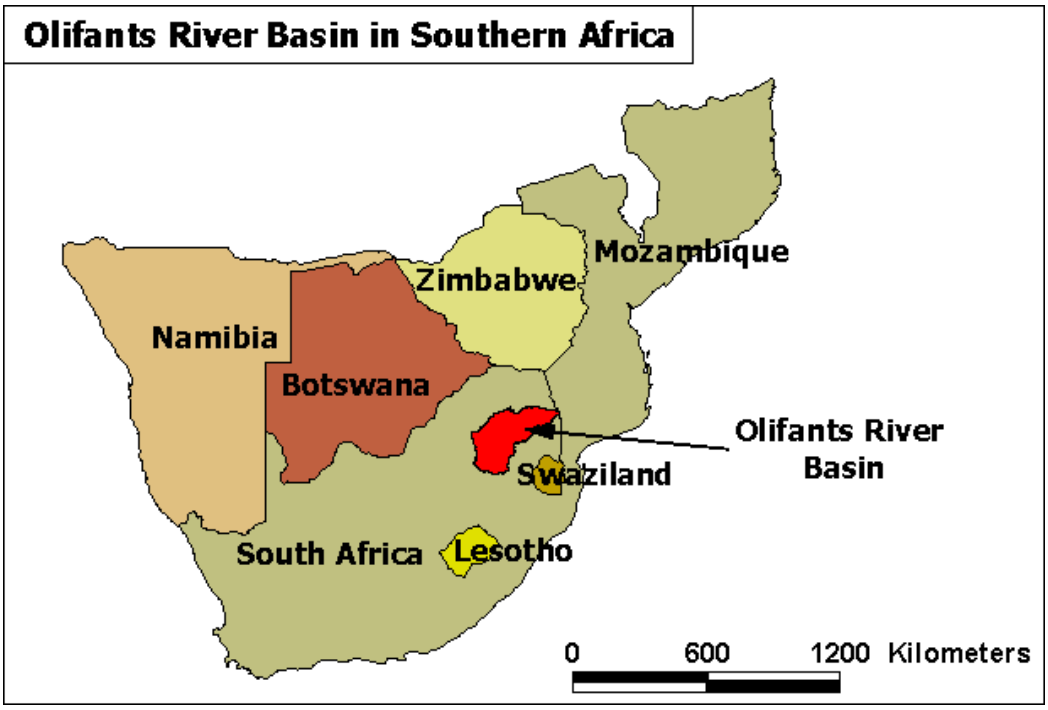
The Olifants River, South Africa
HELP-UNESCO
June 2002

Presentation:



Catchment Details/Basin Properties:

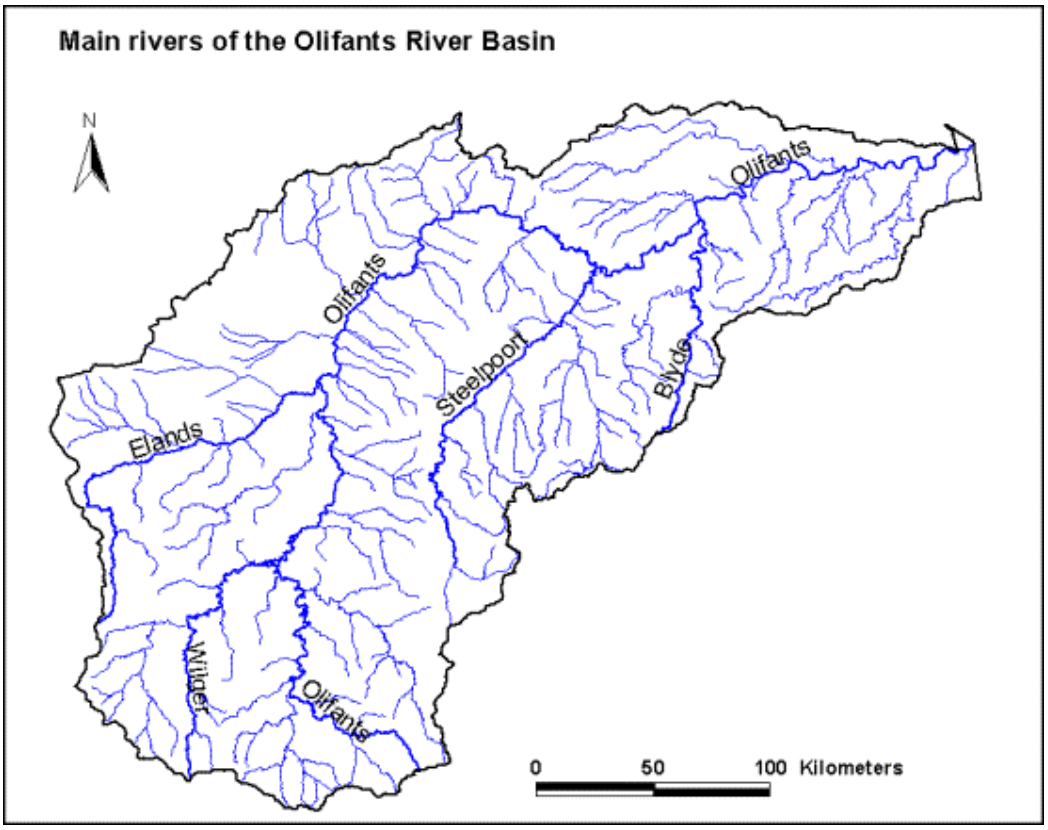
Location:

