

# Background to CRIDFs Water and the Economy Project

This information on 'Water and the Economy' for the 12 mainland States in the Southern African Development Community (SADC) is aimed at providing an overview of the role of water in driving the economies of these countries. The infographics may be used to assess vulnerability to variability in the availability of water and other potential stressors induced by climate change.



The country-specific pull-outs are intended to be primarily comparative rather than directly quantitative in nature and have been derived from a number of freely downloadable sources. Furthermore, CRIDF has compiled its own database on Virtual Water traded in agricultural products and electricity and is available from the contact addresses provided on the cover folder. Other data sources that may be consulted are:

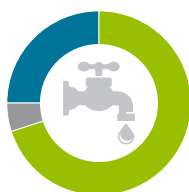
- SADC Statistics Yearbook 2011 - <http://www.sadc.int/information-services/sadc-statistics/sadc-statiyearbook/>
- SADC Economic Accounting of Water Use Project - <http://www.sadcwateraccounting.org/>
- The Statistics Division of the Food and Agriculture Organisation - <http://faostat.fao.org/>
- Knoema Data - <http://knoema.com>

## Sources and explanations



**GROSS DOMESTIC PRODUCT (GDP) PER SECTOR PER YEAR:** The GDP is reflected in current US\$ terms. The percentage contribution for the three main water using sectors is derived from the International Standard Industrial Classification (ISIC). Agriculture corresponds to ISIC divisions 1-5 which includes forestry, hunting and fishing as well as cultivation of crops and livestock production. Industry includes mining use. Notably, South Africa's GDP makes up 61% of the total SADC mainland GDP and 67% of the total SADC mainland GDP is driven by only 5% of the regions surface water.

**Data source: World Bank (2014)**



**WATER USE PER SECTOR:** This reflects the average percentage of the total water withdrawals that can be ascribed to each sector. Typically low and middle income countries have up to 82% of agricultural withdrawals, about 8% for domestic and 10% for industrial use. High income countries have 11% domestic, 59% industrial and 30% agricultural usage. Notably, Malawi, Swaziland and Tanzania (86%, 94% and 89% respectively) have higher proportions of agricultural use.

**Data source: FAO Aquastat**



Value (\$1000) of Agricultural products

**THE TOTAL US DOLLAR VALUE OF GLOBAL AND REGIONAL IMPORTS AND EXPORTS OF AGRICULTURAL PRODUCTS PER YEAR:**

Set against the GDP figure, these data provide an indication of the trade balance in agricultural goods, both with the rest of the world and with other SADC countries. It reflects the importance of agriculture as a forex earner. Most SADC mainland States are net earners in agricultural exports. Notable exceptions are Angola and the Democratic Republic of the Congo, which are both net importers of agricultural goods despite their relative water abundance. Remarkably, most of these imports come from outside of SADC.

**Data source: CRIDF Virtual Water database (2012)**



**IMPORTED WATER FOOTPRINT PER PERSON PER YEAR:** A country's water footprint per person is the amount of water embedded in all products consumed in the country divided by its population. Generally, the water footprint is related to the wealth of the country and globally it ranges from 2483 m<sup>3</sup>/person/year in the USA to 619 m<sup>3</sup>/person/year in the Yemen. Exceptions in the SADC mainland context are Malawi, Mozambique, Swaziland and Tanzania, with relatively higher irrigation demands for exported products. Botswana (45%) and South Africa (22%) are significant importers in SADC due to their relative wealth and lack of water.

**Data source: Mekonnen and Hoekstra (2011)**



**WATER FOOTPRINT OF IMPORTS AND EXPORTS OF AGRICULTURAL PRODUCTS:**

Water footprints are expressed as **Blue water**, which is derived from river, lake or groundwater abstraction – mostly through irrigation but also including process water. **Green water** is derived from rainfall and is determined mainly from crop evapotranspiration. **Grey water** is a measure of the pollution impact of producing the good and is a reflection of the amount of water that would be required to dilute the pollution impact during production. These infographics show the blue, green and grey water percentages of agricultural goods imported and exported. South Africa, Zambia and Zimbabwe stand out as having higher blue water contents of their agricultural exports, indicating the relative importance of irrigation for the forex earnings of these countries.

**Data source: CRIDF Virtual Water database (2014)**



**TOTAL RENEWABLE WATER PER YEAR:** This is the total amount of water available as river flows or groundwater derived from rainfall. When set against the total water withdrawals per person, it can provide an indication of the dependence of the country on external water resources through cross border flows or water footprint imports. Countries with a low **water availability/person:water use/person** ratio are more water stressed and more dependent on 'imported' blue or green water. Notably, South Africa, Swaziland and Zimbabwe have ratios below five.

