assessment of the outcomes of the establishment process. After the WUA was approved, the DoA heard nothing from either the DWAF or the newly established WUA, although the DoA believes that it can play a role in the LWUA, not as a fully-fledged member but as an unofficial one, with the aim of supporting emerging farmers.

A representative from Lepelle Northern Water interviewed said that they had heard about the transformation of the Irrigation Board into a Water User Association, but said that they were never invited to these meetings (LNW1).

The representative of the Kruger National Park, on the contrary, agreed that he ought to attend the LWUA meetings but bewailed his lack of availability.

The public participation document attached to the proposed Constitution stated that it would also be meaningful to get the forestry sector on board, but this did not happen. According to WUA1, there is no need to link with forestry: Although some farmers complain about the way the forestry clears up after logging, there is, however, no erosion.

All in all, the LWUA in 2003 was less inclusive with regard to nonfarming users than the previous Irrigation Board.

Poor Cooperation Between Users

Cooperation between users is difficult to achieve at the local level. Along the Masalal Canal, there are often problems between the Prieska community and the commercial farmers downstream. The commercial farmers accused the Prieska community of misusing the canal by blocking it in order to irrigate their fields and get water for domestic use, as well as by washing their clothes in the canal. Numerous meetings were held with emerging farmers and people from Prieska, to discuss water abstraction, canal management, and the cleaning of the canal but these meetings had limited success.

No Catchment Management Agency

The Great Letaba catchment is part of the Water Management Area 2, which covers Luvubu and Letaba. A catchment management agency should be set up in this area and the water users held meetings on this issue from 1999 until 2001. A consultant was appointed to facilitate the discussions but the meetings stopped when the available funds were used up. The delay in setting up a catchment management agency is because there are still many uncertainties, such as the value of the reserve of water for the environment.

Conclusion

The case study analyzed the transformation of the Letaba Irrigation Board into a Water User Association, which should involve both large-scale and small-scale users. The transformation was aimed at opening the management of the water system to all stakeholders, especially the HDIs who were not associated with it in the past, and the case study has documented the changes that the transformation has brought to the HDIs and what could be expected in the future. The study also analyzed the role that the WUA was playing in 2003 in the local integrated water resource management of the catchment.

Changes That The Transformation Has Brought To HDIs

The transformation of the IB into a WUA has brought few changes for the HDIs, mainly because there is no overlap between HDIs' main needs and the current duties of the LWUA. The LWUA did commit some funds to improve the pumps on the Mabunda Scheme but it did not take into account the fact that, in 2003, the emerging farmers were constrained by having the same water restrictions as the commercial farmers, although the DoLA was paying the full fees for water rights, the majority of which were not put to use for the emerging farmers.

The main positive result of HDI presence in the LWUA is their capacity to voice their difficulties better, for instance, in order to link with the DWAF to manage the Nondweni Dam. The good relationship between the LWUA and the DWAF is useful to emerging farmers, who can use the MC meetings to voice their problems with the DWAF.

The transformation process is not complete. The representation of HDIs and their opportunities to have a voice at the MC are not satisfactory. The participation of HDIs in the LWUA only takes place through three representatives in the MC and no farm workers or women are represented. The way MC members report back to their constituency is not always efficient.

Moreover, the LWUA should welcome the Traditional Authorities to be represented in the WUA in the short term. This is important, since these Tribal Authorities are key stakeholders in solving the land claim problems. The Traditional Authorities should not serve in the MC for a long term because the issues that are discussed at the meetings might not always be of interest to them. They could be invited to the MC meetings only when needs be.

The DWAF, DoA, and DoLA could also have a seat as ex officiomembers in the WUA. The DoA works closely with emerging farmers and understands their needs. With all parties involved, the issues that affect the emerging farmer could be resolved.

The Role of the WUA in Integrated Water Resource Management

In 2003, the role of the WUA in local integrated water resource management is not completely satisfactory. The WUA is doing a good work in monitoring its members in terms of abstraction and pollution, but appears to be less inclusive of nonfarming users than the previous Irrigation Board.

The Vaalharts Water User Association

The last case study of existing water user associations is the Vaalharts WUA (VHWUA), which is unique in that it was not previously an Irrigation Board, but was a government water scheme managed by the DWAF.