The Olifants River passes through three provinces of South Africa (Gauteng, Mpumalanga, Limpopo Province), through the Kruger National Park, into Mozambique, where it joins the Limpopo. (Latitude around 25 S - Longitude around 30 E)

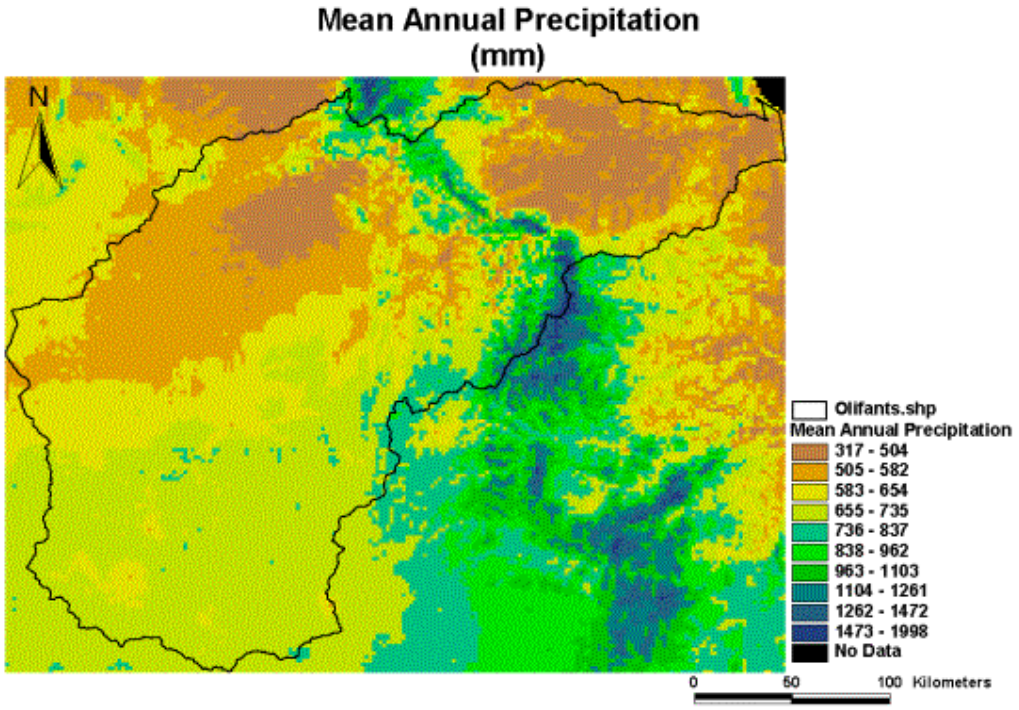
Size: 54,475 km^2 and 770 km long for the main river.

Main rivers: Olifants flows from the Southwest to the North East. From the upper to the lower stream the main tributaries are the: Wilger, Elands, Steelpoort and Blyde rivers.

