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SAVi Sustainable Asset Valuation

MAVA FONDATION POUR LA NATURE

GREEN CLIMATE FUND

SIMULATIONS

What-If SAVi Simulations on a Sustainable Recovery 2020

Why Investing in Sustainable Community Development Is a Pragmatic Recovery Plan: The case for Ghana

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Overview of a four-part series of simulations

The Rationale for the What-If Sustainable Asset Valuation (SAVi) Simulations

Planning a sustainable recovery requires that we look ahead and forecast how spending today will play out in the national and global economy in the years to come. It is also important that the ongoing, unprecedented wave of public spending triggers a sustainable recovery, one that has the environment, climate, and social cohesion at its core. The Sustainable Asset Valuation (SAVi) What-If simulations are designed to inform this debate by helping us understand the economic and societal benefits that can be realized when public spending is targeted at sustainable infrastructure. Simulations are inspired by ongoing recovery plans and are based on authoritative data and real science.

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Section 1. About This What-If simulation

The COVID-19 pandemic has led to economic downturns in many countries, with low-income and lower-middle-income countries being hit the hardest. Countries that have already been struggling to maintain fiscal balance now face new economic challenges, in addition to known issues related to the continued rural-to-urban transition, lack of infrastructure, and limited opportunities for employment creation. Further, with climate impacts expected to worsen in the coming years, many economic sectors will be affected by higher costs and declining revenues, with the need to invest in low-carbon and climate-resilient projects becoming more urgent than ever.

Investments in sustainable community development can result in systemic change with both immediate and long-lasting benefits. Negative climate impacts, which are expected to affect lives and infrastructure in urban areas, could be largely avoided; further, entrepreneurship and revenues can be generated to reduce poverty, create new jobs, improve gender equality, increase incomes in rural areas, and reduce migration to cities. Such outcomes could benefit the health and livelihoods of those within the affected communities, building their resilience to climate shocks and helping them to adapt to a changing climate.

While the negative economic impacts of the pandemic cannot be completely avoided in many affected countries such as Ghana, smart decisions during recovery can minimize their lasting negative effects and set the course for a more sustainable future. By using SAVi What-If simulations to assess several interventions for sustainable community development of a vulnerable agricultural community in Ghana, we make the case for sustainable community development being a sound investment for the sustainable economic recovery of the country. This document serves as an overview of the scope and results of the four simulations that estimate the costs and benefits of the sustainable community development interventions.

Section 2. An Overview of Sustainable Community Development

Sustainable community development focuses on interventions to mitigate the negative impacts of climate change while building resilience and improving environmental, social, and economic outcomes within the community. Sustainable community development in developing countries is essential to mitigating rural-to-urban migration, reducing poverty, and providing sustainable livelihoods for all, women as well as men.

To estimate the impact of recovery spending investments in sustainable community development, this project uses the Sustainable Livelihood Approach (SLA) as its theoretical foundation. SLA presents, in a harmonized way (Serrat, 2017):

(i) **The vulnerability context**: This includes an understanding of the shocks and seasonalities to which the community is susceptible and the community's ability to cope with these.

(ii) **Livelihood assets**: This includes an assessment of the human, social, natural, physical, and financial capital within a community.

(iii) **Transforming structures and processes**: This includes knowledge of the policy-making organizations and processes in the community.

(iv) **Livelihood strategies**: These are the proposed ways of how outcomes, which are aimed at improving the livelihoods of women and men, can be achieved.

(v) **Expected outcome**s: These are what can be achieved if livelihood strategies are successful.

Box 1. Project snapshot using SLA framework

- **Vulnerabilities to address**: Precipitation variability, leading to droughts and floods that lower land productivity; increased soil erosion due to climate variability and poor land-management practices; lack of access to investment/financing due to the unpredictable revenues and income streams in the face of climate change, high cost of financing, lack of own resources and lack of collateral for loans.
- **Strategies envisaged**: Improvement of land-use and farming practices to increase resilience to climate change. This includes using a multistakeholder approach, sustainable agriculture with mixed cropping, improved animal husbandry, introduction of agroforestry, energy generation (e.g., waste to energy and solar power).
- **Investment areas**: (i) Gender-responsive capacity building, (ii) multi-cropping (considering oil palm, maize, rice), (iii) poultry and pork value chain, (iv) mechanization of agriculture and expansion of irrigation infrastructure, (v) manure to fertilizer, (vi) energy generation (solar power, manure to energy), (vii) climate information and early warning systems (CIEWS).
- **Expected outcomes**: (a) Employment and income creation (both avoided job losses from improved climate resilience and new job creation), (b) food security (also related to climate adaptation), (c) energy security (with the use of renewable energy), (d) climate mitigation (with fuel switching from biomass and paraffin lamps to solar power and manure to energy).

