

Strategies for Energy, Water, and Agriculture in Rural Ethiopia (2020-2021)

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BASS CONNECTIONS

Energy & Environment

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Background

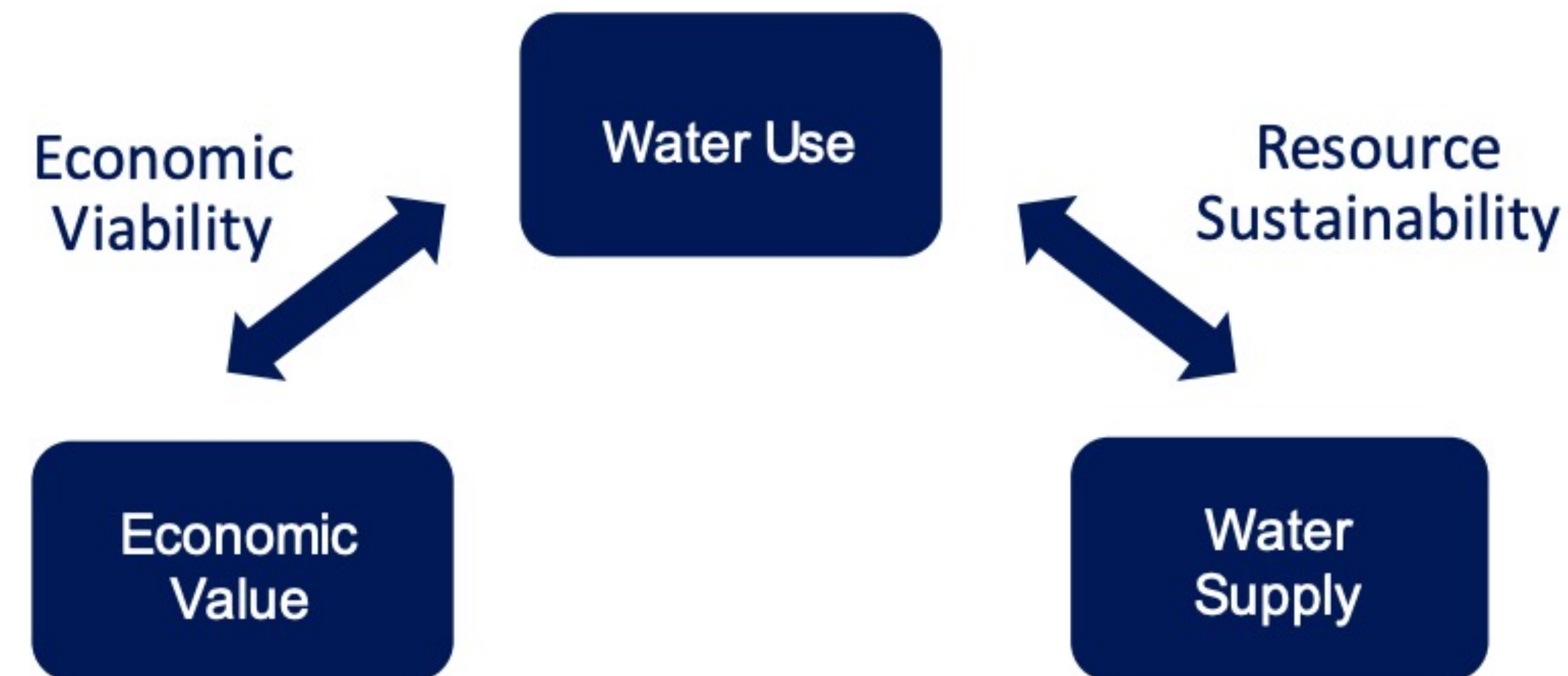
Over 70% of rural Ethiopia lacks access to energy. The Ethiopian government aims to achieve universal electricity access by 2025 through their National Electrification Plan.



Source: ESMP, Kalkidan Kebede

Solar mini-grids may offer a promising solution to facilitate universal energy access and a reliable source of power for irrigation needs of **over 75% of the Ethiopian workforce** with agriculture-dependent livelihoods

Our Approach



Working in collaboration with stakeholders including the Ethiopian Ministry of Water, Irrigation, and Energy, we analyzed 10 pilot sites in Ethiopia to determine if mini-grid powered irrigation generates enough energy demand to make it economically viable, while maintaining sufficient water stock at the site for long-term sustainability.