Blyde river dam in January (credit photo IWMI-SA)



Climate :. The climate is semi-arid with rain falling primarily during the summer (November to March). Average annual precipitation is 631 mm but rainfall is unevenly distributed spatially and temporally (see below the map of precipitation extracted from South African Atlas of Agrohydrology and Climatology RE Schulze, University of Natal)



Water balance:

Supply: Mean Annual Runoff 1,992 million m^3.

Current demand: 976 million m^3 (including hydropower). Estimated future demand 2010: 1,210 million m^3 (source: BKS, Pretoria)

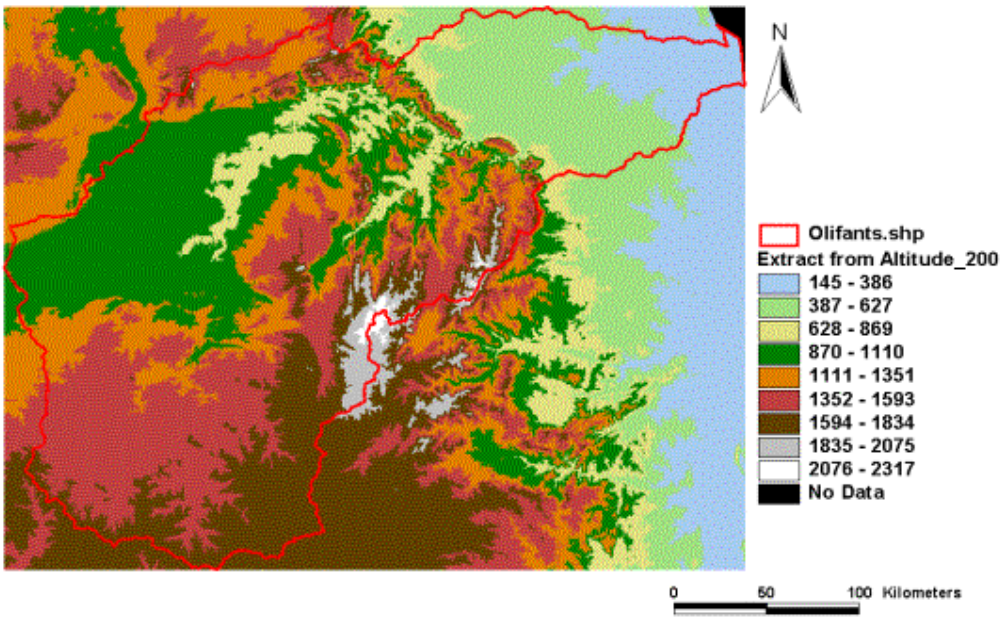
Surface water is the main water source but groundwater is becoming an important source of water for many small towns, villages, small-scale farmers and mines.

Infrastructure:
There are over 2,500 dams, of which 30 are classified as major dams (>2 million m^3).

Topography:

