### Study #2896

**Contributing Projects:**
- P1751 - On & off-grid Solar in Africa and Asia

**Part I: Public communications**

**Type:** OICR: Outcome Impact Case Report  
**Status:** On-going  
**Year:** 2020

**Title:** Solar suitability tool and maps developed by WLE/IWMI now used by private sector actors to expand solar pump supply chains across sub-Saharan Africa

**Short outcome/impact statement:**
A set of online interactive maps have been developed by WLE/IWMI to show the highest-potential locations for targeting small solar-powered irrigation pumps to smallholder farmers. Millions of farmers can substantially increase their incomes using these pumps. The tool is used to inform planning and management of sustainable solar pump irrigation dissemination in sub-Saharan Africa. Several project partners, i.e. solar manufacturing and distribution companies, are using the maps to expand their distribution and supply chains.
Outcome story for communications use:
Private sector using solar suitability tool and maps to expand solar pump supply chains across Africa

As climate change threatens water and food security in Africa, small solar pumps could irrigate millions of smallholder farmers. But which farmers are in the right spots to benefit? The companies deploying these technologies need to navigate a complex landscape where solar irrigation must be part of a sustainable package of solutions to water scarcity, not become part of the problem. What they need, in fact, are maps.

In 2018, supported by the CGIAR Research Program on Water, Land and Ecosystems (WLE) and Innovation Lab for Small Scale Irrigation (ILSSI), the International Water Management Institute (IWMI) produced solar irrigation suitability maps for Ethiopia. These pinpoint areas of potential for smallholders to introduce solar irrigation without depleting water resources. Subsequently, WLE/IWMI refined and developed the earlier work into a complete toolkit for sub-Sahara Africa. Geospatial information on the suitability of areas for upscaling solar irrigation, while minimizing risks to the environment, is now available across the region.

The online toolkit, based on open access information, can be used by development banks and businesses to identify areas for solar-powered solutions. WLE/IWMI integrated the toolkit into the GIZ Toolbox on Solar Powered Irrigation Systems to provide its mapping powers to a wide audience. It then partnered with six solar manufacturing and distribution companies seeking to expand their distribution and supply chains in different countries. With one of these, small-scale solar pump developer FuturePump, WLE/IWMI validated the maps across the region.

A workshop with PEGAfrica, operating in Ghana, Côte d’Ivoire and Senegal, demonstrated how the maps and tools can be incorporated into the sales and marketing strategies of pump distributors. Another workshop with the Smallholder Solar Pump Alliance built collaboration in upscaling sustainable solar-based groundwater management strategies among farmers.

Interest is growing fast. The United States Agency for International Development awarded USD 750,000 to two companies, through ILSSI, to strengthen solar supply chains. One is using WLE/IWMI’s maps to target 1,137 Ethiopian households while setting up financing and distribution centers. Other companies are using the maps to guide marketing in Ethiopia, Kenya and Mozambique, while a World Bank project in Nigeria will use them to gauge feasibility of groundwater development.

The maps make the potential payoff clear and visible. In Ethiopia, for example, they show that 120,000–300,000 households could make good, sustainable use of solar irrigation.

Links to any communications materials relating to this outcome: <Not Defined>

Part II: CGIAR system level reporting

Link to Common Results Reporting Indicator of Policies: No

Stage of maturity of change reported: Stage 1

Links to the Strategic Results Framework:
Sub-IDOs:
- Agricultural systems diversified and intensified in ways that protect soils and water
Is this OICR linked to some SRF 2022/2030 target?: Yes

SRF 2022/2030 targets:
- Increase in water and nutrient (inorganic, biological) use efficiency in agro-ecosystems, including through recycling and reuse

Description of activity/study: 5% increase in water-and nutrient-use efficiency

**Geographic scope:**
- Regional

Region(s):
- Southern Africa
- Western Africa
- Eastern Africa

Comments: Ghana and Ethiopia and Mozambique

**Key Contributors:**
Contributing CRPs/Platforms:
- CCAFS - Climate Change, Agriculture and Food Security
- WLE - Water, Land and Ecosystems

Contributing Flagships:
- F2: Land and Water Solutions for Sustainable Intensification (LWS)

Contributing Regional programs: <Not Defined>

Contributing external partners:
- Futurepump
- SolarWorks! B.V.
- GIZ - Deutsche Gesellschaft für Internationale Zusammenarbeit / German Society for International Cooperation
- PEGAfrica
- Pumptech Limited
- Technoserve

**CGIAR innovation(s) or findings that have resulted in this outcome or impact:**
WLE/IWMI has developed an online tool that provides geospatial information on the suitability of areas for upscaling solar irrigation while minimizing the risk for negative environmental consequences such as water resource depletion. The online tool is based on available open access information that can be used by development banks; private sector companies; agriculture, water and irrigation ministries; and agency technical experts to improve the identification of suitable areas, and related feasibility, for solar-powered irrigation systems.