Our Findings

Major factors of mini-grid attractiveness are:

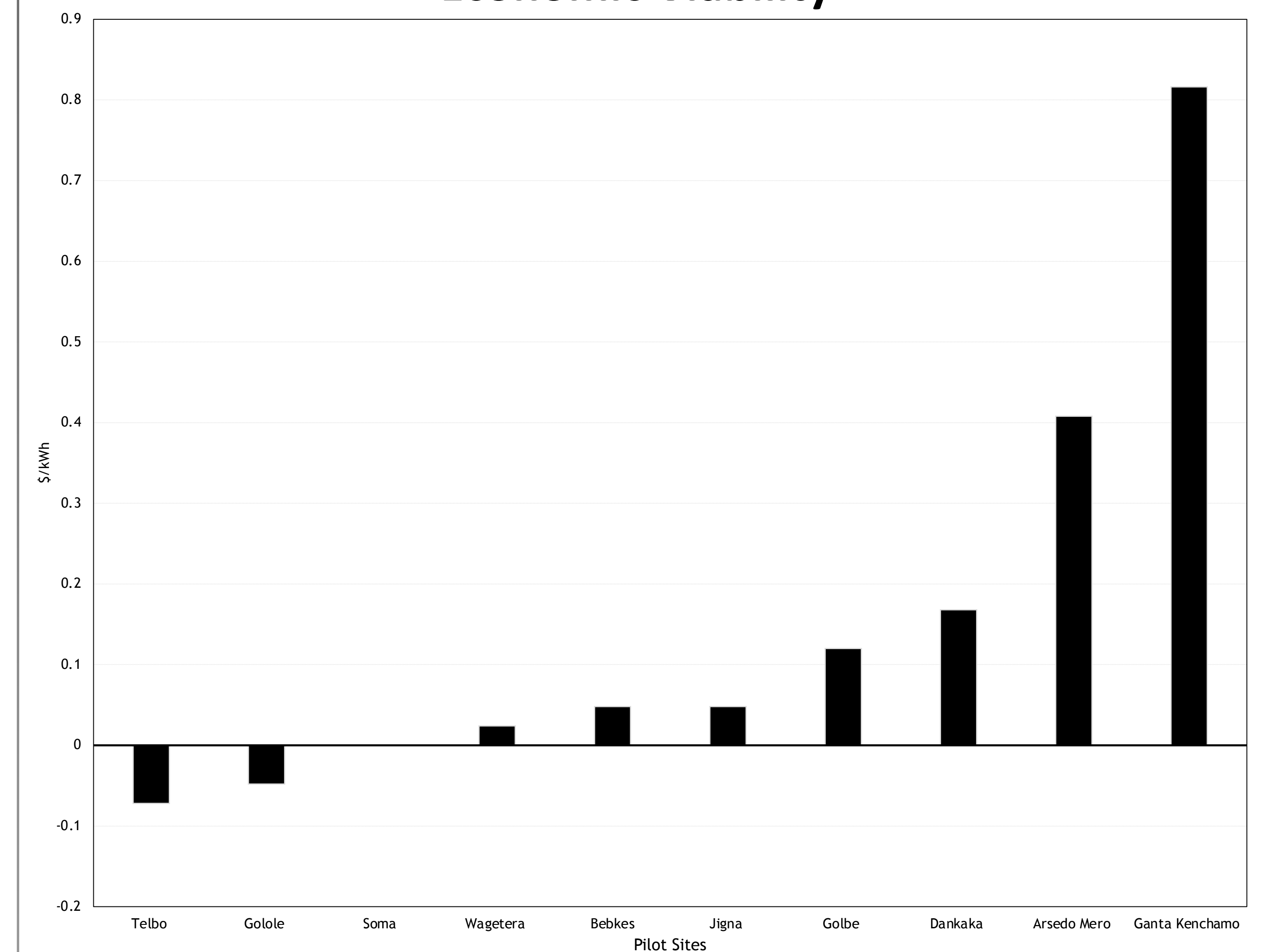
1. Higher fruit crop distribution
2. Groundwater recharge rates exceed groundwater pumping
3. Larger average farm size

A further consideration is the type of irrigation:

1. Drip irrigation can improve attractiveness especially for sites with fruit cultivation
2. Decentralization improves net benefits for most sites