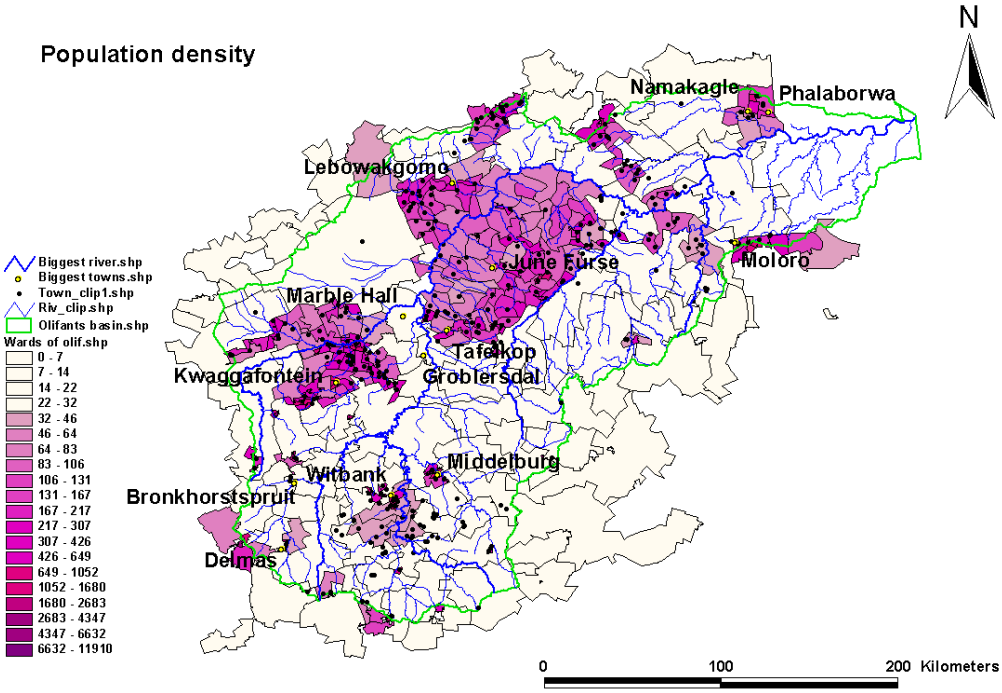
Altitudes range between 2300 m and 300 m at the Mozambique border. The basin could be divided into three regions: a larger plateau (Highveld) in contact with the spectacular Drakensberg escarpment and a plain in the eastern part of the basin (Lowveld). (see the map of precipitation extracted from South African Atlas of Agrohydrology and Climatology; RE Schulze, University of Natal)

Altitude map of the Olifants River Basin

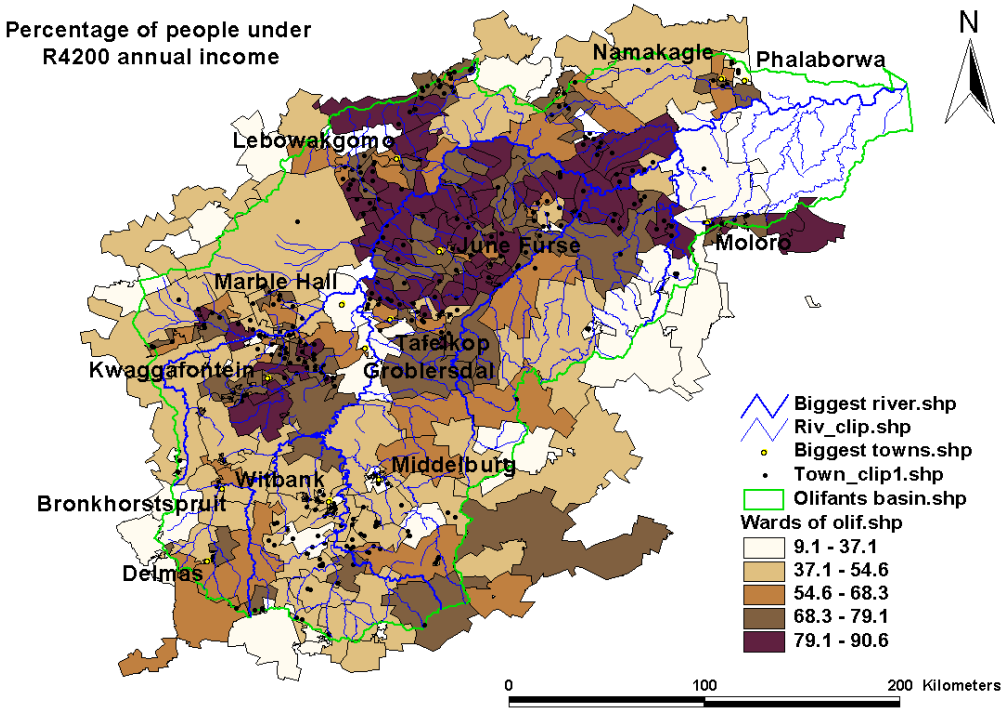


Population:

Currently about 3.4 million. Population densities vary considerably, depending on whether a particular area was a former black 'homeland' or a part of the former white area, with densities ranging from 100 to 350 people/km^2 in former black areas and 50 to 100 people/km^2 in former white areas. Whites currently comprise about 7 percent of the basin population. Ninety percent of the black population lives in rural areas in the basin.



