

Water Affairs in the Lower Blyde River
The role of DWAF in local water management

IWMI Working Paper

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Content

- 1 Introduction**
 - 1.1 Case Study: The Lower Blyde River**
 - 1.2 The Case Study in perspective: South Africa and The Netherlands**
 - 1.3 Case Study Objectives**

- 2 General Background**
 - 2.1 Multi Stakeholder Participation**
 - 2.2 Former SA irrigation policy**
 - 2.3 The new SA water policy: NWA 1998**
 - 2.4 Building CMAs and WUAs**

- 3 The Lower Blyde River**
 - 3.1 The Blyde River Catchment**
 - 3.2 Stakeholders**
 - 3.2.1 Irrigation Farmers**
 - 3.2.2 Mametja / Sekororo Communities**
 - 3.2.3 Upstream Stakeholders**
 - 3.2.4 Downstream Stakeholders**
 - 3.2.5 Governments involved**

- 4 Water Management in the Lower Blyde River**
 - 4.1 The Lower Blyde WUA**
 - 4.2 The Lower Blyde Irrigation Pipeline**
 - 4.3 The 800ha Black Emerging Farmers Project**
 - 4.4 Domestic Water Supply Mametja / Sekororo communities**

- 5 Conclusions**

Bibliography

Annex: list of interviews

1 Introduction

“The new South Africa is the world in microcosm, in its population mix, its wealth gap and above all in the impact which the new forces of globalisation are having on it. Here is where the First and Third Worlds meet, the developed and developing world, the dark-skinned and light-skinned worlds, the rich and the poor, in the same proportions as the rest of the global village of roughly one to five”. (Sparks 2003, prologue)

1.1 Case Study: The Lower Blyde River

The Blyde River is unique in the region for its continuous flow and good water quality and is an important tributary for the Olifants River. The Olifants River is of poor water quality and during droughts there is a lack of sufficient flow. The lower Olifants River basin therefore relies highly on Blyde River water, not only from a quality perspective but also from a quantity perspective. The Blyde River flows into the Olifants River immediately north of the Blyde River irrigation district. The flow of the Lower Blyde River is stabilised to some extent by the Blyderivierspoort Dam (1974). The dam is situated just below the confluence of the Ohrigstad and Blyde Rivers.

The Blyde River region embraces different stakeholders. Blyde river water is used for agricultural, industrial and domestic purposes. At the lower Blyde River there is a relatively small white commercial irrigated farm area (aprox. 400 km²). Adjacent to this irrigation district there are extensive black surrounding communities. Pockets of relative wealth with good infrastructure are neighbouring large black communities suffering poverty and sometimes basic infrastructure. The poor domestic water infrastructure is considered the most pressing problem in the black communities. In the wider region the Phalaborwa mines (mainly phosphor) further downstream are an important stakeholder. The Blyde River Canyon (in the upper catchment) is the third largest canyon in the world and attracts around 900,000 tourists per year. The booming sectors of (eco)tourism, game farms and nature conservation (Kruger National Park, Biosphere Kruger to Canyon) have a growing interest in the development of the Blyde River. Socio-economically the borders between the former homelands (Lebowa and Gazankulu) and the white areas still exist (USAID 2002).

The National Water Act (1998) provides a new institutional framework for water management in South Africa. DWAF is in a process of reorganisation and is delegating powers towards regional Catchment Management Agencies (CMAs) and Water Users Associations (WUAs). Former Irrigation Boards have to be transformed into WUAs. The process for establishing a CMA in the Olifants River Cathment is in its final stages. Ultimately 50 WUAs are identified in the Olifants basin. In the Olifants basin 17 Irrigation Boards have to be transformed; so far 3 WUAs have been established. These are the Lebalelo WUA, the Hereford WUA and the Lower Blyde WUA (DWAF, 2003).

This case study focuses on developments in the Lower Blyde River area. Recently the existing Irrigation Board has been transformed into a WUA. The establishment of an irrigation pipeline marks a crucial phase in the region. Connected with this pipeline is a project to establish 800ha emerging farmers in the region. Improvement of the

domestic water supply for the neighbouring black communities is another important project in the area. One idea is to link the irrigation pipeline with an extension pipeline for domestic water supply. The Department of Water Affairs and Forestry (DWAF) plays a central role in facilitating integrated water resource management in the Lower Blyde River.

1.2 The Case Study in perspective: South Africa and The Netherlands

This case study in the Lower Blyde River can be put into a wider perspective in which local water management is changing all over the globe. The Blyde River basin is a highly complex, diverse and heterogeneous region in ecological and socio-economic terms. Modern governance all over the world is confronted with processes of growing complexity, diversity and heterogeneity. The interdependence between ecology and human life can only be ignored at a high price (Long 2001, Pyburn 2002 Roling, 2002). News bulletins are telling stories of growing water scarcity, catastrophic floods and food insecurity all over the globe. Good governance in water management has become urgent. Dynamic new ways will have to be explored aiming towards a more sustainable and equitable future.

At first sight South Africa as a semi arid and water scarce country and The Netherlands as a flood prone river delta do not have much in common regarding water management issues. Nevertheless South Africa and The Netherlands are both facing growing water constraints and both countries are in a transition from water resource development to integrated water resource management. Furthermore both countries are in the process of (re) building new institutions in local water management.

Both in South Africa and The Netherlands (local) water management is in a period of fundamental institutional change. The promotion of sustainable ecosystems and the enhancement of socio-economic equity (including poverty alleviation) are strongly connected with the way water is managed. Tensions between different stakeholders can arise easily on water issues of use, pollution, ecology, closure of basins. Complexity, diversity and dynamics are connected with modern water governance, therefore new ways should be explored (Kooiman, 1998).

Both South African and Dutch recent water legislation and water policy highly advocate multi-stakeholder participation and self-management. In South Africa water resources are increasingly strained. The new revolutionary National Water Act (NWA 1998) breaks away from the apartheid legislation and tries to redress former inequities based on the principles of integrated water resource management (IWRM). In the Netherlands the national Committee on a new Water Management Policy in the 21st Century (installed after serious floods in 1993, 1995 and 1998) stated that a fundamental change in Dutch water awareness and management is needed.

In the Netherlands the Dutch Water Boards have a long institutional history as autonomous, diverse and flexible local water management bodies. Recent years brought enormous change for the Water Boards. The Water Boards have seen an ongoing merging process from 3000 in 1950 towards 50 in 2003. Since the 1992 Water Board Act the Water Boards have been evolved into more formalised local government institutions. In South Africa a more top-down process of delegation takes place from the national to the local level by creating new institutions such as

Catchment Management Agencies (CMAs) and Water Users Associations (WUAs). The existing Irrigation Boards in South Africa are to be transformed into WUAs.

Comparison of institutional developments in local water management in South Africa and The Netherlands can dovetail two different experiences (top down vs. bottom up). This Case Study is part of a comparative PhD study on institutional innovation in local water management in South Africa and The Netherlands. Finally the PhD study is part of a global research programme on multi-stakeholder platforms for integrated catchment management by Wageningen University in the Netherlands (MSP programme).

1.3 Case Study Objectives and Methods

The objective of this case study is to better understand the role of the Department of Water Affairs and Forestry (DWAF) in facilitating Integrated Water Resource Management in the Lower Blyde River. To reach this objective it is necessary to have knowledge of the context, the Blyde River Catchment, the different stakeholders and the local water institutions and water issues.

Chapter 1 introduces the Lower Blyde River Case Study.

Chapter 2 gives a general background on stakeholder participation in South African water management.

Chapter 3 focuses on the physical and hydrological characteristics of the Blyde River Catchment (3.1). This is followed by a description of the different stakeholders involved in the Lower Blyde River (3.2).

Chapter 4 addresses the Lower Blyde Water Users Association (4.1) and the current local water projects in the area (4.2, 4.3, 4.5). The role of DWAF in the different water management issues is included in this chapter.

Chapter 5 concludes with an analysis of the research findings.

This case study took place in the period from August 2003 till November 2003.

Methods used were:

- Desk research and literature study;
- Dialogues with experts and colleagues;
- In-depth interviews with key persons in The Blyde area and in Pretoria;
- Area visits and observations (including an experience of living for two weeks within a black community in Rutseng/Leboeng).

Two well-attended workshops were organised for feedback on the research findings:

- Maruleng Municipality Hoedspruit, 30-10-03 (local stakeholder participation);
- IWMI Pretoria, 21-11-03 (role of government).

2 General Background

2.1 Stakeholder Participation in Water Governance

In the recent literature there seems to be considerable optimism about stakeholder participation and self-management to solve many of the problems of IWRM. Water users have more direct local information on the physical system and the system of rules governing its use. Less bureaucratic procedures are to be expected and stakeholders thought to be more motivated. Nevertheless different nuances in this optimism can be made especially concerning the dynamics of internal and external water politics of the different stakeholders. So far the existing literature has not provided a clear sense of benefits, costs and perception of farmers and different stakeholders in participating in WUAs (Meinzen-Dick 1996 Rhoades 1998, Warner 2002). Vincent (1997) argues that a comprehensive understanding of irrigation requires a framework that integrates technical and social sciences perspectives. When thinking about institutions of local water management a dynamic multiple dimensional approach can help in understanding processes of institutional innovation. Several synthesis studies were carried out to identify principles for success in (farmer) stakeholder participation in irrigation (Uphoff 1986, Vermillion 1996).

