A brief report on research study entitled "Overcoming Barriers and Enhancing Adoption of Solar Lift Irrigation in Nepal"

Introduction

On April 2024 April, The Small Earth Nepal (SEN) joined a project "The Climate Crisis and Civil Society Advocacy in Asia", the China Program of the Asia House Foundation. Through the small seed project funds, SEN conducted a research study entitled **"Overcoming Barriers and Enhancing Adoption of Solar Lift Irrigation in Nepal."** Besides the study, overall program was accompanied by various engagement and capacity building workshops, networking events and peer-to-peer learning exchange for all the participating NGOs.

Field Study

Nepal remains an agrarian country, with about 62% of the population engaged in agriculture, contributing one-third of the national GDP (Pradhan, 2023). However, almost 67% of agriculture is still based on rain-fed farming despite of Nepal's abundance in freshwater resources. Such inadequate provision of irrigation facilities is one of the major causes of the underperformance of the agriculture sector of Nepal (CIAT; World Bank; CCAFS and LI-BIRD, 2017). Solar powered irrigation systems present a promising solution to Nepal's irrigation water related challenges. The technology has proven in improving water security and boosts agro-economy along with reducing communities' drudgery, thus, changing lives of thousands of smallholder farmers in Nepal's rural areas.

Though solar irrigation systems have been implemented for the past decade and is a proven technology in Nepal, rates of adoption are low (World Bank Group, 2019). It faces institutional, social, governance, and economic hurdles in its implementation, hindering its widespread adoption. Various studies have been indicating that there are challenges being observed questioning the long-term sustainability of the solar pumping technology in Nepal. On this context, SEN conducted total of 6 case studies of community-managed irrigation systems from three districts Dhading, Ramechhap and Lalitpur. The research project aimed at identifying existing barriers that hinders the sustainability of solar irrigation technology in rural mid-hills of Nepal. The study site included Manthali Municipality of Ramechhap, Jwalamukhi Municipality and Nilkantha Municipality of Dhading and Sunakothi at Lalitpur Metropolitan City. The research team conducted Focus Group Discussions (FGDs) with local farmers including

representatives from solar irrigation committee and other beneficiaries. Key Informant interviews (KII) were also conducted with organisational representatives and local authorities such as ward chairperson, solar related technicians, and government officials.

Figure 1: Key Informant Interview (KII) with Mr. Manish Maharjan, Irrigation Division Chief, Dhading

Figure 2: Focus Group Discussion (FGD) at Dhading

Figure 3: Focus Group Discussion (FGD) at Ramechhap

Figure 4: With women only group in Sunakothi, Lalitpur Metropolitan City.

Out of 6 cases, the field survey found that 5 of them were non-functional. The study highlighted a range of technical, social, and institutional barriers that is hindering in the sustainability of the solar irrigation systems in the studied sites. Communities reported frequent pipe bursts, damage due to lightening and flooding events, declining panel efficiency, weak maintenance mechanism due to lack of maintenance funds and insurances were some of the reasons limiting sustainability of solar irrigation system. Furthermore, committees lacked the capacity as well as resources to manage systems effectively, conflict with the neighbouring community for water resources. One case study revealed that if solar irrigation is augmented with other intervention

such as tunnel farming, drip irrigation, grafting technology, mechanization, agriculture production was found to be boosted, however, farmers still struggled with poor market access. At the policy level, drinking water is prioritized over irrigation, few projects remain incomplete after changes in government representatives and there is lack of coordination among government agencies underscoring the need for the multi-year investment and adopt holistic approach. Damages due to intense flooding, in recent year, were found to be another major climate-induced problem for which intensive climate risk assessments is required. Communities expressed that while solar irrigation is beneficial for a longer term, the high initial investment, potentially higher maintenance cost and lack of local technical expertise remain major barriers to its sustainability and wider adoption. Hence, community are switching to electricity-based lifting systems or hybrid system which are cheaper to install and operate compared to solar. Few recommendations from the study so far –

1. Strengthen maintenance support systems by establishing local technical support by government, create maintenance funds by community or promoting insurance schemes
2. Build community capacity by training locals for operation and maintenance of the system
3. Integrate comprehensive climate risk assessment into site selection to minimise damage from floods and landslides
4. Promote productive use of solar irrigation by integrating other agriculture related intervention
5. Ensure projects continuity with multi-year investment plans
6. Promote hybrid systems wherever feasible
7. Facilitate access to finance to support upfront cost as well as maintenance cost.

The findings are expected to support local stakeholders and policymakers in addressing barriers and promoting more sustainable and climate-resilient solar irrigation solutions in Nepal. SEN is planning to conduct national level stakeholder workshop to disseminate the findings and have a panel discussion on identifying collective solutions for sustainable solar irrigation projects.