The striking feature of the basin is also the high level of poverty. The former homelands (black areas) are clearly the larger pockets of poverty. (see map below. Information is based on Census 1996; data from Demarcation Board study, 1999).



Women play a key role in rural areas (credit photo IWMI-SA)

Land uses

- Agriculture, mainly rainfed crops (maize) , livestock but also irrigation (around 100,000 ha including commercial and small scale schemes. Main irrigated crops are: soja bean, cotton, vegetables, citrus, wheat, tobacco.
- Forestry area with: 71,500 ha
- National Parks and game reserves. One must mention the Kruger National Park which is the largest one in South Africa, with about 20,000 ha in the basin, as well as the Blyde River Canyon (that contains the Mariepskop state botanical reserve contains more than 2000 plant species)

Agriculture is of considerable importance in the basin (credit Photo : IWMI-SA)

Water uses in the basin (into brackets, estimations BKS/DWAF)

- Domestic water supply systems are being developed at a rapid pace since thousands don't have access to adequate potable water and sanitation**.(118 Mm^3 but expected to double by 2010)**
- Mining and industry. with around 200 active mines and new developments are underway (Platinum). Water is a crucial input for mining production**.(98 Mm^3)**
- Electricity : More than half of South Africa's electricity is generated in the Upper part of the Basin from coal. Water is imported from other basins for cooling the power plants. **(200 Mm^3**)
- Agriculture. Irrigation is the main water user. There is a strong distinction between "commercial" farmers, who have relatively larger farms, sophisticated technologies, often grow high-value crops (e.g., citrus), most of which are for export; and "small-scale" farmers, most of whom lack capital, with poor support services, lack good market access, and are struggling, as a result of the previous Apartheid policies and withdrawal of subsidies in recent years. (**540 Mm^3)** Livestock is also an important water user **(40 Mm^3)**
- Afforestation considered in South Africa as a Stream Flow Reduction Activity **(55 Mm^3)**
- Recreation: boating and fishing on rivers and reservoirs.
- Environment: especially for the Kruger National Park situated at the mouth of the Olifants river.

Commercial Afforestation is considered as a stream flow reduction activity (credit photo IWMI-SA)

Existing and forecasted uses and concerns:

- Water demand exceeds supply seasonally at present. Current projections show that water resources will be fully utilized by 2010. Consideration of reallocation among uses will therefore be necessary.
- Water quality management will be an increasingly important issue in the future, largely because of existing mines, and pollution from closed mines (acid mine drainage).
- Provision for the environmental demands through the implementation of a 'Reserve' to maintain the ecological integrity of the resource, is expected to have a significant effect on water availability for commercial uses.
- Possible expansion of small-scale irrigation to meet equity objectives may affect water availability for other sectors. Demand management will be essential.
- Overgrazing of the upper middle and lower middle regions is already causing high silt loads, aggravated by the highly erodable soil types found here.
- Satisfying the legitimate demands of the downstream country (Mozambique) both for water supply, and occasional flood control and also salinity control near the Indian Ocean is likely to become a serious problem in future.

Legal and institutional framework

There is a complete shift in the management of water in the country, with very progressive new water legislation, (e.g. New Water Act 1998) , that reaffirms the new constitutional rights :

- Water is now a common asset of the nation and its management must respect three key principles: equity, sustainability and beneficial use.
- Integrated water resources management is adopted in order to meet the needs of the people for water, jobs, and economic growth while protecting aquatic ecosystems.

- Therefore the notion of Reserve is introduced not only for the Environment but also for meeting Basic Human needs, since poverty eradication is a priority. Implications are huge and efforts from other users will be mandatory (possible reallocations of water rights, better water management)
- International requirements are also a national priority under negotiation with Mozambique.

New instruments are in place:

- Catchment Management Agency (CMAs) will be established in order to decentralise decision-making. It will be a mechanism for stakeholders to participate in and eventually take responsibility for water resource management. A process of registration of all water users is underway.

- Water Users Associations will take increasing responsibility for local management of water (e.g. irrigation infrastructure and control structures etc…)

- Water Resources Strategies (National, then per CMA) are under preparation.