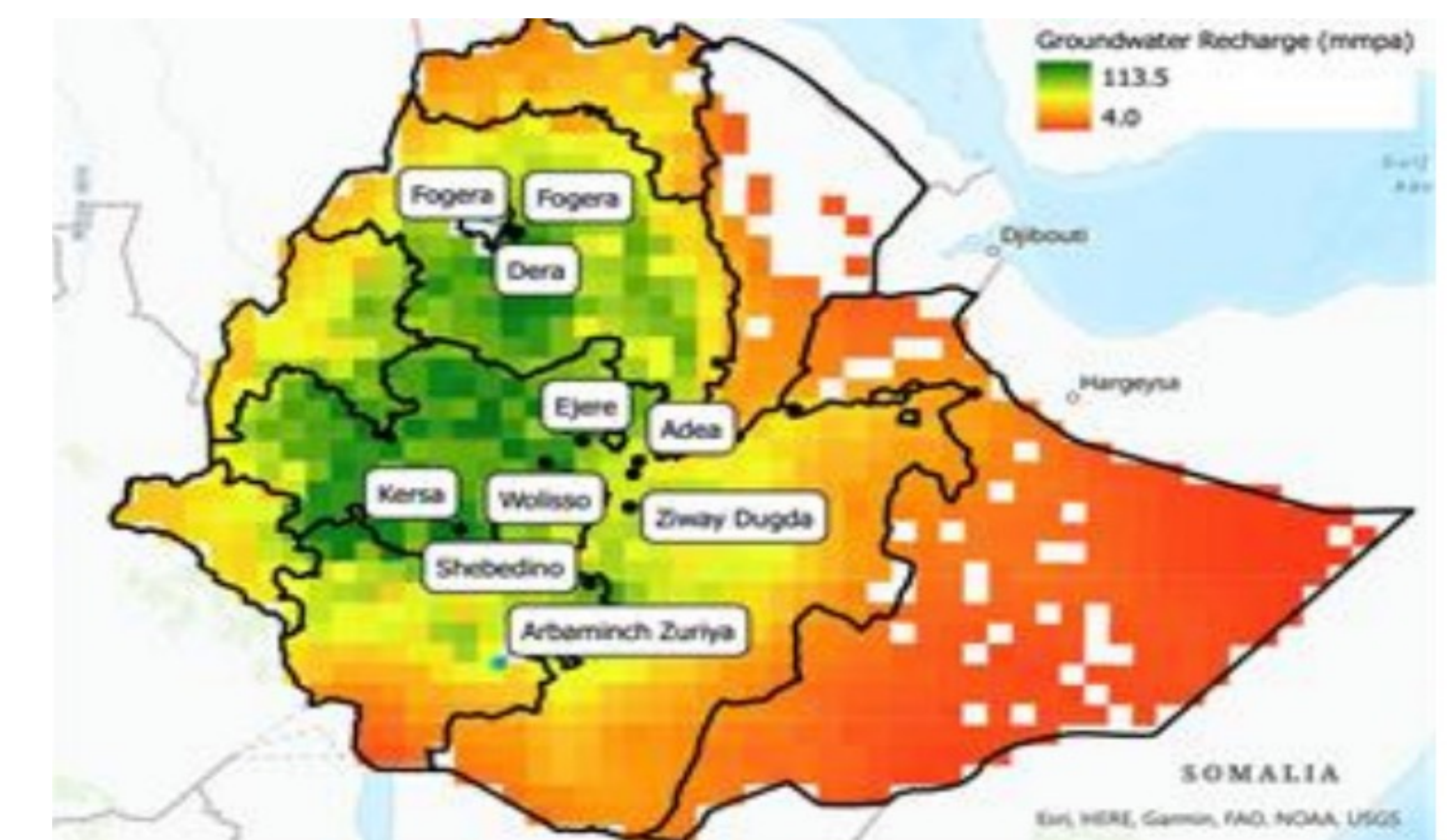
Analysis Framework

Economic Viability



Net Benefit = (Savings from switching from diesel) + (Additional crop value from increased water pumping capacity) - (Cost of electric irrigation)

Resource Sustainability



We developed a groundwater suitability index as a relative measure of groundwater recharge, which is the rate groundwater is replenished from rainfall or surface water.