The first section describes the methodology and the study area. The next section focuses on the current situation with regard to water and its management by the WUA.

Context

Methodology

The study is much shorter than the others since, although the emerging farmers face many internal problems, they have almost no problems with access to water.

Nine stakeholders were interviewed (table 11). The reference codes given in this table will hereafter be placed in brackets and used at the end of a relevant sentence to signify that a specific stakeholder is the source of information.

Table 11. Stakeholders interviewed in the Vaalharts WUA.

Stakeholder	Reference	Number
DWAF Regional Office	DWAF1	1
Vaalharts Water User Association	VHWUA1	1
Department of Agriculture	DoA1, DoA2	2
Emerging farmer	EF1, EF2	2
Water Service Provider	WSP1	1
Small-scale user representative	SSU1, SSU2	2
Total		9

Description of the Basin

The VHWUA is situated around 100 kilometers north of Kimberley. The whole area is semi-arid, with large-scale irrigation schemes that draw water from the Orange and Vaal Rivers (Orange-Riet WUA, Orange-Vaal WUA).

The Vaalharts WUA is situated at the confluence between the Vaal and the Harts Rivers and manages several canals. The main canal is the Vaalharts Canal, which gets water from the Vaal River at Warrenton and distributes it to irrigated fields until it reaches the Dry Harts River (figure 14). Another canal called Barkly West irrigates land close to the Vaal River.

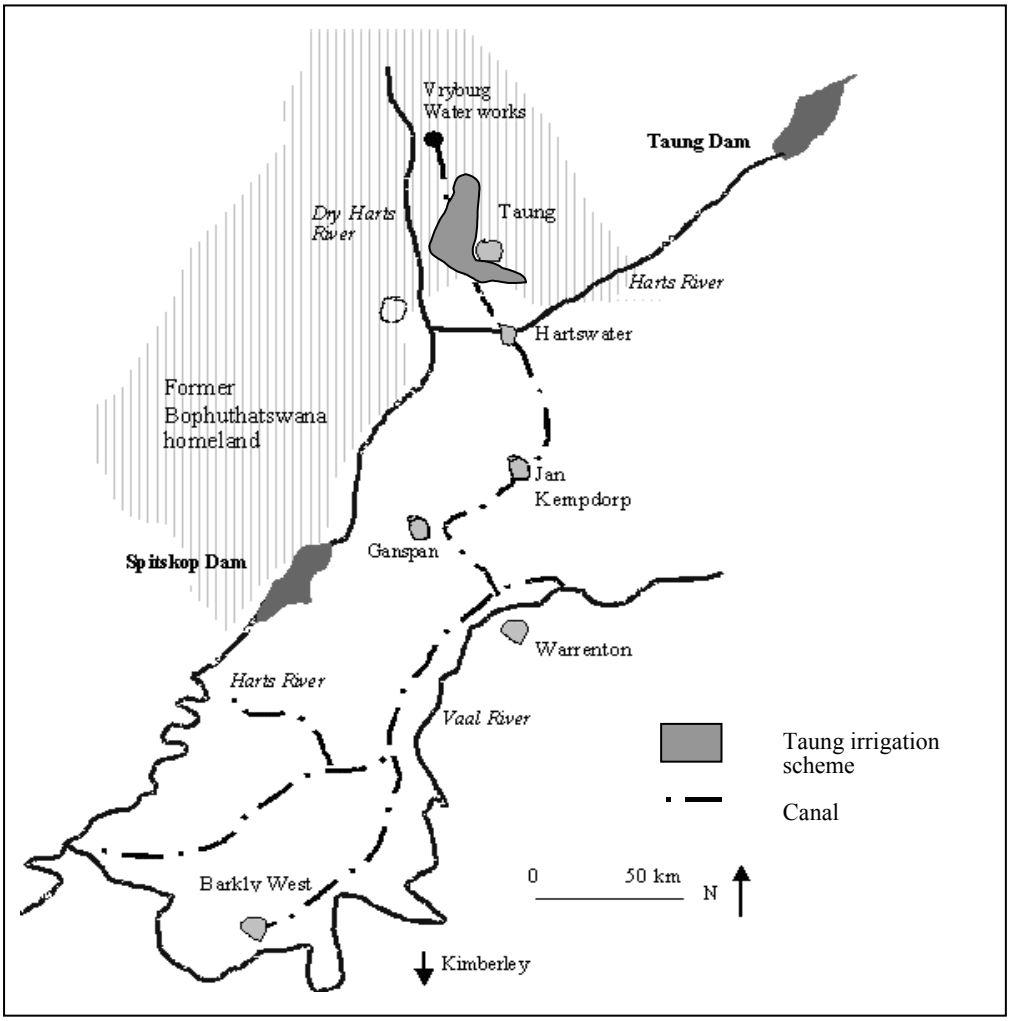
The area of jurisdiction of the Vaalharts Water User Association covers the Vaalharts Canal System from the weir to the Vryburg Waterworks, the Barkly West Canal and the portion of the Harts River from the Taung Dam up to the confluence with the Vaal River (figure 14). This area lies in both the Northern Cape and North West Provinces. The VHWUA is, therefore, made of four zones. The scheduled areas for irrigation for each of the zones are as follows:

1 Vaalharts 29,181 hectares;
2 Barkly West 2,555 hectares;

3 Spitskop 1,663 hectares; and
4 Taung 6,424 hectares, of which only 3,700 hectares have so far been developed.

The WUA falls mainly under the Phokwane Municipality area, which is a cross-boundary local municipality, i.e., also situated in both the Northern Cape and North West Provinces.

Figure 14. The area of the Vaalharts Water User Association.



History

Initial Developments

The Harts Scheme was first considered in 1893. Between 1893 and 1933, many discussions took place in the Cape Parliament regarding the investment opportunities of such a scheme. It was finally started as the Vaal River Development Scheme in 1933, with two components: the Vaalharts Irrigation Scheme and the Vaal Dam, 400 kilometers upstream of the scheme. "The Vaalharts Irrigation Scheme was, in 1976, the largest of its type in South Africa, with 37,192 hectares of land scheduled for irrigation." (Turton and Meissner 2003). The Vaalharts main canal is diverted from the Vaal River by means of the Vaalharts Weir, which is 11 meters high and 750 meters long (Turton and Meissner 2003). From 1939 to 1942, the

Taung Scheme was built in the former Bophuthatswana homeland and connected to the end of the Vaalharts Canal. Flood irrigation was used and each farmer in Taung had a 2-morgen plot (roughly 1.7 ha). The land tenure was fragile.

The Spitskop Dam, with a capacity of roughly 61 million cubic meters, was built in 1967-1968 and led to the creation of the Spitskop Government Water Scheme.

The Upgraded Taung Scheme

In 1978-1979, the Taung Irrigation Scheme was upgraded under the auspices of Agricor, the then parastatal agricultural agency of the Bophuthatswana government. The plot size was increased to 10 hectares, and around 178 farmers lost their land (North West Department of Agriculture 2001). Flood irrigation was replaced by modern pivots, each of them shared by a group of two to four farmers. Agricor withdrew in 1994 and the Department of Agriculture of the North West Province took over the operation and maintenance of the scheme.

Later Developments

The Taung Dam was built in 1982-1984 with a capacity of around 60 million cubic meters. It made the Bophuthatswana area less dependent on water coming from the then Republic of South Africa (DoA1). Since its completion, there has been a plan to connect the dam to the Taung Canals, but nothing has been finalized yet.

In 1994, the capacity of the Vaalharts Canal was upgraded from 28 m^3/s to 48 m^3/s, in order to increase the irrigation capacity in the Vaalharts area from 3.8 mm/day to 7 mm/day. However, the canal was enlarged only in the Vaalharts area and not in the Taung area (VHWUA1). The primary, secondary, and tertiary canals are all lined with concrete.

Transformation into a WUA

The Vaalharts Water User Association (VHWUA) is made of the fusion of the Vaalharts and Spitskop Government Water Schemes and the Taung Irrigation Scheme. The initial proposal was submitted in November 2000 and accepted in May 2001. From May 2001 to April 2003, the staff members remained part of the DWAF but were seconded to the WUA. In April 2003, they were fully transferred to the WUA.