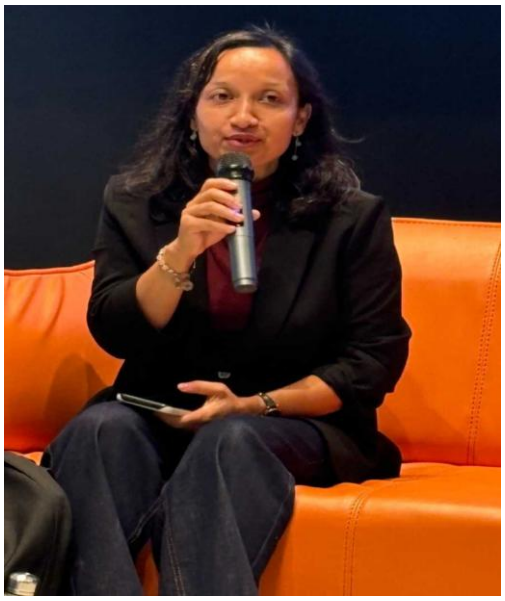
Networking and exchange visits

The engagement events including online webinars and two international visits in China and Bangkok were highly insightful and productive, providing valuable opportunities to exchange knowledge and experiences with regional peers. The workshops and webinars deepened understanding of green financing, gender mainstreaming, and South–South climate collaboration, while fostering meaningful connections with Chinese, Indonesian, and European NGOs. These engagements enhanced cross-country learning and contributed to shaping practical perspectives for integrating civil society in climate action and advocacy.

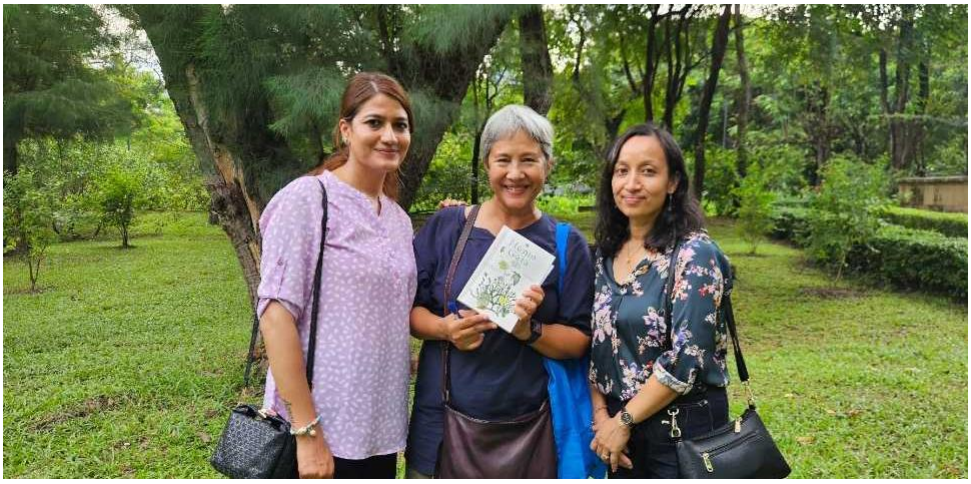
A **China-Europe-Nepal Exchange on Climate Resilience and Technology Cooperation Experience Sharing Session** held in Chongqing, China on 22nd July 2025 jointly organised by Chongqing Renewable Energy Society and Asia house Foundation, created a space for networking with several like-minded organizations. The visit not only provided an opportunity to get knowledge on various types of Civil Society Organisations (CSOs) in China, but it also provided a platform for informal dialogue on cooperation opportunities and getting acquainted with the technical advancement of China in energy transition and green economy.

The project's final workshop held at Bangkok, Thailand from 27th September to 1st October 2025 provided an opportunity to exchange learnings from ground projects implemented by partner organisations and provided a global forum to share the experiences and learnings. Peer to peer walk and project pitching within a 3-minutes session was a very unique way to bring the organizations together and deep dive into each other's projects. Ms. Suchita Shrestha, Deputy Director of SEN was paired up with Mr. Tom Xiaojun Wang, Founder and Executive Director People of Asia for Climate Solutions where Ms. Shrestha had an opportunity to talk about her project in Nepal related to Solar Irrigation and at the same time to know she got to know about Mr. Wang's project called BRIDGE. The session created a space where all the partner organizations of "The Climate Crisis and Civil Society Advocacy in Asia" could brainstorm ideas, exchange learnings and best practices and ways to collaborate in future.

In a Bangkok Climate Action Week (BKKCAW), a side-event "Loacalising Adaptation and Mitigation: Finance, Power and Practice in the Asia Pacific", co-curated by INECC, Ms. Shrestha had an opportunity to be one of the panelists where she contributed to the global discourse of localizing the adaptation and mitigation measures. She talked on how the prioritization of local government has major influence in adopting adaptation and mitigation measures. She also talked about the lack of access to finance for implementing such measures at community level. Besides, she also attended deep dive sessions at Asia-Pacific Climate Change Adaptation (APAN) Forum which enabled her to be a part of global discussion on transformational adaptation and an opportunity to widen her horizon of knowledge.



Ms. Suchita Shrestha, Deputy Director, The Small Earth Nepal participating as a panelist in Bangkok Climate Action Week.



Ms. Shrestha (right) getting signed copy of Book – Homo Gaia from its author, Ms. Oy Kanjanavanit (middle)

Ms. Shrestha (right) participated in APAN forum in Bangkok, Thailand