Institutions do not function in a vacuum but are constituted and embedded in a larger institutional framework (constitutional dimension, inter institutional relations). Furthermore each institution has its own rules and practices of administration (governance and finance), and has a concrete impact (or lack of impact) on the ground (Ostrom 1992, Ostrom, Gardner and Walker eds. 1994,). Institutional innovation in local water management can be witnessed by the occurrence of multi stakeholder platforms (MSPs) in various places all over the globe. Institutional innovation in MSPs can be regarded as a process of renegotiating new institutional agreements with a broad range of stakeholders involved. Warner (2002, 2003) distinguishes three main motivations for the emerging MSPs. First an emphasis can be distinguished on the improvement of management capacity (a wider range of ideas, self-governance, self finance). Second there is a focus on accommodation of different interests (social learning, negotiation, conflict prevention). Third there is a focus on empowerment of disadvantaged people at the local level (democratisation of water management).

Instead of a single dominance on public governance (water managed as a public good) or on privatisation (water efficiency through private entrepreneurship), public-private partnerships and new kinds of co-operative government are recently occurring in water management. In Johannesburg (UN Sustainable Development Summit 2002, South Africa) and Kyoto (Third World Water Forum 2003, Japan) consensus developed on the need for dynamic water systems management where the public sector, the private sector and the other stakeholders play their different roles in reciprocal relations. New roles are emerging for the government, the private sector and the other stakeholders involved.

The quest for sustainable integrated water resource management (IWRM) is contradictory to a growing inequality between rich and poor in a river basin. Subject of debate is how the local water institutions should be opened up to new stakeholders. Multi stakeholder participation should not become water governance by a few

powerful stakeholders. One direction is to provide a sufficient legal system (including water rights) for representation and membership that could empower the less powerful stakeholders. The government has a crucial role to play in facilitating the goals of IWRM.

2.2 Former South African irrigation policy

Much of South Africa's past water legislation was largely oriented towards irrigated commercial agriculture. The central principle in the previous water law was a link between the right to use water and the ownership of land adjacent to that water (the riparian principle). The 1956 Water Act consolidated the system of riparian rights resulting in commercial white land-owning farmers having essentially unconstrained access to water. In commercial agriculture areas, the Irrigation Boards that administered the allocation of water were serving the needs of these farmers. The position of the rural black and coloured people in the system of riparian rights is not difficult to imagine. They simply did not have sufficient (financial) capacity to get access to the administration for establishing water rights while private black landownership was not allowed. The fact that black people were concentrated in homelands with marginal water resources and infrastructure, and with informal or customary traditional land use rights contributed largely to the inequity (Ramazotti 1996). Besides, government dams were, and still are, located in areas of urbanisation and commercial estate farming, meaning that the rural population was forced de facto to turn to groundwater abstraction. Proper infrastructure to reach the groundwater resources in the former homelands was often lacking (Jaspers 2001).

Under the apartheid governments a number of (more or less state owned) irrigation schemes were built in the homelands. In homeland irrigation schemes three sorts of farming could be distinguished in general: large scale state farming (run by development agencies), smallholder commercial farming using irrigation infrastructure and small plot farming for own livelihoods. For most black people the lack of proper infrastructure, of property rights regarding resources, and the subsistence nature of their productive activities strongly limited the potential for improvement and intensification. Most black populations were not only deprived of access to water and land for irrigation purposes but also of adequate and clean water for domestic use (Perret, 2002: 283-300). Many of the irrigation schemes in the former homelands were unsustainable from the beginning but collapsed in the (transition time of the late) 1990s. Now the government is trying to revitalize the most viable of these schemes.

2.3 The new South African water policy: NWA 1998

In 1998 a new National Water Act replaced the old law after an extensive consultation process (key principles were formulated earlier in the White Paper on a new water policy, 1997). Already in 1997 a new Water Services Act had been established (addressing domestic water needs). The purpose of the National Water Act (NWA) is to ensure that the nation's water resources are managed in ways that take into account the basic human needs of present and future generations, promoting equitable access to water, redressing past racial and gender discrimination, facilitating social and economic development, and protecting aquatic and associated systems (Muller, 2000).

Three main issues in the NWA will be shortly addressed:

- 1) The replacement of riparian water rights by a system of licensing water use;
- 2) The introduction of a Reserve for basic human needs and for ecology;
- 3) The introduction of new water management institutions.

Ad1). The system of allocation of water rights based upon the riparian principle is abandoned. It is now replaced by a system of (1) permissible uses, (2) general authorisations and (3) licences. The permissible use system is formulated in such a way that basic (mainly domestic) water users, indicated in a schedule attached to the act, are not subjected to the licence and authorisation system. The system of general authorisations gives the relevant authority the possibility to exonerate types of water uses, groups of persons, and certain parts of a catchment at certain periods of time from legal restrictions or licence application (section 39). Any other water use needs a licence with a maximum duration of 40 years. After this period the licence has to be repealed (section 40). The relevant authority can attach further conditions or obligations to the licences (Jaspers, 2001).

Ad 2). The introduction of the Reserve should result in the determination of minimum flows for basically all rivers and streams for all period of the (hydrological) year. The Reserve consists of two parts; the basic human needs reserve and the ecological reserve. The basic human need reserve should provide for the essential needs of individuals and includes water for drinking, for food preparation, and for personal hygiene. The ecological reserve relates to water required to protect the aquatic ecosystems of the water resource. The Minister is obliged to produce a system indicating classification and quality objectives of all water bodies. Pollution ceilings will be introduced (National Water Resource Strategy, 2002)

Ad 3) The NWA sets out the new institutional framework for the management of water resources in South Africa. These water management institutions include catchment management agencies (CMAs) and water users associations (WUAs), (DWAf CMA and WUA guides, 2000).

2.4 Building CMAs and WUAs

CMAs are statutory bodies (chapter 4 NWA) governed by a board, which represents a broad stakeholder grouping together with experts. CMAs must seek co-operation and agreement on water-related matters from the various stakeholders and interested persons. CMAs are the second tier under the national level. It is decided that 19 CMAs will be established in South Africa. CMAs can delegate powers to for example WUAs, international water management bodies, catchment management committees, water services institutions. More informal Catchment Forums have been developed in some catchment areas to initiate the participation process that must underpin the establishment of CMAs. These forums are non-statutory bodies consisting of different stakeholders.

A WUA is a statutory body established by the Minister under section 92 of the NWA. WUAs are, in effect, co-operative associations of individual water users who wish to undertake water related activities for their mutual interest. The broad role of a WUA is to enable people within a community to pool their resources (money, human resources, and expertise) to carry out local water management activities. WUAs also

provide a mechanism through which a CMA could devolve the implementation of aspects of a catchment strategy to the local level. Potentially WUAs could become a third tier of government. A WUA cannot have objectives conflicting with a CMA strategy for the area in which it operates. WUAs may be established for any form of water use as described in the NWA (Section 21). This is a significant change from the 1956 Act, which only provided for the establishment of institutions focussed on irrigation. A WUA can be single-purpose or multi-sector, dealing with a variety of water uses and issues within its area of operation. WUA functions can include irrigation, water supply for domestic, industrial and municipal use, stream flow reduction activities, wastewater treatment, recreational and environmental control and management and groundwater management. It is for example possible for a WUA to function as a water supplier for domestic purposes in terms of the Water Services Act.

Either the Minister of DWAF or local stakeholders themselves may initiate the establishing process of a WUA (s 91). The Minister may do so in cases where it is desirable to devolve the operation, maintenance and control of a government scheme to a local community, or to support initiatives to settle emerging farmers, or to develop sustainable farming projects, or to promote coordinated development of a water resource. The proposal must include a draft constitution. A model constitution is attached to the NWA (schedule 5). The constitution must be clear about how racial and gender representation will be achieved (s2). The constitution cannot entrench vested interests, or allow any group to dominate another. A WUA must also be financially viable, and self financed. The WUA proposal needs to be evaluated and approved by the Minister. The WUA should recognize and encourage the active participation of the multiple users of water. Previously disadvantaged individuals and groups should become part of the management of these WUAs. The NWA states that existing Irrigation Boards are to be transformed into WUAs (section 98, 1a). There are almost 300 Irrigation Boards with a majority in the Western Cape Province. Shortly after the establishment of the NWA a quick transformation process was expected. Instead only a few WUAs have been established until now. Some reasons for this delay can be given. It has become clear that the transformation process is much more time consuming and incremental than anticipated in the beginning. The participation processes were not always satisfactory (Faysse 2003, Raven 2003, WRC 2003). The Ministry of DWAF has only a limited staff available for an enormous transformation process. Furthermore the WUA policies are still changing and under debate, making the whole process rather precarious (Van Koppen, Jha, Merrey, 2002).

3 The Lower Blyde River

3.1 The Blyde River Catchment

The Blyde River as tributary of the Olifants Catchment

The Blyde river is an important tributary of the lower Olifants River. The Olifants River originates to the east of Johannesburg and initially flows northwards before gently curving eastwards towards the Kruger National Park, where it is joined by the Letaba River before flowing into Mozambique. Most surface runoff originates from the higher rainfall southern and mountainous areas, and is controlled by several large dams. Large quantities of groundwater are abstracted for irrigation in the northwestern parts of the water management area as well as for rural water supplies throughout most of the water management area. A substantial amount of water is transferred into the water management area as cooling water for power generation, with smaller transfers to neighbouring water management areas (Appendix 9 D4, Proposed National Water Resource Strategy, DWAF 2003). Significant mining, industrial and agricultural activities are located within the Olifants Catchment. The Olifants River is one of the principal rivers maintaining the ecology of the Kruger National Park. It is estimated that activities within the catchment generate about 5% of the GDP of South Africa. Partly as a consequence of the important role in the economy of South Africa, numerous water resources studies have been undertaken in the Olifants catchment (McCartney 2003). In compliance with the National Water Act (1998) and National Water Resources Strategy (NWRS) an Olifants Catchment Management Agency is planned (DWAF, 2002). The Olifants River Catchment is part of the international Limpopo River Catchment (South Africa, Botswana, Zimbabwe and Mozambique). At the moment there is no accepted international agreement specifying trans-boundary flow requirements for the Olifants River. The recently established Limpopo River Basin Commission is expected to play an important role in the near future (McCartney, 2003).

