9
Water sustainability of agribusiness activities in **South Africa**

9.1 Water challenges

9.1.1 Water availability

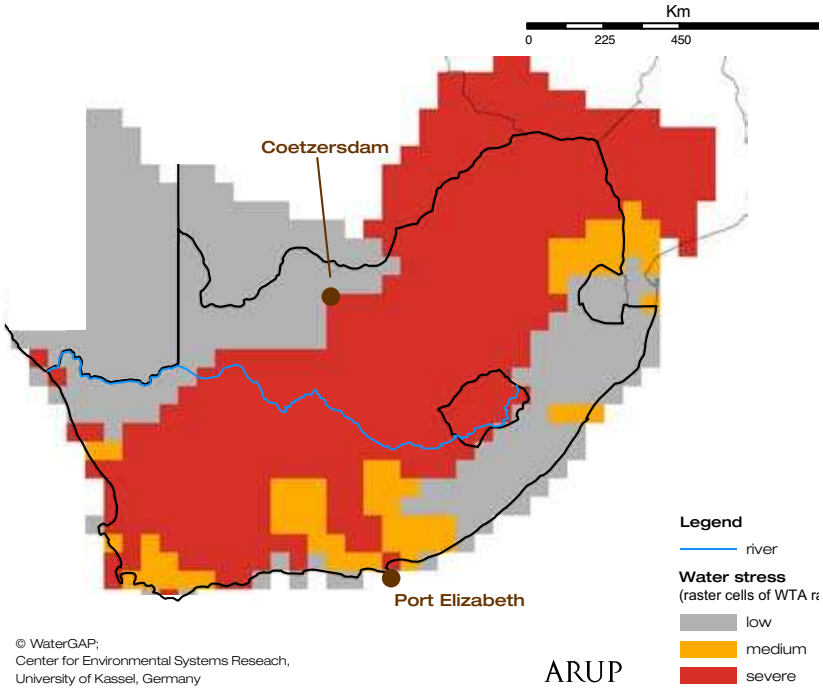
South Africa is a water scarce country where the demand for water is in excess of natural water availability in several river basins. The effects of variable rainfall patterns and different climatic regimes are compounded by high evaporation rates across the country. For example, the Cape Town region experiences a 'Mediterranean'-type climate with rainfall throughout the year and most precipitation during the winter. In contrast, the inland climate of Johannesburg has a rainy season in the summer months (October – April) but is dry throughout the rest of the year.

As groundwater availability is limited by predominantly hard rock geology in South Africa, surface water is the more significant resource. In areas where groundwater is available, it is frequently over-exploited as, for instance, in Dendron, Springbok Flats and Coetzersdam.[69] Social and demographic factors also contribute to water scarcity; one of these factors is, for instance, the distribution of significant settlements and industry adjacent to mineral deposits rather than water resources.

Water availability in South Africa has been assessed using WaterGAP and Figure 10 shows that many areas of South Africa experience severe water stress.

Figure 10

Overview of the water withdrawal-to-availability ratio calculated by WaterGAP. This shows low, medium and severe water stress in river basins across South Africa.



9.1.2 Climate change impacts

Climate change will affect two key parameters: firstly, temperatures will increase and, secondly, rainfall will decrease and be distributed more erratically. A recent estimate[70] of the climate change effects on water resources suggests that South Africa may experience a reduction of 10% in average rainfall reducing surface water runoff up to 50-75% by 2025.

9.1.3 Water quality

Water pollution is a growing problem and can be attributed to municipal pollution, industrial effluent, acid mine drainage and salinisation caused by irrigation. Municipal pollution due to informal settlements built close to watercourses has been linked to contamination of irrigation supplies and as a result, retailers (particularly in export markets) have threatened to cancel fruit imports from regions where pollution is in excess of their local standards for food production.[71]

An example of the growing salinisation problem is the area irrigated by the Orange River system. In the Eastern Cape, the water quality of the Orange River falls in quality as it mixes with the Eastern Cape's more saline river system. This leads to a progressive deterioration in water quality from the north to the south. **Financial institutions should ensure, firstly, that clients are not affected by polluted water supplies and, secondly, that water resources are not being polluted by the clients.**

See PIs 7 & 10

9.1.4 Institutional/regulatory context

South Africa's water policy is underpinned by the National Water Act of 1998. This legislation has a strong emphasis on social equity, environmental sustainability – it features the concept of the Ecological Reserve by which 27% of instream flows[72] have to be allocated to the environment – and on South Africa's responsibility to neighbouring states through the sharing of transboundary river basins.