- Concerning domestic water supply, which is a governmental priority, the newly created municipalities will be in charge of development and management.

Main hydrological issues

- The river has been known to have zero flow during short periods as it enters Kruger Park. Finding ways to avoid this situation is crucial. It could be by reduction of in stream flow reduction activities, water demand management, and enhancing groundwater recharge, limiting evaporation.

Giraffe in the Kruger (credit photo IWMI-SA)

- A major feature of this basin is also its capacity to generate extreme flows, with dreadful floods, especially affecting Mozambique but also South Africa. During the last flooding period in February 2000, the flow in the Olifants peaked at 3,800 $m^3 sec^{-1}$ at the mouth. Hence, managing storage facilities and land use to mitigate floods effects is a major concern.

- The questions of erosion and sedimentation are of importance.
- Understanding the relationships between groundwater and surface water.
- The issues concerning effects of climate change on the hydrology.

Erosion is of major concern (credit photo IWMI-SA)

Water policy and management issues include:

- Meeting human needs and environmental requirements as called for in the 1998 water law
- Demand management by commercial users
- Maintaining water quality
- Satisfying downstream requirements without threatening upstream uses which generate considerable economic wealth and in the mean time respect equitable allocation of water
- Enforcing the law
- Involving the communities, with the aim of empowering stakeholders to manage water effectively and use it to generate incomes.

Traditional Ndebele house (credit photo IWMI-SA)

Principal agencies

DWAF (Department of Water Affairs and Forestry)
WRC (Water Research Commission)
NDA (National Department of Agriculture)
Provincials Departments (Limpopo, Mpumalanga, Gauteng)
DEAT (Department of Environment and Tourism)
DPLG Department of Provincial and Local Government
Municipalities

NGOs :
AWARD,
IUCN (international Union Conservation
ORF (Olifants River Forum)

Research and Technical assistance

BKS (private consultants)
University of Natal
University of Pretoria
University of the North
University of Venda
ARC-ILI (Agricultural Research Council - engineering institute)

The IWMI capacity building proposes to support MSc and PhD students working on water issues on this basin.

Data and models:

There are considerable amount of data available (daily measures of rainfall, flow, temperature,) as well as number of GIS-based maps. Satellite images are also available.

Water quality data are needed to understand non point source pollution behaviour and impact.
In terms of socio-economic data, efforts are to understand the real value of water use and benefits for the people. Registration process is in progress, to know exactly how much water is used. Debates occur on how much water can be mobilised for productive use at a small scale and about the cost and implications of such measures.

Dead cow in the Steelpoort river (credit photo IWMI-SA)

In South Africa numerous excellent models have been developed thanks to Water Research Commission, other funding agencies, consulting companies and Department of Water Affairs and Forestry (DWAF)
IWMI has applied its SLURP model (Dr Geoff Kite) and is in the process of testing a water allocation model (WEAP). IWMI will participate in application of the ACRU model in the basin with University of Natal.

Problems and conflicts

Main problem is lack of participation of the public and the vast majority of the people concerned by water on this basin. Many efforts are engaged to involve all stakeholders around the table.

Conflicts are dormant and may appear soon when competition for water occurs during dry periods

Conflicts could appear in regard to water quality issues since efforts to implement the Reserve will be obviously costly for certain users. Possible court cases are envisaged when prejudice on health could be proved.

International disputes with Mozambique may arise for diverse issues including water quantity , water quality, sedimentation of the Massingir dam and flood control. There's a strong commitment in South Africa to prevent such conflict.

Broken domestic water supply system (credit photo IWMI-SA)

Key people and organisations involved

DWAF Pretoria : Bayers Havenga
DWAF Nelspruit : Margaret Van Mollendorf
IUCN : Chris Clarke
IWMI : Doug Merrey, Barbara Van Koppen, Hilmy Sally, Hervé Lévite (IWMI-CEMAGREF)
University of Natal : Roland Schulze
University of Pretoria/CIRAD : Sylvain Perret, Stefano Farolfi

Contacts

Website : http://www.cgiar.org/iwmi/benchmark/

Links : www-dwaf.pwv.gov.za/
http://www.cgiar.org/iwmi/dialogue/Index.htm
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