Physical characteristics Blyde River catchment

The Blyde River Catchment is approx. 2000 km² in size covering an area inclusive of Graskop and Pilgrim's Rest in the southeast, Ohrigstad in the centre, and Hoedspruit in the east/north-east. The main river is the Blyde River, other rivers forming part of the catchment are the Treur River, Belverdere Creek, the Ohrigstad, Molapong and Plairing Rivers. The Blyde River rises in the Drakensberg Mountains, near Sabie in Mpumalanga. It flows northwards past the town of Pilgrim's Rest and for more than 100 km through a region of great natural beauty along the eastern escarpment. The Blyde and Olifants catchments are divided into two by an escarpment, orientated approximately north south. To the west of the escarpment the landscape is known as the highveld (i.e. altitude > 1,200 m) and to the east, it is known as the lowveld (i.e. altitude < 800 m). The Blyde River flows 30 km into the lowveld and into the Olifants River immediately north of the Blyde River irrigation area (EIS, 1997). The Blyde River Canyon is the third largest canyon in the world and attracts around 900.000 tourists per year, both local and international. The escarpment region of the Blyde and Sand catchment complex contains over 140 endemic species of plants and animals (Rosa 2001). The Blyde river irrigation area is located in the northern extremity of the Blyde River Catchment. It covers an area of approximately 42 366 ha. The annual Rand value of crops grown in the area exceeded R50 million in 1997 (EIS, 1997).

Climate

Because of the escarpment distinct differences in climate occur in the region. The climate varies from cool in the Highveld (South West), to sub-tropical in Lowveld (North East)). For the whole of the Olifants Catchment there are no months when rainfall exceeds potential evapotranspiration. Consequently rainfall conditions are not ideal for the development of crops and irrigation is necessary to reduce the risk of water shortages. The Blyde river subcatchment lies partly on the escarpment and as a result experiences considerably higher rainfall than the other subcatchments in the Olifants River Basin. On the escarpment mean annual precipitation sometimes exceeds 1,000 mm. However, both to the east and the west of the escarpment, mean annual precipitation is generally 600 mm and less. Most of the rain occurs during the summer months. Nearly 74% of the rain falls between November and February. Sometimes flood rains occur with 45 mm a night (McCartney, 2003).

For the Lower Blyde area (Hoedspruit measurement) the average maximum and minimum temperatures for summer and winter are 30.4 / 19.7 degree and 25.3/11.5 degree C. Winter temperatures are relatively mild and suitable for the cultivation of sensitive agricultural crops. Crop damages/losses from frost are uncommon. The relative humidity averages 67.83% and varies within a day and seasonally. Maximum relative humidity occurs in summer months (Nov-Febr), minimum in winter (June-August). Annual evaporation approximates 1 500 mm, with a total annual average precipitation of 538 mm, there is an obvious water deficit necessitating the cultivation of agricultural crops under irrigation. The region is prone to climatic extremes. These include high winds, droughts and hail (MBB, 2000)

Geology, vegetation and fauna

The underlying geology of the Blyde river catchment comprises predominantly of granite rock formations (EIS, 1997). The escarpment region of the Blyde and Sand catchment complex contains over 140 endemic species of plant, reptile, amphibians and invertebrates. The Marieskop state botanical reserve within this complex contains well over 2000 plant species. The high degree of indigenous forest represented on the escarpment fills an important gap in the biodiversity presently being preserved in the national parks in South Africa. The sub-region is said to contain the most species-rich habitats in southern Africa; holding 75% of all terrestrial bird species, 80% of all raptor species and 72% of all mammal species found in South Africa (ROSA, 2001).

In the irrigation area the Blyde River riparian forest and adjacent zone is regarded as the only pristine natural vegetation. Mixed woodland/savannah occurs predominantly at the foot of the mountains in the west with few scattered pockets of vegetation within the irrigation area itself. There are also grasslands within the irrigation area. Apart from indigenous trees, the irrigation area and the surrounding areas are host to a number of invader plants. In terms of fauna, the Blyde River and its riparian zone is host to the following animals: Hippo, crocodile, otter and bushbuck. Blyde River fish include tilapia (indigenous) and bass and carp, dangerous snakes include the Mozambiquan Spitting Cobra, Black Mamba, Boomslang, Puff Adder, redlippid herald and Night Adder (MBB, 2000).

Hydrology, water resources and water use

The flow of the Blyde River is stabilized to some extent by the Blyderivierspoort Dam (approx 50 million cubic meter). The dam is situated just below the confluence of the Ohrigstad and Blyde Rivers. The dam was built in 1974 by the government mainly for the benefits of the mining industry at Phalaborwa. The Mean annual runoff from the Blyde catchment (behind the dam) is estimated at $378.55 \times 10^6 \text{ m}^3$ (EIS, 1997). The Blyde River is unique in the region for its continuous flow and good water quality and is an important tributary for the Olifants River. The Olifants River is of poor water quality and during droughts there is lack of sufficient flow. The lower Olifants river basin therefore relies strongly on Blyde River water, from a quantity and a quality perspective. Groundwater resources in the Blyde Catchment are relatively plentiful and of reasonable quality (Grove 1988). From the total runoff of the Blyde River only 160 million cubic meters per year can be used. From this 160 million cubic meter DWAF made the following allocation: 90 million to the irrigation farmers; 50 million to the Phalaborwa mines and community (domestic use) and; 20 million for the Reserve (basic human needs and ecological reserve).

3.2 Stakeholders

Three levels of stakeholders with an interest in the Lower Blyde River can be distinguished. The local stakeholders, stakeholders in the wider region and different governments involved. The local stakeholders are the white commercial irrigation farmers in the irrigation area and the people in the neighbouring black Mametja / Sekororo communities. In the wider region stakeholders can be found upstream and downstream of the Lower Blyde River. Finally different central and local governments are involved in the Lower Blyde River.

3.2.1 Irrigation Farmers

History

Before the 1930s it was impossible to settle permanently in the lowveld because of the Tse Tse fly and malaria. Black tribes and voortrekkers used the lowveld mainly for hunting and cattle. The 1860s marked the height of the Bapedi Sekhukhune Kingdom. Tswana raids kept the Bapedi on the border of the escarpment. From 1838 the (voortrekker) history starts in South Africa. Louis Trichard and his voortrekkers returned to the escarpment after his exploration of the north (Zimbabwe). Trichard used the escarpment as a base to find a harbour for trading with Europe (Maputo in present Mozambique). A voortrekker group waited for his return but gave up on him. They decided to move away from the river they called the 'Treur River' (sad river). Trichard returned soon after and so they called the next river the 'Blyde River' (happy river).

Only after DDT killed the 'Tse Tse fly' in the 1930/40s permanent crop farming started in the area. Water is the key factor for farming in the lowveld. The farmers in the area took water from the river according to the riparian right system and expanded their irrigation area through a system of earthen canals. The canals were dug by hand without government help. According to a respondent the old voortrekker mentality is "a bit government allergic". In the 1950s/1960s under the apartheid governments the irrigation lands were proclaimed for the white Afrikaner farmers. Until the 1990s the

farmers relied on the continuous flow of the Blyde without much of an incentive to save water.

Irrigation phases

Three irrigation phases can be distinguished. In the first phase the farmers used the river and the canal system mainly for flood irrigation to grow vegetables. A second phase started with the building of the dam in 1974. The farmers started to use individual dams and pumps on their farms. In the 1980s more sophisticated irrigation techniques came in (e.g. centre pivot, sprinklers, drip irrigation). Citrus and mango farms became profitable. The mid 1980s saw a real 'mango boom' taking off. In this period large scale 'foreign-owned' fruit companies started to establish themselves in the area. The third phase started with the recent irrigation pipeline (2003). According to most respondents the pipeline will change the old ways of farming into more effective farm entrepreneurship.

Socio- economics

At present there are two sorts of commercial irrigation farms working in the irrigation area. There are the smaller family farms (approx. 30/40 ha). The older family farms are mainly producing vegetables (corn, seed maize, luzern, sweet potatoes, tomatoes etc), while some also produce citrus and mango. Some of these farmers are economically struggling to keep their head above the water. Second there are the larger 'estate farms' (from 250 ha and bigger) growing mainly citrus and mango and mostly owned by big (foreign owned) companies. Citrus and mango are considered as stable crops. Nevertheless it takes considerable money and time (4/5 years, high investment costs) to establish such a farm. The Blyde area has a good climate to grow fruits and vegetables. In winter it is still warm enough to grow fruits and vegetables (no frost). The region has a strategic slot market in this specific period in South Africa (although wind is a problem).

Most respondents expect to see more large-scale foreign owned companies coming in and more family vegetable farms disappearing in the next decade. Vegetable farming is the most labour intensive. Respondents say that the costs of water and labour are rising. "Smaller commercial farming can survive but only in a more effective businesslike way". One respondent is not too positive about this development. "Big companies produce mainly for the export, the local food market will be forgotten (food prices go up) and a lesser amount of local workers are needed". One of the respondents says the government creates a situation of 'over-legislation' (water laws, labour laws). Interesting is that also the apartheid governments were notorious lawmakers, often accused of 'over-legislation'.

"First-world laws are to be implemented in a third world situation. This kind of over-legislation takes away the trust between the white and the black communities. Because of the implementation gap left by the government too much is expected from the white farmers. The government brings laws and taxes but not much administration. The rich are getting richer and blacker. The poor are getting poorer and stay black".