Water Users

Commercial Farmers

The commercial farmers grow cotton, deciduous fruits, groundnuts, maize, pecan nuts, and watermelon in summer. In winter, they turn to barley, citrus, wheat, and some vegetables. Many commercial farmers use boreholes as a source of drinking water and also to complement the water from the canal.

Emerging Farmers

There are currently 409 farmers in the Taung Scheme (table 12). The pivots are shared between two to four farmers, depending on their size.

Table 12. Irrigation techniques used in the Taung Scheme.

Type	Number	Area (ha)	Farmers
40 ha pivot	52	2,080	208
30 ha pivot	2	60	6
20 ha pivot	16	320	32
10 ha pivot	3	30	3
Sprinkler on 7.5 ha	136	1,020	136
Flood on 1.8 ha	24	43	24
Total	233	3,553	409

The farmers usually grow barley in winter, followed by groundnut and maize in summer. In the past, farmers had many financial problems and many of the pivots stopped functioning gradually. However, some years ago, the South African Breweries (SAB) started to contract with the farmers of Taung for the production of barley (Tregurtha and Vink n.d.). SAB took charge of most of the farming operations such as land preparation, spreading of fertilizers and pesticides, and harvesting. The farmers are responsible for the irrigation and extension officers from the SAB, and the Department of Agriculture help them schedule their irrigation. The emerging farmers interviewed were satisfied with their relationship with the SAB, with whom they currently farm 2,400 hectares. "In 2002, the number of farmers involved in the scheme doubled to 193, and nearly 10,000 tons of barley were purchased" (South African Breweries Miller 2003.) Some farmers also sell barley on the open market.

The farmers used to have a similar contract with another company for the production of groundnuts, but current disagreements between this company and the farmers might even lead to legal action.

The land is currently state property but, for several years now, there has been negotiations over its transfer to the community, so that it would be managed by the Tribal Authority. A significant stumbling block is that 176 farmers lost their land during the upgrading of the scheme in 1978. The Tribal Authorities refuse to take over management of the land until the problems of these 176 farmers are solved. They are claiming compensation, which could be done through the planned development of a further 2,700 hectares, so that Taung uses its full water rights.

In some areas of the scheme, farmers rent the land from other farmers. This means, several emerging farmers in the Tshidiso subarea have become large-scale farmers with more than 50 hectares each.

There are also small-scale farmers in two other places in the VHWUA area: a group farming 180 hectares in the Ganspan Settlement, and 15 farmers sharing a commercial farm with 154, 5 hectares of water rights, in the Barkly West area.

Drinking Water Use

The VHWUA provides water for all the local towns and villages, the main ones being Vryburg (3.1 million cubic meters--MCM), Jan Kempdorp (0.8 MCM), Hartswater (0.95 MCM), Taung (1 MCM), Pampierstad (1 MCM) and Pudimoe (1.3 MCM). In the Northern Cape, the local municipalities are the water service authorities (WSA). The Sedibeng Company is the water service provider of the Phokwane Municipality, which encompasses the towns of Jan Kempdorp and Hartswater.

The area averages five persons per household. Thus the free basic water granted to each household has been fixed at 4.5 cubic meters per month, and not 6 cubic meters, as is the case in many other places in South Africa. There are two systems of water distribution in the villages. First, some villages do not meet the Reconstruction and Development standard, which calls for a pipe within 200 meters of each household. And as the villagers mostly use less than their free basic water allowance the municipality has decided, in the short term, to supply their water for free without being individually metered (WSP1). Second, in other villages, prepaid water meters were installed on the pipes 4 years ago. Some of these villages already have access to free basic water. All villages should get water by the end of 2003 (WSP1).

Small-scale Users
Small-scale users are mainly livestock farmers. They use water from the Harts River or the Taung Canal. There is currently no policy to provide extra water for homestead gardening or livestock farming from the drinking water taps (WSP1). Some farm workers also drink raw water from the canal (SSU1).

Industry
The few industries in the area include a marble factory, a brick factory, and the on-farm processing of citrus. There are some diamond diggers in the Barkly West zone.

Recreational Use
The Spitskop Dam is used for angling and net fishing.