The Department of Water and Environmental Affairs (DWEA) is responsible for water management decisions in conjunction with river basin authorities, catchment organisations and water user associations. Irrigation policy in particular has evolved under the direction of DWEA and the Department for Agriculture. The National Water Resource Strategy reports that 98% of the available water resources are allocated of which 65% are allocated to agricultural activities. The recently announced Water Growth and Development Framework is outlined in the box below.

The Water for Development and Growth Framework (March 2009)

The Department of Water Affairs (DWEA) is very concerned about the magnitude of water use inefficiencies in irrigated agriculture and aims to improve water use behaviour.

To date farmers have been exempted from certain water charges and fees. It is the Department's view that the sector needs to make a contribution to the operations and maintenance of state-owned irrigation infrastructure.

The Department is also considering other interventions including a water allocation reform, the creation of a water market and the promotion of innovative techniques to enhance water efficiency. Volumetric charging may soon become mandatory.

The Framework provides four recommendations for irrigated agriculture:
1.) Enforce irrigation scheduling.
2.) Incentivise the use of technology for enhanced water use efficiency.
3.) Introduce cascading water tariffs, and 4.) Stop all illegal water use.

Currently, irrigated farms pay a water resource management charge and hence contribute to the sustainability of water resources and to ensuring that all water users receive their allocated share of water. These funds also contribute to specific activities such as the removal of invasive plant species. **The development of water regulation in recent years shows that the issue is being addressed and will increasingly be addressed by public authorities. Farms and agribusiness operations that already today comply with emerging regulation and regulation likely to emerge in the future will have a competitive advantage relative to unprepared peers.**

See PIs 2, 5 & 10

Water trading is one of a number of tools under the National Water Act aimed at enabling improved water management. **Water markets provide additional incentives for water efficiency improvements enabling farmers to 'sell' and immediately monetise achieved water savings.**

See PI 5

9.1.5 Transboundary water management

South Africa has entered into a number of bi-lateral and tri-lateral transboundary water agreements with neighbouring states on watercourses such as the Orange and Limpopo River systems.

Nationally, a system of inter-basin water infrastructure enables the large-scale transfer of water in-between provinces. As a result of this strategy and despite water availability challenges, South African Governments have so far succeeded in providing water for agriculture and industry at the needed scale:[73] large volumes of water are transferred from the relatively water-rich eastern areas of the country to the water scarce areas in the west by means of man-made infrastructure. While this makes agricultural operations possible in many dry areas of the country, the reliance of farms on water transferred over long distances is risky: political priorities in South Africa could potentially shift leading to a reconsideration of water-transfer policies. For instance, the Water for Development and Growth Framework (2009) makes the recommendation that inland water resources should be retained for use inland rather than being transferred to coastal locations.[74]

See PI 8

9.2 Water sustainability in irrigated agriculture: citrus fruits and vines

The South African agricultural sector consists of two sub-sectors: the less developed subsistence sector and a well-developed commercial sector.[75] Approximately 1.3 million hectares of land are irrigated of which 50'000 ha are smallholdings.[76] The focus in this report will be primarily on the commercial sector given its relevance for the local and international financial services sector – which relies on large irrigation schemes.

Most commercial sector operations are found in the Orange River Basin[77], the Crocodile River (a tributary of the Limpopo in the north of South Africa)[78], the Lower Vaal River (central)[79], the Sundays/Fish basins (situated north of Port Elizabeth[80] where citrus fruits are grown) and finally in the Western Cape region. Deciduous fruits, including apples, are grown in the Western Cape and the Eastern Cape. Fruits, including grapes (grown in the lower Orange region) for wine, earn as much as 40% of agricultural export earnings in some years.