3.2.2 Mametja / Sekororo Communities

Large black communities (Mametja, Sekororo) are neighbouring the irrigation area northwest, over the Olifants River on both sides of the road to Tzaneen. The irrigation

area and these communities form both part of the Maruleng Municipality (140.000 inhabitants, approx. 90% black population). In the former homeland system the black communities belonged to the homeland Lebowa. The communities and settlements are mainly located in arid and dry areas.

Water problems

Domestic water problems are a big problem in the communities, rated first amongst others problems by respondents in the communities. The communities depend on boreholes for water supply for domestic use. The quality of the groundwater is sometimes poor (salty and polluted). The main problem at this stage is not the ground water availability (yet) but rather the poor technical infrastructure. The boreholes pump water into reservoirs, from where it runs to the public village taps. The villagers bring water containers on wheelbarrows to collect the water from the water taps. The tribal authorities in the villages have appointed water committees to allocate the water to different quarters in case of scarcity. The boreholes often face technical problems. The DWAF borehole operators cannot always solve the many technical problems. The DWAF borehole operators are supposed to be in contact with the water committees but (based on the interviews) it seems that communication is sometimes lacking. Illegal water connections are another experienced problem. This disturbs a proper flow to the public taps even further. In case of broken boreholes the communities sometimes fall back on highly polluted water from the Olifants River.

Farming

Most households in the villages are growing maize in summer after rainfall in their yards or on one Morgan (0.8 ha) further from the house allocated by the chief (rainfed farming). One Morgan is supposed to be enough for a household to survive through the winter. Most of the villagers are dependent on rainfed maize crops for their basic food. When there is no rainfall there are bad crops and food security problems. Respondents tell that the last 5 years have been very dry. In most villages there are community vegetable gardens mainly worked by women. Some small commercial plot farming exists on top of that (1-5 ha). Small emerging farmers are found in The Oaks, Finala, and The Willows villages. The private farmers in the communities grow mainly vegetables and tomatoes for the local markets.

Near the Olifants there is a former homeland irrigation scheme and citrus farm. The government policy of withdrawal and privatisation in the 1990s led to a collapse of the scheme. The new provincial government (Limpopo Province, ARDC) is now trying to revitalize and delegate the irrigation scheme. The land is state land with a land claim by The Oaks and The Willows communities. The provincial government decided to give a commercial company a concession to manage the farm in co-operation with ARDC and the communities involved. The water intake is from the Olifants River. According to the farm manager the main advantages for using water from the Blyde River instead of the Olifants River are: 1) continuous flow (no boreholes needed for backup); 2) less mud in the water (no filters and checks needed); 3) less polluted water (less fertiliser needed).

Socio-economics

The socio economic situation of the black communities is alarming (USAID, 2002). The unemployment is high (80%), basic infrastructure is sometimes lacking. The population in the black communities is growing very significantly. One of the

respondents estimates that 50% of the population is aged under 15 and expects a doubled population in 5 years. The AIDS epidemic is a problem like everywhere in South Africa (Maruleng IDP 2003). The commercial irrigation farmers provide jobs for approx. 10 000 farm labourers (EIS 1997). According to respondents approx 15% are permanent workers living on the farms (compounds etc.). Some of the farms are investing in their permanent farm labourers and giving good career opportunities. Most of the farm workers are seasonal fruit pickers. The majority of the seasonal farm labourers at the commercial farms are women seeking income. Not all of the farm workers come from the Oaks/Willows communities. A large group comes from the Acornhoek area (former homeland Gazankulu, Tsonga/Tswani people).

Some employment can also be found in the (eco) tourism industry (e.g gamefarms) and in the mines (Phalaborwa), forestry and the government sector (teachers, nurses, departments). Gender issues are sometimes problematic. Many younger men left the village to find work in the cities or the mines. Women head many of the black rural households (Maruleng IDP 2003). The recent obligatory minimum wages are subject to controversy in the region. The new government has been building RPD houses, providing electricity, building schools and community halls in the last period. Electricity came into the villages only after 1994. The communities are highly dependent on government support (elderly pensions and children grants).

Some describe the social economic situation as a ticking time bomb where something has to be done. Both sides harbor fear for each other. Some black respondents state there is some fear of ill treatment, while some white respondents fear a 'Zimbabwe situation'. Most respondents admit that the communication between the white farmer area and the black communities is rather poor. Not all respondents are impressed by the compassion which is shown by the white community for The Oaks or The Willows for example. "The government and economy has been very good for the whites in the last ten years". "It is very important to stabilize the black communities, the whites have a responsibility, in the new South Africa this is also their community". Building trust and decreasing fear is seen as crucial for a better co-operation between the two communities.

3.2.3 Upstream Stakeholders

In the wider region of the Lower Blyde River many sometimes conflicting developments take place. The combined developments will increase pressures and demands on the Blyde River. In the following paragraphs the focus will be on stakeholders in the wider region. In the last paragraph the different governments involved in the Lower Blyde River will be addressed.

Mines

There are a few small gold mines in the upper Blyde Catchment. According to a DWAF respondent only this part of the river is protected for its natural value (specific ecologic regulations). Amazingly the rest of the Blyde River has no specifically protected status.

Forestry

In the upper parts of the Blyde river catchment (mainly the upper parts of the Sabie and Sand catchments) large-scale commercial forestry takes place. Forestry is a big

water user and prevents a proper water run off in the catchment (EIS, 1997). Commercial forestry started as an activity of the mines, needing wood for mineshafts. The government is discussing the possibility to move commercial forestry out of the upper catchment in the next 20 years, restoring the natural environment. Destructive alien plants such as lantana and black wartel have invaded the upper catchment. These plants and trees are big water users. In the upper catchment (Mpumalanga) a 'Working for Water Programme' (chopping alien trees) has been started as well as 'Rehabilitation of Wetlands Programme' (DWAF correspondent).

Rural communities

Most of the topsoil of the mountainous upper catchment is not suitable for agriculture (ROSA, 2001). Rural black settlements and some small cities do exist on the upper catchment (Graskop, Pilgrim's Rest). Some of the irrigation farmers downstream are concerned about the uncontrolled development upstream. Respondents in the irrigation area claim that in 2000 for the first time the river was polluted with silt, mud and strange weeds. According to the respondents this is mainly caused by poor land management in the growing communities upstream in the upper catchment. "The lands there are starting to get overgrazed and there is too much maize farming on hardly arable lands". In their views the soil is insufficiently protected, which leads to erosion and in general creates the problem of land degradation.

3.2.4 Downstream Stakeholders

Former Homelands

The Blyde River Catchment supports one of the densest and poorest rural populations in South Africa. The Blyde river catchment is surrounded by the two former homelands: Lebowa and Gazankulu (ROSA 2001).

Phalaborwa Mines

Downstream of the Olifants River are the Phalaborwa mines located since the 1950s (Foskor). This huge mining complex is a major stakeholder in the Blyde river water. The mines are an important regional employer. The mines were highly involved in the establishment of the Blyde Dam (1974). The Phalaborwa mines use Blyde river water as a back up for droughts. The Phalaborwa mines are allocated with 50 million cm Blyde river water per year. For this reason the mines have built the 'Phalaborwa Barrage' in the Olifants River to divert the water in and out of the complex. Blyde River water is also used for domestic purposes for the Phalaborwa city and the neighbouring communities. The mines cause considerable pollution and are monitored by DWAF. There are many mines in Olifants basin and the general tendency is towards fierce expansion in the next period (DWAF correspondent).

(Eco) Tourism and game farms

There is a booming eco tourism sector in the wider area of the Lower Blyde River. Some respondents see eco tourism as the main economic driver for the wider region. In recent years the amount of game resorts and guesthouses is rising very fast. Only in the Hoedspruit area, already more than 100 guesthouses and holiday resorts exist. The interest for arts and crafts, restaurants, shops and tourist infrastructure brings work and opportunity to the region. Nevertheless there is scepticism amongst some respondents whether the sector is labour intensive enough to provide sufficient jobs

for the large group unskilled unemployed blacks in the region. The tourism boom will have increasing domestic water needs and demands.

Game farming is expanding in the area. The game farms consist of large areas (up to 3000 ha). It seems game farms do not offer a big job solution in the region. Game farms up to 2/3000 ha, employ more or less 5-40 workers. There are two forms of game farm tourism: hunting and animal viewing. Especially animal viewing tourism is on the rise and brings much more money than the hunting variant. Most of the game farms are fenced off because of the wild animals and also to secure the property of the land. According to respondents cattle in the black communities is dying in dry periods where they could have survived on the game farms. "Some game farms have helped out but the reluctance of the white farmers to save community cattle in their game farms caused anger in the black communities". One of the respondents says "it is a strange situation that only a handful of farmers own land all the way up to the mountains along the Blyde River with black communities suffering along side with droughts and dying cattle". On the issue of black community cattle on white farms in dry periods one of the white farmers says: "It is difficult to draw a line. There is already too much cattle, where is the limit, how much cattle and of whom do you let enter the game farm". "In the black communities cattle are an important factor for status and wealth (livelihood, *Lebola*, ceremonies)". The subject of cattle farming is an important and controversial issue in the region. Differences in white and black values and perceptions can easily clash on this subject.

Nature reserves and Kruger National Park

The area around the 'Blyderivierspoortdam' is a nature reserve. The irrigation area falls within a much bigger 'International Biosphere reserve(s) Kruger to Canyon' (Worldbank Biosphere brochure 2002). The Lower Blyde River irrigated area is very small compared with the surrounding nature reserves, game farms and the Kruger National Park. From this perspective it becomes clear that the agriculture in the irrigation area is too small to carry the wider regional development.

