SAVi Sustainable Asset Valuation

Applying the Sustainable Asset Valuation (SAVi) to the Southern Agricultural Growth Corridor of Tanzania (SAGCOT) Initiative, Tanzania

A focus on irrigation infrastructure

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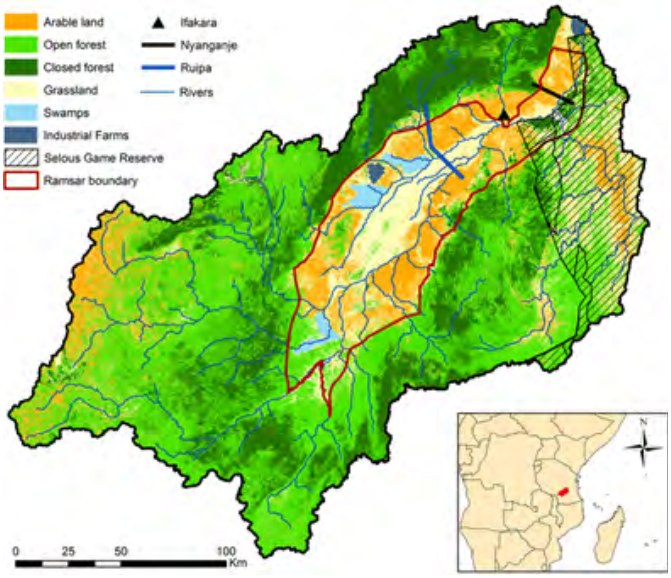
MAVA FONDATION POUR LA NATURE

The Scope of This SAVi Assessment



SAGCOT aims to strengthen Tanzania's agriculture sector. It foresees a total expansion of 350,000 hectares of agriculture land to increase production and processing of agricultural goods. 51,800 hectares of this expansion is foreseen in the Kilombero basin. Given this level of expansion, SAGCOT will create job opportunities and growth in agriculture production. It provides an important opportunity for improving farmers' livelihoods. On the other hand it will increase pressure on natural resources, in particular on the water resources needed for irrigation.

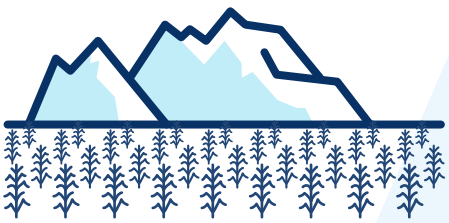
The SAVi assessment compares two irrigation technologies for the implementation of SAGCOT: flood irrigation and drip irrigation.

Externalities

The SAVi analysis values the following externalities:

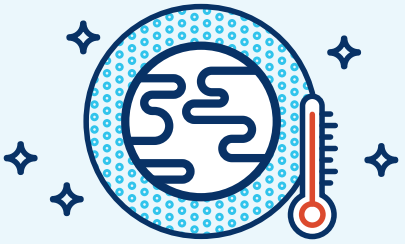
Water use

Valuation of the use of water.



Additional irrigated land

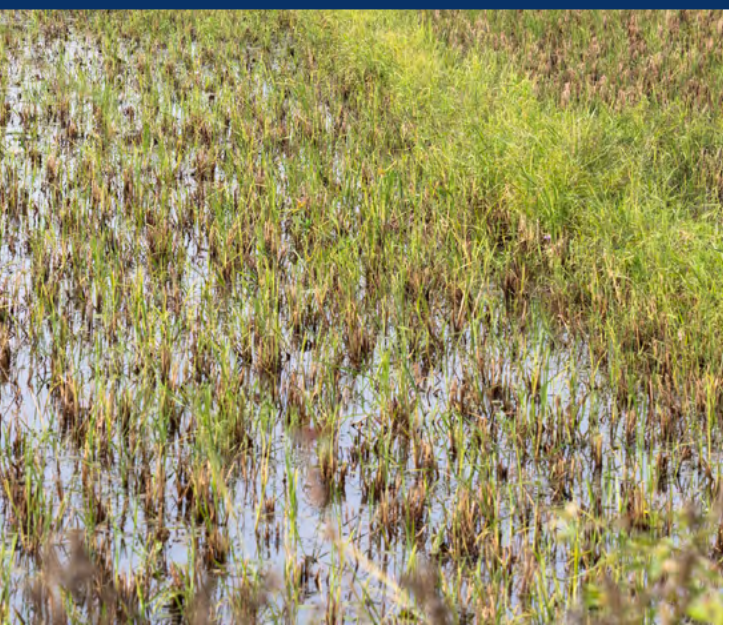
Valuation of the additional revenues and costs related to the additional irrigated land. The use of drip irrigation saves water, which in turn allows for a larger area of land to be irrigated. While this boosts revenue and employment, it also requires additional capital investment and operating and maintenance costs.



Social Cost of Carbon

Valuation of CO2 emissions through the Social Cost of Carbon. The energy use and accompanying CO2 emissions are higher for flood irrigation than for drip irrigation because a larger quantity of water has to be extracted.

Summary of Results



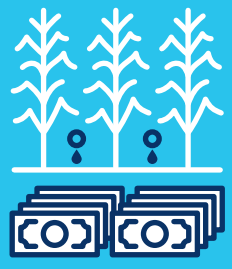
The SAVi analysis is organised under 3 scenarios. The SAVi simulation demonstrates that the net benefits have a direct correlation with the cost of the irrigation technology. The higher the capital costs, the lower the net benefit realised. As a result, Scenario 3 brings the most net benefits.

The Net Benefits

The net benefits include the correction for the externalities described earlier: water use, additional irrigated land and the social cost of carbon.