Irrigation across South Africa uses over 50% of the surface water resources and virtually all large irrigation schemes are supplied from storage dams. As a result of high conveyance losses, a significant proportion of this water does not reach farmers. In the Mokolo Basin, for instance, these are in the range of 35-40%.[81] **Financial institutions should, therefore, pay attention to the condition of the water infrastructure relied on by clients.**

See PI 12

9.2.1 Citrus fruits

South Africa is the second largest exporter of citrus fruits in the world (after Spain). Approximately 20 million trees are found on 58'000 hectares of orchards, some of which are over 300 years old. Oranges for export markets make up almost 70% of the yield. The majority of irrigated citrus fruit plantations are located in Mpumalanga, Western Cape, Eastern Cape and Limpopo.

The investments and business risks associated with citrus orchards are different from those of so-called annual crops. Substantial yields are not recoverable until 5-7 years after planting, and orchards have life cycle production spans of 20-30 years depending on citrus type and variety.

See PIs 3 & 7

Water management is essential for high quality and quantity yields. Water quality, particularly salinity, affects both yield quality and quantity. **Financial institutions should ensure that water management skills are developed and that reliable assessments on the long-term availability of water of sufficient quality have been made.**

See PI 4

See PIs 13 & 14

In the Cape region most rainfalls during the winter months (May to August). Water deficits therefore occur when the fruits require most water, the flowering and early fruit setting stages (October to March).[82] Therefore, supplemental (deficit) irrigation is required to manage citrus crops in a productive, high-yielding manner. **The potentials of rainwater harvesting during wet seasons to enhance of irrigation security in dry seasons should be explored.**

Case study 4

Water conservation and wastewater disposal in Robertson town

The town of Robertson in the Western Cape is situated in the "valley of wine and roses". The three wineries and a grape juice concentration plant located in Robertson all have the common problem that the quality of their effluent does not meet legislative requirements; moreover, the wastewater treatment plant of the municipality is already operating at full capacity. At present, therefore, the wineries discharge the effluent through an irrigation system, but the salt and organic content of the effluent is high, resulting in environmental and water resource pollution.

Action taken

A national project addressing water problems has been set up through a South Africa – Netherlands cooperation program on water management involving the participation of the Department of Water and Environmental Affairs (DWEA) and a strategic alliance of companies, public authorities and institutes (Frysian Water Alliance). The prime objective of the project consists in encouraging all key stakeholders to implement appropriate water conservation/ water demand management measures.

See PI 11

To this end, the largest wine and fruit processor in South Africa KWV, the Breede River Winelands Municipality in Western Cape, several wineries in Robertson and DWEA have agreed on a pilot project to treat the industrial and municipal effluent in Robertson for reuse in both agriculture and households ("grey water"). This pilot project on water-reuse has demonstrated the possibility for sustainable growth in agricultural output and local social improvement in light of harsh water conditions. As part of it, the technical, commercial and environmental viability of water recycling and reuse has been assessed and the results will be used to develop policy that provides incentives for water reuse in various regions in South Africa.

Sources: Nuon Energy & Water Investments[85], Global Water partnership Toolbox[86]

9.2.2 Vines

Approximately 103'000 hectares of agricultural land are used for vine orchards in South Africa. These orchards are concentrated in the Western and Northern Cape regions.[83] Vines for table grape are also a long-term investment. Financial gains depend on climate factors and sufficient water availability at important crop stages. The highest water demand coincides with the dry season from October to January.

See PIs 13 & 14

South African table grapes and vines require between 520-830 mm of water per year, which means that water productivity compares well to international standards.[84]

9.3 Performance indicators

Based on the current context of water challenges and agribusiness operations in South Africa, 14 tailored PIs are presented. These aim to support financial institutions in starting to assess the water-performance of farms and agribusiness operations in the region.