Water Management

Water Issues

Water Quantity
The scheme does not face a general constraint of water availability. The last water restriction was in 1995, and the last serious one was from1983-1987, when farmers only obtained 60 percent of their quota. However, Taung main canal is small for the area it is supposed to supply and it was not expanded after the increase of the area under irrigation in 1978. Therefore, during the peak periods in summer, this canal sometimes cannot supply the necessary amount of water to Taung (DoA1). Moreover, the flow arriving at Taung may drop unexpectedly up to 30 percent below the maximum flow of 3.5 m^3/s (DoA1), due to the lack of a water demand system on the Taung Irrigation Scheme like the one on the Vaalharts Scheme.

Water Quality
Water from the Vaal River is saline. This can create problems with the use of pressure irrigation, which does not enable the salts to be ‘flushed’. Because of the chlorine content of the water, farmers stopped growing tobacco some years ago. Drainage systems have had to be built in the whole area. A Water Research Commission project is currently in progress to help farmers choose the best crops, given the salinity of their soils (VHWUA1).

General Management by the WUA

The water quota is 9,140 m^3/yr/ha for the Vaalharts area, 11,855 m^3/yr/ha for the Barkly West area, 7,700 m^3/yr/ha for the Spitskop area and 7,700 + 10 percent = 8,470 m^3/yr/ha for the Taung area. The extra 10 percent in the Taung area accounts for the losses in the Taung Scheme, according to an old agreement between Bophuthatswana and the Union of South Africa. "Government Notice 2651 of 21 November 1952, stipulated that the rightful irrigation allocation from the Vaal River for land on the Taung Irrigation Scheme was equal to 7,700 m^3/ha/yr plus 10 percent distribution losses on an area of 6,424 hectares. This was equivalent to 54.4. million cubic meters a year" (Turton and Meissner 2003).

In the commercial farming area, distribution is based on the demand. Each tertiary canal usually supplies six farms, and the six irrigators nominate a spokesperson for the canal. Every Thursday, this farmer collects the demands of all farmers on the tertiary canal for the next week and puts the total demand in a local mailbox. The local water bailiff collects all the demands and sums them at the level of the secondary canals so that the distribution of water among the secondary canals can be planned accordingly.

The main canal has been expanded from 28 m^3/s to 48 m^3/s, but the maximum discharge is currently 32 m^3/s. The priority in 2003 is to refurbish the secondary and tertiary canals that are old and are leaking. Maintenance is done principally during the 6 weeks a year when the canal is closed.

Internal Management within Taung

Farmers irrigate from Monday morning to Saturday noon, mostly during the day. The extension officers do the irrigation scheduling for them.

There are three storage dams in the Taung Scheme, which have a capacity varying from 250,000 to 650,000 cubic meters. From these dams, the water is sent to secondary canals, which in turn feed small reservoirs near the pump stations. Each pump station contains up to six pumps for six pivots. The pumps can function separately and each 40-hectare pivot uses a flow of 40 ℓ/s. There is an automatic cut-off system at the entrance to each small reservoir.

Six officers manage the water distribution network in the Taung Scheme: They measure the levels in the dams every day and they operate the gates leading to the pump station reservoirs. The farmers are supposed to tell the local operator when they irrigate and when they stop their pivots, so that no water is wasted at the end of the secondary canal, but they do not always do so.

The operators are from the North West Department of Agriculture (DoA) and will be transferred to the VHWUA at the end of 2003.

There is no demand management within Taung because, while farmers are asked to announce their demand for the following week, few of them actually do so (DoA1). Therefore, the officers regulate the system according to the capacity of the three storage dams and statistics on water use during former years. They request water from VHWUA using the aforementioned criteria.

There used to be fences protecting the canals within the Taung Scheme, but they have been stolen.

The New Water User Association

The Creation of the Association

As for all government water schemes, the transfer to the Water User Association is done gradually. The WUA was enacted in May 2001, with the DWAF staff seconded to the WUA. Then, the staff of 206 people were fully transferred on 1 April 2003. The last step will be the final transfer of assets, which is due in 2008, once the VHWUA has proved that it is able to manage the waterworks in a sustainable way.