The effectiveness of investments—and hence the outcomes that they generate—using the SLA approach depends on social structures and processes as well as assets and vulnerabilities. It is important to note that strategies might not result in the expected outcomes due to the emergence of side effects and trade-offs. These could include limited availability of assets, lack of institutional capacity, and/or underestimation of vulnerability.

This series of simulations emphasizes that investments made in multiple interventions can foster a sustainable recovery of communities. The multiple interventions can work together in a symbiotic manner so that side effects and trade-offs are limited, and the benefit of each intervention is realized at its full potential. Specifically, we simulate the implementation of investments (recovery spending) in infrastructure (e.g., reliable power supply), the creation of knowledge (e.g., climate-smart agriculture) and the creation of business opportunities (e.g., reuse of manure for energy and fertilizer production). The expected outcome is a commercially viable village enterprise that operates with a small footprint and thrives because of ecological integrity. It will increase the resilience of both rural and urban livelihoods.

Section 3. An Overview of the Proposed Sustainable Recovery Interventions

The interventions assessed by our What-If simulations are assumed to take place on 10,000 acres (4,047 ha) in an agricultural community in Ghana. The interventions are assumed to impact 44,000 livelihoods. The specific sustainable community development interventions that are simulated are:

1. Climate-smart agriculture (CSA) interventions. Specifically, crop rotation, mixed cropping, improved nutrient management, improved genetic resources (through improved seed varieties), and minimum tillage.
2. The replacement of flood irrigation systems with water-efficient drip irrigation.
3. Installation of solar photovoltaic (PV) energy generation.
4. The reuse of pig manure for biogas energy generation and as compost to replace chemical fertilizers.

The What-If simulations also estimate the improved economic viability of the project when sustainable recovery support from the Green Climate Fund (GCF) and other development partners is provided. GCF's recovery spending will address climate additionality and de-risk investment in the proposed interventions. Specifically, we estimate the impact of GCF and other donors offering concessional lending or providing collateral to reduce interest rates on loans for CSA interventions and for solar power energy generation.

GCF's involvement will improve the economic viability of these investments, allow projects to materialize and move quickly to the implementation stage and hence generate societal benefits during these challenging economic times, showcasing how public recovery spending could contribute to a sustainable (local) recovery. Targeted recovery spending for sustainable community development will create synergies across diverse projects that are normally assessed in isolation. It is therefore expected that GCF involvement will create demand for other sustainable community development interventions and crowd-in private investment.

The scope and effectiveness of the assessed interventions can be strengthened by scaling the use of Climate Information and Early Warning Systems (CIEWS). Information on expected rainfall patterns and other climate-related data are essential for farmers to decide when to plant seeds and when to harvest. Further, such data could support the decision to invest in water-efficient drip irrigation. Reduced use of flood irrigation would allow the restoration of river basins and reduce soil erosion, which will yield long-lasting benefits to the community.

Forecasts of climate hazards are critical to securing livestock, avoiding agricultural and other business losses, and minimizing damage to physical infrastructure. Climate data and projections can also optimize the siting of decentralized solar PV installations and inform the most appropriate technical choices. Both decentralized energy generation and local fertilizer production reduce the risk of disruptions to livelihoods and enterprises due to damage to larger-scale power distribution systems, roads, and supply chains more generally. CIEWS are a critical asset for sustainable and climate-resilient communities, especially in the context of COVID-19, which has exposed the vulnerability of our highly interconnected trade and infrastructure systems.

Box 2. National Adaptation Planning in Ghana

On July 2, 2020, while this simulation was being developed, the Government of Ghana reported undertaking a National Adaptation Planning (NAP) process as part of its COVID-19 recovery plan. The NAP in Ghana seeks to mitigate the negative impacts of climate change by developing projected rainfall and temperature change scenarios for the next 60 years. These projections can be used to guide decision-makers to invest in the most vulnerable sectors, particularly the agricultural sector, which accounts for a large portion of Ghana's GDP. Ghana's Environmental Protection Agency will carry out the NAP with support from the UN Environment Programme (UNEP) and with funding worth USD 2.97 million from GCF (UNEP, 2020).

While this NAP is only one step in building climate resilience in Ghana's agricultural sector, it shows that efforts for a sustainable and resilient recovery are being made.