The Blyde River is an important tributary of the Lower Olifants River. The Blyde River water plays because of its continuous flow and good quality an important role in the ecological sustainability of the National Kruger Park (NKP). The National Kruger Park is part of the international border crossing nature reserve between South Africa, Zimbabwe and Mozambique (Treaty Great Limpopo Transfrontier Park).

Downstream Mozambique

The Olifants River is an international river, entering Mozambique after leaving the Kruger Park. Mozambique has built a huge dam not far across the border (Masinguri Dam). Due to the civil war in Mozambique, this dam has never been properly used. Mozambique however is to a large extent dependent on proper water management on the South African side to prevent floods and to make irrigated agriculture possible. In the near future an international agreement between South Africa and Mozambique is expected on the Olifants/Limpopo River basin (in line with the NWA, see the already existing Nkomati agreement). This agreement will surely have a serious impact on the future water demands of the Blyde River.

3.2.5 Governments involved in the Lower Blyde River

Municipalities

The local government system in South Africa has been completely reorganized since 1994. In the new local government system some local municipalities make up one district municipality. The Lower Blyde River area and the Mametja / Sekororo communities fall under the Maruleng Municipality. In this area the district municipality is Bohlabela (head office Thulahashe / Bushbuckridge) with two local municipalities: Maruleng (Hoedspruit) and Bushbuckridge.

Councillors in the local municipality are elected in wards. Wards are geographic districts within the municipal area. A so-called 'party representative' assists each ward councillor. Local elections are held one year after the election for the national and provincial parliaments. New elections for the municipalities will be held in 2005. The Municipality is divided into 10 wards. The council has thus 10 ward councillors and 10 party representatives. The Maruleng local municipality has 20 councillors (15 ANC, 2 DA, 1 PAC, 2 UDF). There is one ward councillor specifically for the (white) irrigation area. Most of the ward councillors are, apart from their district responsibilities, concerned with specific subjects. The councillors elect the members of the Executive Committee and a Mayor amongst themselves. The municipality staff is headed by a manager (civil servant). The District Municipality has no elected councillors. District officials are elected through the local municipalities.

The main new obligatory strategic plan of the municipality is the Integrated Development Plan (IDP). The most recent Maruleng IDP is dated October 2003. Under the new Water Services Act of 1997 the authority for domestic water supply has been delegated by DWAF to the municipalities since June 2003. Maruleng Municipality is now the authority on domestic water supply issues. Major domestic water projects have to be approved by the district municipality.

Tribal authorities

In South Africa the tribal authorities are part of the governmental structure. This is secured in the constitution and the tribal authorities are partly paid by the government. Nevertheless it is often unclear what the tasks and responsibilities for the tribal authorities are. Tensions easily arise between the often more conservative and older chiefs and the mostly ANC dominated political institutions. In the rural areas co-operation with the tribal authorities is vital. The communal lands are allocated and issued by the chiefs and the municipality delivers public services. A chief heads the tribal system. The chief is born in a chieftain family and is often a woman. The chief gets advice from his councillors, called *indunas*. The chief chooses a maximum of 12 tribal councillors in a community meeting. For different subjects there are different indunas and committees responsible. Most tribal communities have a water committee and a water councillor. This water committee is responsible for the relations with DWAF and the municipality on community water affairs. The water committee also gives water restrictions and other rules for the use of domestic water.

Provincial government

There are nine provinces in the New South Africa. The Blyde River catchment falls into two provinces, Limpopo and Mpumalanga. The upper catchment falls under the Mpumalanga Province with the border just on the ridge of the escarpment. The Lower Blyde river area falls under the Limpopo Province. The Limpopo provincial government is based in Polokwane (Pietersburg). The Mpumalanga provincial

government is based in Nelspruit. Most national departmental activities are performed through the provincial governments (e.g. agriculture, labour etc). DWAF is an exception in this case and operates fairly centralised with regional offices in the different provinces. Important provincial agencies for the Blyde river catchment are the Mpumalanga and Limpopo Parks Boards.

Central government:DWAF

The Department of Water Affairs and Forestry (DWAF) is an important stakeholder in the Lower Blyde River. The Blyde Dam is build (and mainly paid) by DWAF and is still a DWAF asset. DWAF is responsible for sustainable water management by monitoring water use and pollution according to the NWA. DWAF allocates the available water of the Blyde River to different users. In allocation questions DWAF has established certain priorities. The highest priority for water use is reserved for domestic water use; a second priority is water use for strategic industries; water use for irrigated agriculture is only a third priority. DWAF Pretoria was and is involved in the WUA and in the irrigation pipeline project and connected with the pipeline an 800ha emerging farmers project (see chapter 4). Deconcentrated regional DWAF departments are responsible for the implementation of the Water Services Act. DWAF is in a process of reorganisation, delegation and privatisation.

DWAF delegation: CMAs, WUAs and Municipalities

DWAF is in a process of delegating water management to CMAs, WUAs and municipalities. The regional DWAF offices in Nelspruit (Mpumalanga) and Tzaneen / Polokwane (Limpopo) have recently been integrated and transferred to Groblersdal in the expectation of the establishment for the Olifants River CMA. DWAF has delegated the authority on issues of domestic water supply to the Municipalities. Nevertheless the regional office of DWAF in Polokwane is still highly involved in the domestic water supply for the Mameŧja communities. The existing boreholes in the Mameŧja / Sekororo communities are mainly operated by local DWAF technicians. In the near future these local DWAF offices and technicians will be transferred to the Municipality.

4 Water Management in The Lower Blyde River

4.1 The Lower Blyde WUA

The Lower Blyde River Water Users Association has a long history. Under the Water Act of 1912 it started as a River Board, co-ordinating the water use of the riparian land owners. It became a more formalised Irrigation Board (IB) in 1952, accommodating the Water Act of 1956. The Blyde River Water Control Area was declared in 1957 (Proclamation 276, section 59(1)(b)). The boundaries of the control area coincided with those of the ‘Irrigation District’, declared in 1960 (Proclamation 353) (EIS, 1997). From the 1960s onwards for the first time water pressure was felt in the irrigation area. One of the main tasks of the IB was to provide water equity among the irrigation farmers. According to respondents malfunctioning of the earthen canal system resulted in water fights among the farmers. The IB was hardly able to maintain its authority in these matters. It became clear to the farmers that proper distribution was the key issue. Under the National Water Act of 1998 the existing Irrigation Board was transformed into the Lower Blyde River Water Users Association in 2002 (17th January 2002 Government Gazette).

WUA Constitution and Functions

The primary function of the WUA is the management of the irrigation scheme in accordance with environmental policies and acts. The constitution recognizes in its opening statements that to achieve the purpose of the NWA appropriate community, racial and gender representation must be reflected in the establishment of the WUA. The WUA constitution means to serve as a basis for fair, effective and sustainable water resource management for the benefit of its members as well as surrounding communities and the resource in general. The prevention of water being wasted is specifically mentioned as a function of the WUA. Ancillary functions are the provision of services, training for members, other water institutions and surrounding communities. The constitution mentions the function of facilitating integrated resource management in the Blyde River basin. In a footnote it is stated that the association envisages to extend its skills and experience in water management to neighbouring communities.

The chairman of the WUA states that at this moment there is no real catchment management functioning at the moment in the Blyde River Catchment. “Sufficient co-operation and co-ordination with key actors within and outside the catchment is lacking”. In his view integrated catchment management is badly needed and the only way forward. “Participation in the integrated management of the Blyde River Catchment and in the Olifants CMA is vital for the Lower Blyde River WUA”.

WUA Management

The present WUA has a management committee (MC). No general board apart from the MC does exist. The MC has a number of maximum 16 members. The chairperson and deputy are elected by and among the MC members for a period of 12 months (with re-election possible). The WUA constitution gives three categories of members in the MC: affected parties (A), irrigation water users (B) and other water users (C). The WUA asks the categories to bring in their own representatives.

Category A members are affected parties who are not entitled to water use. These can be governments, communities or NGOs for example. The constitution provides 2 seats for this category in the MC. These members have only limited voting power tied to their direct interest. Category B members are the irrigation water users. The constitution provides 12 seats for these members with full voting power. These seats will have to include black emerging farmers in the future (see chapter 4.3). The irrigation farmers elect their 12 representatives in a separate meeting. At present neither black emerging farmers, farm workers, women nor other so-called historically disadvantaged individuals (HDIs) are represented in the MC. The irrigation farmers are up until now the only paying members of the WUA. Finally category C members are those water users not being irrigation farmers. For this category 2 seats are reserved. Examples for this category could be domestic water users, nature reserves, and industries.

According to WUA respondents category A and C members are mostly absent in the MC meetings. “The municipality always gets an invitation but they never attend the meetings”. A municipality respondent argues that “it is understandable for an understaffed institution such as the municipality to stay away from meetings where the role is merely to observe, the subjects are mainly internal farmer issues, and the influence in the decision making process minimal”. In practice the same farmers of the former IB now attend the MC meetings of the WUA.

Finance

The Lower Blyde River WUA is primarily self-financed by its members. According to the constitution the Lower Blyde River WUA has two means for financing its functions and works. It can raise loans and it can levy water charges. The charges can only be levied on category B members (irrigation water users). There are two forms of water charges: a charge for the water use itself and a charge levied by the WUA to cover its expenses in fulfilling its functions (cost recovery). The levy is ‘pro rata’ relating to water use entitlements. Category A members can only be responsible for costs of their participation in the work of the WUA. Category C members are bound by financial obligations incurred by the WUA on their behalf.

The WUA must annually produce an audited financial statement of accounts and activities for the preceding year. It is obliged to present a financial plan for the next year.

