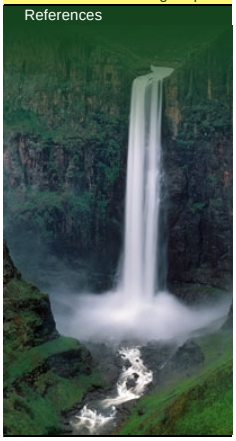
Resource Management



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Resource Monitoring:

Data and Monitoring Gaps

Monitoring gaps and unsuitable monitoring programmes presently hobble the effective and holistic management of water resources within the Orange-Senqu River basin. Various additional monitoring requirements have been identified for the basin:

Integrated data and information systems

Although data exist on the basin's water resource allocation, there exists no single integrated data and information system for all water uses throughout the basin (NeWater 2005).

Comprehensive basin-wide monitoring systems

National agencies have implemented numerous monitoring strategies throughout the Orange-Senqu River basin; however, collection systems are inconsistent in frequency of monitoring and spatial coverage. The basin would benefit from a more comprehensive monitoring program (NeWater 2005). Groundwater has been emphasised as an area that requires additional transboundary monitoring (DWAF 2004).

Institutionalising data bases and information systems

Under the Revised Protocol for Watercourses in the Southern African Development Community (Revised Protocol), basin countries are obligated to "exchange available information and data regarding hydrological, hydrogeological, water quality, meteorological and ecological condition of shared systems". The sharing of data and information is part of current and ongoing scientific and technical discussions within ORASECOM. To date, there is no formal platform for exchanging information, and no guidelines exist for cooperative information management or sharing, resulting in issues related to data type and format. National hydrometeorological services and other similar institutions will be key players in future exchanges of data and information (NeWater 2005).

Environmental flows determination method to be agreed

Currently there is no agreed method for environmental flow determination for the Orange-Senqu River basin. Lesotho and South Africa apply similar methods; Namibia and Botswana have not adopted any method. A focused and consistent monitoring system should be established to provide the necessary information, applying a single methodology to both the river and the estuary.

A standard methodology for determining environmental flows is needed for the basin.

Source:Beekman 2008

(click to enlarge)

Water flow monitoring in the Orange-Senqu River

Stream flow gauges need to be improved at the Gariep and Vanderkloof dams, and added along the Modder/ Riet river catchment in the upper reaches of the Orange-Senqu River. Flow gauging of low flows downstream of the Vanderkloof Dam needs to be improved (DWAF 2004). The river flow measuring system in the Lower Orange River is not spatially comprehensive (NeWater 2005). This is especially true for low-flow scenarios, where existing data are unreliable. A flow-gauging weir should be established close to the Orange River mouth to determine operating losses and to ensure that the mouth is receiving enough water to meet its ecological requirements (DWAF 2004).

Environmental economics data for the whole Orange-Senqu River

A preliminary set of environmental accounts have been developed for the Orange-Senqu River by Lange *et al.* (2007), which need to be updated and improved in terms of detail and consistency between basin states. There is significant value in this approach and it should be updated regularly to account for changing economic conditions. Of particular relevance is a good understanding of the value of water and its uses, particularly the ecological services that water provides, and value created by different types of water use.

Interactive

Basin Map

Explore the sub-basins of the Orange-Senqu River
enter

Water Management

Explore the water management systems around the basin - including intra-basin transfers and sectoral water requirements
enter

Dams

Investigate the dams and water infrastructure in the Orange-Senqu basin
enter

Video Tour

Tour video scenes along the Orange-Senqu River related to Meeting the Water Challenge
enter

Panel Discussion

Listen to a panel discussion about the history and challenges in the Orange-Senqu basin
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Botswana, Namibia and South Africa have country-specific water accounts; Lesotho has yet to create a resource/water account.

Environmental flow requirements of the Fish and other ephemeral rivers

Currently, there are no clear mechanisms to determine environmental flows for ephemeral rivers. It is important to quantify environmental flow requirements for the Fish River, due to its important seasonal contribution to the Orange-Senqu River mouth, as well as for the optimal management and development of the Fish River system. These ephemeral rivers (e.g. Nossob / Auob) contribute little or nothing to the flows of the larger Orange-Senqu River, but are associated with important groundwater resources.

Irrigation water use monitoring

It has been established that irrigated agriculture is the main user of water in the Orange-Senqu River basin. The environmental flow studies conducted in the Lower Orange Water Management Area have shown that the degraded condition of the system results partly from the severely altered hydrology and partly from poor agricultural and irrigation practices. Excessive irrigation and inappropriate cultivation practices result in return flows carrying pesticides, sediment and fertilisers into the river. Studies by DWAF (2004) for the Upper and Lower reaches of the Orange River indicated that there was a serious gap in data with respect to irrigation water use.

Displacement of communities in Lesotho

A comprehensive assessment of the resettlement program associated with the Lesotho Highlands Water Phase 1 Project has yet to be completed. There are estimates that 4 000 households were relocated from the Mohale region now covered by for the construction of Mohale Dam; however, there are only limited data on the baseline conditions of these households (livelihoods, etc.) as compared to their present situation. This could be confirmed with analysis of satellite images and a retrospective social impact assessment.

Better understanding of the consequences of the proposed dam at Vioolsdrift

Construction of a storage dam is being considered at Vioolsdrif in the Northern Cape of South Africa (opposite Noordoewer, Namibia). The full environmental, social and economic impacts of such a structure need to be assessed, so that optimisation and mitigation measures can be addressed (Alexander and van Wyk 2005):

- Baseline information as compared with other proposed sites to determine the potential impacts
- Likely changes in water temperatures and potential effects on downstream aquatic biota
- The size of the land area likely to be inundated
- Resettlement options, if any are needed
- Migration of invasive fish and plant species
- The extent to which large floods could flush pollution from existing and proposed operations (e.g. mines) into the dam

A comprehensive State of the Environment Report

Each of the basin countries has a State of the Environment report determining human well-being and the state of major ecosystems. Data in these reports are presented at varying scales, and some datasets are incomplete. A comprehensive state of the environment report needs to be compiled for the entire Orange-Senqu River basin (NeWater 2005).

Impacts of climate variability and change

The impacts of climate change need to be monitored, and scenarios modelled to determine how to best manage future changes. This will improve understanding of the countries' and regions' water needs, and better prepare organisations for water resource changes that might occur as a result of climate change.

Next Chapter: Meeting the Water Challenge References