Among the issues under discussion is the transfer of the Taung Dam, which is leaking. The VHWUA is currently measuring the exact amount of the leakage and will ask the DWAF to resolve this problem before the association agrees to take it over.

Finances

In the area served by the Vaalharts Canal, the basic fee is 8, 12 cents/m^3 for all farmers. Since the quotas vary among zones, the actual fee also varies: ZAR742/ha/yr in the Vaalharts area and ZAR962, 63/ha/yr in Barkly West. The Spitskop farmers pump water directly from the river so they pay a lower rate of ZAR297.22/ha/yr). Of the 8, 12 cents, 1.12 cents go to the DWAF for the operation and maintenance of the dams upstream, as well as for the new water management fees. Thus, 7 cents go to the VHWUA. According to the VHWUA1, there is no volumetric tariff because the DWAF has to store the water in the dams for the farmers and thus farmers have to pay for their full annual quota, whether they use it or not.

The household and industrial water users pay a very high fee, because they all pay for the Lesotho Highland Project. They pay a total of ZAR1.53/m^3, of which ZAR1.43 go to the DWAF and ZAR0.10 to the WUA.

The annual budget is around ZAR21 million. The VHWUA is mainly in charge of the operation and maintenance of the waterworks. However, since the VHWUA will soon take over the ownership of the works, it has to build a financial reserve. According to VHWUA1, this reserve should be at least ZAR10 million in the beginning. Like all government water schemes, the VHWUA received a grant of 50 percent of its annual budget at the transfer, (i.e., ZAR11 million,) but it had to be used to buy heavy work vehicles from the DWAF (ZAR4.8 million) and to build up the WUA's own vehicle fleet (ZAR4.6 million).

In 2004, every zone will have its own water tariff based on its own operation and maintenance costs, according to statistics currently being compiled by the VHWUA. In 2003, the fees of the commercial farmers were used partially to help the emerging farmers, but this will cease with the new system.

The New Management Committees

The main Management Committee (MC) comprised 20 members and the first elections were held in May 2002. The representatives of the farmers are elected for a period of 3 years. For the other categories (emerging farmers, small-scale users, local municipalities and industries), the term is one year, and each representative can be re-elected for a maximum of 3 years. The WUA will help the small-scale users coming to the MC meetings. The MC meets quarterly and extra meetings are organized if necessary. Taung farmers are represented as the irrigators in the Taung Zone and not as emerging farmers.

For more urgent matters, an Executive Committee has been set up, with five members: three representatives of irrigation, one for the emerging farmers, and one for small-scale users. The current origin of these representatives is indicated in brackets in table 13.

Table 13. Composition of the main MC and the subarea MCs.

Category	Main MC	Subarea MCs			
		Vaalharts	Barkly West	Spitskop	Taung
Irrigation	10 (2 from Taung) (2)	5	3	2	5 (1)
Emerging farmers	1 (1)	1	1	0	0
Small-scale users	3	1 (♀)	1	1	1 (♀)
Local authorities	3	1	1 (♀)	0	2
Industries	1	1	1	0	1
Government departments	2	1	0	0	1
Traditional leader	0	0	0	0	3
Total	20	10	7	3	13

Note: Members of the Executive Committee are indicated in brackets.

The symbol ♀ designates a female representative

There is also one MC for each of the four zones or subareas. Table 13 gives the composition of these local MCs, which meet at least once a year. In the future, they will probably have to meet more often, especially with the budget separation per area (VHWUA1). All members of the main MC are also members of one of the local MCs.

The meetings are held in Afrikaans, and key aspects and motions are translated into English because the representatives of the small-scale users who do not speak Afrikaans and usually speak English (VHWUA1, EF2). Members strive to reach consensus, but when they vote, the Constitution indicates that each person has one vote (VHWUA1).

Since its inception, the main MC has dealt mainly with the issue of transformation from a government water scheme into a WUA (transfer of staff and assets). Though the Taung MC exists on paper, it still had not yet met by October 2003. As said earlier, the meetings will probably become more necessary once the WUA implements a differentiation per zone of the water tariffs.

Contrary to the situation in many other WUAs in South Africa, the water service provider and municipality representatives attend the main Management Committee meetings. There are several reasons for their interest.