**Data Source: World Bank & FAO Aquastat (2012)**



**TOTAL DAM STORAGE PER PERSON:** This is a reflection of the amount of blue water that is stored in the country relative to its population. World-wide per person storage ranges from 5,500 m<sup>3</sup>/person (North America), to 2,500 m<sup>3</sup>/person (South America) and 1,500 m<sup>3</sup>/person (Europe). In SADC mainland States, it is typically less than 1,000 m<sup>3</sup>/person. Countries with low storage and lower per person renewable water availability will be more vulnerable to decreased rainfall or delayed onset of rains. If low storage is coupled with a higher blue water content of exports, the country's economy can also be affected by reductions in rainfall. Lesotho, Malawi and Zambia stand out as being vulnerable in this regard.

**Data source: FAO Aquastat (2012)**



**WATER WITHDRAWALS PER PERSON PER YEAR:** This is a reflection of the total amount of blue water withdrawn from lakes, rivers or groundwater per person, irrespective of the use of that water. Countries that abstract a large amount of water for irrigation relative to their population are Swaziland, Zimbabwe and South Africa.

**Data source: FAO Aquastat (2012)**



**THE WATER FOOTPRINT OF MAJOR EXPORT CROPS:** This provides an indication of the total tonnage, earnings and blue, green and grey water content of the country's top four exported crops. Crops with a higher blue water content are more reliant on irrigation. Some crops, like tobacco, are very high earners per unit of blue water, whereas others like fruit products tend to use more blue water irrigation per dollar earned. In some cases, crops either grown under irrigation from polluted rivers or which require some processing have higher grey water contents.

**Data source: CRIDF Virtual Water database (2014)**



**THE GINI COEFFICIENT:** This is a measure of income disparity. It ranges from a theoretical 0 where everyone has the same income to 100, where one person has all the income. It does not account for income derived from social grants. World-wide Gini coefficients range from nearly 70 (Namibia) to 25 (Denmark). Three SADC States are the top 3 in the world - Namibia, Botswana and South Africa with all remaining SADC mainland States except Tanzania being above the global average. The significant income disparities in SADC are likely to drive increasing demands for greater equality and with this an increase in water, food and energy consumption.

**Data source: World Bank (average since 1990)**



**CALORIE INTAKE PER PERSON PER DAY:** This is a measure of food consumption and mostly related to income. Globally, it ranges from 3,800 calories per person per day (Austria) to 1,590 calories (Eritrea). It is a reflection of the amount of food the country has to produce or import to maintain food security. In the SADC mainland countries calorie intake ranges from 3,000 calories (South Africa) to 1,880 calories (Zambia).

**Data source: FAO Aquastat (2012)**



**HUMAN DEVELOPMENT INDEX (HDI):** The HDI Index is a composite statistic of life expectancy, education and income indices used to rank countries into four tiers of human development. World-wide it ranges from Norway at 0.96 to the Democratic Republic of the Congo at 0.30. The UN recommends that countries should aim for an HDI of 0.80. In mainland SADC, the HDI ranges from South Africa at 0.63 to the DRC at 0.30.

**Data source :** UN <http://hdr.undp.org/en/statistics/hdi> (2012)



**HAPPY PLANET INDEX (HPI):** The HPI uses global data on life expectancy, experienced well-being and Ecological Footprint. It is an efficiency measure ranking countries on how many long and happy lives they produce per unit of environmental input. Globally, it ranges from Costa Rica at 64 to Botswana at 23. In SADC, the HPI ranges from 42 (Malawi) to 23 (Botswana). SADC State's HPI is heavily affected by the lower life expectancy due to HIV / AIDS.

**Data source:** <http://www.happyplanetindex.org/>(2013)



**CARBON EMISSIONS:** This is a measure of the total emission of CO<sub>2</sub> per person per year in metric tons and is hence a reflection of the country's contribution to climate change. Globally, it ranges from Trinidad and Tobago at 38 tons per person per year to Lesotho at 0.01 tons. In SADC mainland States, emissions range from South Africa 9.01 tons to Lesotho 0.01 tons.

**Data source:** World Bank (2010)



**ENERGY USE IN OIL EQUIVALENT:** This refers to use of primary energy before transformation to other end-use fuels, which is equal to the country's production plus imports minus exports. World-wide, it ranges from Iceland at 17,964 kg oil per person per year to Eritrea at 129 kg. In SADC mainland States, it varies from 2,741 kg oil (South Africa) to the DRC at 383 kg oil.

**Data source:** World Bank (2011)



**CLIMATE VULNERABILITY INDEX:** A country's climate vulnerability index is composed of a Vulnerability score and a Readiness score. Vulnerability measures a country's exposure, sensitivity and ability to cope with climate related hazards, while Readiness accounts for the overall status of food, water, health and infrastructure within the nation. Globally, it ranges from Denmark at 0.83 to the Democratic People's Republic of Korea at 0.34. In SADC mainland States, it varies from 0.57 in the DRC to South Africa at 0.37, which is very exposed due expected higher temperatures, lower rainfall, and its existing water stress. This high vulnerability is despite South Africa's better readiness.

**Data source:** <http://index.gain.org/>(2012)