The role of DWAF

DWAF policy states that the institutional development and stakeholder participation in the WUAs and the CMAs should lead to a more sustainable and equitable water resource management by a local/regional stakeholder process (White Paper principles 22 and 23). The Lower Blyde WUA constitution complies with the new NWA regulations. A closer look at the DWAF involvement in the WUA transformation gives the impression of a rather legalistic approach. The internal problems with the irrigation pipeline (see chapter 4.2) were the main drivers in the process of institutional change. At the moment there is little difference in practice between the former IB and the present WUA. The geographical boundaries stayed the same for example. The spirit of transformation towards multi stakeholder participation or integrated water management in the Lower Blyde River WUA has not been strong. DWAF limited itself more or less to the task of legal/institutional approval without

further involvement in the local transformation process. The new institution can easily become a platform for the already powerful and organised stakes.

4.2 The Lower Blyde Irrigation Pipeline Project

From 1989 until 1993 the region faced a very dry period with only 25 % of the normal rainfall. DWAF imposed water restrictions. The deterioration of the earthen canal system led to water losses of more than 50%. These enormous water losses became unacceptable for the government and for the farmers. Different plans and proposals were discussed, such as cementing the earthen canals. In 1993 the idea of a new irrigation pipeline came out as the most effective way forward (CSIR/IB 1995). The plan consisted of a connecting pipeline between the Blyde Dam and the main network (1 500 mm dia and 5 540 m long). The total length of the main network pipelines covers approx. 105 km, with pipe diameters varying from 1 300 mm to 100 mm, with approx. 130 irrigation off-takes (EIS, 1997).

The pipeline project

In 1994 the new government of South Africa came into power. Apartheid was abandoned. The ANC won the first democratic elections. Nelson Mandela became the first black President of South Africa. The changes in legislation and government policies were revolutionary. Water affairs and environmental issues became politically important for the government. The first stages of the Lower Blyde Irrigation Pipeline project coincided with this revolutionary political atmosphere. In 1995, under the new Environment Conservation Act, an 'Environmental Impact Assessment Study' for the pipeline started. The study took nearly 3 years and included a participation process for all interested and affected parties (CSIR, EIS 1997). In 1997 the (former) Irrigation Board officially proposed to build a pipeline as replacement for the old canal system. Already in the early nineties the new South African government policy suspended all subsidies towards so called 'former advantaged' irrigation schemes. Therefore the pipeline project was to be privately financed by the farmers and a commercial Bank (Rand Merchant Bank).

Under the new minister of DWAF, Dr. Kader Asmal, negotiations started about the new water work and allocation. The DWAF interest was to save water and to 'empower former disadvantaged people' at minimum costs. In pipeline plans it was estimated that 10% water savings extra could be made on top of the regular savings. The Minister decided that this water could be used for black emerging farmers. The amount of this extra water is approx. 8 million cubic meters and would provide sufficient irrigation for 800 ha farmland in the area. The Minister agreed with the pipeline project under the clause that the pipeline should provide water for 800 ha for black emerging farmers in the region (letter to RMB by the Minister of DWAF, 29 October 1998). Although this letter gives no formal guaranty for the bank loans of the irrigation board (no longer necessary under the NWA), the letter clearly states the approval and commitment of DWAF with the project. For the bank the letter was some kind of 'informal warrant'. The Minister approves for example with the new irrigation board charges for the pipeline and states that 'disestablishment' by the Minister of a IB/WUA especially in the case of outstanding debts is very unlikely. The letter further states that in case of financial mismanagement the Minister may take over powers. Finally the letter states that DWAF will give financial assistance in regard of the capital costs of the pipeline attributable to the emerging farmers. On this

basis the bank provided the necessary loan and the work on the pipeline began. The first deadline was 2000.

Problems

The pipeline project faced many problems after the work started in 1997. Excessive rainfall complicated the technical work. According to respondents there was, and still is, considerable scepticism about the working of the pipe. “Further more the country was in turmoil, many farmers believed they had no future in the new South Africa, so why invest in an expensive pipe?” “Zimbabwe was in the back of their heads”. In the course of the project the costs were rising far above the first estimations. A conflict between smaller farmers and bigger ones over the rising costs occurred. Some farmers refused to pay their contributions. The Irrigation Board threatened to cut off their water. Legal issues surfaced as it became clear that the former Irrigation Board was not properly delegated and mandated for the work by DWAF. A group of farmers now refused to pay the IB the money per ha necessary for the work to continue. The work was further delayed and halted. According to respondents the WUA was mainly established to ensure to have properly delegated power to take further decisions on the pipeline. The IB applied to be transformed into a WUA. DWAF approved with the new constitution, which complied with the legal conditions in the NWA. DWAF established the WUA in January of 2002. The irrigation pipeline project was continued and in August 2003 the pipeline started to become operational.

Because of the growing costs the WUA, the Bank and DWAF have found themselves in a financial deadlock. The Bank formally owns the infrastructure until the loans are paid back. The contract for building the pipe went already up from 100 to approx. 150 million Rand. The total costs of the project have become non-affordable for the farmers. The initial costs for the farmers were estimated at 1.500 Rand per ha but this had gone up to 4.000 Rand per ha. As a result of this a group of farmers still refuses to pay the contribution. Some farmers say they are trying now to get separate water licences from DWAF, which enables them to continue using water from the river and the canals. Negotiations have started to find a way forward. A DWAF respondent says that the latest development is that DWAF is willing to make an extra contribution of approx. R 48 million in the irrigation project. This can help to get out of the financial deadlock and to prevent collapse or bankruptcy of the project. With this ‘subsidy’ the costs will be brought down to approx. R 2 800 per ha for the participating farmers.

Future possibilities

With the pipeline new possibilities are opening up. Despite the high costs most respondents see the added value of the pipeline for the longer run. According to the WUA chairman for example the pipeline guarantees enough water pressure at the linking points so there is no more need anymore for individual dams and pump stations (less electricity costs). “The pipeline will bring a more sustainable delivery and secures water savings. With the pipeline a geographical expansion of irrigated farming becomes possible”. Nevertheless the high costs for using the pipeline is an economical limitation. Most respondents think the pipeline urges existing farmers towards more effective farming in the irrigation area. “Small farming can be successful if it is effective”. Respondents say it is a matter of attitude change instead of scale. The WUA chairman states that the new pipeline will bring a more professional staff and management for the WUA. Because of the pipeline the WUA will appoint a new manager and professional staff. According to the chairman “the

main tasks of this manager should be managing the pipeline, co-ordinating the 800ha project, and improving co-ordination and co-operation in the Blyde and Olifants catchments”.

The role of DWAF

The main interest of DWAF in the irrigation pipeline project was to save water and to support black emerging farmers against minimal government costs. In the 1990s government emphasised on government withdrawal and privatisation. The new government stopped subsidizing ‘formerly advantaged’ irrigation schemes. The financial deadlock in the project can cause a breakdown with high social economic consequences for the region (more than 10.000 workers in the irrigation area). A collapse of the pipeline project will cause a setback in the DWAF policy towards integrated water management in the Lower Blyde River and in the wider region. The legal commitment of DWAF towards the pipeline project as formulated in the letter mentioned above remains unclear. The legal position of DWAF hasn’t improved by the issue of the ‘improper delegation’. There seems considerable risk of legal liability for DWAF in case of financial problems of the Lower Blyde WUA. A WUA is not a private enterprise but a public entity, although with a status still under debate. In case of financial mismanagement DWAF has an obligation to take action (section 95 (1) NWA). Against this background DWAF got, more or less against its will, drawn into the project to save it from financial collapse. The DWAF involvement could well result in subsidising a small group of ‘formerly advantaged’ beneficiaries with the larger farms benefiting the most.

4.3 The Blyde 800 ha Black Emerging Farmers Project

As part of the agreement with DWAF a water reservation for 800ha black emerging farmers will become available once the pipeline is in operation. The pipeline design provided a linking point for this development. No specific land has yet been identified. At present there are no black emerging farmers in the limited white irrigation area itself. According to a respondent DWAF provided for the ‘Blyde 800 ha project’ the capital costs in the pipeline (approx. R 20 mil.). Because of the pipeline problems the connected ‘Blyde 800 ha black emerging farmers project’ came also to a hold. Since the completion of the pipeline in 2003, the 800ha project can start again. The WUA chairman states that the success of the 800 ha project is necessary to make the pipeline economically viable. The emerging farmers will have to pay for the operational costs of the pipeline (estimated on 600 R per ha per year). The WUA cannot afford not to use this water for financial reasons.

Models

Different farming models for the 800ha emerging farmers project are thinkable. The chairman of the WUA thinks “it is best to have for example 40 smaller farms instead of one or a few bigger farms”. There is scepticism under the commercial farmers towards large ‘trust’ farms, “too many captains on deck”. According to the chairman it is important to spread the risk, the expertise and the failures. “It is not easy to become an established farmer, the emerging farmers will need a lot of training”. The chairman thinks that the WUA can play a supportive role in making business plans and contracts. Once established the emerging farmers will have seats in the management committee. According to the chairman the WUA is willing to help emerging farmers (in time, advise, access to markets, infrastructure etc). The WUA

has no financial budget for the 800ha project. There are existing government provisions for the emerging farmers for the development of the land, the running costs, and training/education. DWAF for example has a subsidy programme to support emerging farmers: R 10 000 per ha, with a maximum of R 50 000 per farmer. This subsidy is only one time available. According to a respondent 1ha irrigated farmland could create more or less 1 job for an emerging farmer and extra 3 jobs in the region (multiplier effect).