1 The tariff for drinking water is high (cf. supra) but the linking of Taung Dam to the WUA network would enable the municipalities to obtain much cheaper water from the Harts River (from ZAR1.53/m^3 down to ZAR0.4/m^3 for raw water). However, 90 percent of the water in this canal is earmarked for irrigation and, therefore, the municipality cannot take the lead in implementing the project (WSP1);
2 Sedibeng operates a sewage system that sends treated water to the Harts River. It also pumps water for a drinking-water network from downstream in the same river. There is, hence, a need to interact with the VHWUA because it is in charge of the management of this stretch of the river;
3 Sedibeng also pumps from the Spitskop Dam, which receives the effluent water drained from the commercial farms and thus contains pesticides and fertilizers. However, there is enough dilution within the dam for the moment (WSP1);

4 The canal is closed for 6 weeks per year on average (usually twice for two weeks and twice for one week). The municipalities must be aware of the periods of closure in order to stock sufficient water to carry them through; and
5 The VHWUA provides some services to its members (the municipalities), for instance, renting its heavy equipment (VHWUA1).

The Involvement of the Taung Scheme

Emerging farmers currently face almost no problems of water quality or quantity. The main obstacle to the Taung farmers' inclusion in the VHWUA may be the payment of their water fees. For the past 5 years, the emerging farmers have had to pay water fees but many of them have run into debt. The DWAF is owed a total of approximately ZAR12 million by the emerging farmers and will probably have to write off this debt (VHWUA1).

Since the scheme was formerly a government water scheme, the DWAF pricing strategy applies and the emerging farmers can phase in the payment of their fees over a period of 5 years: They had to pay 20 percent of the fees in 2002/2003, they currently have to pay 40 percent, and they will have to pay the full fees in 2006. The DWAF agreed to pay the WUA the difference (which amounted to ZAR1.5 million in 2003). However, the VHWUA has not yet received the funds.

The WUA charges for the area currently developed, i.e., 3,700 hectares, and not for the 6,424 of water rights (this is a different situation from the one in Great Letaba) and the DWAF also does not bill the VHWUA for the remaining 2,724 hectares. When the Taung farmers grow barley, SAB (South African Brewery) pays for the water directly to the VHWUA and subtracts the amount from the money paid to the farmers.

Since there will soon be a balanced budget for each zone, the nonpayment by Taung farmers will mean less refurbishment on their own canals (VHWUA1).

The Involvement of Small-scale Users

All the seats allocated in the different management committees are filled. The representatives of small-scale users for the Vaalharts and Taung subareas were interviewed. Approximately half of commercial farmers use water from the canal for domestic purposes; the others use boreholes (VHWUA1). Therefore, the former can be considered as small-scale users in this regard, having for instance specific requirements in terms of water quality in the canal or assurance of water supply. The representative for Vaalharts is a lady who lives on an irrigation farm that she is renting to a commercial farmer. This representative was nominated by the Vaalharts Farmer Union and the local Woman Farmer Union and elected at a local meeting. While some farm laborers attended the election meetings, their participation at the meeting and their interaction with the representative are limited, mainly because of a lack of internal organization within the farm-worker community. The VHWUA will attempt to address this issue in the future (VHWUA1).

The representative for Taung area is a young man, who was elected by farmers in the Ipelegeng area, one of the five subareas of Taung. This area was chosen by Taung representatives to nominate a small-scale user representative because it includes some households that use canal water for small-scale gardening. The representative is not himself a small-scale user (he lives in the town of Taung, which is distant from the canal) and the Ipelegeng farmers probably chose him because he is fluent in English and has a cell phone (VHWUA1). However, despite numerous meetings where the new organization explained

how to foster user participation, this representative does not know what his responsibilities are at the MC and what the term 'small-scale users' means.

During the few months of the case study, the VHWUA had to deal with important issues with regard to the transfer and there were no burning issues with regard to small-scale use of the canal water. However, it is important to secure proper representation of the small-scale users soon. This would entail a minimal organization of these users. For instance, the Orange-Riet WUA plans to gather all the farm laborers together so that they can elect their representative. It may be better to have a representative who is him/herself a small-scale water user. It is also important to provide capacity building so that the representatives understand their responsibilities.