	Description	Rationale and materiality
PI 1 **Does the client hold specific water licences and entitlements to use the needed amount of water?**	Clear property rights to irrigation water reduce the risk of water conflicts between competing users and provide a framework for water trading or compensation if the rights to water are removed.	A lack of water entitlements relative to forecast water needs can lead to insurmountable water constraints and insufficient levels of production.
PI 2 **Does the client comply with existing environmental standards and/or is the client in a position to comply with regulation likely to emerge in the future?**	Environmental standards relevant to water sustainability include the contamination of water supplies and the over-abstraction of water. For example, water withdrawals resulting in river flows falling below the ecological reserve – which according to the South African Water Act 1998 ought to be maintained at 27% – can trigger adverse regulatory responses.	Breaching environmental standards and subsequent prosecution can incur financial costs and cause reputational damage and losses from litigation, both for the farm as well as the lender. In contrast, agribusiness operations that already comply with environmental regulation likely to emerge in the future will be at a clear advantage relative to unprepared peers.
PI 3 **Has the client participated in training on irrigation, pesticide management or integrated nutrient management?**	Training programs are effective instrument in the promotion of good agricultural practice with regard to soil and water conservation. In South Africa, training for farmers is available through AgriSETA courses; training can be provided on how to adhere to irrigation standards and guidelines, such as those provided by the South African Irrigation Institute (SABI).	• Training for farmers has been shown to increase irrigation efficiency and increase yields. • Correct nutrient and pesticide management can furthermore reduce the application of these substances thereby reducing costs. • Efficient use of fertilisers and pesticides can prevent excess run-off of pollutants and contamination of water supplies and therefore prevent reputational damage and losses from litigation.
PI 4 **Does the client use best available water-efficient irrigation systems/ technologies?**	In South Africa, irrigation consists of 33% surface water systems, 55% sprinkler and 12% Micro-Drip Irrigation.[87] In light of sharpening water pressures, farmers should strive to adopt the most water efficient system available for their irrigation requirements. This is in line with recommendations in the *Water for Development and Growth Framework* (2009) – Promoting Water Conservation and Water Demand Management. [88] These recommendations should be taken seriously as they are likely to be picked up in future regulation requiring farmers to do so.	The use of innovative irrigation systems such as drip irrigation or well managed centre or linear pivot sprinkler systems[89] enhances irrigation efficiency relative to conventional techniques. It reduces exposure to water risks and input costs making an agribusiness operation more resilient, profitable and solvent.
PI 5 **Does the client have access to (participate in) a water trading scheme?**	Water trading is one of a number of tools under the National Water Act that facilitate better water management. It is an important mechanism for promoting efficient and productive water use.	Participation in trading-schemes can enable producers and irrigators to flexibly adapt to changing water availabilities and irrigation needs: shortfalls of water supply can be compensated by purchasing additional water rights. Achieved water savings can be sold, which may open new revenue streams for farms and additional incentives to increase water efficiency. Overall, environmental markets have proven to be flexible, user-friendly and effective means to address environmental problems and resource constraints.