Selection and Location

According to several respondents the proper selection of emerging farmers is one of the crucial factors in this project (who selects, criteria, money, time, methods). There are some small farmers in communities but some respondents are sceptical about their commercial farming capacities (“a lot of people in the black communities just want land ownership, this gives status, but they are not interested in commercial farming”). Experienced and motivated farm labourers are a good option according to some respondents. Another issue amongst respondents is the current confusion on where the 800ha should be located. There seem to be two options: 1) at the communal lands; 2) within the white area. It is unclear if a pipeline for emerging farmers on communal lands is more viable than using available borehole water or Olifants River water. According to some respondents the choice for the communal lands means that the emerging farmers have to begin from scratch. Most respondents think that joint ventures at the white irrigation farmlands bring the advantage of already established infrastructure and support (e.g. market access).

Sugar

One of the plans to help small emerging farmers is the development of sugar cane production in the area. The sugar plan is developed by local business men (Blyde Valley Sugar Ltd, 2000). According to one of the drivers of the plan “sugar is a good and easy crop for emerging farmers. Citrus farming instead is complicated and expensive especially in the first 5 years”. There have been other plans for sugar production the area but water distribution was always the key problem. With the new pipeline this problem can now be solved. The proposed sugar project includes a Sugar Mill with an estimated investment of R 500 million. The Sugar Mill needs 13,000ha of sugar cane production in a circle of approx. 90 km according to the plan makers. According to the initiators the project can create an estimated 7.000 jobs, 200 in the mill itself. According to a respondent the sugar mill and industry can be a strong economic driving force for the region. The sugar plans will have enormous consequences for the region. DWAF Pretoria states the plans are unrealistic because there is no water available. Nevertheless there are strong drivers behind the sugar project claiming no extra water is needed. One argument used by the sugar planners is to empower black emerging farmers. They plan to use the 800ha project and the Limpopo revitalisation schemes project. In public news items the government of Limpopo Province has shown some support for the sugar plans. Further investigation in the sugar plans is worthwhile.

The role of DWAF

The Minister of DWAF initiated the ‘Blyde 800 ha’ project as part of the Lower Blyde River Irrigation Pipeline project. From the beginning it was a rather virtual black emerging farmer project. The first concern was a reservation of water in the pipeline. There had not been a consultation process on the ground whether the local

people really wanted this emerging farmer project or instead maybe domestic water supply from this reserved water. DWAF has tendered a request for proposals for the 800 ha project (DWAF, 2001). A tender like this can be considered as time consuming and costly (staff, procedures, preparations, consultants, implementation). According to a DWAF respondent so far two large-scale proposals had been received (November 2003). The respondent indicates that the Blyde 800 project is a DWAF project and that co-operation in the project management at this moment with the WUA is not foreseen. DWAF says it is planning to inform the concerned communities. The DWAF tender seemed unknown to most respondents in the area (stakeholder workshop Maruleng Municipality 30-10-03). So far the Blyde 800 ha project is managed by DWAF. This approach of the central government could result in blocking a potential successful local stakeholder process between the WUA, Maruleng Municipality, white and black farmers and communities. In this research the focus has been on the role of DWAF. Nevertheless the impression is that the involvement of other departments such as Land Affairs and Agriculture so far has been minimal in this project.

4.5 Domestic Water Supply Mametja / Sekoro Communities

In the period 1994/1995 it became clear that the Olifants River suffers severe pollution. The Olifants River water is not suitable for domestic purposes. Therefore the Mametja and Sekororo communities rely on boreholes for domestic water. With the idea of the irrigation pipeline the idea developed to link another pipeline for water supply to 31 neighbouring villages (Mametja / Sekororo communities). The idea was to join hands between DWAF, municipality, communities and the white farmers who were planning the pipeline for irrigation purposes. A link between the irrigation pipeline and a drink water extension pipeline is a technical possibility. At 2 km from The Oaks there is an off take point, primarily designed for the 800 ha project, which could also be used for an extension pipeline (DWAF Limpopo / EVN, 2002). According to respondents in the communities the issue of water supply through an extension of the Blyde River pipeline has been raised for many years but has never been formalised (1995-2000). Until now nothing has happened yet. Some villages are severely lacking water mostly due to a poor working borehole infrastructure. A purification plant located on the air force base nearby serves the domestic water needs in the irrigation and Hoedspruit area (approx. 800 mainly white households). This plant takes Blyde River water and is still operated by the Department of Public Works.

The extension pipeline project

DWAF Polokwane has carried out a recent study on an extension pipeline of the irrigation pipeline supplying 31 villages with domestic water. This study mentions a project deadline in 2009 (DWAF Limpopo / EVN 2002). A municipality respondent states that the operational costs are approx R 90 million, to be financed by DWAF (Polokwane). Since June 2003 DWAF has delegated the authority on domestic water services to the municipality. Maruleng Municipality is now in charge of this project. A mega project of this size needs approval of the district municipality (Thulamahashe). DWAF Polokwane is involved in the water supply plans. A municipal respondent describes the following problems in the project. Firstly the delay in the irrigation pipeline caused delay in the domestic water supply project. Secondly a feasibility study has shown that the costs for operation and maintenance of

the domestic water network are too high for the municipality and the communities. The willingness and ability in the communities to pay for this new water infrastructure is an unresolved issue. Another important issue is the possible use of domestic water for productive use in the communities. This means for example the possibility to use domestic water for making bricks or vegetable gardens. This of course will lead to a larger water use and demand. A municipal respondent states that a new feasibility study will be undertaken with concern to the costs of the extension pipeline for domestic water use. According to this respondent DWAF Polokwane has promised to fund intermediate solutions in the mean time, such as solving technical problems with the boreholes.

Domestic water allocation

A WUA respondent states that the question of allocation has not been solved. The first step should be a DWAF decision on a water allocation for domestic water from the Blyde River for the Mametja / Sekororo communities. Formally the municipality has to request for this allocation. This has not been done yet. A problem is that at present no more Blyde river water can be allocated (without new infrastructure being build). Water for domestic use has to come from either the 'Blyde 800 water' or from the water surplus of the farmers in the pipeline. In the last case the water has to be bought from the farmers. Another option is maybe to buy or swap Blyde River water with the Phalaborwa mines. Domestic water use takes much less water than water use for irrigation. Most respondents think that in good negotiations a solution is well possible, although some predict water scarcity in the future. At present nevertheless there is confusion on the allocation issue between the different partners. Strangely enough the extension pipeline plans so far lack this information. Theoretically the WUA could play a role in water supply delivery. The WUA chairman sees this purely as a business decision that has to bring added value (income) for the WUA.

The role of DWAF

Till now there has been no request nor DWAF decision for a (re)allocation of Blyde River water for domestic use in the Mametja / Sekororo communities. An allocation decision is a necessary prerequisite for the extension pipeline project. Under the Water Services Act DWAF has delegated the water services authority to the municipalities. Maruleng Municipality has now the responsibility for the domestic water supply project for the Mametja and Sekororo communities. DWAF will fund the capital costs of the project. However the remaining future operational and maintenance costs are a large burden for a relatively small municipality with a high proportion of poor inhabitants. The delegation seems without enough financial means for this municipality to properly execute this complex new task (withdrawal central government). DWAF is still technically responsible for the boreholes on the ground. This can be the cause of considerable bureaucracy dependency. It seems much easier and probably more cost effective to delegate this function to the tribal authorities involved. DWAF respondents admit there is a lack of internal DWAF co-operation between irrigation issues and domestic water issues. Respondents from the Municipality and the WUA also admit that there is a lack of knowledge and co-ordination between each other on the different projects and plans (workshop 30-10-03).

5 Conclusions

As said in the introduction the objective of this Case Study is to better understand the role of the Department of Water Affairs and Forestry (DWAF) in facilitating Integrated Water Resource Management in the Lower Blyde River. This research report described after a general context the characteristics of the Blyde River Catchment. The different stakeholders and governments involved were distinguished. An exploration followed of the most important water management issues in the Lower Blyde River area. The Blyde River WUA, The Irrigation Pipeline Project, The Blyde 800 ha Emerging Farmers Project and the Mametja / Sekororo Domestic Water Supply Project were addressed. The role of DWAF in each of these elements of water management in the Lower Blyde River was discussed. In this final chapter the research findings are assembled and brought to a conclusion.

Dynamics in the Blyde River Catchment

The Blyde River Catchment forms a region, with many contrasts and boundaries in ecological, socio economical and administrative terms. The Blyde River is unique for its continuous flow and good water quality. The Blyde River is one of the most important tributaries of the Lower Olifants River. The socio economic situation in the former homeland areas (Lebowa and Gazankula) surrounding the catchment is alarming. In the wider area many sometimes contradictory and conflicting developments can be foreseen for the near future. The booming eco tourism (expanding gamefarms), an expanding mining industry (Phalaborwa), expanding irrigation agriculture, expanding domestic water demands, growing water demands of the Kruger / Transfrontier Park and growing water demands of Mozambique. It is clear that these combined developments will increase pressures and demands on the Blyde River. The Blyde River Catchment is currently managed by different government agencies with diverse policies. The need for more integrated water resource management in the Lower Blyde River is highly recognized. Increasing dynamics, diversity, and complexity characterise the developments in the Blyde River Catchment. The ecological, socio economical and administrative situation of the Blyde River Catchment can be described as volatile.

The Lower Blyde River WUA

So far not much difference can be found in the practice of the Lower Blyde River WUA and the former Irrigation Board. Nevertheless the new WUA structure provides for changes in the near future. The involvement of DWAF was limited to the legal/institutional approval of the Lower Blyde River WUA. The main driver for the establishment of the WUA was the work on the irrigation pipeline. By focussing mainly on the legality of the WUA so far, DWAF withdrew more or less from the real multi stakeholder transformation process in the WUA. It seems the new established WUA can easily become a platform for the already powerful and organised stakes.