Conclusion

This case study was unique because it dealt with the transformation of a government water scheme into a water user association. It appears that the presence of a well-structured permanent staff gives the WUA the capacity to undertake the steps necessary to meet the requirements of the DWAF for the inclusion of HDIs. The Management Committees are organized as required by the DWAF. The two outstanding issues with regard to HDI involvement are the lack of organization among the HDI small-scale user community and the HDIs limited understanding of their responsibilities in the new WUA.

The WUA staff members are sensitive to the DWAF requirements, first, because they used to work for the DWAF, and second, because the WUA is still negotiating with the DWAF with regard to the forthcoming transfer of assets. Water scarcity is not a problem for the VHWUA in general, as well as for the inclusion of the Taung farmers. The main issue with regard to the involvement of the latter will be their capacity to pay the water management fees and to get the Taung subarea management committee participating in decisions with regard to the maintenance of their part of the system.

Appendices

Appendix I

Economic Assessment of Production in the Ebenhaezer community: Lower Olifants Water User Association

Irrigation farming is based on beans and lucerne from which the following is an indication of the margin of these two crops (WCDoA1).

1. The average harvest for beans is 1.5 t/ha (2.4 t/1.6 ha).
2. No chemical correction to the soil is done, but farmers use pesticides for red spider and rust. Pesticides costs roughly R1,000/ha (R1,600/1.6 hectares).
3. Implements for crop dusting are hired to each other.
4. Seeds are obtained from the DoA, and farmers do not pay for their irrigation water.
5. The Lutzville Co-op is the main buyer of their products, with market prices varying around R6,500/ton (R15,600/2.4 ton).
6. Farmers use their own labor and transportation.

Therefore, the revenue is roughly R13,000/1.6 hectares or R26,000 per year for both seasons from the beans. Quality-wise, the beans are comparable to those of CFs, as are their prices.

An average margin for lucerne would be based on the following elements (WCDoA1).

- No chemical correction or crop dusting is done for lucerne.
- Yield is 100 bales/ha (160 bales/1.6 ha).
- Selling price is R10 to R15 a bale to CFs.

Therefore, the income is R2,000 for lucerne. No transportation costs are applicable because the client normally comes to collect the bales from the farm.

Given the abovementioned income, it is difficult to earn a living from agriculture, hence many members of the EKB engage themselves in other employment. Farming satisfies their daily needs and they go elsewhere for a source of monetary income. Some members also hire additional land from neighbors (WCDoA1).

Other crops like tomatoes, cabbage, carrots, pumpkins, onions and potatoes are also produced but in small quantities. Most of these goods are traded in a small open market to other producers and the RDP community. Prices are driven by supply and demand, and are definitely not reflected by the commercial prices (WCDoA1).The following is a rough comparison between the potential gross incomes of the most important crops for the LORWUA area.

Table 1. Gross income for a selection of crops.

Crop	Yield (t/ha or bales/ha)	Income (ZAR/ton or ZAR/bale	Income/ha ZAR	Seasons/yr	Gross income/ ha (ZAR)
Steen	28.0	800	22,400		
Colobar	32.0	800	25,600		
Cabernet	15.0	3,500	52,500		
Beans	1.5	6,500		2	19,500
Lucerne	100.0	15		1	1,500

Appendix II

Brief Financial Analysis of Emerging Farming Activities in the Letaba Water User Association

Table 1.Overall cost and benefits of Mariveni Irrigation Scheme.

	Cost and Benefit in Rands per annum	Cost and Benefit in Rands per ha
COSTS		
Electricity	19,014.59	67.67
Labor	45,913.40	163.39
Fertilization	99,458.00	353.94
Fuel	6,800.00	24.20
Weed control	15,963.60	56.81
Disease control	17,012.80	60.54
Scheme fee		
Water management fee canal	3,074.82	10.94
Transport	6,662.00	23.71
Other costs		
Total Cost	213,899.21	761.20
REVENUE		
Citrus sales	120,509.4	428.86
Banana sales	133,504	475.10
Total Revenue	254,013.40	903.96
NET BENEFIT	40,114.19	142.76

Total irrigated area is 281 hectares, with citrus cropped on 147 hectares and bananas cropped on 134 hectares.

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