PI 6 **Has the client conducted an assessment of the security of sustainable water availability in quantitative terms?**	Water stressed river basins are identified in Figure 10. An assessment of sustainable water supply should report on levels of physical availability (surface supply and groundwater levels), storage capacity within the river basin, levels of unallocated water within the catchment and socio-economic factors such as the nature and number of competing water users.	A better understanding of the availability and constraints of water supply is key for business success. Together with a regional assessment of water issues, a local assessment on the farm level will provide the foundation to identify bottlenecks, adverse developments as well as possible responsive measures and promising solutions.
PI 7 **Has the client conducted an assessment of security of sustainable water supply in qualitative terms?**	An assessment of sustainable water quality should include an assessment of salinity, micro-pollutants and eutrophication.[90] High levels of salinity can reduce crop yields. This is a growing area of concern, for instance, in the Orange River Basin and can reduce the utility of available supplies. Attention should also be given to how the activities of the client may exacerbate existing water quality issues. This includes, for instance, the level and intensity of saline returns from irrigation.	Not only water availability in quantitative terms, but also the availability of water in high enough quality has become a key determinant of agribusiness viability.
PI 8 **Is the client dependent on water transfers from other regions?**	In South Africa, large volumes of water are transferred from the relatively water-rich eastern areas to the water scarce areas in the west. While this enables agricultural operations in many dry areas of country, the reliance of farms on water transferred over long distances can be risky if political priorities shift in leading to a reconsideration of water-transfer policies. Due to conveyance losses, such transfers can be very inefficient.	Dependency on distant water sources can be a source of political/regulatory and physical water risks. Farmers able to sustainably source required water input locally have a competitive advantage.
PI 9 **Has the client assessed the appropriateness of the crop cultivated relative to local water conditions?**	Water resource conditions include local water availability, precipitation patterns, salinity levels as well as water and air temperature. Crops that are suitable for a specified environment can be identified using the FAO Ecocrop.[91]	Drought resistant crops and those with higher salt tolerance levels present a key opportunity; their introduction can have positive effects on cost structure and business resilience over the medium to long term.
PI 10 **Have steps been taken to mitigate adverse water impacts on ecosystems and the environment?**	Has the client improved the water environment beyond what is required by law? This may include proactive water quality management procedures, rainwater harvesting, wastewater reuse systems or improving weed control to minimise water consumption from non-agricultural species.	Sustainable water management, including investment in alternative supply options reduces individual risk of failing water supply.
PI 11 **(a) Has the client assessed its water impacts on adjacent communities?** **(b) Has an ongoing process been established to manage community relations in regards to water issues?**	Consideration should include upstream and downstream users, local communities, poor and vulnerable groups and ecosystem requirements such as the ecological reserve. Community relations management can involve a designated contact person in the local community as well as a community relations department within the agribusiness company.	Water sustainability and equity considerations are interlinked and an assessment of the impact on competing users may reduce the risk of negative off-farm impacts.
PI 12 **Is local water infrastructure, such as canals well maintained?** **Does the client contribute to the maintenance of local irrigation infrastructure?**	Maintenance of irrigation infrastructure is essential for the efficient operation of these systems. Canals and localised systems require regular maintenance to remove silt, weeds, debris and repair leaks. Low levels of cost recovery lead to declining funds for maintenance and exacerbate the poor provision of irrigation services. In South Africa, farmer contributions such as the *Water Resources Management Charge* are used to fund the operation and maintenance of infrastructure. This is particularly relevant if the farmer is dependent on water sourced from dams or transfers.	In order to operate effectively and efficiently, water infrastructure must be adequately maintained. The bad shape of irrigation and water transfer infrastructure in South Africa leads to high conveyance losses. Farm reliance on infrastructure, particularly if poorly maintained, increases the risk of water shortfalls.

PI 13 **Does the client access innovative sources of water: managed aquifer recharge, re-use of water and/or rainwater harvesting?**	South Africa´s natural water resources are increasingly stressed. Furthermore, the problem is exacerbated as for many agricultural activities most water is needed when least water is available. Intensive rainwater harvesting during the wet season for use during the dry season should be further expanded. This applies to the re-use of grey water from agricultural and other activities.	Farms and agribusiness operations reliant on conventional/unsustainable water resources will be at a competitive disadvantage relative to those that manage to diversify water sources to more sustainable alternatives. Increasing levels of water re-use as well as collecting and storing rainwater during the wet season (even at the scale of aquifer recharging) appear promising ways forward.
PI 14 **What is the client's crop-specific water productivity performance?**	High levels of water productivity/efficiency may not be a sufficient condition for sustainable water management, but a necessary one. Water productivity is usually measured as m^3 per ton of harvest or unit of turnover. The level of water efficiency of a given operation will depend on a wide set of local parameters. National or regional averages can, therefore, only serve as very rough proxies. **Reference values** Benchmark values of water productivity in South Africa are: **Table and wine grapes (Western Cape Province)** 263-213 m^3/ton	In addition to environmental benefits, high levels of water efficiency have positive impacts on the cost- structure and drought-resilience of agricultural activities.