1. The SAGCOT Reference Scenario (SAGCOT flood): The implementation of SAGCOT with the use of flood irrigation, with the capital cost of the technology estimated at USD 81.50 per hectare.

Net benefit: USD 12.88 million



2. The SAGCOT Green Economy Scenario (SAGCOT drip, high capex): The implementation of SAGCOT with the use of drip irrigation, with the capital cost of the technology estimated at USD 3,000 per hectare.

Net benefit: USD 3.98 million

3. The SAGCOT Green Economy Scenario (SAGCOT drip, low capex) with the use of drip irrigation, with the capital cost of the technology estimated at USD 1,500 per hectare.

Net benefit: USD 39.21 million

SAVi Results

SAVi estimates that the use of drip irrigation will generate water savings that will allow a larger area of land to be irrigated for agriculture production. That will lead to further job creation, and increased revenue for the local population. It will also decrease pressure on water resources, especially in the dry season.

SAVi's Integrated Cost Benefit Analysis (in USD millions)

Scenarios	1. SAGCOT flood	2. SAGCOT drip (high capex)	3. SAGCOT drip (low capex)
Capital investment	3.26	57.43	29.59
Operations & Management (O&M) costs	11.53	16.88	16.88
Externality 1: Water Costs	89.97	74.71	74.71
Externality 2: Costs of exploiting the additional land, unlocked because of the use of drip irrigation (capital and O&M costs)		15.62	8.23
Externality 3: Avoided social cost of carbon*		0.34	0.34
Revenue (incl. additional revenue from unlocked land in case of drip irrigation)	117.65	168.61	168.61
Net benefit	**12.88**	**3.98**	**39.21**

** This cost will only be avoided if the energy used to provide water to the additional "unlocked" land will be renewable-based*

The SAVi integrated CBA further demonstrates that only in the case of a low CAPEX scenario would the net benefits of the use of drip irrigation outweigh those of flood irrigation.

The implementation of SAGCOT with flood irrigation will lead to a net benefit of USD 12.88 million compared to USD 39.21 million. The analysis also shows that the additional land that can be exploited for agriculture purposes in the case of the use of drip irrigation, brings with it another additional cost of investment, ranging from USD 8.23 to USD 15.62 million. The revenue generated because of the additional production in the case of drip irrigation is higher (USD 168.61 million) than in the case of flood irrigation (USD 117.65 million).

SAVi results: financial indicators

Scenarios	IRR	NPV	DSCR	LLCR
Scenario 1: SAGCOT flood	6.20%	(0.61)	1.18x	1.19x
Scenario 2: SAGCOT drip (high CAPEX), including externalities	6.04%	(12)	1.22x	1.22x
Scenario 3: SAGCOT drip (low CAPEX), including externalities	13.42%	10	2.33x	2.34x

SAVi simulation on the financial performance of SAGCOT

The Internal Rate of Return (IRR) and Net Present Value (NPV) indicate the financial viability of the project. In other words, they calculate whether the project can pay back investors and still generate a sufficient return. Flood irrigation generates a positive IRR of 6.20%. Both drip irrigation scenarios, when corrected for the value of the externalities, generate a positive IRR as well. In the low capex case, the IRR is 13.42%, significantly higher than the flood irrigation scenario.

The debt service coverage ratio (DSCR) and the loan life coverage ratio (LLCR) indicate the financial health of the project. These credit ratios are particularly of interest for lenders as they calculate how easily the cash flows can service the outstanding debt in each period. that these minimum ratios do not reach the so called lockup ratio, which is 1.15x for DSCR and 1.10x for LLCR.

By 2030 the implementation of SAGCOT with drip irrigation is estimated to provide 8% more employment, 8% more agriculture production and use 14% less water compared to flood irrigation.

Flood irrigation maintains a sufficient level of DSCR and LLCR during the life of the loan with 1.18x and 1.19x. In scenarios 2 and 3 the credit ratios of both the high and low capex versions outperform the flood irrigation scenario, e.g., min DSCR 1.22x and 2.33x respectively.

Of course, the inclusion of the value of externalities does not make the cash flows less or more robust in reality. The purpose of this exercise is to demonstrate that when taking a high-level macro perspective, sustainability can have a positive impact on the financial health of public infrastructure investments.

SAVi results: projections on water use, employment and agriculture production

Projections for 2030	BAU (without SAGCOT)	SAGCOT with flood irrigation	SAGCOT with drip irrigation*	Net benefits from drip irrigation compared to flood irrigation
Water use from agriculture (billions litres/year)	84.8	95.3	82	-14 %
Employment (FTE)	263,303	278,693	300,787	+8 %
Agriculture Production (tons/year)	299,462	305,987	330,365	+8 %

**Irrespective of a higher or lower CAPEX for drip irrigation the water use, employment and agriculture production remains the same.*

Why Use SAVi?

SAVi calculates the environmental, social and economic risks and externalities that impact the financial performance of infrastructure projects. These variables are typically ignored in traditional financial analyses.

SAVi is a simulation tool that is customized to individual infrastructure projects. It is built on project finance and systems dynamics simulation.

Visit the SAVi webpage:
https://www.iisd.org/project/SAVi-sustainable-asset-valuation-tool

About SAVi

SAVi is a simulation service that helps governments and investors value the many risks and externalities that affect the performance of infrastructure projects.

The distinctive features of SAVi are:

- Valuation: SAVi puts a financial value on the material environmental, social and economic risks and externalities of infrastructure projects. These variables are ignored in traditional financial analyses.
- Simulation: SAVi combines the results of systems thinking and system dynamics simulation with project finance modelling. We engage with asset owners to identify the risks material to their infrastructure projects and then design appropriate simulation scenarios.

Customization: SAVi is customized to individual infrastructure projects.

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