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Evaluating Diverse Solar Irrigation Systems for their Scalability in India

Solar irrigation systems offer a climate-smart and sustainable approach to extend the area under irrigation while using a renewable source of energy. They strive to break the vicious cycle of excessive green-house gas emissions (GHG) due to the usage of electricity or diesel operated pumps, which further exacerbates the vulnerabilities of farmers, pushing them to engage in resource intensive farming practices.

Solar irrigation systems offer both adaptive and mitigating benefits to help curb climate change impacts, through solarisation of agriculture and pumping of water for irrigation. In the long run, solar irrigation systems are likely to lead to sustainable economic growth while facilitating the achievement of country's Nationally Determined Contribution (NDC) targets. However, they may turn into maladaptive practices as the threat of exploiting existing ground-water aquifers due to practically negligible operational and maintenance cost becomes a vivid possibility. Maladaptation of this sort needs to be negated while promoting good adaptive mechanisms for agricultural water management to climate change.

In India, there is a predominance of electric or diesel operated pumps in the agricultural irrigation space. However, with increasing focus on solar energy's use in agriculture in recent times, several pilots and models on solar irrigation systems have been rolled out in the country. Nevertheless, the scaling of solar irrigation mechanism has been fraught with challenges despite heavy subsidies being provided to the farmers for its promotion. This rationale the need to comprehensively synthesise such pilots leading to the identification of efficient and effective models for scaling. It is also imperative to evaluate different business and institutional models of solar irrigation systems to understand factors supporting and hindering their adoption. With this vision of generating a comprehensive knowledge base on different functional solar powered smart irrigation models in India and their scalability, the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), Borlaug Institute of South Asia (BISA)-International Maize and Wheat Improvement Center (CIMMYT) is documenting and evaluating different solar pump models across India, in collaboration with the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) and International Water Management Institute (IWMI).



OBJECTIVES

1. To develop a compendium of major solar irrigation pilot projects in India;
2. To carry out a systematic review of existing piloted models for their scalability; and
3. To promote suitable solar irrigation models through awareness campaigns.

APPROACH

Developing a compendium on Solar Irrigation pilot projects

To scale up quality agricultural water management approaches to address climate change impacts and simultaneously support economic growth, detailed datasets on assessment of models will be generated. To generate these datasets, a compendium of piloted solar irrigation models is being prepared. The compendium will document the problems faced by communities in respective pilot areas, while detailing out the socio-economic impacts of such projects. It will further document the factors which supported the implementation of solar irrigation projects as well as the challenges faced and, the strategy used to overcome them. A representative sample survey approach is being used for the collection of data. The sample survey focuses primarily on those states where the piloted models represent a significant portion of the total solar irrigation systems installed in India.

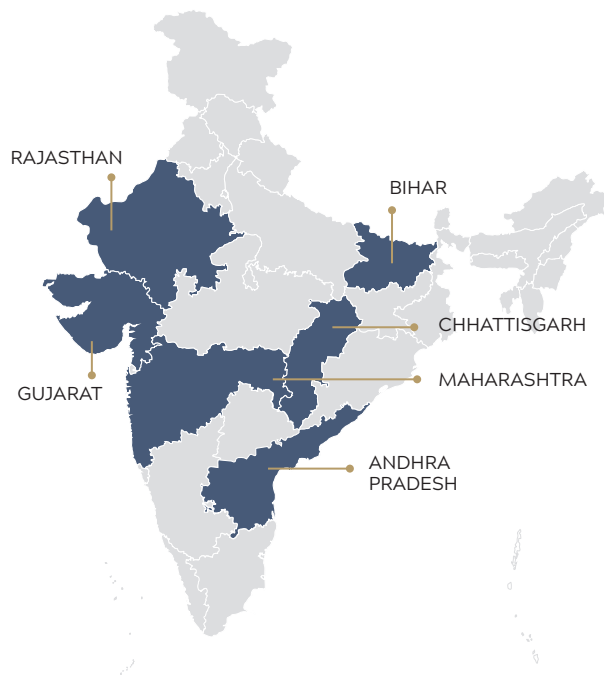
Systematic review of existing piloted models for their scalability

After listing the pilot projects, a detailed analysis of each of these initiatives will be conducted to identify respective strategies that worked in a particular blend of bio-physical, socio-cultural, political and economic setting. An indicator based framework will be developed for holistic evaluation of solar powered irrigation systems. This framework will integrate traditional evaluation technique with the indicators of scalability, sustainability, inclusion and climate-smart agriculture.

Promoting suitable solar irrigation models

Generated knowledge will be shared across the horizontal and vertical spheres of the sector. Workshops, meetings and stakeholder consultations will be conducted at various stages of the project, firstly to invite feedback on project ideation and implementation, secondly to share the knowledge generated and thirdly to advocate strategies to promote suitable solar irrigation models.

LOCATIONS



Solar powered irrigation pumps can lend a helping hand to India in achieving

38%

of its green energy target

EXPECTED RESULTS

- Compilation of working solar powered irrigation models across India, proposing a set of options to choose from, based on the bio-physical, socio-cultural, political and economic requirements.
- Evaluation of solar irrigation models for scalability, would serve as a guide book for practitioners, researchers and policy makers to adapt and mitigate climate change impacts by agricultural water management.
- Knowledge generation and dissemination of practices/technologies supporting implementation of solar powered projects, field level challenges being faced by the community and strategies used to overcome them.
- Establishment of a collaboration among researchers, local partners, private sector and policy makers to replicate efficient solar irrigation models.

ABOUT CCAFS:

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), led by the International Center for Tropical Agriculture (CIAT), brings together some of the world's best researchers in agricultural science, development research, climate science and Earth System science, to identify and address the most important interactions, synergies and tradeoffs between climate change, agriculture and food security. www.ccafs.cgiar.org. CGIAR is a global agriculture research partnership for a food secure future. Its research is carried out by 15 CGIAR centers in close collaboration with hundreds of partner organizations. www.cgiar.org.

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Read more about CCAFS' work on solar irrigation in South Asia

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