The Irrigation Pipeline Project

The Irrigation Pipeline Project has a long history. When the work started many problems surfaced before the pipeline was finally completed in 2003. Still technical, financial, and management questions have to be solved to make this project successful. The main interest of DWAF in the irrigation pipeline project was to save water and to support black emerging farmers against minimal governmental costs.

The financial breakdown of the project could cause high social economic consequences for the region (more than 10.000 workers in the irrigation area). The legal commitment of DWAF towards the pipeline project as formulated in the letter mentioned above remains unclear. There seems considerable risk of legal liability for DWAF in case of financial problems of the Lower Blyde WUA. A WUA is not a private enterprise but a public entity, although with a status still under debate. In case of financial mismanagement DWAF has an obligation to take action (section 95 (1) NWA). Against this background DWAF got, against its will, drawn into the project. Although the formal policy was to stop subsidising 'former advantaged farmers' the DWAF involvement in the irrigation pipeline could well result in subsidising again a small group of 'former advantaged' beneficiaries to save the project from collapse.

The Blyde 800 Emerging Farmers Project

The Minister of DWAF initiated the 'Blyde 800 ha' project as part of the Lower Blyde River Irrigation Pipeline project. There was no consultation process with the local people if they really wanted this emerging farmer project. DWAF has tendered a request for proposals for the 800 ha project. So far the Blyde 800 ha project is managed by DWAF Pretoria. The DWAF approach in my view seems to take over a possible potential successful local stakeholder process. The local stakeholders are considerable confused and ill informed on this project. However there seems sufficient good will between the white and black farmers and communities and between the WUA and the Maruleng Municipality to make this project a success. The white irrigation farmers could for example play a role in mentoring and marketing. Interesting is the economic motivation for the WUA to make the 'Blyde 800 ha' project a success. The project is important to make the irrigation pipeline financial viable (emerging farmers pay R 600 per ha per year for operational costs, DWAF pays capital costs). This factor can work as a local driver behind the project. The project should not unevenly benefit the irrigation farmers and their pipeline, leaving the problems for the government and the emerging farmers. The impression is that co-operation between DWAF and other departments such as Land Affairs and Agriculture on this subject can be improved.

Sugar

The controversial sugar plan in the region incorporates the use of the Blyde 800 ha project. Further investigation in the sugar plans seems worthwhile.

Domestic Water Supply Mametja / Sekororo Communities

For the neighbouring communities improvement of the water supply infrastructure is a priority. If the infrastructure improves however and the demand rises water scarcity could be not far away. Boreholes will probably not be sufficient enough in the developing circumstances, apart from the debatable quality of the borehole water. Extension of the irrigation pipeline is a technical possibility. One of the first steps is to create clarity on water allocation from the Blyde River for domestic use in the Mametja / Sekororo communities. An allocation decision by DWAF on request of the Municipality is a necessary prerequisite for the extension pipeline project. Further delays in the service of basic water supply can easily increase tensions in the region and will not help building trust between the white and the black communities, especially with the irrigation pipeline now running. DWAF Polokwane has delegated the authority for domestic water supply for the Mametja / Sekororo communities to

the Maruleng Municipality. The delegation doesn't provide enough financial means for this municipality to properly execute this complex new task. In my view this withdrawal of DWAF leaves the local stakeholders with an impossible problem.

DWAF is still technically responsible for the boreholes on the ground. It seems easier and probably more cost effective to delegate this function to the local water users or the tribal authorities involved.

DWAF as Facilitator

In my view the goals of integrated water management in the Lower Blyde River area cannot be reached without a balanced DWAF role. In promotion of multi stakeholder participation in local water management DWAF has a role in assuring fair play of the 'big players' and supporting 'small players'. On one hand DWAF provides the legal and institutional framework (playing field). On the other hand DWAF plays an important role in facilitating the stakeholder negotiating process. It makes little sense for poor stakeholders to participate without the capacity to have a meaningful contribution. Multi-stakeholder participation in a platform of ignorance is not what DWAF advocates. A more sustainable integrated water management cannot be reached when the substantial socio-economic gaps in the region even further widens. However, redressing inequities through new water institutions can only be a part of the much broader and complex process of poverty alleviation.

Pitfalls for DWAF intervention

In my view there are two major pitfalls for DWAF intervention in the water management of the Lower Blyde River. The first pitfall is a one sided focus on privatisation and withdrawal from the local process, believing the private stakeholders themselves will naturally provide for a balanced and just participation process. There seems considerable trust in the power of private enterprise providing naturally efficient and effective local water management for all the stakeholders. The second pitfall is DWAF taking over the stakeholder process in local water management, imposing centralised blueprint solutions. In this way stakeholders are easily kept dependent on government. It almost encourages passive behaviour of the local stakeholders involved. This approach doesn't facilitate the local negotiating process between stakeholders but rather blocks the transformation process so much needed in local water management. Furthermore this approach requires high government investments in professional staff and local expert knowledge. The needed money and skills are often not available. This policy can easily become doing everything and nothing, leaving everyone passively blaming the government when results are poor.

Lacking Co-ordination

The respondents acknowledge the lack of sufficient co-ordination, co-operation and integration as the major management problem in the area. The internal DWAF co-ordination and co-operation between irrigation issues and domestic water issues in the Lower Blyde River area is not strong. For example the allocation problem for domestic water supply for the Mamejja / Sekororo communities has not been solved yet. The co-ordination and co-operation on water issues between the Municipality and the WUA can also be considered as weak. The improvement of co-ordination and co-operation between the Lower Blyde WUA, Maruleng Municipality and DWAF is a key factor.

Recommendation: Integrated Project(s) Management

This study closes with a final recommendation. As co-ordination is a crucial factor in the Lower Blyde River, integrated project(s) management could be positive step forward. A suggestion is to appoint one manager to co-ordinate the different projects mentioned for example for a fixed period of five years. According to the required tasks this needs to be a 'heavyweight' manager. The estimated costs for such a manager are between R 200.000 – R 300.000 per year. This manager could be co-funded by DWAF (Pretoria and Polokwane), Maruleng Municipality and the Lower Blyde WUA. For example each party could finance one third of the costs. In this way domination of one of the parties can be prevented. It gives the manager certain independence. The manager has to be able to communicate with the different stakeholders and governments. The manager should accommodate the processes of stakeholder participation and integration in the Olifants CMA and the Lower Blyde WUA. Specific project results can be formalised in a management contract. This agreement should also give clear guidelines, available resources, and accountability moments for example. It could be worthwhile to investigate the idea of a project(s) manager in the Lower Blyde region further.

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Interviews

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26-06-03 Interview with Derek Weston, DWAF Pretoria, concerned with institutional development, tel. 012-3368590

30-06-03 / 28-08-03 Interviews with Francois van der Merwe, DWAF Pretoria, Manager/Engineer concerned with irrigation Pipeline and Blyde 800 project, tel. 012-3368245

02-07-03 Interview Margaret von Mollendorf, DWAF regional office Nelspruit. Tel. 013-7597300

03-07-03 Interview Kitty Ras, Blyde River Dam Manager, DWAF, Tel. 015-7955642

03-07-03 / 05-08-03 Interviews with Johan Du Preez, Vice chairman WUA, tel. 015-7955380

04-07-03 Interview with Derrick Dutoit, Project manager Award for public awareness raising, Acornhoek Tel. 015-7933991, Project: Save the Sand, Manager: Sharon Pollard, tel: 015-7933991

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30-07-03 Interview with Jan Mohlala Ms Edwina Kgouloane, Ward Councilors for Oaks, Finala, Santeng, tel Mohlala: 082 3879551

30-07-03 Interview with Sam Modiba, Technical Engineer Maruleng Municipality, Hoedspruit, tel: 082-3865987

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02-08-03, Ditabeng Johannes Moach, ward councilor Leboeng for local municipality of Greater Tubatse (Burgersfort), tel: 082-8290764.

05-08-03 Interview with dr Peter Scholtz, Citrus farmer and businessman, driver sugar plans, tel: 015 7955087

05-08-03 Interview with Oscar Chiloane, Headman Farm Labour Bavaria Citrus Farm tel: 072-5902238,

06-08-03 Interview with Roelof Nienaber, Farm Manager on Mike Scott farms, Tel: Mike Scott: 083-6350502

06-08-03 Interview with Piet Maritz, Vegetable and Corn Farm, tel: 015-7955051

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07-08-03 Interview with Gert Bezuidenhout, chairman WUA, Citrus/mango Farm

07-08-03 Interview with Manie Kriel, (white) ANC Provincial Representative Limpopo, Tel: 015-7813921

28-10-03 Interview with Judy Meeser, Gamefarm Transfronties, Hoedspruit, 015-7930062

29-10-03 Interview with Liz de Beer, Maruleng Municipality Manager, 015-7932409.

30-10-03

Stakeholder Workshop 1: *Integrated Water Management in the Lower Blyde River, Boardroom Maruleng Municipality,*

Presentation B.W. Raven.

Participants: Robert Mbwana (independent chairperson of this meeting) Gert Bezuidenhout (chairman WUA), August Winter (Rand merchant bank, former WUA), 4 Maruleng ward councillors from the Mametja communities), Yvon (secretary Maruleng Municipality), Francis Mohlala (water issues The Oaks), Marie Tinka Uys (Biosphere), Nynke Postuiterweerd (IWMI), Tebogo Seshoka (IWMI), Gert Deijssel (head water services Maruleng municipality).

21-11-03

Stakeholder Workshop 2: *The role of DWAF in the Lower Blyde River, IWMI office Pretoria.*

Presentation B.W. Raven.

Participants: Barbara van Koppen (IWMI, chairperson of this meeting); Derek Weston (DWAF), Gerhard Backeberg (WRC), Anthony Turton (AWIRU), July Brown (Manchester University), Silvain Perret (Pretoria University); IWMI researchers and staff.