**Innovations:**
- 1499 - Application of new tool to map the economic and environmental suitability of solar irrigation in sub-Saharan Africa
Elaboration of Outcome/Impact Statement:
In 2018, WLE/IWMI and the Innovation Lab for Small Scale Irrigation (ILSSI) developed solar irrigation suitability maps for Ethiopia (1, 2). The maps showed the potential for solar-powered irrigation using small pumps targeting smallholder farmers. Through further support from WLE and Germany, the mapping framework was refined and applied to sub-Saharan Africa (SSA). The maps are disseminated as an online interactive tool (3) which aids in planning and management of solar irrigation. This project developed partnerships with solar manufacturing and distribution companies seeking to use the information to expand their distribution and supply chains: PEGAfrica (4), Sunculture (5), SolarWorks (6), Rensys (7), FuturePump (8) and PUMPTECH (9).

Partnering with GIZ (10), the online tool has been integrated into the Toolbox on Solar Powered Irrigation Systems to provide geospatial information on solar suitability to a wider audience (11). Working with FuturePump (8) enabled WLE/IWMI to validate the maps across a large area of SSA. An October 2020 workshop with PEGAfrica (Ghana, Côte d’Ivoire and Senegal focused) demonstrated use of the maps and tools being incorporated into the sales zoning and marketing strategy of 20 pump distributors. It was attended by four female and four male representatives (12). WLE also partnered with SolarWorks (Mozambique focused) (6) and Sunculture and TechnoServe (Ethiopia focused) to generate customized maps to aid their marketing campaigns (13).

Another workshop with the Smallholder Solar Pump Alliance, attended by 30 representatives of various ministries and organizations (14), aimed at collaborating to up-scale sustainable solar-based groundwater management strategies for smallholder farmers. A USD 750,000 grant was awarded by the United States Agency for International Development to Rensys and PEGAfrica through ILSSI to strengthen their supply chains for solar irrigation equipment and services and to target the most suitable areas to roll out innovative finance mechanisms for poor smallholders. Rensys is using the suitability maps in three regions to target 1,137 households and setting up financing and distribution centers. In northern Nigeria, a USD 700 million investment by the World Bank will use the solar suitability maps to evaluate feasibility for groundwater development (15).

Based on the suitability maps, assuming an average landholding size of 2 hectares per household and a suitability threshold of 80%, it is estimated that 120,000-300,000 households in Ethiopia and 18,000-34,000 in Ghana could potentially benefit from solar-based irrigation, depending on pump type and sources of water (12, 14).
References cited:

Evidence: journal articles, reports, emails, media coverage etc.:


7. Sub-agreement contract for ILSSI signed by IWMI and Rensys, 2020. Confidential. https://cgiar.sharepoint.com/:b/s/WLE/ERkxxCsfwHVZClaBt-OHVQdIBqfHxBx3H5zERq1EnxYsnJCA?e=TLOH7d

8. Partnership agreement signed by IWMI and FuturePump, 2020. Confidential. https://cgiar.sharepoint.com/:b/s/WLE/EX8C0Hj1tRMrTq9pnKVqF8BPM7-jqy67hPNzUq7LJ4w?e=MGOe1Z


10. Agreement of cooperation signed by IWMI and GIZ, 2020. Confidential. https://cgiar.sharepoint.com/:u/s/WLE/EUN693NUiRNerCRW3eY8q31f4ChRL4Y4RLq-rbFs5YzA?e=4b5tYD


Promotional products: blogs, outreach materials (cannot be used as evidence but useful for promotion):
- Solar-powered irrigation could boost climate resilience for millions. Agrilinks.
- Benefits of farmer-led irrigation are “immense”: An update from the innovation lab for small-scale irrigation. Agrilinks.
  https://www.agrilinks.org/post/profile-feed-future-innovation-lab-small-scale-irrigation

Quantification: <Not Defined>

Gender, Youth, Capacity Development and Climate Change:

Gender relevance: 0 - Not Targeted
Youth relevance: 0 - Not Targeted
CapDev relevance: 0 - Not Targeted
Climate Change relevance: 1 - Significant

Describe main achievements with specific Climate Change relevance: Climate change has implications for water scarcity and food security. Solar irrigation coupled with sustainable irrigation practices has the potential to boost climate resilience for several millions of smallholder farmers across SSA (2).

Other cross-cutting dimensions: Yes

Other cross-cutting dimensions description: Other cross-cutting dimensions under this project include considering environmental sustainability while identifying solar suitability areas. This was done by specifying sustainable irrigation water (15) that satisfies necessary environmental water requirements for solar based irrigation. Hence, the solar suitability maps considered areas that may not be suitable for solar irrigation in order to prevent long-term water resource depletion (3).

Recent studies by IFPRI show that solar photovoltaics can provide a more cost-effective energy solution to support irrigation development in Africa (16). By including this information within the solar mapping framework, identified suitable areas take into consideration the cost-effectiveness of adopting solar irrigation compared to diesel irrigation.

The solar suitability maps present opportunities to explore a range of socio-economic issues surrounding farmer-led irrigation. For example, Kafle et al. (17) highlight the need for policies aiming at facilitating farmer-led irrigation development in Ethiopia to include household socio-economics and existing agricultural practices in addition to land suitability. As a result, investment decisions that consider irrigation suitability as well as socio-economic characteristics and existing agricultural practices, while targeting specific target groups, could potentially increase agricultural productivity and reduce poverty, food insecurity and social inequality (17).

Outcome Impact Case Report link: Study #2896
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