More information: https://www.unenvironment.org/news-and-stories/press-release/covid-19-wake-call-ghana-develop-national-plan-climate-adaptation

Section 4. An Overview of the What-If Simulation Results

Tables 1 and 2 offer an overview of the results of all four simulations. The values presented are an average of the cumulative costs and benefits generated by each intervention over the project timeline. This timeline is 30 years for CSA, irrigation, and pig manure reuse. The project timeline for solar energy generation is 25 years. We note that the total costs for all interventions amount to USD 216.3 million if the GCF is not involved. If all interventions are implemented together, society will realize a cumulative net benefit of USD 280.7 million

GCF's involvement in projects usually lasts for the first five years of implementation. This simulation estimates that the costs for the assessed interventions amount to USD 72.7 million during the first five years. Assuming that the GCF provides capital to cover 30% of these project costs, with the rest of the project financing coming from private sector investment, the GCF would contribute USD 21.8 million. If this GCF financing is made available, the interventions would become more economically viable to implement in the short term. The net benefits would rise to USD 310.3 million in the long term.

Overall, results show that some of the needed investments (e.g., sustainable agriculture and solar power generation) would not be appealing and viable at given market conditions (e.g., high commercial interest rates) and due to long anticipated payback periods. Since the projects could break even in the medium term and would generate many community benefits, GCF recovery support at the outset and early phase of interventions (by providing concessional lending or other financial support measures) would encourage investment decisions of other market participants in times of economic uncertainty. As a result, GCF recovery support will ensure the medium- to long-term sustainability of the investments and increase the climate resilience of livelihoods and communities while also reducing emissions.

Further, results show that investments in infrastructure (e.g., production facilities to convert manure to fertilizer and biogas, and drip irrigation infrastructure) are economically viable, but require a large upfront investment that is not easily available to rural communities. The implementation of such infrastructure would create considerable synergies with investments of farmers, individual economic actors, in sustainable agriculture and solar power generation. These synergies are not only relevant for agricultural yields and economic activity but also for employment creation and women's empowerment.

Details on the costs and benefits of each intervention as well as the methods applied to calculate the values indicated in Table 1 are provided in the four sub-reports.

Table 1. An overview of the SAVi simulation results (short term)

Indicator	Economic impact after five years of project implementation
Costs	
(1) CSA Total	USD 27,832,000
(2) Irrigation	USD 7,110,000
(3) Solar Power Generation	USD 36,188,000
(4) Pig manure reuse	USD 1,577,000
Total Costs	**USD 72,706,000**
Benefits	
(1) CSA total	USD 145,325,000
(2) Irrigation	USD 8,472,000
(3) Solar power generation	USD 58,159,000
(4) Pig manure reuse	USD 4,363,000
Total benefits	**USD 216,318,000**
Net societal benefits	**USD 23,308,000**
*** Net societal benefits (with GCF support)**	**USD 38,114,000**

Table 2. An overview of the SAVi simulation results (long-term)

Indicator	Economic Impact after entire project timeline (25–30 years)
Costs	
(1) CSA total	USD 145,325,000
(2) Irrigation	USD 8,472,000
(3) Solar power generation	USD 58,159,000
(4) Pig manure reuse	USD 4,363,000
Total Costs	**USD 216,318,000**
Benefits	
(1) CSA total	USD 197,453,000
(2) Irrigation	USD 15,095,000
(3) Solar power generation	USD 266,539,000
(4) Pig manure reuse	USD 17,892,000
Total benefits	**USD 496,980,000**
Net societal benefits	**USD 280,661,000**
*** Net societal benefits (with GCF support)**	**USD 310,274,000**

References

Serrat, O. (2017). *The sustainable livelihoods approach*. Springer.

United Nations Environment Programme. (2020, July 2). *COVID-19 is a wake-up call: Ghana to develop national plan for climate adaptation* (press release). UNEP. https://www.unenvironment.org/news-and-stories/press-release/covid-19-wake-call-ghana-develop-national-plan-climate-adaptation

About SAVi

The SAVi is a simulation service that helps governments and investors value the many risks and externalities that affect the performance of infrastructure projects. It integrates best-in-class climate data from the EU Copernicus Climate Data Store.

The distinctive features of SAVi are:

- Valuation: SAVi values, in financial terms, 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.

Check out the SAVi track record, on-line demo, and academy at www.iisd.org/savi.

For more information visit our website: iisd.org/sustainable-recovery

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